Development Benefits of Water Resources Investments

APPENDICES

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APPENDICES TO

DEVELOPMENT BENEFITS OF WATER RESOURCE INVESTMENTS

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PREFACE

This project, in conjunction with the complementary work done at the University of Chicago under the direction of Professor George Tolley,[1/] has been focused on the question of the determination and evaluation of developmental benefits of water resource investments. As such, it represents a new departure in concepts of analysis for public investment decision making. In essence, it recognizes that in addition to producing services whose value to users would be benefits of an investment project, that the project itself might produce additional changes in the economy of the region in which it was located that would serve to promote (discourage) economic activities in that area. In other words, in addition to the value of water resource services to water service users (primary benefits) it is recognized that water resource investments might cause an enhancement of a region's economy by way of inducing the expansion or formation of economic activities in that area that would not otherwise be expected to develop (secondary benefits).

There already exists a long tradition and an extensive literature in the determination of primary benefits. While from time to time it will be necessary to refer to and comment on that tradition, we will here be concerned with secondary benefits. Our concern, of course, only mirrors the concern of investment decision makers in government and the Congress over potential development benefits. At least from the standpoint of economic analysis, it would seem that there would be three reasons for such concern.

First, there is the possibility that structural unemployment of considerable magnitude and duration may be more typical of our society now and in the future, than it was in the past. If this is the case, it is no longer safe to assume that economic activities encouraged in one location as a consequence of water resource development would necessarily be offset by decreases in economic activity elsewhere or in other industries. Moreover, even with quantitatively compensating adjustment elsewhere it would appear, as will be developed in the report, that those concerned with public investment decisions and the law itself, are not totally indifferent with regard to impacts on the regional distribution of economic activity, even given the national total of activity.

Second, there is probably reason at least to be skeptical as to whether the spatial distribution of economic activities is determined in accordance with perfectly competitive conditions. If competitive conditions cannot be assumed necessarily to exist, then water resource investments may reallocate economic activities in ways which are either more, less, or equally efficient with respect to the aggregate costs of transporting inputs and products plus total production cost.

Finally, even with perfectly competitive locational adjustment of firms and full employment of resources, a private market economy will achieve an efficient allocation of resources, spatially as well as industrially, only with respect to the given resource environment. Thus, the most efficient allocation with respect to one environment may differ in absolute efficiency

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1/ This study to be published by the Institute for Water Resources.

from the most efficient adjustment to a different environment. Clearly, changes in patterns of water resource availabilities affect that environment to which the private economy is adjusting. And quite aside from the question of the private economy's ability to achieve competitive adjustment is the question of whether or not administratively induced environmental changes are being made in a more or less optimal manner.

Ideally, of course, it would have been very satisfying if our research could have concluded that all that would be necessary to assess developmental benefits would be to provide for some minor modifications and extensions of present U. S. Corps of Army Engineers evaluation procedures. In essence, the most desired state of affairs certainly would have been one which specified that all that would be needed would be to add a few steps to evaluation procedures in district or division offices, which steps could be completed within the competence of present staffs and utilizing data already or easily available to them.

Even in the planning stage, before this project was actually undertaken, it was clear that while what would be needed was somewhat indeterminant, that very simple changes probably would not carry us very far. Some of the immediate secondary consequences, like the affect on employment in water oriented industries, probably can be estimated at the "local" level. However, as indicated above, and as will be brought out in much greater detail in the report, it is necessary to know not just what might happen in the immediately affected area, but how these local changes are related to changes in other areas of the country and to total national economic activity. This is a problem which requires looking at a very complicated system of interregional economic relationships. For this reason alone, it requires a more complicated analytical format and a much more extensive data collection effort than is normally undertaken in analysis at the district or even division level.

In addition, the problem to be solved essentially is the same problem for all parts of the country, namely evaluating the national and interregional consequences of exogenous change in a single region. The solution of that problem, which has been at the center of the bulk of our research effort, requires new theoretical formulations, new analytical techniques, and unconventional kinds and combinations of data. In short, what is needed is not simply a minor revision or extension of present methods of project evaluation, but a whole new way of looking at project analysis for purposes of determining secondary benefits. This is not meant to apply to the analysis of primary benefits. While considerable work is going on to improve techniques of primary benefit estimation, there is nothing in our research on secondary benefits which suggests the need for a really radical departure from current methodology in primary benefit analysis. The only problem in that regard which has come to light is that the distinction between primary and secondary effects may be a bit more complicated than it normally is conceived to be; more will be said on this in the report.

While it would be presumptious to claim that we have substantially solved the problem of interregional general equilibrium analysis, we feel that some of the needed reformulations in regional development theory that are necessary for such a solution have been accomplished, and the way to further theoretical improvement is clearer than before. In addition, we feel that we have developed practical operational analyses--although, unfortunately, not very simple ones--which are capable of producing quantitative evaluations of at least substantial parts of the interregional impacts. Finally, we do have some recommendations on how present Corps evaluation procedures could and should be altered.

The body of the report is divided into four main sections. Section I consists of a general overview and description of the work as a whole. Section II contains the material we have developed on regional development theory. Section III contains the descriptions of analytical models for developmental benefit evaluation, and the final section contains a description of purposes and present procedures for evaluating water resource investments with some suggestions for alterations. The reader should be warned that we are dealing with a rather complicated matter and hence the discussion will be somewhat complicated. However, we have tried to put relevant but not directly essential discussion, as well as detailed tables in the appendices.

We readily recognize that if we are judged by the reader in terms of whether or not we have achieved a complete and final solution to the problem of regional development analysis that our results may look less than completely satisfying. On the other hand, if, as we hope, we are judged against the standard of whether we have made a substantial improvement over a methodology which simply assumes that secondary effects on economic activities necessarily must cancel over the nation as a whole, then it is hoped that we will be seen as having made some real advancement.

The research effort underlying this report included the participation of many individuals. A number of the many working papers produced as the study progressed are incorporated, some with relatively minor changes, in this document. Many other sections contain the ideas and findings embodied in the working papers. Nevertheless since the various reports were edited, some extensively, it is the editor who must bear the responsibility for the content of this report, while at the same time recognizing that it was others working on the project who generated most of the concepts and research findings contained herein.

Virtually all of the material in Chapters 3 and 4 was prepared by Professor Richard Muth. He was assisted in the project which led to these chapters by Mr. Ben-Chieh Liu. Chapter 5 was the direct result of a research effort by Professor Edgar M. Hoover of the University of Pittsburgh, who in addition to developing the material for that chapter also participated in some of the analysis underlying Chapter 7.

In essence, Chapter 6 represents an abstracted version of David Greytak's doctoral dissertation at Washington University. Dr. Greytak currently is a postdoctoral fellow at Indiana University. The collection of the necessary data and the supervision of the calculations for Chapter 7 was mainly the responsibility of Mr. Raymond Struyk. In addition to his work on this chapter he generally assisted in many ways in the preparation and organization of the final report.

Chapter 8 is based on the work of a number of individuals. For the most part the material on estimating agglomeration effects stems from an additional effort by David Greytak earlier in the project, and this work in turn drew importantly on analysis, and especially on data collected by Professor George Green, then of the University of Pittsburgh and now of the University of Maryland. The material on the response of state tax revenues to economic growth is based mainly on a research project of Professor John Legler and Dr. Perry Shapiro of Washington University. It might be noted that while their work was not supported by this project it was going on at the Institute contemporaneously with this project, and in recognition of its relevance they kindly granted their permission to include their results in this report. This section also draws, in part, on some earlier work of Professor Raymond Richman of the University of Pittsburgh that was carried on in connection with the project.

Working papers prepared by Joseph Mulholland and Raymond Struyk provided the main basis for Chapter 9. Chapter 10 relies heavily on earlier working papers by David Rasmussen and Dr. Jack Ochs as well as extensive additional material prepared for it by Dr. Ochs.

Appendices A and B represent the work of Dr. Warren Mazek and Dr. Robert Bruce and are drawn from their doctoral dissertations at the University of Pittsburgh. Appendix C was prepared by Professor Edgar M. Hoover. Appendices D through L are drawn from Dr. David Greytak's work. Appendix M represents the location model calculations prepared by Professor Edgar Hoover. Appendix N represents material supplied to us by the University of Chicago project and it was prepared by Dr. Steven Hastings. Appendix O is the programming statement for the interindustry calculations for Chapter 7 and was prepared by Mr. Struyk. Appendix P is part of the material by Legler and Shapiro in Chapter 8 and Appendix Q is part of Mr. Struyk's material in Chapter 9.

In addition to those specifically cited above, the following graduate students at Washington University contributed to the work in more general ways: David Landes, Everett Rehkop, Abraham Serfaty and Manuel Smith.

As indicated earlier this work was carried out in conjunction with a closely related project, under the direction of Professor George Tolley, initially at North Carolina State University, and later at the University of Chicago. We would like to express our thanks to Professor Tolley and his

associates, especially Dr. Shaul Ben-David and Dr. Steven Hastings, for their very helpful cooperation and collaboration. We are similarly appreciative of the helpful cooperation and advice which we received from the U. S. Corps of Army Engineers who supported this research. In particular we would like to mention the help of Nathaniel Back and Leonard Brown of the Office of the Chief of Engineers, and of helpful comments at an earlier stage by Robert Gidez also of the Office of the Chief of Engineers, and of Donald Banachek and James Maas of the St. Louis District Office of the Corps.

Finally, we would like to give recognition to Mrs. Carol Martin for the substantial effort involved in typing, editing and assembling the manuscript.

C. L. L.

St. Louis, Missouri

APPENDIX A

The Efficacy of Labor Migration with Special Emphasis on Depressed Areas

LABOR MOBILITY, WAGE RIGIDITY AND THE THEORY OF THE LABOR MARKET

Most discussion of the operation of the labor market in the United States has been replete with the observance that wage rigidity, particularly with respect to wage decreases, is the rule rather than the exception. To the extent to which this is the case, the operation of the labor market is, of course, fundamentally altered. For this reason and because the raison d'etre of this study is the response of the labor force to varying levels of regional unemployment, which is, at least in part, the consequence of the failure of the wage mechanism, it is important that the implications of wage rigidity for the efficiency of the labor market be thoroughly analyzed. Efficiency of the operation of the perfect labor market means that the wage structure should reflect opportunity costs. But with a rigid wage structure, is efficiency of operation a meaningful concept, i.e., is such a labor market ipso facto, inefficient? Or should the terms of efficiency be redefined? What are the implications for resource allocation?

It is perhaps most informative to begin with the simplest case of wage rigidity, that of a two-sector market with wages frozen at the same level in both. The conclusion was drawn there that a decrease in demand in such a situation would result in an equilibrium with identical unemployment rates in both markets. This result depends upon a series of assumptions: that workers are determined to maximize their preference functions, shifting to that sector of the market where the probability of attaining a job is highest; that they have exactly the same preference functions; that mobility is perfect; and that there are no economic costs of mobility.[1] Thus, this model is in principle distinguished from the model of the perfect labor market only in the assumption of wage rigidity.

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[1] Perhaps it should be emphasized once more that the concern here is with a homogenous labor force.

What is the place of efficiency in this simple static model? Alternatively, are the opportunity costs of employment being accounted for somewhere in the model?

Actually, the conclusion of equal employment rates is the result of the efficient operation of the labor market, the evaluation of opportunity costs. To demonstrate this better, assume the converse that there is a differential in unemployment rates in this type of market. For the unemployed worker, is there a net advantage of employment to him elsewhere if he is in that sector where unemployment is higher? Clearly there is--if he is attempting to maximize his preferences, he should be offering his services in that market where the probability of employment is higher. If he is perfectly mobile and there are no economic costs of mobility, he will move to that sector with a lower unemployment rate. Given identical preference functions for all workers, movement will take place until the unemployment rate is equalized. The market is permitting opportunity costs to have their effect.

Suppose, instead, that the worker moving across sectors of the market incurs transfer (mobility) costs. A difference in unemployment rates is now sustainable. At some differential in unemployment rates, the economic costs of mobility will have the effect of making a high-unemployment sector in which he is participating equally attractive as a sector with a lower unemployment rate. Instead of equalizing wages, there are now equalizing differentials in unemployment.

In a similar fashion, extension of the model with rigid wages to include other imperfections has results parallel to including imperfections in the model of the perfect labor market. If the model is bifurcated by differences in preference functions, an equalizing differential in unemployment will arise.

Again, take a two-sector model and introduce a decrease in demand in the sector in which unemployment is valued less relative to the other dimensions of the preference function than in the second sector. This assumption amounts to saying that workers in this sector are willing to accept a higher rate of unemployment, ceteris paribus, than workers in the other sector. On this basis, whatever the initial demand shift, equilibrium with different wages will be achieved. The difference will be a precise evaluation of opportunity costs when the worker is indifferent between markets.

If workers are not attempting to maximize their preference functions, then there is no principle with which the outcome of the operation of the labor market can be determined. Both markets will probably display some rate of unemployment with no predictable relationship between them. Any differential that might occur will be nonequalizing, and, consequently, the labor market may be judged on this basis as inefficient.

The final source of imperfection is the lack of perfect mobility between sectors of the market. With the hypothesized decline in demand in a given sector, there should be a net outflow of workers from that sector. If all those who wish to leave this sector for the other sector are restricted from entry into the other sector, the relative unemployment rates will reflect the strength of the restriction rather than the preferences of the labor force. The labor market is inefficient on this basis also. If workers are reluctant to leave a sector because of social ties, the structure of unemployment rates will be an equalized one.

While it might appear redundant to consider the implications of imperfections in a model with rigid wages when the imperfections have already been thoroughly explored with respect to the theory of the perfect labor market, doing so facilitates comparison of the models. The perfect labor market without these imperfections results in the equalization of wages while the model with rigid wages results in the equalization of unemployment rates. However, in both instances, the efficiency of the market is not lessened by the introduction of dissimilar preference functions, economic costs of mobility or imperfect mobility due to social ties, but merely creates a structure rather than a level of wages or of unemployment, respectively. At the same time, irrational behavior of workers and noneconomic barriers to mobility of the institutional variety yield a wage structure or an unemployment structure which is in no way related to opportunity cost considerations. Thus, in both instances, the conditions of efficiency of operation, aside from wage flexibility, are identical--mobility and maximization of preferences are essential.[2]

This is not to say that both models are equally desirable. Indeed the balance of advantages appears to be with the perfect labor market. On one level, wage equalization in the perfect labor market serves to maximize social product. Social product remains unchanged if the initial equilibrium position is one of full employment or some unemployment in one or both sectors of a two-sector model with rigid wages, given a decrease in demand. Only if there is excess demand in one of the markets does mobility increase social product.

In a growing rather than a static economy, it is, of course, less dubious that the mobility response to unemployment differentials is merely serving the

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[2]The extension of the model to include nonhomogeneity of the labor force is straightforward. In a labor market with rigid wages and labor of various types, a structure of unemployment differentials will emerge. If the labor market is truly efficient, differences in preference functions between types of labor, the economic costs of mobility and reluctance to sever social ties will create an equalizing differential in unemployment rates. Likewise, institutionalized noneconomic barriers to mobility and nonmaximization of preference functions will cause unemployment differentials which are nonequalizing. Whatever the source of the differentials, there will be both differentials in unemployment rates within a homogeneous supply of labor and between homogeneous types of labor.

function of equalizing unemployment rates.[3] A good argument can be made that, in a growing economy, the results obtained by a flexible wage structure or a rigid one are not too different. Excess demand for a factor generated by increasing demand for income-elastic goods and services and by technological change will probably lead to both an increase in the price of that factor and an increase in employment of the factor if wages are flexible and if the supply of the factor is not completely price-inelastic. If wages are not flexible upward, employment will nevertheless increase. The mechanism of the labor market will here too be operating so as to allocate the factor in accordance with the relative demands for the factor. Of course, both the mix of inputs and products will be different, since the structure of factor prices is presumably different in each case. In brief, the distortion is likely to be more serious in terms of the "quality" of the output rather than the level of output.

Even the most cursory examination of the literature about the labor market today suggests convincingly that there is a greater propensity for wages to be inflexible downward than upward. In fact, a good deal of the criticism of the labor market is that it permits unwarranted increases in wages. To the extent that wages are upwardly-flexible, the operation of the labor market is more adequately described as a combination of responses to wages and unemployment. With wage increases uninhibited but wage decreases unlikely, the growth of demand for a given kind of labor within a particular sector of the market will call forth a tendency for wages to increase in that sector. Should wages be lower and/or unemployment exist in other sectors of the market, the flow of

[3]It is self-evident that, if wages are rigid at different levels, the labor market operating correctly will develop corresponding equalizing differentials in unemployment.

labor from these sectors to the sector with increased demand will mitigate the induced rise in wages. On balance, employment and the wage rate will have risen in the affected sector. The flow of labor ought to be described as a response to wage and unemployment differentials, assuming unemployment did initially exist somewhere in the system. The converse case of downward-inflexibility and decreases in demand has already been covered.

The implications of unwarranted wage increases in a sector of the market for labor mobility are clear. Unwarranted is defined here as an increase in wages not arising from an increase in demand or a decrease in the supply of labor. From an initial equilibrium situation, the rise can only mean unemployment. If employment opportunity is better elsewhere, mobility will act to assuage the problem; if not, general unemployment of the factor will persist.

In conclusion, labor mobility is a necessary condition for the theory of the perfect labor market. Its acuteness is not diminished when the model is made less perfect by introducing imperfections of various kinds, such as wage rigidities, dissimilar preference functions, etc. The notions of efficiency of operation of the labor market and labor mobility are inseparable. Also, it can be shown that in much the same manner as migration permits national economic growth, it is also essential for growing regions. However, migration in the case of declining regions probably leads to a reduced level of output and employment, although income per capita in such regions is probably higher, even though income per employed worker is likely to be less. In total, migration is a determinant of the pattern of regional growth rates in the efficient labor market system and is particularly important for those activities which are sensitive to labor costs.

A TEST OF THE THEORY OF LABOR MIGRATION

This study is traditional--traditional in the sense that it does not depart radically from previously elaborated labor market theory; traditional in that its methodology is largely patterned upon existing studies. This study is unconventional only in its eclectic formulations which, by and large, derive their existence from the most extensive migration data yet developed.

The selection of an empirical problem for analysis is not an endeavor independent of the existence of data sources. Quite often it is to be expected that definition and delineation of the problem take place simultaneously with an investigation of data sources, achieving clarity as the investigation proceeds. Furthermore, data sources impose constraints upon the ambitions of the analyst, limiting the scope of the theory which can be analyzed. Because of this simultaneity, the aspirations of this study can perhaps be most expeditiously stated if the main data source and its characteristics are disclosed at the start.

The 1960 census of population provided a heretofore unknown plethora of migration data for various kinds of geographical areas. However, the greatest amount of data tabulated was for Standard Metropolitan Statistical Areas with populations of 250,000 or more, a total of ninety-seven cities.[1]

With few exceptions SMSA's are identical to the major labor market areas as defined by the Bureau of Employment Security. While the basic requirement of a labor market area is that daily commutation to work is possible, the distinguishing element of a <u>major</u> labor market area is that the area have a central

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[1]1960 U.S. Census of Population, <u>Mobility for Metropolitan Areas</u> (above, chap. ii, note 17).

city of 50,000 or more hence, in this way conforming to the definition and actual boundaries of SMSA's.[2] Consequently, SMSA's provide a meaningful geographic unit for the analysis of migration of the labor force in that they are approximate labor market areas, and migration defined relative to labor market areas is an extremely useful analytical concept, much more so than for states or any other political units.

The 1960 census estimates represent a 25 percent sample of the census itself, a sample which should be large enough to ensure highly reliable estimates. In addition to this, probability statements as to the precision of the estimates can be made. The place of residence in 1955 of each person enumerated was determined, from which estimates of migration for each SMSA were developed. However, data on the volume of total in and the volume of total outmigration cannot be obtained directly from the volume, Mobility for Metropolitan Areas, since in all instances each directional stream is presented in two parts which must be summed: total regional in(out)migration from (to) areas which are not SMSA's and total regional in(out)migration from (to) other SMSA's.

Since each respondent supplied other information about himself, each of the four migration streams described in the preceding, as well as the nonmigrant population, was further broken down by selected characteristics of the migrants. Of special interest here are the age data. The number of migrants and nonmigrants in each age classification is presented by sex and color. The age classification used is as follows, where age refers to age in 1960: 5-9, 10-14, 15-19,

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[2]U.S. Department of Labor, Handbook on Defining Labor Market Areas (March 1960).

20-24, 25-29,30-34, 35-44, 45-54, 55-64 and 65 and over. Thus the total number of outmigrants from Pittsburgh to other SMSA's and to areas which are not SMSA's between 1955 and 1960 who are white females 35-44 years of age is an example of the nature of the data.

Also important for the purposes of this study are the data on occupational migration. The standard census classification of occupations is used: professional and technical workers, managers and officials, clerical workers, sales workers, craftsmen, operatives, service workers and, finally laborers.[3] The occupational distributions are for white males and nonwhite males, ignoring females altogether. An example of the type of data provided for occupations is the total number of inmigrants to Pittsburgh from 1955-1960 who are working as service workers and who migrated from another SMSA. Here, too, data are presented on the same basis for the nonmigrant population.

It should be stressed at this point that since the data are not cross-classified the age characteristics of migrants cannot be related to the occupational characteristics. Data are also presented by levels of educational attainment of migrants and nonmigrants, the income distribution of both groups and the number of in and outmigrants for each city in each of the years 1955-1960. Obviously, there are worthwhile hypotheses about the movement of population which could be investigated with these data; however, the concern here is only with the data for the various age and occupational groups. Because of this, these other statistics will be ignored, which would not be the case if they were cross-classified with age and occupation.

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[3]For a listing of the specific occupations included in each of these categories, see 1960 U.S. Census of Population, United States Summary, Detailed Characteristics, Subject Report PC(1)-1D, U.S. Department of Commerce, Bureau of the Census, pp. 30-32.

Use of this type of data has the advantage over most earlier studies, in that migration can be analyzed by components of the migration streams as well as by total migration. The analysis of migration by age and occupational components of the population or labor force is a major function of this study.

There has been only one study which rigorously attempts to determine the response of the population or labor force by subgroups to disequilibrium conditions such as income or unemployment differentials, this being the regression work of Larry Sjaastad on migration between states for the age groups 15-24, 25-44 and 45-64. The main motivation of the study is the attempt to measure the response of each of these groups to regional income differentials, with subsidiary attention to unemployment. Unfortunately, income and unemployment pertain to the entire region, rather than being specific to the age groups. Admittedly there are studies which take note of the differential migration response of various portions of the population, but the Sjaastad study is the only instance in which a model is explicitly introduced and tested empirically for a set of areas. Illustrative of these studies are the familiar reports on residential mobility and migration for the entire range of age and occupation groups published periodically by the Bureau of the Census which indicate declining mobility and migration with age and a mixed pattern for occupations. Nevertheless, no attempt is made to explain the differences on the basis of regional differences in the values of economic variables. Indeed little explanation is extended.[4]

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[4]U.S. Bureau of the Census, Current Population Reports, Ser. P-20 and P-50 (Washington: U.S. Government Printing Office).

The differential migration response, if any, of groups within the population is often observed as part of regional economic studies.[5] The explanation of the observed patterns is usually that they are the result of the behavior of the entire regional labor market as far as economic opportunity is concerned. While a clear trend in the pattern of migration response might be discerned with increasingly severe regional unemployment, it is difficult to derive the assertion from this that the labor market is operating efficiently for any given portion of the labor force, such as craftsmen or females 20-24 years of age, for rarely is the unemployment rate of a group, regionally, correlated perfectly with the unemployment rate of the regions. Moreover, the migration of any group from a region might or might not be the result of an economically efficient labor market, depending upon the unemployment and income experience of the particular group in other regions.

There have been studies which compare the rate of migration of the employed and the unemployed cross-classified with age groups.[6] Whether the groups be classified by age, occupation or on some other basis, the conclusion that the unemployed of a given group are more likely to migrate to other regions than the unemployed of another group is not sufficient evidence that the labor market for the given group is functioning more efficiently than the labor market for another group, but is merely indicative. The reason for this is that workers

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[5]For example, see Ira S. Lowry, Economic Study of the Pittsburgh Region, Vol. II: Portrait of A Region (Pittsburgh: University of Pittsburgh Press, 1963), pp. 49-50.

[6]A good, although outdated, discussion of the British sources can be found in The Response of Labour to Economic Incentives," by Herbert W. Robinson, Oxford Studies in the Price Mechanism, ed. T. Wilson and P. W. S. Andrews (Oxford: Clarendon Press, 1951), pp. 223-226.

might move from centers of low employment opportunity to centers of high employment opportunity with no unemployment occurring at all due to their being transferred by their employers or because workers are able to find positions in other regions for themselves without any intermediate unemployment experience. At the same time, those who do become unemployed might, for a host of reasons such as inertia, not have a very high migration rate. On balance, the labor market could possibly be working quite efficiently as far as migration is concerned, in contrast to the inefficiency indicated by the low migration rate of the unemployed.

Another type of study which might be noted here is that which endeavors to determine the extent to which migrants of various types maintain that the reason for their migrating is economic factors. One such study asked the migrants of various occupational groups if they had moved to take a job, to look for work, to transfer to another job or for reasons primarily noneconomic.[7] While this type of approach can yield results indicative of the strength of the response to economic conditions, the fact that the approach is single-dimensional in the sense that the recent migrant is asked to give the most important reason for his action suggests that the results be interpreted quite cautiously because this does not obviate the possibility that other factors were important and entered quite significantly into the decision-making process. Certainly the researcher would also want to know the relevance of these secondary economic factors before judging the relative ease with which various groups adjust to economic change. Moreover, a worker's response that he had migrated for economic reasons does not necessarily mean he should have or that the movement was in the proper direction, i.e., aided the equilibration process.

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[7]U.S. Department of Labor, Samuel Saben, Geographic Mobility and Employment Status, March 1962-March 1963," Monthly Labor Review, LXXXVII, No. 8 (August 1964), 877.

The difference between the methodology of the study Sjaastad has done and these other studies is not trivial, but rather is critical because the classical theory of migration, specifies a differential response to migration in accordance with a migration-inducing variable not being equalized over all regions, hence, the superior framework for testing the theory apparently is an analysis of a set of areas with varying migration rates and wide range of values of the causative variable (e.g. income). The other studies discussed fail to investigate a set of regions, so for this reason the others mentioned in the discussion of these studies, their results should be interpreted to be at best largely suggestive.

This explains the emphasis on highly formalistic models as well as rationalizing the basic approach of this study which is the analysis of migration over a set of areas. However, it is clear that this does not necessarily mean that regression models are the best method to use, but the well-known advantages of regression are highly enticing for a study which attempts to examine the equilibrating forces in the labor market. For one thing, regression models do have the advantages accruing to inferential statistical methods--parametric estimation, the ability to attach probability statements to the parameters, etc. For another, they facilitate determination of the relationship of one variable with one or more other variables while furnishing a regression coefficient or coefficients which display in a straightforward fashion the nature of the relationship(s).

Hopefully it is clear by now that the purpose of this study is an examination of the ability of the labor market to adjust to diverse economic conditions via migration and that, given the data to be used, will employ a regression model or models resembling Sjaastad's model in its attempt to deal with components of the population. As has been stressed, the data available are quite conducive to this sort of analysis.

The major emphasis will be on the ability of the market to remove differentials in unemployment rather than in income or wages by region. The interest arises primarily from the labor market experience of the United States dating approximately from 1947 to the present time. National unemployment since than has shown a puzzling persistence to remain at relatively high levels and simultaneously to increase from cycle to cycle. Defining the cycle from peak to peak, the unemployment rate of the 1948-1953 cycle averaged 4.2 percent, 4.4 percent for the next cycle from 1953-1957 and 5.9 percent over the 1957-1960 cycle.[8] Since 1960 the nation has witnessed nearly sixty months of continual expansion of employment and Gross National Product, yet only in the last several months of this expansion has unemployment fallen below 5.0 percent. This is the most recent expression of the trend over the last two decades for the unemployment rate to rise from expansion to expansion.

The preceding phenomena have led to controversy as to the cause of this secular trend. Economists divide themselves into two largely disparate groups on this issue, the structuralists and the aggregate demand proponents. The aggregate demand proponents argue that the cause is a deficiency in aggregate demand; that the labor market works quite well in shifting workers from sectors of excess supply to sectors of excess demand; and that the policy conclusions of Keynesian economics if pursued vigorously enough would alleviate the situation. Holding opposing views are the structuralists who argue that a high level of aggregate demand is only a necessary condition for full employment; that the cause of unemployment is today the result of the inefficient operation of the labor market and/or the inability of certain segments of the labor force, such

[8]Joint Economic Committee, Higher Unemployment Rates, 1957-1960: Structural Transformation or Inadequate Demand (Washington: U.S. Govennment Printing Office, 1961), pp. 4-5.

as the uneducated, to acquire those skills which are in demand. It is on the former issue, that is, the question of the efficiency of the labor market, that migration studies potentially have much to offer, as has been continually emphasized in this study, for if migration is not in the proper direction or is of insufficient volume, then any given structure of unemployment will be sustained, if not worsened.

The purpose of this report is not to elaborate upon the nuances of the aggregate demand-structuralist argument nor to render a decisive conclusion as to the relative viability of the two hypotheses, but merely to examine one aspect of the entire problem, the efficiency of the labor market on a geographical basis.[9]

There have been several attempts to assay the importance of the geographical factor over the period. The Joint Economic Committee study of the problem concluded that there was essentially no change in the rate of mobility of the employed or of the unemployed since before World War II, implying that this in itself cannot explain the apparent divergence in the behavior of the national labor market from its previous performance.[10] The evidence is at best incomplete since the rates of mobility refer to the percentage of the national population which changed residence and also which changed county of residence in each of the years examined. Such rates are extremely gross--obscuring completely whether or not the movement was made from centers of low economic activity to more

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[9]For a more thorough explanation of these two opposion theories, see Joint Economic Committee, Higher Unemployment Rates..., pp. 9-15.

[10]Ibid., pp. 39-41.

vigorous economic centers and ignoring area rates altogether. Indeed, the same mobility rate could apply to both an extremely efficient labor market and to one in which migration is totally mischievous by the standards of the theory of the labor market.

Lowell E. Galloway employed an indirect test of the sufficiency of geographic mobility by hypothesizing that, if the market were not operating efficiently geographically, a correlation of regional unemployment rates over time (1948-1960) would be low; that, alternatively, if the market were functioning properly, the correlation should be high. According to this reasoning, a smooth-functioning labor market would not permit areas to develop unusually high or low rates of unemployment because mobility occurring would eliminate extreme divergences in unemployment rates in either direction, hence, a correlation of regional unemployment rates over time should be quite high.[11] Caution should be used in the interpretation of the correlation coefficient since it is also possible for the correlation coefficient to be high because the inefficient labor market is permitting highly dispersed regional unemployment rates to persist. Supplementary information is required.

Under the circumstances of the existence of only a few studies supplying but partial evidence as to the role of migration in a period with an unemployment problem of serious proportions, the value of a regression study of migration as outlined here becomes clear. Moreover, the use of components of the labor supply can conceivably enable the analyst to discern those sectors in which the problem is more significant, if it is at all crucial.

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[11]Lowell E. Galloway, "Labor Mobility, Resource Allocation, and Structural Unemployment," American Economic Review, LII (September 1963), pp. 707-709.

As stated previously, the emphasis upon unemployment reflects, in part, a pessimism as to the ability of the market to adjust on a regional basis by changes in income and/or wages, particularly when decreases in income and/or wages are called for. The literature from the elementary textbook to the most sophisticated journal treatise, along with articles appearing in the popular press, stress repeatedly the downward-inflexibility of wages and/or income. Institutional developments such as nationally-negotiated union contracts and the application of the minimum wage law appear to strengthen this conclusion over regions. Furthermore, the tendency for firms to establish plants geographically dispersed should mean more uniformity of payment to labor by regions to the extent that company-wide wage and salary schedules are set. In addition to this, there is an understandable reluctance by workers to take pay-cuts, regardless of the nature of the organization of the labor market. Less obvious is the possibility that the firms themselves might also hesitate to impose pay reductions for fear of losing workers to other firms and also because of the impact upon worker morale.

As was asserted earlier, the impossibility of wage or income reductions eradicating regional unemployment in excess of normal, frictional unemployment means that a substantial burden is placed upon the labor market mechanism to transfer workers from high unemployment to low unemployment areas. If labor costs could be reduced, part of the problem would be eradicated in this way, eliminating to some extent the necessity of geographical transfers.

The arguments for believing that there is downward-inflexibility of wages and/or income are impressive, nevertheless, they might not be applicable in any particular instance.[12] It is difficult enough to determine the factors which

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[12]Frequently herein both the terms income and wages have been used concomitantly. The reason for this is that to some extent wages and income are, for the hourly worker, substitutes. For example, a worker may be willing to work for a lower hourly wage if there is the possibility of a sizable total income as the result of working long hours, rather than for a higher wage situation which promises fewer hours worked and, consequently, less take-home income.

go into setting wages and salaries within any one company and the wage and salary response to changes in the demand and supply of labor to do so for any single region, let alone a large number of SMSA's, is, to say the least, a formidable task. Because of this and the desire to concentrate upon unemployment differentials, the prerogative exercised here is the easier, more indirect task of including income as an independent variable in the regressions upon migration, merely testing the response of the labor force to differentials in income in order to be sure that unemployment is not acting as a proxy variable for income. There is much to be said in favor of using wages rather than income, as wages are a price, thus placing the analysis within the domain of standard labor theory, and because wages may be the more relevant parameter upon which employment decisions are made by employer and employee alike. However, the lack of regional data, especially for the age groups, precludes this possibility.

In conclusion, the hopes and aspirations of this study are to continue the previous work done on the ability of the labor market to remove unemployment differentials, particularly the line of development utilizing regression models. At the same time, the plan is to investigate a dimension of the equilibrating process about which little is known, the relative ease with which selected subgroups of the population are likely to adjust to severe unemployment by migration. Moreover, if migration is in this way at all differentiable, an extended effort shall be made to explain the reason or reasons for the variation. Finally, the nature of the unemployment problem over the 1955-1960 period imputes special significance to a migration study of this type.

THE CONCEPT OF POTENTIAL UNEMPLOYMENT

While the theory of labor migration in relation to unemployment differentials is clear enough, less straightforward is the application of the principles to the unemployment data. Two difficulties usually present themselves immediately--the pragmatic one that data simply do not exist in the form desired and the conceptual difficulty that migration has an interdependence with unemployment which requires careful specification of the unemployment variable in the model.

The import of the interdependence problem can be seen by considering migration studies similar to this one which are still in the preparatory stage. Several of these studies attempt to use the 1960 regional unemployment rates as the independent variable in regressions to explain migration flows of the population from 1955-1960. If the labor market is truly efficient--migration being both rapid and in the direction specified by the theory--the unemployment coefficient should indeed be insignificant because migration has acted so as to reduce unemployment differentials. In effect, the observed end-period unemployment rates in no way reflect the state of the labor market which motivated migration. An exception occurs in the case where migration takes place in accordance with the theory but at a very slow rate so that the dispersion of unemployment rates is preserved, in this way rendering the unemployment coefficients meaningful. But even with a low rate of migration of only a few percent, migration is typically large enough relative to observed unemployment at any one time that it is impossible to be certain that the dispersion of observable unemployment rates has been unaffected by migration. Apparently end-period unemployment rates become less relevant the more rapid the response to unemployment conditions.[1]

One alternative is to lag the unemployment rates, making migration in any given time period a function of the unemployment of a previous time period or periods. However, the difficulty might still exist that, if migration occurs at a rapid rate, the unemployment rate of the preceding period, like the unemployment rate of the same period as the migration flow, might be unrelated to the migration flow. Moreover, this solution is impossible if the requisite data do not exist for the preceding periods, as often is the case.

When data do exist for the entire period under analysis, the unemployment data used as the independent variable are usually formed by averaging the unemployment rates over the entire period. Thus, a study such as Sjaastad's for the years 1940-1950 uses the average of the annual unemployment rates by region. However, this does not completely free the unemployment variable from the simultaneity problem that unemployment leads to migration and migration, in turn, leads to less unemployment since the end-period data are included in the average, and in a similar fashion other unemployment rates used in the average might also have been affected by the rate of migration.[2] For this reason,

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[1]The contemporaneous studies referred to are preliminary reports and, in all instances but one, do not permit quotation. Howeve , reference may be made to the preliminary report of Leonard A. Rapping, An Investigation into the Role of Labor Migration in the Economic Adjustment of Appalachia (unpublished report, Center for Regional Economic Studies, University of Pittsburgh, 1964), since permission of the author has been granted. An interesting aspect of a conversation with Rapping was his complete dissatisfaction with having to use the 1960 unemployment rates due to the lack of sufficient data.

[2]Another alternative worth considering, if the data permit, is to experiment with using a weighted rather than a simple average of the unemployment rates. Furthermore, to the extent that migration is a lagged reaction, the regression estimates might be improved by including in the average the one or two periods immediately preceding the commencement of the migration flow.

the average itself is not too useful although it does appear to be an improvement over sole reliance upon end-period data. This shortcoming of the average could explain to some extent the failure of the unemployment coefficient in the Sjaastad study to be very strong. Once again, the alternative to using end-period data depends upon the existence of data covering all of the periods used in the study.

Another workable alternative which is followed here does not directly utilize observed unemployment rates for the independent variable, but instead constructs new data which are called potential unemployment rates. This is a hypothetical construct which is defined as the unemployment rate which would exist in a region at the end of the period studies if no migration--in or out--took place during the period. It is estimated by first estimating the size of the labor force at the end of the period, assuming no migration, and subtracting from this the actual employment of the labor force at the end of the period. As will be demonstrated shortly, this is the precise equivalent of adding the net outmigration of the labor force that took place over the period to the actual unemployment rate at the end of the period. In brief, if net outmigration of the labor force had not taken place, the presumption is that regional unemployment would have been higher at the end of the period than it actually was. Conversely, if no net inmigration had taken place, unemployment would have been lower than the observed end-period rate. Indeed, it is quite possible that without net inmigration there might be excess demand for labor at the end of the period. The estimate as constructed would in this case of significant net inmigration, be negative.

It can be shown that deriving the estimate of potential unemployment according to its definition (which is to subtract the actual employment in the region in the end-period of 1960 from the estimate of what the labor force would have been in that year if no migration had taken place) is the same as adding the net outmigration of the labor force to the actual level of unemployment in 1960. The identity of the two definitions permits either to be used in obtaining the desired estimates of potential unemployment.

Before continuing with a discussion of the possible contribution that the concept of potential unemployment can make to the type of migration study envisaged, it should be noted that the term and its definition are mutations of Cicely Blanco's "prospective unemployment" which is defined as "the annual rate of change in unemployment which would be expected to occur if workers were not able to migrate between states. It is measured by the difference between the actual rate of change of employment and the natural rate of increase of the working-age population in each state."[3] In other words, it is the annual rate of change of unemployment which is determined by taking the difference between potential unemployment, i.e., what unemployment would have been at the end of the period if migration could not take place, and the actual unemployment at the beginning of the period, and subsequently dividing this difference by the number of years covered.

In both instances, the concepts have the advantage of implicitly including changes in the labor suuply due to deaths and to the entrance of new workers into the labor force since presumably these changes taking place over any period analyzed will be reflected in the levels of employment and the size of the

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[3]There are two sources for Cicely Blanco's work, but only one has been published at this time. This is her "Prospective Unemployment and Interstate Population Movements," The Review of Economics and Statistics, XLVI, No. 2 (May 1964), 221. The other source is a paper delivered at the Midwest Economics Association Meetings in April 1964 titled "A Quantitative Analysis of the Effect of Regional Economic Growth on the Redistribution of Population in the United States, 1900-1960."

labor force observed in each region at the end of the period.[4] At the same time, each implicitly assumes that the level of employment at the end of the period is independent of the rate of migration--in or out--over the period. Admittedly this is somewhat inaccurate, but it does not appear to be an undue approximation.[5]

For subgroups of the labor force which do not constitute a major portion of the total labor force, such as each of the age and occupation groups which form the basis of this study, the assumption of an employment level invariant to migration might be quite accurate, and not a crude approximation at all. First, consider the demand determinants of employment of any subgroup of the regional labor force. If the subgroup serves as labor inputs for products which are solely exported from the region, the rate of migration will not affect the product demand. On the other hand, if the labor of the subgroup is used in producing products consumed entirely within the region, the rate and direction of migration will affect the product's demand to the extent that the subgroup consumes the product. However, rates of net migration seldom exceed 20 percent and, since the entire subgroup, being a small fraction of the total labor force, accounts for little of the demand for the product, the total change in regional demand should be insignificant. On balance, each subgroup probably assists in the production of goods for both "foreign" and "home" consumption. From the demand side, at least, the assumption appears to be a good one. Moreover,

[4]In her paper presented at the meetings of the Midwest Economics Association, "A Quantitative Analysis..." (above, sec. III, note 3), p. 19, Cicely Blanco was able to separate the two components of prospective unemployment--natural changes in the supply of labor and changes in the demand for labor--and to test their individual effects upon migration. The difference was fairly small.

[5]*Ibid*., pp. 11-12.

the extremely small portion of the total regional labor force which migrants of any subgroup represent will mean that sources of income other than wage income will have little influence upon the derived demand for the subgroup.

From the supply side, the rate of migration will have an impact upon the employment level of a subgroup only to the extent that the subgroup can change the wage rate. Inflexibility of the wage structure will rule out this possibility, while any inelasticity of demand for the subgroup, given that the migration rates are usually small, will minimize the impact of changes in labor supply due to migration. In total, these factors lead to the conclusion that the assumption of subgroup employment being independent of the migration of these groups is not unreasonable, although it must be admitted that the accuracy of the assumption is likely to differ by subgroup.

The obvious relationships should not be permitted to obscure the crucial dissimilarity as to the nature of the unemployment mechanism which each pre-supposes induces migration. In applying prospective unemployment, the presumption is that, over a given period, the rate of net outmigration is a function of the rate of change in the demand for labor relative to the rate of change in the supply of labor due to deaths, retirements and entrance into the labor force by the young. In broader terms, the rate of outmigration is a function of the <u>change</u> in job availability on a regional basis. On the other hand, use of the concept of potential unemployment implies that net outmigration takes place because the absolute level of potential unemployment is the decisive factor; that a high value for potential unemployment means that the labor force participant had a difficult time in finding a job, at least compared to a region where potential unemployment is low. Obviously, the use of prospective unemployment ignores the initial unemployment of the region, whereas potential unemployment implicitly includes the level of initial unemployment, since potential unemployment is, in effect, the initial unemployment rate adjusted by the rates of growth of labor supply and employment over the period.

As an illustration of the difference, the Blanco migration concept would imply that the rate of net outmigration should be the same from a region moving from a 2 percent unemployment level to a possible 4 percent without migration as from a region with a possible rise from 12-14 percent since the change in unemployment is the same in both instances. In contrast, using potential unemployment refutes the notion that the migration rates should be identical since, by that definition, the rate of net outmigration should be greater for the latter city, even if there were no possible rise in unemployment without migration.

If, without migration, job availability were to remain the same as at the beginning of the period at 2 percent and 12 percent respectively, the rate of change of unemployment is by definition zero; consequently, no net outmigration would take place, granted that migration is a function of prospective unemployment. It is difficult to believe that the labor force in any region would endure for very long an unemployment rate of this severity, particularly when there are alternatives such as migration to the area with the low unemployment rate and to other similar areas.

Alternatively, if the hypothetical unemployment rate at the end of the period based upon the assumption of no migration is the same for two regions, there should be no difference in the rates of net outmigration of the two regions according to the potential unemployment concept. However, if the respective rates of change of employment opportunity are such that in one case the hypothetical unemployment rates represent a decline in unemployment while the other case represents a rise in unemployment, the implication of using prospective unemployment is that the rate of net outmigration should be negative (net inmigration) in the former case and positive (net outmigration) in the latter.

Once more, it is questionable that the migration streams should be in the directions suggested if, in both instances, the regions face, without migration, an unusually high or an unusually low unemployment rate. However, it is not unreasonable to expect some quantitative impact upon the respective rates of migration due to the differences in the rate of change of unemployment.

Nevertheless, the lack of inclusion of the initial regional unemployment rate seems to indicate a serious deficiency in the rate of change variable, prospective unemployment, a deficiency which is mitigated to the extent that the unemployment rates are equal at the beginning of the period, a phenomena of little likelihood. For this reason, the convention adopted here is the adherence in the models to be tested to the concept of potential unemployment.[6]

Defining the relevant unemployment variable in this way, as potential unemployment, is quite advantageous from the standpoint of data availability. The novitiate to regional labor market analysis is probably quite startled at the lack of data. Even data as gross as unemployment rates of the total labor force for SMSA's were not available until 1957,[7] except in those scattered instances where the local Bureau of Employment Security undertook the function on its own. Before then, the unemployment status of these labor markets was disclosed on a bimonthly basis by an alphabetic gradient. The gradations were very broad, however, and as a result, presented a shortcoming. For example, one classifications was for areas with unemployment between 7 and 11 percent.

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[6]Ideally, even though it appears that potential unemployment is the definition which provides a better test of the classical theory of migration, one would still want to investigate the effect of differential rates of change of unemployment upon migration. This requires knowledge of the initial unemployment rates which, for age and occupational groups by region, do not exist except for census years and thus not for 1955, as is required in this instance.

[7]U.S. Department of Labor Series, The Labor Market and Employment Security (Washington: U.S. Government Printing Office).

Furthermore, although the definitions were basically in terms of actual unemployment rates, they were modified at times to include producers' expectations of the future as far as their need for labor inputs was concerned. Because of this, the fact that a city fell into the 7-11 percent bracket was not necessarily indicative that the labor force had an unemployment rate somewhere in that range. Conceivably, the regional labor market might never have such a high unemployment rate if producers' expectations were proven to be incorrect. These data gaps hold for other types of areas as well--counties, urban areas, minor labor market areas, etc.

This betokens the even greater difficulty of obtaining data on a regional basis for components of the labor force, in particular, the age and occupational groups which are the focus of attention here. Only for census years, as part of the regular census, are data gathered on a regional basis--SMSA or whatever--on unemployment or employment for these groups. It is at this juncture that potential unemployment is quite useful because the only unemployment rates required in applying the concept to these groups are those at the end of the period, the census year of 1960.

The concept of potential unemployment is also advantageous for the purposes of this study because it takes explicit recognition of the interdependence of migration and regional unemployment, the secondary effect mentioned earlier that greater outmigration leads to less employment. In effect, the problem is solved by defining the independent variable, unemployment, as a hypothetical construct rather than directly as an observable variable. The explicit recognition is that, given that net outmigration had taken place over any period, the greater would the unemployment rate have been compared to the actual observed unemployment at the end of the period. Conversely, the implication is that, if assuming net inmigration could not have occurred, although it actually had, the observed end-period unemployment rate would have been lower. Hence, given any observed rate of net outmigration--positive or negative--the computed potential regional unemployment rates serve as an indication of the ease or difficulty with which the labor force participant looking for a job could obtain one in the region. The consequence of adding the volume of net outmigration to the actual level of unemployment is a simple, straightforward way of removing the secondary impact of migration upon unemployment so as to arrive at a figure which is truly indicative of the state of the regional labor market which theoretically induces the observed migration patterns.

In order to further point out the implications of the concept, it is useful to examine the least-squares estimator of the coefficient of the independent variable, potential unemployment. The least-squares regression equation of the relationship to be empirically tested is as follows:

1) $M' = a + b_1 U^{*\prime} + e$

where M' = the rate of net outmigration of the labor force which is defined as the total number of net outmigrants from the region divided by the potential labor supply, i.e., the labor supply at the end of the period if no migration could occur. The rate of gross outmigration, O', and the rate of gross inmigration, I', will also be examined by inserting each of them in the equation in place of M'. These terms are also defined relative to the potential labor supply. The reason for defining each migration stream as rates in this way rather than using their absolute levels will be explained in Section IV. In any case, it is to be understood that O' and I' are also to be used as dependent variables in identical equations.

$U^{*\prime}$ = the rate of potential unemployment, which is the absolute level of potential unemployment divided by the potential labor supply at the end of the period.

The least-squares estimator of the coefficient in (1) can be shown to be as follows:

2)

$$b_1 = \frac{\Sigma\{(U/L^*)-(\overline{U/L^*})\}\cdot\{(M/L^*)-(\overline{M/L^*})\}+\Sigma\{(M/L^*)-(\overline{M/L^*})\}^2}{\Sigma\{(U/L^*)-(\overline{U/L^*})\}^2+2\Sigma\{(U/L^*)-(\overline{U/L^*})\}\cdot\{(M/L)-(\overline{M/L})\}+\Sigma\{(M/L)-(\overline{M/L})\}^2}$$

where M = the total number of net outmigrants from 1955-1960 for the region,

U = the total number of unemployed in the region in 1960,

L* = the potential labor supply in 1960.

Since the variables are rates or percentages where the base is the labor force, the coefficient of the independent variables relates any change in the rate of unemployment to the rate of migration--net out, gross in or gross out--whatever the case may be. Thus a value for b_1 of plus one would mean that, if potential unemployment for the group should increase by one percentage point, the rate of migration will do likewise. For purposes of simplification, only net outmigration will be used here in the discussion. Positive values for b_1 of less than one would indicate that the response to unemployment is inelastic in the sense that the increase in the rate of potential net outmigration of the labor force is less than the increase in the rate of potential unemployment. Furthermore, a negative value for net outmigration, i.e., net inmigration, might be the consequence of either a negative potential unemployment rate (excess demand) or the combination of a negative a-term and a low potential unemployment rate.

Incidentally, it is worth noting at this point that the b_1 coefficient is not an elasticity. The usual definition of elasticity is as the percentage change of a variable relative to a percentage change in another variable, where the change in the former variable is customarily assumed to be induced by the change in the latter. Thus, to determine the elasticity of net outmigration with respect to potential unemployment, the required computation is the percentage change in the rate of net outmigration divided by the percentage change in the rate of potential unemployment. But an increase in potential unemployment of one percent is not equivalent to a one percentage point increase in the potential unemployment rate. In a similar fashion, an increase in the rate of net outmigration from 6 percent to 7 percent is a percentage increase of 16.5 percent in the rate of net outmigration, not a percentage increase of one percent in the rate of net outmigration.

Continuing the examination of the interpretation of possible values of b_1 if the coefficient is insignificant, the understanding is that potential unemployment is not an explicative factor in migration. Finally, a significant negative value would mean that a one-percent increase in potential unemployment induces a decrease in the rate of net outmigration. In terms of the theory of the labor market, the conclusion to be drawn in the latter case is that, not only is the market operating inefficiently, it is acting perversely, tending to worsen the unemployment rate of areas which already have a serious unemployment problem.

Deriving the estimates of the independent variable, potential unemployment, by adding the net outmigration of the given group to the actual 1960 unemployment, does not mean that the coefficient, b_1, which relates potential unemployment to the rate of migration, is necessarily related to the dependent variable in any way, particularly so as to render b_1 significant and near to a plus one. The meaning of this should become clearer as the discussion proceeds. Alternatively, is it possible that b_1 will always show the labor market functioning effectively, since the estimate of potential unemployment includes the dependent variable, migration?

The fact that it is possible for b_1 to take on the entire range of values discussed can be seen by inspection of (2). Moreover, the implications of the interpretations of the coefficient with respect to the efficiency of operation of the labor market can be further understood in this way. Since the denominator can never be negative[8] and, if the first term of the numerator is positive, the numerator is necessarily smaller than the denominator (because the denominator includes the first term in the numerator twice, the second and only other term in the numerator once and, in addition, includes the first term in the denominator which must always be positive), implying that the upper limit of the coefficient is a plus one. As the first numerator term becomes increasingly negative, b_1 will become smaller and will itself become increasingly negative, b_1 will become smaller and will itself become increasingly negative once the absolute value of the first term exceeds that of the second. This also depends upon the fact that the denominator can never be negative.

With these observations in mind, how does efficiency or inefficiency have an impact upon the coefficient b_1? Begin with the case of an extremely efficient labor market--the migration response to potential unemployment is rapid and in the direction specified by the classical theory of the labor market. What will the spread of regional unemployment rates look like at the end of the period, in this case, 1960? The answer is simple enough--if migration occurs as indicated, the regional unemployment rates should be nearly equal, which implies that each term $\{(U/L^*) - (\overline{U/L^*})\}$ is small so that, when each is multiplied by the corresponding deviation of its migration rate from the average migration rate and summed to arrive at the first term in the numerator, this sum will be so small as to have little impact upon the value of the numerator.[9] Likewise,

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[8]The denominator of the term as expressed in (2) is derived from and hence equal to the sum of the squared deviations of potential unemployment about its mean. Because the operation involves squaring each of the terms, the sum of them can never be negative.

[9]To be precise, equality of end-period unemployment rates, U/L_{60}, means that the U/L^* are unequal since $U/L^* = U/(L_{60} + M)$, where M is the number of net outmigrants, and, of course, it is the variability of the migration flows which has served to equate the end-period unemployment rates. However, if migration did not tend to equate the regional unemployment rates at the end of the period, the variability of the deviations of the U/L^* would be even

its impact on the denominator will also be minor and, of course, the first term of the numerator will also be of little magnitude. Taken together, the b_1 term will approximately equal the ratio of the squared deviation of the migration rate about their mean to the same thing, i.e., b_1 will be nearly equal to one. Therefore, it can be said that the equilibration forces of the market are perfect when a b_1 value near to a plus one is obtained.

On the other hand, consider the possibility that, although migration has been proceeding in the directions theoretically specified, the rate of migration has for all regions been relatively slow with the net effect that the ordering of regional unemployment rates is preserved, i.e., areas which have the highest actual rates at the end of the period. Since the migration rates are positively and highly correlated with the observed and potential unemployment rates and there remains substantial variability of regional unemployment rates, the first term in the numerator will be large and positive as will the same term in the denominator and the first term in the denominator. This will mean that the larger the variability of the end-period unemployment rates, the more will b_1 be less than a plus one, which follows from the first term being positive and appearing twice in the denominator along with the attendant large value of the first denominator term.

Should migration not be equilibrating at all, but rather a random process, this will be reflected by the first term in the numerator being equal to zero, approximately. However, an inefficient labor market by its very nature permits

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larger; thus, $\Sigma\{(U/L^*) - (\overline{U/L^*})\} \cdot \{(M/L^*) - (\overline{M/L^*})\}$ would be larger since each U/L^* would differ from the others by this factor in addition to the term M. In this way, the summation term in the preceding sentence is a minimum only in the situation whereby migration has been efficient. Nevertheless, the rate of net outmigration or inmigration over a five-year period seldom exceeds 10 percent, so that with equal rates of regional unemployment in 1960 each value of $\{(U/L^*) - (\overline{U/L^*})\}$ will be nearly equal to zero.

widespread divergences in unemployment to appear; hence, the first term in the denominator must be relatively large. These factors, when taken in conjunction, will mean that b_1 will be nearer to zero the larger the divergences in regional unemployment rates.

For the last possibility, assume that net migration is completely perverse--that there are large volumes of net inmigration into areas which at the beginning of the period had relatively high unemployment rates and, conversely, that regions with initially low unemployment rates experience net outmigration of the labor force. Consequently, the first term in the numerator will be negative and extremely so if the rates of migration are voluminous. Under these circumstances, b_1 will be negative.

Thus, the interpretations placed upon the coefficients previously and the inspection process undergone clearly show that the concept of potential unemployment is a useful analytical construct. The inspection process shows that the value of the b_1 coefficient estimated in any particular instance depends upon the efficacy of the migration that has taken place. In effect, the variable evaluates the efficiency of migration in terms of the impact of migration over the period upon the dispersion of regional unemployment rates appearing at the end of the period. Only when migration has behaved properly will the b_1 coefficient have a value of plus one and, as migration becomes less effective, the b_1 coefficient becomes increasingly smaller, eventually becoming negative if migration is thoroughly perverse.

In conclusion, it appears that the concept of potential unemployment is advantageous for the purposes of this study for several reasons. For one thing, only the end-period unemployment rates for the groups to be investigated are required, which are the only data available for these age and occupational groups. Secondly, unlike other alternatives, the use of potential unemployment takes explicit recognition of the interdependence of migration and regional unemployment, providing an index of the facility with which jobs are attainable to the job-seeker over the period to be studied.

SPECIFICATION OF THE EQUATIONS

There remains the necessity of translating the totality of ideas discussed into equations which are mathematically representative of these ideas and, furthermore, which are capable of empirical implementation. The specification of the equations to be examined is, by and large, an econometric problem. As is always the case, the solution of the econometric problem is not an endeavor apart from the economic problem, but rather is an endeavor which requires careful statement of the exact economic problem to be empirically analyzed. Because of this, the possible role of total regional unemployment must be considered.

The basic form of the equations to be tested was stated in the preceding section as equation (1). Repeating that equation:

1) $M' = a + b_1U^{*\prime} + e$

It is once more to be understood that the rate of net outmigration, M', is but one of the three migration streams to be scrutinized; that gross outmigration, O', and gross inmigration, I', will each be separately expressed as a function of the variables on the right-hand side of this equation and all of the other equations to be discussed. In addition, each equation is to be applied to each age and occupation group.

Each of the migration streams, as well as potential unemployment, will be expressed as rates or percentages, where the base in each instance is the potential labor supply at the end of the period. It will be recalled that the potential labor supply is defined as the algebraic sum of the regional labor force in 1960 plus the number of net outmigrants in the labor force from the region over the five-year period. One very simple reason for using percentages is the obeisance to tradition--it is the customary way of stating migrational relationships, a custom especially followed by regression studies of migration. This precedence is not unfounded, but is based upon the application of sound logic, the recognition that, if the migration experience of a diverse set of regions is to be compared, percentages or some other base which is a multiple of 100, such as per 1000 population, are essential. Primarily this is the consequence of regions having unequal populations; hence, if the <u>intensity</u> of the migration response to some stimulus is to be determined, percentages or the like must be used. Secondly, if predictions of migration are to be made, the relative frequency of migration must be known.[1]

However, granted the urgency of using percentages, there still remains the issue as to the proper base. Rightfully, Bogue suggests that "the denominator, or base, must be the total population which was exposed to the risk of the event."[2] In terms of this analysis, the population which is exposed to the possibility of migration is clearly the potential labor supply. It is on the basis of this rationalization that each of the terms mentioned is divided by the potential labor supply of the respective regions, as is potential unemployment. Consequently, migration and potential unemployment expressed as rates are probabilities in that each is the ratio of the total number of responses to an event to the total number of elements exposed to the event.

The classical theory of migration so heavily depended upon here, states very simply that the rate of net outmigration of the labor force depends upon differential regional unemployment rates. Implicit in the theory is an opportunity-cost explanation as to precisely why workers will leave areas with

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[1]Donald J. Bogue, Siegfried A. Hoermann and Henry S. Shryock, <u>Subregional Migration in the United States, 1935-1940</u>, Vol. I, <u>Streams of Migration Between Subregions, A Pilot Study of Migration Flows Between Environments</u>, p. 8.

[2]<u>Ibid</u>.

high unemployment, a statement to the effect that it is the superior unemployment opportunities elsewhere along with the serious unemployment problem in the labor market in which the worker is involved at any time that is important. The alternatives to the particular regional unemployment situations are of the first order of importance.

This notion can be easily included in the model as follows:

3) $M' = a + b_1(U^{*\prime} = U'') + e$

where U'' = the rate of unemployment of relevant alternative areas or perhaps an average thereof, however these areas might be defined in any particular instance. For example, in considering migration to and from cities, the relevant alternative areas might be defined as the entire area within a one-hundred-mile radius of each city.

The term $(U^{*\prime} - U'')$ is a measure of the relative regional unemployment rate of each city. In this fashion, the alternatives are explicitly recognized. Where the unemployment rates in relevant alternative areas are low relative to the potential unemployment in the stated region, the entire term will be much larger than zero, and, consequently, if migration is efficient, the coefficient of the term will also be large and positive with the result that the rate of net outmigration will be substantial. Of course, the migration flow will be in the opposite direction if the regions' potential unemployment is relatively low (a negative value for $(U^{*\prime} - U'')$).

In precisely the same way, the alternatives as far as income is concerned can be introduced into the model in the following way:

4) $M' = a + b_1(U^{*\prime} - U'') + b_2(I - I'') + e$

where I = median income per family or however defined,

I'' = median income per family in alternative areas.

It is worth emphasizing that the terms U" and I" are unique to each area however the definition of alternatives is established.

Other than the alternatives within geographical proximity, geography enters in another way in the form of distance. The role of distance as an inhibitor of migration is well known, perhaps being most explicitly recognized in the gravity-type models discussed earlier. How should distance be included in the model, if at all?

Actually, since the concentration of the study is upon differentials in unemployment, the areas to be studies were selected so as to rule out the necessity of embodying the distance factor and the alternatives, U" and I", for each region. If the sample were taken entirely from an area which is a fairly small portion of the United States, the geographic distance from each of the areas to the rest of the nation or any region thereof would be approximately the same; consequently, distance could be ignored in the model. Furthermore, the smaller the area from which the sample was taken, the greater would be the probability that the alternatives of U" and I" which the migrants would face would be the same. To the extent that this is true--the alternatives are the same for the entire sample--the structure of the equations can be rearranged to yield:

5) $M' = (a + b_1U'' + b_2I'') + b_1U^{*\prime} + b_2I + e$

That is, the relevant unemployment and income alternatives become included in the constant. The reason for this is that, since U" and I" are the same for all regions, each is a constant and therefore may be factored out of the respective unemployment and income variables.

For the purpose of maintaining a model as simple as possible in order to preserve the emphasis upon unemployment, the procedure of selecting a sample from entirely within an area which is but a portion of the nation was followed here. In actually selecting the sample, this procedure was not adhered to as strictly as possible since too small an area would have meant that the sample of SMSA's would have itself been too small to take advantage of the inferential properties inherent in the use of relatively large samples. In attempting to balance the gains from each consideration, the decision--not a costless one--was to select all of those SMSA's within an area which is roughly the northeastern quadrant of the United States. Admittedly by doing so, overlooking distance and impounding U" and I" in the constant is a crude approximation.[3] Hereafter, the inclusion of U" and I" in the constant is to be understood.

Table A-1 is a complete list of the SMSA's included in the sample, a total of forty-seven cities. The westernmost city in the sample is Chicago, while the southernmost cities are Louisville, Kentucky, Charleston, West Virginia, and Richmond, Virginia. On the north, the sample is bounded by Rochester and Utica-Rome, New York. As the table shows, there is sufficient diversity of unemployment rates over the cities. Columbus and Dayton, Ohio, Hartford, Connecticut, Richmond, Virginia, and Rochester, New York, were apparently tight labor markets over the period from 1954-1960 with unemployment rates averaging under 4 percent. At the other extreme, Charleston, West Virginia, Providence, Rhode Island, and Erie, Johnstown and Wilkes-Barre-Hazelton, Pennsylvania, experienced severe labor surpluses, each having an average unemployment rate exceeding 9 percent. Thus, the sample should provide the entire range of possible unemployment rates for both the total labor force and the age and occupation groups. Without even examining employment opportunities

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[3]The over-all high quality of the results obtained, which will be presented in Section V, indicates that the simplifications made are not restrictive.

TABLE A-1

SAMPLE OF STANDARD METROPOLITAN STATISTICAL AREAS
WITH AVERAGE UNEMPLOYMENT RATES, 1954-1960

SMSA	Average Unemploy-ment Rate	SMSA	Average Unemploy-ment Rate
Akron, Ohio	3.9	Louisville, Ky.-Ind.	5.5
Albany-Schnectady-Troy, N.Y.	5.7	Newark, N.J.	5.4
Allentown-Bethlehem-Easton, Pa.-N.J.	4.4	New Haven, Conn.	3.7
Baltimore, Md.	4.7	New York, N.Y.	5.2
Boston, Mass.	3.9	Paterson-Clifton-Passaic, N.J.	6.8
Bridgeport, Conn.	5.4	Philadelphia, Pa.-N.J.	6.4
Buffalo, N.Y.	8.3	Pittsburgh, Pa.	7.4
Canton, Ohio	5.4	Providence-Pawtucket, R.I.-Mass.	9.7
Charleston, W.Va.	9.8	Reading, Pa.	6.2
Chicago, Ill.	4.2	Richmond, Va.	3.0
Cincinnati, Ohio	4.1	Rochester, N.Y.	3.0
Cleveland, Ohio	4.0	Springfield-Chicopee-Holyoke, Mass.	5.6
Columbus, Ohio	3.3	Syracuse, N.Y.	4.5
Dayton, Ohio	3.5	Toledo, Ohio	5.8
Detroit, Mich.	8.1	Trenton, N.J.	5.4
Erie, Pa.	9.2	Utica-Rome, N.Y.	7.4
Flint, Mich.	6.6	Washington, D.C.-Md.-Va.	2.9
Grand Rapids, Mich.	5.8	Wilkes-Barre-Hazelton, Pa.	12.3
Harrisburg, Pa.	4.4	Wilmington, Dela.-N.J.	3.9
Hartford, Conn.	3.0	Worcester, Mass.	5.2
Huntington-Ashland, W. Va.-Ky.	8.6	Youngstown-Warren, Ohio	5.8
Indianapolis, Ind.	3.9		
Jersey City, N.J.	6.6		
Johnstown, Pa.	10.9		
Lancaster, Pa.	3.6		
Lansing, Mich.	4.7		

in areas outside of the domain of the sample, it is apparent that there are enough areas in the sample with good employment opportunities to induce workers in less fortunate regions in the sample to migrate to them. More on this point later.

The models are to be applied to the age and occupation groups for which data are available, regressing the migration rates for each group upon the rates of potential unemployment calculated for the very same groups. This is a strong statement in that it presupposes that the regional labor market attracts or expels workers of a given type in accordance with how well the regional labor market is functioning for the group, not upon the functioning of the regional labor market as a whole. By this reasoning, there is no regional effect other than this. How unrealistic a notion is this? Specifically, given the unemployment rate of the group in question, does the unemployment of the entire regional labor market influence decisions to migrate to or from the region in any way?

Several possibilities are evident. It is conceivable that, although the potential unemployment rate of the group is the fundamental unemployment variable upon which migration decisions are made, the labor force participant's ability to obtain a job, as shown by the potential unemployment rate of the group of which he is a member, is judged relative to what he believes the behavior of the entire regional labor force is as far as unemployment is concerned. In brief, this says that the severity of unemployment conditions is not an isolated event, but one whose severity is judged by the individual in relation to what he observes the behavior of the entire regional labor market to be. Knowledge of the nature of the unemployment experience of the local labor market is obtainable in many ways--news media reports of unemployment, the reports of friends and relatives, etc. However obtained, it may be hypothesized that the worker behaves in the following manner, responding to <u>relative</u> potential unemployment, that is, the potential unemployment rate minus the region's average unemployment rate over the period, say from 1954-1960. In equation form:

6) $M' = a + b_1(U^{*\prime} - U_r) + b_2I + e$

where U_r = the average rate of regional unemployment over the 1954-1960 period.

Alternatively, the relationship might be expressed as:

7) $M' = a + b_1(U^{*\prime}/U_r) + b_2I + e$

In any case, the ideas considered here do not in any way specify on an <u>a priori</u> basis which functional form, equation (6) or (7), is to be preferred. For this reason, the selection must be made on the basis of the empirical results, i.e., on the basis of the significance of the coefficients in either ase and the percentage of the variability of the dependent variable which each equation "explains."

The expectation is with each variable that the coefficient thereof will be positive and significant. The presumption in both instances is that, if the worker is experiencing difficulty in obtaining a job, whereas it appears to him that it is easy, in general, to get a job in the region, he will judge his inability as a good indication that employment opportunities in the area are poor for himself and others like him and, consequently, will tend to migrate. At the same time, if the entire regional labor force is suffering substantial unemployment, he might judge his experiences as being somewhat typical, hence not as serious as in the former case. On the other hand, if the unemployment experience of the group relative to the region is good, it is possible that the given group will feel particularly fortunate and thus be willing to tolerate its potential unemployment in the area, whatever it may be.

For the variable $(U^{*\prime} - U_r)$ or $(U^{*\prime}/U_r)$ to be more important than $U^{*\prime}$ alone, not only must the worker be aware of the behavior of the regional labor market, he must be relatively unaware of employment opportunities elsewhere for himself; otherwise he would, being rational, judge the severity of the pertinent unemployment problem by these opportunities elsewhere rather than by the over-all local conditions. Once again, only the more statistically significant variable will be retained.

Actually, the potential unemployment rate and the average rational unemployment rate may be interacting so as to render the variables $(U^{*\prime} - U_r)$ and $(U^{*\prime}/U_r)$ relatively insignificant. Strict adherence to any of the equations discussed until now reflects a suggestion of the dependence of the workers in each group upon employment within that group and seems to preclude the possibility of such workers obtaining employment in another group, such as in another occupation. However, workers can to some extent shift jobs, occupations, etc., and in this way, the regional unemployment rate might be important, serving as an indication of the opportunities available for the workers in a given classification in other pursuits within the region. Thus, for example, an unusually low rate of net outmigration or perhaps even net inmigration of a group might occur with a region that has a relatively high rate of potential unemployment because of the vigor of the local labor market which is sufficient to alter the migration patterns as described, restraining the outflow of population.

If this type of behavior is prevalent, then the variables $(U^{*\prime} - U_r)$ and $(U^{*\prime}/U_r)$ will be less powerful in explaining migration because, although potential unemployment by itself should produce net outmigration, the low average regional unemployment will be acting in the opposite manner, tending to decrease the net outmigration flow. When taken together, each composite variable will, under the circumstances described, be weak.

Furthermore, regional unemployment and its average might be an important determinant of migration because the worker views the employment prospects in the region for himself and the group of which he is a part by the behavior of the regional labor market as a whole. More incisively, the possibility must be considered that the worker is more likely to have knowledge of over-all employment conditions within the region than to have knowledge of the employment conditions germane to the subsection of the labor market within which he operates and thus react more to the former set of circumstances. This would depend, in part, upon the role of the news media in disclosing such information and would also depend upon the organization of the regional labor market and of the sector of the labor market of the group in question. If, for example, the local Employment Service is efficient and often frequented by the unemployed, the unemployed worker will quickly get an idea of the possibilities for him in the region. In addition, if he is a member of a craft union or professional association, knowledge of openings for which he is suited might be available to him. However, private employment services are not designed or motivated to handle employment in many types of menial and/or low paying tasks. Moreover, employers do not tend to advertise in local newspapers for such workers, making it difficult for these people to acquire knowledge of job availability.

Short of a field study, it is virtually impossible to determine the precise role of these factors. Instead, an indirect approach is utilized, initially assuming the extreme that the unemployment rate of the group, except to the extent that it is indicative of regional unemployment, is not important in determining migration at all. In this case, the potential unemployment rate in (1) is replaced by U_r to read:

8) $M' = a_1 + b_1U^{*'} + b_2I + b_3U_r + e$

To repeat: regional unemployment might be a significant variable in explaining regional migration patterns to the extent that aside from the potential unemployment of a given group, the regional unemployment rate indexes the opportunities of employment for members of the group in alternative employments within the region and, secondly, to the extent that the worker is more likely to have knowledge of the regional employment situation than of the employment situation of the group of which he is a member.

THE EFFICACY OF LABOR MIGRATION

a. The Efficacy of Occupational Migration

A primary reason for violating the postulate of homogeneous labor in this study is the belief that the fundamental processes of migration can be best understood in this way. The violation referred to is, of course, the analysis of migration by occupation and by age group, rather than the more gross analysis of regional migration of the entire labor force. This disaggregation is based on the belief that the migration response to economic variables such as unemployment is a differential one, a differential formed by a combination of circumstances. These circumstances include both the ability of the worker to migrate and the opportunities available to him if he does.

The empiricism of this study involves the testing of a set of equations, which should clearly show whether or not the initial belief in dissimilarity of migration patterns is justified. Put in terms of the equations, the test is a simple enough one: do the coefficients of the unemployment variables--the potential unemployment of the group and regional unemployment--differ by group?

The over-all results for the occupational groups vindicate the judgment of differentiation. However, the migration data on occupations are such as to necessitate interpreting the results cautiously. In deriving the estimates of potential unemployment by occupation, the actual 1960 employment of the occupational group in the region is subtracted from the estimate of what the labor force would have been had no migration taken place. This is the source of the problem since to derive the estimate of this hypothetical labor force, the number of persons in the region who had not migrated and were practicing the given occupation is added to the number of outmigrants of the same occupation.

But the number of outmigrants of that occupational class was determined by the 1960 occupation of outmigrants from the city now living in other areas. If they had not outmigrated, would the migrant have the same occupation, the occupation reported in the census?

This requires defining potential unemployment as the unemployment rate that would have taken place in 1960 had no outmigration taken place and if outmigrants were to practice the same occupation in the region from which they moved as they reported practicing in the region into which they moved. But how unreasonable or heroic an assumption is this? It is known from a few other studies that, although a substantial proportion of migrants do shift occupations,[1] the majority of migrants retain their occupations; thus, it seems likely that the greater the number of outmigrants from a region practicing a given occupation, the greater should be the number of persons, who, if they had remained in the region, would be practicing that occupation in the region. Because of this, the correlation and regression results should not be too unreliable, but the estimate of potential unemployment for a given occupation in any one region

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[1]See Saben, Monthly Labor Review, LXXXVII, No. 8 (above Sec. II, note 7), 880. The labor force survey which is Saben's topic shows that two out of three migrants remain in the same occupation as they practiced prior to migration. The changes that do occur are largely to the occupation that most resembles the initial occupational class. For example, laborers who change occupation are most likely to become operatives, and professional workers are most likely to become managers or officials. This suggests that, if the number of occupational groups were reduced from eight, the changes between these broad occupational classes would be small enough in number to render the problem insignificant. In addition, as the results of this study show, there is a wide disparity of migration response of white-collar and blue-collar workers; consequently, given the small number of changes which take place between these two groupings, the results of the study, on this broad basis, are quite valid.

should be interpreted quite cautiously, i.e., potential unemployment becomes but a proxy variable, an index, for regional demand conditions for labor. It is because of potential unemployment being a proxy variable that the correlation and regression results are meaningful. Moreover, the empirical results appear to be strong enough to support the conclusion that the assumption made for the occupational groups is not a bad one. Note that this problem does not arise with the age groups, since age is a migration-constant variable.

With this reservation in mind, the regression results can be presented. Regressions were performed in all instances for in and outmigration as well as for net outmigration. It should be emphasized at the outset that the results for net outmigration--where net outmigration, say, increased with the independent variable, gross outmigration did likewise, while gross inmigration, at the same time, typically decreased with the variable. Temporarily, the equations for in and outmigration will be ignored until after those of net outmigration have been discussed.

At the first stage, the unemployment variables $(U^{*\prime} - U_r)$ and $(U^{*\prime}/U_r)$ were each separately regressed upon net outmigration to determine which is a better predictor of the net outmigration of each occupation. By and large, the former variable, the potential unemployment rate of the group in a region minus that region's average unemployment rate is a much better variable, explaining a larger percentage of the variability of the net outmigration rates. There does not appear to be any theoretical reason to expect the superiority of either form, the decision is an empirical one. Empirically, then, the decision is that the variable $(U^{*\prime}/U_r)$ will not be retained.

The variable $(U^{*\prime} - U_r)$ was in turn compared with the least squares regression results using $U^{*\prime}$ as the relevant explanatory variable. In every instance for net outmigration, the potential unemployment rate was proven to be a much better variable in a statistical sense. It was hypothesized that the worker evaluates the seriousness of unemployment relative to the unemployment of the region, at least what he believes the performance of the regional labor market to be. At the same time, the possibility was considered that the unemployment rate of the region indexes opportunities for the worker elsewhere within the region, in this case in other occupations, so that subtracting (dividing) the average regional unemployment level from (into) the potential rate of unemployment might weaken the variable. This might account for what happened; in any case, the relative potential unemployment, although significantly related to net outmigration, is not as significantly related as is the potential unemployment rate.

For net outmigration, the coefficient of the potential unemployment rate is significant in every instance (at the 5 percent level, the standard for all tests employed in this study). Beginning with this simple equation of migration regressed upon the potential unemployment rate, median income by occupation for each region and average regional unemployment over the period were added stepwise to determine the effect of these variables, i.e., the final equational form estimated was equation (9) of the preceding chapter. The coefficients of the equations with the three independent variables for each occupation are presented in Table A-2. It should be noted that the occupational data refer to male occupation; data on the migration experience by occupation for females is simply not available.

The dependent variables are measured as rates, where the base is the potential labor force. Each cell in the table, and in all of the tables like it, consists of three numbers: the first is the regression coefficient, the figure in parentheses is the standard error of the coefficient to its standard error. At the 5 percent level, a t-value of 2.0 is significant. The last

TABLE A-2

REGRESSION COEFFICIENTS: NET OUTMIGRATION BY OCCUPATION

Occupation	Independent Variables			$\bar{R}^2$
	Potential Unemployment Rate[a]	Regional Unemployment Rate[b]	Median Income[c]	
Professional	.9863 (.1172) 84.2	-.0104 (.0381) .3	.0166 (.0118) 1.4	.9957
Managers	.8715 (.0650) 13.4	-.2438 (.1243) 2.0	-.0823 (.0293) 2.8	.8432
Clerical	.9272 (.0356) 26.1	-.1338 (.0771) 1.7	-.0147 (.0312) .5	.9760
Sales	.9619 (.0201) 47.8	-.1609 (.0452) 3.6	.0061 (.0116) .5	.9854
Craftsmen	.4330 (.1031) 4.2	.3273 (.1863) 1.8	.0582 (.0633) .9	.4123
Operatives	.2671 (.0625) 4.3	.5193 (.1511) 3.8	-.1161 (.0621) 1.9	.6801
Service Workers	.6904 (.1066) 6.5	.1489 (.2546) .6	-.0011 (.0289) .0	.7059
Laborers	.3574 (.0914) 3.9	.2331 (.2245) 1.0	-.0006 (.0406) .0	.5133

[a]The 1960 occupational unemployment rates required to determine the potential unemployment rates are from Table 75 of the 1960 U.S. Census of Population, General Social and Economic Characteristics, Vol. PC(1)-C.

[b]From the U.S. Department of Labor Series, Area Labor Market Trends. The average is for the period 1954-1960.

[c]From Table 124 of the 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D. Median income is median family income by occupation in 1959 in terms of the nearest $100.

column with the heading $\bar{R}^2$ is the coefficient of multiple determination corrected for degrees of freedom. In other words, $\bar{R}^2$ is the percentage of the variability of the dependent variable explained by the equation.

In the main, the coefficients of potential unemployment follow a pattern not wholly unexpected, decreasing as one goes down the occupational scale, i.e., the more occupationally elite--professionals and managers--respond more to unemployment than do the less-gifted such as service workers and laborers.

The coefficients do seem to follow an ordering of occupations, declining with the occupational scale. The coefficient of potential unemployment for professionals is approximately .99, the largest of the eight cases, for managers the coefficient is .87, for clerical workers, .93, and for sales workers, .96. The values of the coefficient for blue-collar workers are each lower than any one of the coefficients for white-collar workers. The highest value of the blue-collar group occurs for service workers, a value of .69. Next in order is a coefficient of .43 for craftsmen, while the coefficient for laborers is .36. Lowest of all the coefficients is the .27 for operatives. Multicollinearity does not appear to create any serious problems in estimating the coefficients of the three variables in any of the eight occupational groups examined, although such interdependence is somewhat high between potential unemployment and average regional unemployment for clerical workers, service workers and laborers.

Only for professionals and sales workers is the coefficient not significantly different from one, indicating that the migration response to potential unemployment of these two groups is perfect in the sense that a one-percent rise in potential unemployment leads to a like rise in the rate of net outmigration. For the remaining six groups, the rate of response is low enough to indicate that without any other means of adjustment, such as a drastic shift to other occupations, retirement from the labor force, a specific labor market policy to eliminate such differentials, etc., pockets of employment are permitted to develop and persist. As an example, the coefficient for craftsmen is a low .43; assuming that the coefficient is perfectly linear and the standard error of the estimate is zero, it would take a city with a rate of unemployment of craftsmen two percent higher than the average slightly less than five years for migration to eliminate the differential. The example is merely meant to be illustrative; the pitfalls of making such predictions are entirely too obvious.

In addition, not only is the response weaker for the groups mentioned, but, with potential unemployment as the sole independent variable, the percentage of net outmigration which the variable explains ($\bar{R}^2$) would tend to fall off. The earlier remark that the migration response to unemployment is a differential one seems to have been borne out. The differences are observable; however, to determine if the differences are statistically significant, an analysis of covariance was applied to the set of equations. The null hypothesis formulated was that there is no difference in the equations relating net outmigration to potential unemployment, that, in effect, the same equation holds for all eight cases. The null hypothesis was rejected since a greater percentage of net outmigration is explained by using eight equations rather than just one.[2]

Median occupational income proves to be a fairly weak variable in predicting net outmigration, being significant only for managers. The coefficient is of the expected sign--net outmigration is estimated to be a decreasing function of median income of managers, officials and proprietors. The coefficient of -.08 indicates that for every $100 differential in median income over the cross-section of cities studied, net outmigration decreases by eight-hundredths of a percent, a small response, indeed. The over-all ineffectiveness of the variable might be due to the use of the median income figure coupled with very broad occupational classes, which together could obscure to some extent the actual movements that do take place, movements which perhaps did take place in response to income differentials. Each of the occupational classes does contain a tremendous diversity as to the types of workers they include.

Secondly, the income measure used refers to money income, not real income; consequently, the results are at best highly suggestive. Unfortunately, the means to correct this deficiency are not available. Thirdly, the results for income could be interpreted as justifying the suggestion made throughout this study that the labor market, geographically, does serve mainly to redistribute jobs, not as a mechanism in eliminating income differentials.[3] For one thing, a good deal of migration that does take place is the result of intrafirm transfers which are not simultaneously opportunities for improving upon income earned.[4] Moreover, migration might be the alternative to no job at all, and thus the migrant might be quite willing to move from an area in which the average income earned is quite high. Apparently, mobility takes place for a variety of reasons, increased income being but one of them.

Regional unemployment was included as a separate variable in an attempt to determine if, in addition to the impact of potential unemployment, the level of regional unemployment had any effect upon the migration patterns of the various groups. For each group this is meant to be a bipartite test; a test of the notion that the migrant's decision to migrate whatever the occupational unemployment rate depends upon the regional unemployment rate because the worker views his employment prospects in the region also by the opportunities for

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[3]See the comments of Lloyd G. Reynolds in his The Structure of Labor Markets, Yale Labor and Management Series (New York: Harper and Brothers, 1951), especially pp. 244-245.

[4]The proportions of moves involving transfers will be looked at shortly.

employment in other occupations within the region; a test of the notion that the worker is likely to have more knowledge about the regional labor market than about the local labor market of his own occupation. Over all occupational groups, the latter is also meant to be an indirect test of the hypothesis that the more occupationally elite the group is, as professionals surely are, the more likely is the group to have knowledge about employment conditions which pertain to its own occupation, while the less-skilled and lower-paid occupations are more dependent upon information of a more general sort, specifically, information about the performance of the total regional labor market as publicized by news media, etc., and, hence, are more likely to respond to regional employment conditions. The more fortunate do often have the advantage of professional journals which include job advertisements, companies and the government tend to recruit nationally, etc. To the extent that this hypothesis holds, the expectation is that, as one goes down the occupational scale, the larger should be the positive coefficient of regional unemployment, other things being constant.

The results prove to be quite varied. Only for three groups is the coefficient significant--managers, sales workers and operatives. Moreover, the coefficient is -.24 for managers and officials and -.16 for sales workers. Only for operatives is the sign the expected one: the coefficient is +.52. The information hypothesis and the opportunity hypothesis are only substantiated by the results for operatives, which is one of the least-skilled groups investigated. Under these circumstances, it is virtually impossible to discern which of the two hypotheses is the stronger for operatives.

Also puzzling are the negative coefficients for managers and sales workers. This could be due to the existence of opportunities unrelated to unemployment--occupationally or regionally--which are producing the observed migration patterns. The result for managers, an occupation containing a large proportion of the self-employed, might be attributable to the self-employed having less mobility because of their committed investment or because these workers are willing to absorb capital losses to stay in the region, possibly with the hope that the region will experience more vigorous economic growth in the future. With data as gross as these, such anomalies are, by and large, inexplicable.

As stated before, the results for net outmigration are largely supported by those for inmigration and for outmigration. Because of the general weakness of the regional unemployment rate and median income, these variables will be totally ignored in the discussion that follows. However, the coefficients of these variables can be found in Tables A-3 and A-4, for former dealing with inmigration and the latter with outmigration. Also presented in the tables are the coefficients of the potential unemployment rate.

Basically, for gross inmigration, the coefficients for white-collar workers are stronger than those for blue-collar workers, paralleling the coefficients in the net outmigration equations. Somewhat unusual is the rather good response for clerical workers with a coefficient of -.95. In other words, clerical workers show the greatest tendency to migrate into regions where jobs are available. Of the blue-collar groups, only service workers have a coefficient of potential unemployment which is significant and of the theoretically expected sign, the insignificance of the rest, along with the relatively low coefficients of multiple determination, implying that craftsmen, operatives and laborers are as likely to migrate into regions where the employment prospects for them are poor as into regions with low rates of unemployment in these occupations.

The results for gross outmigration do not distort the impressions about occupational migration established so far. Professionals, managers and sales workers react well to potential unemployment. On the other hand, clerical workers, craftsmen, operatives and service workers rates of migration are not correlated

TABLE A-3

REGRESSION COEFFICIENTS: GROSS INMIGRATION BY OCCUPATION[a]

Occupation	Independent Variables: Potential Unemployment Rate	Regional Unemployment Rate	Median Income	$\bar{R}^2$
Professional	-.5934 (.1150) 5.2	-.6906 (.3739) 1.8	-.2556 (.1159) 2.2	.4813
Managers	-.4028 (.1462) 2.8	-.2104 (.2795) .8	.0345 (.0659) .5	.2492
Clerical	-.9514 (.1379) 6.9	.5157 (.2991) 1.7	-.1386 (.1211) 1.1	.6285
Sales	-.5921 (.1409) 4.2	-.3632 (.3165) 1.1	-.0185 (.0812) .2	.4313
Craftsmen	-.2190 (.1136) 1.9	-.3045 (.2052) 1.5	.0154 (.0698) .2	.1916
Operatives	-.1544 (.0969) 1.6	-.5917 (.2344) 2.5	.0246 (.0963) .3	.3240
Service Workers	-.7457 (.1423) 5.2	.4119 (.3399) 1.2	-.0437 (.0386) 1.1	.4773
Laborers	-.0108 (.1177) .1	-.8865 (.2893) 3.1	.0002 (.0523) .0	.2944

[a]The explanation and data sources of this table are the same as for Table A-2.

TABLE A-4

REGRESSION COEFFICIENTS: GROSS OUTMIGRATION BY OCCUPATION[a]

	Independent Variables			
Occupation	Potential Unemployment Rate	Regional Unemployment Rate	Median Income	$\bar{R}^2$
Professional	.3946	-.7902	-.2794	.3252
	(.1162)	(.3776)	(.1171)	
	3.4	2.1	2.4	
Managers	.4971	-.4688	-.0550	.2064
	(.1337)	(.2557)	(.0603)	
	3.7	1.8	.9	
Clerical	.0708	.1778	-.1310	.0900
	(.1480)	(.3211)	(.1300)	
	.5	.6	1.0	
Sales	.3578	-.4946	-.0145	.0788
	(.1389)	(.3120)	(.0801)	
	2.6	1.6	.2	
Craftsmen	.2141	.0228	.0736	.0105
	(.1330)	(.2403)	(.0817)	
	1.6	.1	.9	
Operatives	.1044	-.0668	-.0815	.0000
	(.0974)	(.2358)	(.0969)	
	1.1	.3	.8	
Service Workers	-.0709	.5556	-.0427	.1061
	(.1071)	(.2556)	(.0290)	
	.7	2.2	1.5	
Laborers	.2320	-.2706	.0085	.0755
	(.0967)	(.2376)	(.0430)	
	2.4	1.1	.2	

[a]The explanation and data sources of this table are the same as for Table A-2.

with the potential unemployment rate. The coefficient of +.23 is significant for laborers, displaying an ability to adjust via outmigration markedly better than for inmigration, but is still not as good as the response of other occupations such as professional workers.

Comparatively, except for laborers, in every instance the results for inmigration are much more satisfactory in terms of the efficiency of the operation of the labor market than are the results for outmigration. In effect, this means that the redistribution of jobs and unemployment that does take place is largely due to inmigration. In a way, this should not be too surprising, reflecting, perhaps, a reluctance to migrate, particularly in response to diverse economic conditions, but given that this reluctance is overcome, i.e., outmigration occurs, migrants attempt to improve their lot as much as possible, moving into those areas with better employment opportunity. Moreover the period studied is long enough--five years--for migrants to move into a region, gauge the opportunity therein and, if dissatisfied, move to another area, and thus through this trial-and-error process eventually move into an area which can provide a job. Through such a process, the coefficients of potential unemployment will be stronger for inmigration than for outmigration.

The observed pattern of potential unemployment coefficients seems to be quite explainable, particularly in the case of net outmigration. In part, the pattern appears to be the consequence of the relative demands for labor. At the same time, given the state of demand by occupation, the pattern is formed by the differences in the ability of the groups to adjust.

On the demand side, the pattern of coefficients parallels the rate of growth of employment of each occupation for the sample of regions taken as a whole and for the entire United States. The relevant data are presented in Table A-5. While the data are for the ten-year period from 1950 to 1960 and the period studied is the shorter one of 1955 to 1960, the differences in the rate of growth of employment taking place over the longer period are large enough to have exerted their influence over the shorter period. First, looking at the rate of growth of employment for the sample of cities taken as a whole, the rate of growth of employment of professionals is an impressive 54.0 percent, while the rates for clerical workers and sales workers have been less, although substantial. The decline in the absolute level of employment of managers, operatives and service workers was not much over the period; however, the fact that the nation was experiencing growth would indicate that the declines in employment represent a major shift in the structure of employment. For laborers, the decrease in employment is at the rate of -.13.3 percent, the most adverse situation of all.

TABLE A-5

THE RATE OF GROWTH OF MALE EMPLOYMENT BY OCCUPATION, 1950-1960

Occupation	Rate of Growth of Male Employment--Sample[a]	Rate of Growth of Male Employment--U.S.[b]
Professionals	54.0	46.7
Managers	-2.6	6.5
Clerical	9.1	14.6
Sales	13.3	15.6
Craftsmen	4.2	12.7
Operatives	-1.4	7.8
Service Workers	-.0	8.6
Laborers	-13.3	-6.3
Total Male Labor Force	5.1	6.9

[a]Calculated from Table 122, 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

[b]Source: Table 201, U.S. Census of Population, United States Summary, Detailed Characteristics, Vol. PC(1)-1D.

The rates of growth of employment for the United States over the entire period behave in approximately the same manner, although each tends to have a higher value. The rank order correlation coefficient between the two arrays of growth is a perfect +1.0. The rate of growth of total male employment in the United States was 6.9 percent, whereas the growth rate was only 5.1 percent for the sample. Managers and service workers for the United States as a whole are among the occupations with the most unfavorable growth experiences, but in contrast to the sample had positive growth rates of 6.5 percent and 8.6 percent respectively. Even the decline in employment of laborers was not as severe, a growth rate of -6.3 percent.

To the extent that rates of growth of employment denote relative changes in the demand for occupations, demand provides a partial explanation of the coefficients estimated. Admittedly, the total national employment of an occupation can only grow if mobility--geographic and otherwise--is high, but a high rate of growth of national employment of any occupation is probably a sign that demand rose substantially, too. Simply put, growth in the demand for labor over a set of regions or for a nation means that the worker contemplating leaving a region where unemployment is high stands a good chance of obtaining a job elsewhere--the "pull" that the student of migration hears so much about is there. Without this "pull," the "push" is likely to be weak. Using the rank order correlation coefficient, the correlation between the coefficients of potential unemployment and the rates of growth of employment is +.79. In effect, where the market for labor of a specific type is tight, migration is marked; where the market over a set of regions is slack, the migration response to unemployment is weak.

Another way to compare the relative levels of demand for occupations is to consider the average 1960 unemployment rate of the sample of SMSA's for each occupation. These figures appear in Table A-6. Once more the ordering is pretty much as expected--unemployment, by and large, increases reading down the table. If the coefficients obtained by the regression equations are correlated by means of the rank order correlation coefficient, a value of +.88 is obtained. Once more the importance of over-all demand becomes evident.

Perhaps a more dramatic way to demonstrate this is to investigate the potential unemployment rates obtained for each SMSA by applying the definition of potential unemployment to the data. Initially assume that migration was completely forbidden over the period, that migration could not take place, so that the potential unemployment rates are in actuality achieved. Utilizing the potential unemployment rates computed for the regression equations, each SMSA would have had, on the average, the unemployment rates in 1960 by occupation shown in the second column of Table A-6.[5] However to hypothesize that these rates could have been the actual rates in 1960 is somewhat unrealistic, the assumption of no migration aside, in that some of the cities show a negative potential unemployment rate which is the consequence of adding a large flow of inmigration to a relatively small level of unemployment in 1960. Even in the tightest of labor markets, a certain amount of frictional unemployment is evident as workers are between jobs, etc. To adjust for this, the convention adopted is the assumption that the regional unemployment rate can never be less than one percent. The unemployment rate which constitutes an irreducible minimum of frictional unemployment is, of course, debatable. These adjusted figures are presented in the column so titled. Note that, with the exception of professionals, the rates are not too different. The exception in the consequence of a larger number of potential unemployment rates being less than one percent for professionals than any other group; hence, the adjustment raised the potential unemployment rate noticeably.

[5]It should be stressed again that the absolute values of the potential unemployment rates are to be interpreted with caution due to the nature of the migration data for occupations.

TABLE A-6

RATES OF POTENTIAL UNEMPLOYMENT, ACTUAL 1960 UNEMPLOYMENT AND NET OUTMIGRATION BY MALE OCCUPATION[a]

Occupation	Average 1960 Unemployment Rate	Average Potential Unemployment Rate	Average Potential Unemployment--Adjusted[b]	Average Net Out-Migration Rate
Professionals	1.3	2.3	4.4	1.2
Managers	1.4	3.5	3.9	2.0
Clerical	3.4	3.1	4.0	-.3
Sales	2.6	3.8	4.4	1.2
Craftsmen	5.2	5.8	5.8	.9
Operatives	6.6	5.7	5.8	-.5
Service Workers	5.7	5.3	5.8	-.2
Laborers	12.7	11.8	11.8	-1.0

[a]In each case, the average is the simple arithmetic average of the rates of the 47 cities.

[b]Computed on the assumption that even in the tightest of labor markets, there is an irreducible minimum of one-percent unemployment.

Of particular interest is how these figures compare with their counterparts in the first column, the average 1960 unemployment rates. Without migration, the unemployment rate of professionals would have been 3.1 percent higher than it actually was, for managers the unemployment rate would have been 2.5 percent higher, for clerical workers, 0.6 higher, for sales workers, 2.8 higher, while craftsmen would have had an unemployment rate 0.8 percent higher. On the other hand, operatives would have actually had a lower rate of unemployment if migration could not have taken place. By this standard, the difference is a mere 0.1 percent. A similar result holds for laborers, who without migration would have had an unemployment rate 0.9 percent lower than that which actually occurred. Since the sample does not constitute a closed system in that the boundaries of the sample units are not contiguous and migration can occur to and from areas not included in the sample, the average rate of net outmigration need not be zero, as is shown by the last column of Table A-6. These net outmigration rates tend to mitigate the conclusions drawn with respect to the effect of migration on the average occupational unemployment rate. For example, part of the decline in unemployment for professional workers from 4.4 percent to 1.3 percent is due to the 1.2 percent average net outmigration rate of professionals. Without net outmigration, the presumption is that migration from SMSA's with high unemployment and to SMSA's with low unemployment reduced the unemployment rate by 1.9 percent.

Nevertheless, white-collar workers as a group were able to reduce their unemployment by migrating. On the other hand, while the migration of blue-collar workers was not perverse (the b_1-coefficients are, as Table A-2 indicates, positive and significant), the migration of blue-collar workers does not appear to have improved their unemployment rate. Part of the reason for this is the average net inmigration of blue-collar workers into the areas studied. But much of the ineffectiveness of the migration of these groups in reducing unemployment must be attributable to the fact that these groups have high rates of unemployment everywhere; that the redistribution of such workers over areas will only redistribute unemployment and not, as in the case with white-collar workers, reduce the over-all unemployment rate. For example, the lowest unemployment rate in any of the forty-seven cities studied for laborers was, in 1960, 6.8 percent. Certainly this level of unemployment is in excess of frictional unemployment so that, should laborers have moved into this area from any other area, the rate of unemployment would necessarily have risen from 6.8 percent by the rate of net inmigration of laborers.

The extent to which demand plays a crucial role in determining whether or not migration is able to reduce the unemployment of an occupation can be seen by considering the number of cities which would have had excess demand for a given occupation (a negative potential unemployment rate) if migration had been impossible over the 1955-1960 period. Professionals lead the list with seventeen such cities; clerical workers are next with nine; sales workers, eight; managers, six; service workers, five; craftsmen and operatives, two; and finally, laborers, none. As crude as these indications might be, they do give an idea of the relative demand for the labor of each occupation.

This leads to the conclusion that, in spite of the differential response to unemployment by occupation, particularly the poor response, i.e., low potential unemployment coefficients, of the blue-collar groups, the labor market was operating quite effectively where it had to. Where unemployment could be reduced via migration, it tended to be; where unemployment could not be reduced in this way, migration failed to respond accordingly. Several attempts have been made here to estimate the role of demand in explaining the coefficients estimated; in each case, demand appears to be an important explanatory factor.

In addition to demand, socio-economic characteristics by occupation indicate another set of reasons for the coefficients. For one thing, educational attainment decreases correspondingly with the decreases in the coefficient. While education is surely a good proxy for labor demand in the United States today, it is probably at the same time a good determinant of the resourcefulness of the individual in maximizing his preferences in the labor market. A good argument can be made that the educated are more likely to have knowledge of the mechanics of job-seeking than the relatively uneducated; that the more educated will have the confidence to assert that knowledge, etc. In any case, education decreases moving down the list of occupations, as Column 1 of Table A-7 shows.

TABLE A-7

SELECTED SOCIO-ECONOMIC CHARACTERISTICS BY OCCUPATION FOR MALES

Occupation	Median Educational Attainment in Years[a]	Median 1959 Income[b]	Median Age[c]
Professionals	16.4	$8670	38.6
Managers	12.5	8900	45.5
Clerical	12.3	6390	38.5
Sales	12.5	7280	38.5
Craftsmen	10.3	6880	42.4
Operatives	9.1	6020	39.7
Service Workers	9.1	4010	45.3
Laborers	8.3	5070	37.5

[a]Source: Table 8, 1960 U.S. Census of Population, Educational Attainment, Vol. PC(2)-5B.

[b]Each figure in this column is the average median income in 1959 for the sample of 47 cities. The source is Table 124 of the 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

[c]Source: Table 123 of the volume referred to in footnote b above.

The group with the best response to potential unemployment, professionals, is also the most educated; sales workers are second both in terms of education and size of the unemployment coefficient. Over-all, the rank order correlation coefficient between the unemployment coefficient and education is +.88. Apparently education also provides an explanation of the results.

Median income by occupation tends to substantiate the results even more. In general, there is a strong correspondence between median income and the migration reaction to potential unemployment. The second column of Table A-6 provides information as to the median income of each occupation in 1959. The rank order correlation coefficient is, in this case, +.67. To the extent that income is indicative of financial reserves, this is another factor contributing to an explanation of the coefficients since financial reserves should ease the migration process. Moreover, greater income should mean that the migrant can recoup any costs of migration with little difficulty.

Other than income and education, the analysis of socio-economic variables does not seem to improve upon the explanation of the migration differentials. It is usually presumed that age is an important determinant if the rate of mobility, yet managers with one of the highest migration responses to unemployment have the highest median age of all the groups studied (45.5). On the other hand, laborers have the lowest median age--37.5 years--yet their record as far as migration and economic opportunity are concerned, is extremely poor. The median age of each of the occupations is presented in Table A-7. Other than the two extreme cases of managers and laborers, there is almost no relationship of age to the coefficients of potential unemployment--the rank order correlation coefficient is a low +.14.

Furthermore, large families are thought to be a deterrent to migration, but the rank order correlation coefficient with the percentage of families with own children under 18, as shown in the first column of Table A-8 is of a minor order--+.16. In computing the correlation coefficient, the occupation with the lowest percentage of families with own children under 18 was assigned a value of one, the occupation with the second lowest, 2, etc. In other words, the correlation is designed to show the relationship of the regression coefficient with the ease of migration with respect to family size; the nearer the coefficient to plus one, the more migration and ability to move are in correspondence. Similarly, the data in the second column of the same table, the percentage of

TABLE A-8

FAMILY CHARACTERISTICS BY OCCUPATION

Occupation	% of Families with Own Children under 18[a]	% of Families with More Than One Child[a]
Professionals	67.8	69.0
Managers	61.1	67.6
Clerical	61.0	64.4
Sales	61.0	64.4
Craftsmen	65.7	68.8
Operatives	67.4	68.5
Service Workers	54.1	64.0
Laborers	63.1	70.1

[a]Source: Table 189, 1960 U.S. Census of Population, United States Summary, Detailed Characteristics, PC(1)-1D

families with more than one child, were ranked in accordance with the suggested ease of mobility, i.e., service workers first and laborers last. The correlation coefficient computed is a weak +.26.[6] Possibly the inconsistencies noted here--the unimportance of age and family size--are created by the considerable influence of demand exceeding that of these other determinants.

In all of the sources of explanation put forth, the relatively high coefficient of potential unemployment for service workers (+.69) seems slightly irregular--service workers have next to the lowest income, next to the lowest educational attainment, and there are not many areas which had excess demand for service workers, as defined, over the 1955-1960 period. The only factor which seems to explain this irregularity is the ability to migrate which service

[6]These are the only characteristics of family size by occupation which are available. Certainly average family size would be a more desirable variable.

workers have because of favorable family characteristics. Of all the families of which the head is a service worker, only 54.1 percent have children under 18, the lowest percentage of all the occupations, nearly 7 percent lower than the group with the next lowest percentage, managers. At the same time, the percentage of families with more than one child is the lowest for service workers. Other than this factor, the size of the regression coefficient is puzzling.

The final explanatory factor to be studied is the way in which each occupation goes about moving to another region and obtaining a job in the region. What is the relative importance for each occupation of job transfers, migration to look for work or migration to take a new job? Answers to these questions were gathered by a Department of Labor survey and are presented as Table A-9 in this text. In every instance the results support the distribution of regression coefficients of potential unemployment by occupation.

As shown in the table, white-collar workers are more likely to move because of a job transfer, are less likely to move to seek work and are more likely to move to take a pre-arranged job than are blue-collar workers. Once more utilizing the convenience of rank order correlation coefficients, the correlation between the percentage of workers of each occupation moving because of a job transfer with the relevant regression coefficients is +.87, whereas the correlation with the percentage of each occupation migrating to take a job in the receiving region is +.37. Correlating the regression coefficients with the information on the percentage moving to look for work, but assigning the value of one to managers (who have the lowest percentage), two to professional workers (who have the next lowest), etc., a value of +.62 is obtained. Viewed in these terms, the conclusion is inescapable that those occupations which migrated most effectively were aided by the institutions of the labor market expediting the process. Professional workers, sales workers and the other white-collar

TABLE A-9

REASONS FOR MIGRATING BY OCCUPATION--PERCENT DISTRIBUTION[a]

Occupation	Reason for Migrating: To Take a Job	To Look for Work	Job Transfer
Professionals	42.3	1.9	19.4
Managers	31.7	1.1	15.8
Clerical	24.6	3.0	13.4
Sales	26.8	8.7	26.2
Craftsmen	28.3	7.3	7.8
Operatives	27.2	14.6	6.4
Service Workers	20.9	17.3	6.4
Laborers	17.3	26.0	1.3

[a]Source: Saben, Monthly Labor Review, LXXXVII, No. 8 (above, Sec. II, note 7,) 877. Adding the three columns for each occupation and subtracting from 100.0 yields the percentage of respondents who migrated for other than work-related factors.

groups were often able to arrange for jobs before they moved, did not have to undergo the uncertainty of moving and then finding a job, and finally, their migration was frequently associated with a job transfer.

The empirical results for the labor force by occupation, as interpreted, strongly suggest that the geographical labor market is working quite well, shifting labor resources from centers of high unemployment to centers of low unemployment where there is some possibility that the transfers will reduce the over-all unemployment rate of the occupation. This is the situation for professionals, managers, clerical workers, sales workers and, to some extent, service workers. Where the response to unemployment is weak, such as for laborers and operatives, the opportunities for employment elsewhere are usually nonexistent. In effect, redistribution of the labor force of these occupations will not reduce unemployment. Demand, as far as the geographic dimension of the labor market is concerned, is essential for the efficient functioning of the labor market. At the same time, the relative income and education advantage accruing to some of the groups helps to account for the adequacy of their migration response to unemployment.

b. The Efficacy of Male Migration by Age Group

The empirical results for males by age group are similar in many ways to those for the occupational classes. In and outmigration tend to complement each other, together creating the rather strong results for net outmigration. Both forms of relative potential unemployment were tried (i.e., in one instance, the potential unemployment rate was divided by the average unemployment rate of the region and, in the other instance, the average unemployment rate of the region was subtracted from the potential unemployment rate), but once again the form $(U^{*\prime} - U_r)$ proved to be statistically superior. When relative potential unemployment was, again, compared with the potential unemployment rate, the former was discarded in favor of the simpler term, the potential unemployment rate. Again it is the absolute unemployment rate of the group that is relevant, not any comparative concept of unemployment.

Median regional income specific to each age group is also an insignificant variable except in the instances of the 25-29, 45-54 and 55-64 age groups (see Table A-10). Only in the case of the 25-29 age bracket is the coefficient of the expected sign, with net outmigration declining by one-fourth of one percent for every one-hundred-dollar increase in median regional income. The positive sign of the income coefficient for the 45-54 and 55-64 age groups is puzzling, particularly since potential unemployment and median income are only slightly correlated. As happened with the occupations examined, the suggestions made are that possibly job-related factors other than income are operating here, serving to attract members of these age groups from areas with high income (e.g., early retirement might lead to migration to low cost areas); that real income rather than money income might show otherwise; and, finally, that the labor market functions so as to equalize unemployment rather than income, given rigidities in labor pricing.

The variable, "average regional unemployment," is also used here for the same purpose--to test the idea that labor force participants also judge their employment prospects within a region by the total performance of the region as a labor market. Furthermore, the opportunity presents itself to empirically implement a test of the commonly-held notion that chronically depressed areas disgorge large numbers of the young simply because of the poor employment experience of the region as a whole. In effect, the notion asserts that the coefficient of average regional unemployment should be largest for the younger age groups, the 20-24 and 25-29 year-old bracket. On the contrary, only in the 30-34 and 35-44 groups is the coefficient significant at all and, moreover, is of the opposite or negative sign. In view of the expectation that the coefficients should have the opposite sign, it is not at all clear what the explanation is. It is unlikely that multicollinearity is creating a problem since the simple correlation coefficients with the potential unemployment rate are only +.324 and +.408, respectively, while the simple correlation coefficients of average regional unemployment with median income are also small, measuring -.265 and -.302, respectively. The answer to the problem is not clear at all; perhaps factors other than income and potential unemployment are operating here,

TABLE A-10

REGRESSION COEFFICIENTS: NET OUTMIGRATION BY MALE AGE GROUP[a]

Male Age Group	Independent Variables: Potential Unemployment Rate[b]	Regional Unemployment Rate	Median Income[c]	$\bar{R}^2$
20-24	.9249 (.0320) 28.9	-.3638 (.2276) 1.6	.1263 (.0769) 1.6	.9793
25-29	.6987 (.0683) 10.2	-.1691 (.2474 .7	-.2528 (.1109) 2.3	.8527
30-34	.8806 (.0438) 20.1	-.3550 (.1095) 3.2	.0164 (.0503) .3	.9142
35-44	.8204 (.0463) 17.7	-.3019 (.0877) 3.4	.0463 (.0327) 1.4	.8944
45-54	.5886 (.0670) 8.8	-.1345 (.1005) 1.3	.0789 (.0318) 2.5	.7255
55-64	.4716 (.0760) 6.2	-.0904 (.0969) .9	.0926 (.0275) 3.4	.6203

[a]The dependent variables are defined as explained in Section IV.

[b]The 1960 unemployment rates for each group which are required to compute the potential unemployment rates are from Table 115 of the 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

[c]Source: Same as above, Table 134.

tending to restrain the movement of males between 30 and 44 years of age out of areas which have had high rates of unemployment for some time. Here, too, regional unemployment is not an important source of variation in migration by subgroups.

Once more potential unemployment is highly significant for all male age groups in the multiple regression equations for net outmigration, shown in Table A-10, denoting that to the extent chronically depressed areas are disproportionately losing the younger components of their population, the cause is to be attributed to the lower employment opportunities for the young rather than the unemployment experience of the regional labor force taken as a whole. The coefficients of potential unemployment for all male groups behave as expected, in general declining with age. As Table A-10 indicates, the coefficient for males age 20-24 is .92 (which is significantly less than one); for males 25-29, .70; for males 30-34, .88; for 35-44, .82; for 45-54, .59; and 55-64 has the lowest value of all, .47. Thus, the response tends to decrease with unemployment, the only anomaly being the relatively low value of .70 for 25-29 year-olds which is a "discrepancy" of a minor order. In addition to this, in terms of the coefficient of multiple determination, potential unemployment explains less of the observed migration as age increases.

The migration response to potential unemployment is indeed differentiated by age. To confirm that the observed differences in the coefficient are substantive, the analysis of covariance test used for occupation was also applied here with the identical result: more of the net outmigration of the labor force is explained, statistically, than if a single equation were used.

As stated before, these results are supported by both inmigration and outmigration, although the results for gross outmigration are fairly weak. The regression results for inmigration are presented in Table A-11 and the results

TABLE A-11

REGRESSION COEFFICIENTS: GROSS INMIGRATION BY MALE AGE GROUP[a]

Male Age Group	Independent Variables: Potential Unemployment Rate	Regional Unemployment Rate	Median Income	$\bar{R}^2$
20-24	-.7865 (.0729) 10.8	.3006 (.5186) .6	-.4851 (.1753) 2.8	.8749
25-29	-.4873 (.1281) 3.8	-.7136 (.4637) 1.5	-.1149 (.2078) .6	.5068
30-34	-.5736 (.1282) 4.5	-.2815 (.3206) .9	.0129 (.1471) .1	.4384
35-44	-.4111 (.1286) 3.2	-.1446 (.2436) .6	.1500 (.0909) 1.7	.4113
45-54	-.2855 (.1240) 2.3	-.0579 (.1861) .3	.0754 (.0588) 1.3	.3087
55-64	-.3202 (.1336) 2.4	.0426 (.1703) .3	.0164 (.0484) .3	.1956

[a]The sources and explanation of this table are the same as in Table A-10.

for outmigration are in the following table, Table A-12. In both cases, the results are for the multiple regression equation with the potential unemployment rate, the regional unemployment rate and median income as the independent variables.

For inmigration, the coefficients are each negative as expected and are each statistically significant at the 5-percent level. Identical to the net outmigration equations, the age group with the greatest reaction to unemployment is the 20-24 age group with a coefficient of -.79; the response is less for

TABLE A-12

REGRESSION COEFFICIENTS: GROSS OUTMIGRATION BY MALE AGE GROUP[a]

	Independent Variables			
Male Age Group	Potential Unemployment Rate	Regional Unemployment Rate	Median Income	$\bar{R}^2$
20-24	.1369 (.0593) 2.3	-.0530 (.4219) .1	-.3530 (.1426) 2.5	.2706
25-29	.2106 (.1303) 1.6	-.8783 (.4716) 1.9	-.3672 (.2114) 1.7	.1047
30-34	.3078 (.1364) 2.3	-.6417 (.3411) 1.9	.0278 (.1566) .2	.0654
35-44	.4156 (.1325) 3.1	-.4474 (.2508) 1.8	.1969 (.0936) 2.1	.2060
45-54	.2971 (.1238) 2.4	-.1831 (.1859) 1.0	.1532 (.0588) 2.6	.1585
55-64	.1489 (.1384) 1.1	-.0479 (.1764) .3	.1092 (.0502) 2.2	.0891

[a]The sources and explanation of this table are the same as Table A-10.

the 25-29 bracket, and is somewhat stronger, -.57, for 30-34 year-olds. From there, the response to potential unemployment tends to decline with age, being -.41 for 35-44 year-olds, -.29 for 45-54 year-olds and -.32 for the 55-64 year olds. Incidentally, the groups 14-19 years old and 65 and over are ignored since the focus here is upon the labor force, and the labor force participation rates in these instances are quite small, 32.7 and 30.8, respectively. Once more the propensity for adjustment to unemployment via migration to decline with age is evident. Confidence in the ability of the young to adjust to economic conditions appears to be lessened in view of the income coefficient of the gross outmigration equation for 20-24 year-olds, an unexpected negative .4851. The reason for this is not at all clear.

Less evident of the propensity to adjust to unemployment are the regression coefficients of potential unemployment in the case of gross outmigration. For one thing, the coefficient is not significant for the ages between 25-29 and 55-64. Moreover, while the coefficient is positive as expected in the other four categories, the +.42 for 35-44 year-olds is the highest, with the +.31 of the 30-34 age bracket next, followed by 45-54 year-olds with a coefficient of +.30 and the 20-24 age group with +.13. While these results offset the results obtained for gross inmigration, they do so only partially, permitting the rather strong results noted with net outmigration.

In total, the values of the coefficients of net outmigration are reasonable since it is known that as age increases there apparently is increasing reluctance to move, to disrupt established life patterns and social ties. Moreover, there is a tendency to accumulate possessions over time, which in itself is expected to inhibit geographical mobility. But perhaps an even more important contributive factor to the over-all decline in the migration coefficient is the fact that the present value of a discounted stream of future earnings is larger for the young, even with the same annual earnings, because of the greater time span for which such earnings are available to the young. In other words, the income gains accruing to the young should they migrate are greater than the income gains for the older segments of the labor force. For this reason, the coefficients should decline with age.

Another factor contributing to an explanation of the coefficients is educational attainment which also served as an explanatory variable for the empirical results on occupations. The median educational attainment for males by age is shown in the first column of Table A-13. The upward historical trend

TABLE A-13

SELECTED SOCIO-ECONOMIC CHARACTERISTICS BY AGE FOR MALES

Male Age Group	Median Educational Attainment in Years[a]	Median 1959 Income[b]	Average Family Size[c]
20-24	12.2	$2960	3.10
25-29	12.3	5100	4.14
30-34	12.1	5100	4.14
35-44	12.0	5740	4.46
45-54	10.1	5510	3.67
55-64	8.7	4970	2.84

[a]Each figure is for the United States. The source is Table 1 of the 1960 U.S. Census of Population, Educational Attainment, Vol. PC(2)-5B.

[b]Each figure is the average median income for the sample. The requisite data are from Table 134 of the 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

[c]Computed from Table 186 of the U.S. Census of Population, United States Summary, Detailed Characteristics, Vol. PC(1)-1D.

in education is a well-known phenomena, leading to the inverse relationship of age and education shown in the table. The contention here, as before, is that education works in two ways to facilitate the movement of the labor force: first, education is to some extent a proxy variable for demand as the complexities of modern production have evolved and will continue to evolve, requiring ever more educated labor inputs; second, the acquisition of education probably facilitates maximization of labor force-oriented goals by increasing the resourcefulness of the worker. In any case, there is a persistent relationship between the coefficient of the potential unemployment rate and education--a rank order correlation coefficient of +.67. Actually, many of the 20-24 year-olds have not, presumably, completed their education so that eventually this group will have the highest median attainment of education.

Aside from this, median income and average family size do not seem to have patterns which assist in the explanation of the age specificity of migration noted. Median income rises with age but eventually declines for the last two age brackets considered--45-54 and 55-64--as is shown in Table A-13. At the same time, average family size follows a pattern unlike that of the regression coefficients--rising initially and reaching a peak for the 35-44 age group and declining consistently thereafter. However, the small average family size of the young, particularly those 20-24 year old, probably does permit ease of movement. Even the relatively high average family size for 25-29 year-olds might not be too much of an inhibitor of migration since a large number of such families have children too young to attend school so that disruption of school attendance is sometimes not a problem to be weighed in the migration decision.

On balance, much of the age selectivity of migration in response to unemployment depends upon the ability of the individual to move as determined by his personal characteristics--his established social ties, the importance of gains in income if migration takes place, family size, accumulation of possessions, etc. Perhaps important above all is the spirit of youth--the willingness to accept change, even to welcome it--a spirit undefinable, unmeasurable, the expression of which is much better left to the poets.

Nevertheless, demand conditions modify that spirit and alter the relative importance of personal characteristics. What were the relative changes in the age structure of employment of the male labor force over the 1950-1960 period? Beginning with the rate of growth of employment for the sample taken as a whole, which is presented in the first column of Table A-14, one prominent feature is

TABLE A-14

THE RATE OF GROWTH OF MALE EMPLOYMENT BY AGE, 1950-1960

Male Age Group	Rate of Growth of Male Employment--Sample[a]	Rate of Growth of Male Employment--U.S.[b]
20-24	-2.9	-.73
25-29	-8.2	-8.2
30-34	7.1	5.6
35-44	15.4	11.8
45-54	17.6	20.3
55-64	15.0	30.8
Total Male Labor Force	5.1	6.9

[a]Source: Table 116, 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

[b]Source: Table 195, 1960 U.S. Census of Population, United States Summary, Detailed Characteristics, Vol. PC(1)-1D.

the absolute decline in employment of the 20-24 and 25-29 age groups, a decline occurring while male employment of all groups was increasing by 5.1 percent. Employment of males age 30-34 rose by 7.1 percent in the forty-seven cities and rose substantially for the remaining groups; by 15.4 percent for 35-44 year olds; 17.6 percent for 45-54 year-olds; and 15.0 percent for the 55-64 age group. Correlated by rank order with the regression coefficients, a value of -.43 is obtained. In other words, migration was most responsive in those sectors of the labor market where it is perhaps least expected, where employment actually declined. Moreover, this is not an oddity of the sample, since approximately the same changes took place in the entire nation, as is demonstrated by the rank order correlation coefficient between the two types of growth rates of +.89. Thus, although the levels of rates of growth are different, comparatively, for each age group, the structure is preserved.

Before commenting on the variation between the coefficients and the rate of growth of employment as an estimate of relative demand, it is instructive to first look at some other indicators of demand. Average unemployment in 1960 of the sample is one of these. The relevant data are presented in the first column of Table A-15. Similar to their growth rates, the worst employment conditions are suffered by the two younger groups--the 20-24 and 25-29 year-olds--with average unemployment rates of 9.0 and 5.4 respectively, although the ordering is, in this case, reversed from the growth rates. Other than this, there is no clear pattern for the remaining groups, each deviating from an unemployment rate of 4.2 percent by no more than one-half of one percent. Still, the evidence seems clear that the migration response to unemployment was strongest where over-all demand was weakest.

TABLE A-15

RATES OF POTENTIAL UNEMPLOYMENT, ACTUAL 1960 UNEMPLOYMENT AND NET OUTMIGRATION BY MALE AGE GROUP[a]

Male Age Group	Average 1960 Unemployment Rate	Average Potential Unemployment Rate	Average Potential Unemployment--Adjusted[b]	Average Net Out-Migration Rate
20-24	9.0	11.3	13.5	3.1
25-29	5.4	4.2	5.8	-1.3
30-34	4.3	5.9	6.3	1.8
35-44	4.0	5.8	5.9	1.9
45-54	4.2	5.5	5.5	1.3
55-64	4.7	6.3	6.3	1.6

[a]In each case, the average is the simple arithmetic average of the rates of the 47 cities.

[b]Computed on the assumption that, even in the tightest of labor markets, there is an irreducible minimum of one-percent unemployment.

Again, it is fruitful to ask if, for any of the groups, migration reduced the unemployment rate. What would the rate of unemployment by age group have been if no migration had occurred? The potential unemployment rates--some of them negative--were averaged and are presented in Column 2 of Table A-15. Assuming that negative unemployment rates are impossible and adopting the convention that the unemployment rate can never fall below one percent, recalculating the unemployment rates yields Column 3, "average potential unemployment--adjusted." Note that the rates cluster about 6 percent, with only the 13.5 percent rate of the 20-24 age group deviating drastically.

In comparing these hypothetical rates with the rates actually occurring in 1960, given that migration did take place, special attention should be paid to the last column of Table A-15 "average net outmigration," which shows the average rate of net outmigration for the sample of SMSA's. Since the sample is an open one in that some of the migration of the labor force is to and from areas not in the sample, the average rate of net outmigration for the sample will probably not be zero, as the table indicates. Consequently, a positive rate of average net outmigration means that this factor reduced the 1960 unemployment rate of the sample below what it otherwise would have been. In a like manner, average net inmigration (negative net outmigration) tends to raise the actual end-period unemployment rates.

For the 20-24 age group, net outmigration from the sample of cities as a whole reduced the potential unemployment rate by 3.1 percent, while migration from areas of high unemployment to areas of low unemployment reduced the unemployment rate by the remainder of the difference between the average potential unemployment rate (adjusted) and the actual 1960 unemployment rate, a reduction of 1.4 percent. Without average net inmigration, the average potential unemployment rate would have been 7.1 percent (average potential unemployment, adjusted, of 5.8 percent plus average net inmigration of 1.3 percent); hence, migration reduced the average SMSA unemployment rate by the difference, 1.7 percent. Consequently, unemployment would have been higher if the migration observed had not occurred.

Applying the same type of analysis to the 30-34 age groups implies that migration reduced the unemployment rate by 0.2 percent, whereas for the other groups, there is no difference. These latter groups did respond to potential unemployment to some extent, although not as much as the younger components of the labor force. In addition, there apparently was enough movement by these groups for reasons other than differentials in potential unemployment to somewhat offset the migration which tended to reduce the unemployment rate. _Ex post_, a total of seven cities would have had excess demand for members of the labor force 20-24 years of age, and fifteen cities would have had excess demand for those 25-29 years of age, while there were only five such cities for 30-34 year-olds and two for 35-44 year-olds. For the two oldest age groups there is not a single city which, as measured by potential unemployment, would have had excess demand.

The fact that there are, conceptually, SMSA's which would have had excess demand, as defined, for the younger components of the labor force, which is not true of the older segments of the labor force, is probably not an indication of excellent over-all demand for the labor services of the young, but rather is an indication of the relative ease and rapidity with which the young adjust to economic opportunity, i.e., disparities in regional unemployment rates. Because the young are able to adjust so well, the potential unemployment rates are in some cases negative (excess demand). By other standards--the rate of growth of employment and average unemployment--the demand conditions for the young were poor at the time migration took place. In effect, the explanation offered is that, in spite of adverse demand conditions, the ability of the young to migrate leads to a migration response coefficient to unemployment greater than the same coefficient for the older members of the labor force, reducing the over-all unemployment of the young. It is interesting to speculate what the size of the regression coefficients for the young would have been if demand conditions had been good.

While the coefficients for the three older age groups are not as large as those for the three younger groups, they are of appreciable magnitude. Nevertheless, an examination of the actual unemployment rates indicates that, if the migration response had been stronger, these groups could have reduced their over-all unemployment rate, since there were a number of cities with fairly low unemployment rates and demand was favorable. For example, one city had an unemployment rate for 35-44 year-olds of 1.8 percent in 1960; the city with the best record for 45-54 year-olds had an unemployment rate of only 2.2 percent. Similarly, 2.5 percent unemployment was the best unemployment record for those workers 55-64 years of age. In each case, the minimum unemployment rate is much lower than the average unemployment rate.

In contrast to the conclusions drawn for the occupational groups studied, the analysis of the male labor force segmented by age shows less of a dependency upon demand for an explanation of differentials in the adjustment to migration and more upon the ability of the groups to adjust. Age and its attendant relationships becomes crucial. In no way is this meant to be a denial of the proposition that demand is a key factor; certainly if a shift in demand should develop favoring the young, the migration response should be even stronger. In conclusion, in terms of the efficiency of operation of the labor market, the response of the young is quite good, whereas that of the older components of the labor force is to some extent deficient.

c. The Efficacy of Female Migration by Age Group

The migration behavior of the female labor force is in many ways similar to that of males; however, female migration patterns are unique enough to warrant the separate discussion. At the same time, the format followed is nearly identical to that utilized in the two preceding parts of this section, permitting a cursory treatment of the reuults.

Resembling the results for males, neither of the relative potential unemployment terms compares favorably with the potential unemployment rate as an explanatory variable. For females, neither median regional income by age nor average regional unemployment are significant in any instance, although both variables are included in the equations analyzed. The set of such equations for net outmigration is to be found in Table A-16. The potential unemployment rate is significant in every instance for net outmigration with the coefficient initially decreasing with age and rising somewhat for the last two groups studied. For females 20-24 years of age, the coefficient is .94, for females 25-29, the coefficient is .95, for ages 30-34 the coefficient drops to a low of .34, it rises to .49 for the 35-44 bracket, to almost .52 for the 45-54 category and, finally, has a value slightly greater than .52 for the 55-64 group. Once more, the result of the analysis of variance test is that migration is truly differentiable by age, that using a set of six equations is superior to using a single equation.

These results are supported to a large extent by the regression coefficients for gross inmigration. As can be seen from Table A-17, "Regression Coefficients: Net Inmigration by Female Age Group," the best reaction to potential unemployment is by the young--the 20-24 and 25-29 age groups--while the coefficient is not significant for 30-34 year-olds (the only instance in which it is not significant). For the 35-44 group the coefficient is a -.37, it improves to

TABLE A-16

REGRESSION COEFFICIENTS: NET OUTMIGRATION BY FEMALE AGE GROUP[a]

	Independent Variables			
Female Age Group	Potential Unemployment Rate[b]	Regional Unemployment Rate	Median Income	$\bar{R}^2$
20-24	.9435 (.0432) 21.9	.1221 (.2151) .6	.1636 (.0972) 1.7	.9687
25-29	.9522 (.0642) 14.8	-.0867 (.1764) .5	-.1410 (.1130) 1.2	.8863
30-34	.3361 (.0901) 3.7	.4302 (.2359) 1.8	.2290 (.1750) 1.3	.3395
35-44	.4919 (.0762) 6.4	.1588 (.1401) 1.1	.1352 (.0878) 1.5	.5838
45-54	.5191 (.0743) 7.0	-.0018 (.1031) .0	-.0349 (.0538) .6	.6526
55-64	.5242 (.0885) 5.9	-.0699 (.1201) .6	-.0456 (.0604) .8	.5209

[a]The dependent variables are defined as explained in Section IV.

[b]The 1960 unemployment rates for each group which are required to compute the potential unemployment rates are from Table 115 of the 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

[c]Source: same as above, Table 134.

a -.52 for those females 45-54 years of age and reaches a low for the oldest group studied, a coefficient of -.35.

In contrast, not one coefficient of potential unemployment is statistically significant for gross outmigration (see Table A-18). While most of the outmigration

TABLE A-17

REGRESSION COEFFICIENTS: GROSS INMIGRATION BY FEMALE AGE GROUP[a]

Female Age Group	Independent Variables: Potential Unemployment Rate	Regional Unemployment Rate	Median Income	$\bar{R}^2$
20-24	-1.0124 (.1003) 10.1	.6160 (.4998) 1.2	-.8671 (.2258) 3.8	.8442
25-29	-.7559 (.1590) 4.8	-.3405 (.4367) .8	.1126 (.2797) .4	.5002
30-34	-.1909 (.1114) 1.7	-.7342 (.2916) 2.5	-.0420 (.2165) .2	.2326
35-44	-.3701 (.1175) 3.2	-.2281 (.2148) 1.1	.1157 (.1346) .9	.3489
45-54	-.5158 (.1159) 4.5	.1291 (.1607) .8	.2027 (.0837) 2.4	.4428
55-64	-.3513 (.1154) 3.0	.0901 (.1565) .6	.1562 (.0787) 2.0	.2656

[a]The sources and explanation of this table are the same as in Table A-16.

coefficients are significant for the occupational male age groups, the coefficients are usually smaller than those of net outmigration and gross inmigration; consequently, these results in conjunction with the results for females point to the conclusion that the equalization of unemployment that does take place is due more to migrants moving to areas with low unemployment than to large outflows from areas with high unemployment. It has been stated in this study that this is not too surprising because, given that there is some reluctance to move, once this reluctance is overcome, the maximization principles of the

TABLE A-18

REGRESSION COEFFICIENTS: GROSS OUTMIGRATION BY FEMALE AGE GROUP[a]

Female Age Group	Independent Variables: Potential Unemployment Rate	Regional Unemployment Rate	Median Income	$\bar{R}^2$
20-24	-.0697 (.1045) .7	.7411 (.5210) 1.4	-.7030 (.2354) 3.0	.1999
25-29	.1944 (.1647) 1.2	-.4181 (.4524) .9	-.0267 (.2897) .1	.0000
30-34	.1457 (.1092) 1.3	-.3013 (.2860) 1.1	.1874 (.2123) .9	.0119
35-44	.1182 (.1256) .9	-.0625 (.2297) .3	.2521 (.1440) 1.8	.0472
45-54	.0069 (.1325) .1	.1317 (.1838) .7	.1723 (.0957) 1.8	.0169
55-64	.1756 (.1366) 1.3	.0159 (.1853) .1	.1086 (.0932) 1.2	.0414

[a]The sources and explanation of this table are the same as in Table A-16.

labor market are apparently adhered to. The particular inability of females to leave areas in which they are experiencing substantial rates of unemployment is not startling, either, since family responsibilities should serve to restrict the free movement of women. This might also explain the unimportance of average regional unemployment and median income for females.

The migration response of women with respect to gross inmigration and ··t outmigration is quite efficient, even when compared to that of their male counterparts. However, each net outmigration coefficient for females is significantly different from the corresponding coefficients for males. The coefficients of .94 and .95 for females 20-24 and 25-29, respectively, show a better response to potential unemployment than the response of males (.92 and .70 in that order). On the other hand, for the next three age groups the unemployment response is very much less than that of males. At the other extreme of 55-64 year-olds, the coefficient is once more superior for women, .52 compared to .47.

The parabola-like movement of the coefficient seems to be the reflection of the child-bearing and child-rearing cycle which has its greatest incidence in precisely those years, accounting for the poor rate of response to unemployment of women between 30 and 45 years of age.[7] At the same time, this should mean that the upper and lower extremes of the age distribution are relatively mobile. The acuteness of the response of the two youngest groups is somewhat extraordinary since the coefficients are significantly greater than the corresponding ones for males. The reason for this is not at all clear because both demand conditions and characteristics of females are nearly the same as for males, as will become evident as the discussion proceeds.

In spite of the minimum response for females occurring with the groups at the center of the age distribution rather than for the last age group, or groups, it still remains true that, on a broad basis, the coefficients of the young are larger than the coefficients of the older groups studied.[8] Apparently the factors which created the same results for males are at work here, such

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[7]See Table A-13 which relates average family size to the age of the head of the family, giving a good indication of the impediment family size is to migration for certain age groups.

[8]The coefficient of rank order correlation of age with the regression coefficients is +.43.

as increasing reluctance to disrupt established life patterns and social ties, the spirit of the young, the accumulation of possessions over one's lifetime, etc. In addition, the median educational attainment of females decreases with age, as can be seen in Table A-19. The rank oorrelation coefficient between age and education is a perfect -1.0, whereas the correlation coefficient between education and the regression coefficients of potential unemployment is +.43, signifying that education is of some importance.

Furthermore, income appears to be of no immediate consequence in this instance, either, since income and the regression coefficients are inversely related, the rank order correlation coefficient being -.6. In fact, this is the obverse of the notion that greater income should facilitate the migration process. Perhaps this factor is offset by the rigidities imposed by family responsibilities.

Turning to demand considerations, the rate of growth of female employment over the 1950-1960 decade for the sample and for the nation uniformly resemble the male growth patterns. For the sample, the 20-24 and 25-29 groups experienced a decline in their levels of employment, declines of -14.2 and -7.6, respectively. This contrasts sharply with the prodigious growth in employment of the rest of the female labor force. However, the same type of pattern was followed in the entire nation--the rank order correlation coefficient between sets of growth rates is +.95. Again, the same situation presents itself as with males in that the national growth rates are higher than the sample growth rates as is shown by the rates of growth of the total labor force. The divergence for females is 7.7 percent, favoring the nation with a growth rate of 35.1 percent compared to 27.4 percent for the sample as a whole (see Table A-20).

TABLE A-19

SELECTED SOCIO-ECONOMIC CHARACTERISTICS BY AGE FOR FEMALES

Female Age Group	Median Educational Attainment in Years[a]	Median 1959 Income[b]
20-24	12.5	$1990
25-29	12.4	2080
30-34	12.2	2090
35-44	12.1	2270
45-54	11.4	2470
55-64	10.0	1890

[a]Each figure is for the United States. The source is Table 1 of the 1960 U.S. Census of Population, Educational Attainment, Vol. PC(2)-5B.

[b]Each figure is the average median income for the sample. The requisite data are from Table 134 of the 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

TABLE A-20

THE RATE OF GROWTH OF FEMALE EMPLOYMENT BY AGE, 1950-1960

Female Age Group	Rate of Growth of Female Employment--Sample[a]	Rate of Growth of Female Employment--U.S.[b]
20-24	-14.2	-4.4
25-29	-7.6	-6.7
30-34	5.7	16.7
35-44	30.5	36.5
45-54	69.6	69.8
55-64	88.5	82.9
Total Female Labor Force	27.4	35.1

[a]Source: Table 116, 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

[b]Source: Table 195, 1960 U.S. Census of Population, United States Summary, Detailed Characteristics, Vol. PC(1)-1D.

The slackness in the market for the younger components of the female labor force is also apparent when the 1960 unemployment rates by age group are compared (see Table A-21). In fact, there is a perfect inverse relationship between age and the unemployment rate with the 20-24 age group having the highest unemployment rate--6.4--and the 55-64 age group having the lowest unemployment rate, a rate of 3.8 percent. Again, the relationship between demand (as measured by average unemployment and the regression coefficient is the perverse one that the best migration response to unemployment differentials seems to occur for the segments of the labor force where demand is most unfavorable.

TABLE A-21

RATES OF POTENTIAL UNEMPLOYMENT, ACTUAL 1960 UNEMPLOYMENT AND NET OUTMIGRATION BY FEMALE AGE GROUP[a]

Female Age Group	Average 1960 Unemployment Rate	Average Potential Unemployment Rate	Average Potential Unemployment--Adjusted[b]	Average Net Out-Migration Rate
20-24	6.4	4.0	6.6	-2.5
25-29	6.2	7.0	7.5	1.0
30-34	6.1	8.7	8.7	1.8
35-44	5.1	6.7	6.7	1.4
45-54	4.1	5.1	5.1	1.1
55-64	3.8	5.5	5.5	1.8

[a]In each case, the average is the simple arithmetic average of the rates of the 47 cities.

[b]Computed on the assumption that even in the tightest of labor markets, there is an irreducible minimum of one-percent unemployment.

Nevertheless, the vigor with which the young seek out employment opportunity can be poignantly demonstrated by considering the spread of average potential unemployment rates (adjusted) shown in Column 3 of Table A-21 relative to the actual 1960 unemployment rates. Once more, the impact of average net outmigration must be weighed. If net outmigration had not occurred, the average potential unemployment rate (adjusted) of the 20-24 age group of females would have been 9.1 percent; hence, the equilibration of the labor market reduced the unemployment of this group by 2.7 percent. The similar reduction for the next age group is a hypothetical 0.3 percent, while the reduction for 30-34 year-olds is 0.8 percent. The weakness of the migration response of the remaining groups is sufficient to have little or no effect upon the actual unemployment rate with only a possible 0.2 percent decrease in unemployment for those 35-44 years old, whereas unemployment actually increased by 0.1 percent for the last two groups. These increases might be a statistical artifact created by the gross rounding permitted in computing the rates in each instance.

In terms of the number of cities which would have excess demand had migration not taken place at all, the age group 20-24 leads with fourteen such cities, followed by the 25-29 age group with five, while all the rest, on this basis, do not display a single city which would have had excess demand.

Thus, the great mobility of young women, like that of young males, evinces itself in the ability of these groups to reduce their over-all unemployment rates even though the labor market for them is one of general excess labor supply. The better unemployment rates enjoyed by the older segment of the female labor force along with their relatively low regression coefficients point out the possibility that greater geographic mobility in the directions specified by the theory of the labor market would serve to reduce the total unemployment rate of these groups. However, for the middle categories of age, the existence of family responsibilities tends to preclude the possibility that migration, for these groups, could become more efficient, even though these groups have the lowest coefficients among females.

THE IMPLICATIONS OF LABOR MIGRATION FOR DEPRESSED AREAS

Granted that the age and occupation specificity of migration differ, to what extent did areas with high rates of unemployment over the period studied lose members of their labor forces and, on the other hand, to what extent did areas in which the labor market as a whole was tight show a net gain in the size of the labor force due to substantial net inmigration? In order to answer these questions, each directional flow of migration of the entire regional labor force was regressed upon the potential unemployment rate. This rate was computed for each region in accord with the definition utilized here as the unemployment rate which would have existed in the region in 1960 if migration had been impossible.

Application of this concept to the total regional labor force is not as satisfactory as when applied to components of the labor force, since the total population of a region and the regional unemployment rate are more likely to be interrelated in this case. This is primarily due to the enhanced possibility that the size of the regional population affects the level of regional employment via demand, whereas the number of persons in any occupation or age group will have little impact upon the demand for their services and, in this way, upon their employment and unemployment.

However, sufficient reasons were put forth at an earlier point to warrant the conclusion that the definition, even in this case, is not too tenuous. One of these reasons is that regional unemployment is a function of a host of other factors, such as export demand, that intraregional demand is not always a primary determinant of employment. Another is that, the preceding aside, the ability of migrants into a region to increment the demand for the output of the region depends upon the sources of income these people might have which are supplemental to wage income. The fact that, historically, the wage share of national income has been around 75 percent would indicate that the strength of this factor is not enough to conclude that a given rate of net inmigration will induce a similar rate of increase of regional employment.[1] To be sure that observable unemployment rates are not better predictors of migration, regressions using both were performed with the results that the potential unemployment rates behave as expected, proving to be a better variable than the observed unemployment variable used, the average regional unemployment rates over the period.

In addition to the potential unemployment rate, median regional income was included as an independent variable to attempt to estimate the strength of this factor in influencing migration. The over-all regression results parallel those obtained for the disaggregative analysis applied to the age and occupational groups. In this instance, the flow of gross outmigration does not appear to have aided the equilibration process in the least, as the following equation shows:

10) $O' = 1.75 + .11\, U^{*\prime} + .05\, I$		
standard error	(.12)	(.06)
t-ratio	.9	.7

In the equation, O' is the rate of gross outmigration with the potential labor force as the base and where U*' and I refer to the regional potential unemployment rate and median income (in hundreds of dollars), respectively. As noted,

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[1]An exception to this statement occurs if the inmigrant has great wealth, position or influential ability, etc. which will significantly stimulate regional employment, i.e., if the qualitative rather than the quantitative aspects of migration are considered. Much of this section will be an involvement with this issue in terms of the age and occupational structure of migration.

neither coefficient is significant at the 5-percent level of significance which necessitates a t-ratio of at least 2.0. Moreover, correcting for degrees of freedom, the equation explains 0.0 percent of the dependent variable. Once again the "push" of regional unemployment is unimportant.

Results more in compliance with theoretical expectations are displayed by the equation for gross inmigration, I':

11) $I' = 13.2 - .54\ U^{*\prime} + .01\ I$

standard error	(.11)	(.06)
t-ratio	4.9	.1

Equation (11) which statistically explains 37 percent of gross regional inmigration indicates that cross-sectionally a one-percent rise in the potential unemployment rate is associated with a one-half of one percent decline in the rate of gross inmigration.

The net effect of the in and outmigration streams is to render net outmigration (M') a direct function of the potential unemployment rate. This is evident from equation (12):

12) $M' = -1.29 + .60\ U^{*\prime} + .01\ I$

standard error	(.06)	(.03)
t-ratio	10.7	.2

The coefficient of multiple determination, corrected for degrees of freedom, is substantial, .74.

The linear and highly significant rate of adjustment of .60 specifies that, to the extent inferences from the equation are valid, it would take slightly less than ten years for a city with an unemployment rate one-percent greater than the average to reduce its unemployment to the average via migration alone. The estimate of ten years is based, in part, upon the five-year time span over which the migration estimates were made. There are, of course, cities which have unemployment rates much greater than the average. For example, over the period the average sample SMSA had an unemployment rate of 5.7 percent, while Wilkes-Barre averaged a dismaying 12.3 percent. The consequence of the inability of migration to act as a safety valve is that centers of persistent high unemployment, such as Wilkes-Barre, are permitted to develop.

Nevertheless, even though the migration response to unemployment is not good enough to equilibrate regional unemployment over a short period of time, it does tend to reduce differentials in regional unemployment. This can be seen by considering those ten cities of the sample which had the highest rates of average unemployment from 1954-1960. These are Buffalo and Utica-Rome, New York; Charleston and Huntington, West Virginia; Providence, Rhode Island; Detroit, Michigan; and Erie, Johnstown, Pittsburgh and Wilkes-Barre, Pennsylvania. For the six-year period, the average unemployment rate of the ten SMSA's is 9.0 percent. However, the recovery which began in 1960 and has continued through 1965, along with the net outmigration which did take place (an average of 2.7 percent for these depressed areas), lowered the 1960 unemployment rate of the cities taken as a whole to 7.1 percent. Of particular interest is the observation that, if migration had not occurred, the unemployment rate in 1960--the potential unemployment rate--for these areas, again taken as a whole, would have been 10.7 percent.[2] Thus, the net outflow of the labor force served the

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[2]A basic assumption here is that, if those who had migrated out of the region had remained in it, their labor force participation rate would have been the same as the regional rate. It could be argued that this is erroneous, that those who migrate have a greater commitment to participation in the labor force than do nonmigrants. However, a study by this author of labor force participation rates of in and outmigrants of SMSA's and of nonmigrants from data presented in the Census volume, <u>Mobility for Metropolitan Areas</u>, shows that inmigrants tend to have the same labor force participation rate as the receiving region, while outmigrants do not have the same rate as the region from which they migrated. Instead, since outmigrants from any city tend to go to many different regions, they usually have the same labor force participation

function of reducing the seriousness of the unemployment problem experienced by the areas with a chronic unemployment problem. Still, these cities did have a high unemployment rate of 7.1 in 1960 compared to an average of 5.8 for the entire sample, which includes these depressed cities.

Both the regression results and the comparison of potential unemployment with actual unemployment, then, indicate that the labor market, geographically, does tend to equilibrate regional unemployment rates. But the indications are also that the adjustment to regional unemployment by migration is not sufficient, by itself, to redistribute employment opportunities, unless the view is taken that the social costs associated with a long time period of adjustment are not inordinate.

Since the efficacy of migration differs by occupational group, it is useful to examine the changes in the structure of the labor force and unemployment by occupation in depressed areas, and the effects of occupational migration of these relationships. Once again the concepts of potential unemployment and the potential labor force will be found useful, enabling a comparison of the occupational structure "before and after" migration and making it possible, in the same way, to compare the structure of occupational unemployment in 1960 with an estimate of what the structure would have been if migration had been impossible. Given the results of these comparisons, an attempt will be made to evaluate whether or not the occupational structure of the labor force and unemployment were in some sense improved by the observed patterns of migration.

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rate as the nation. Thus, the basic assumption appears to be a good one. The idea that the regional labor force participation rate is molded by the unemployment situation of the region is the subject of the report by Martin Segal, Population, Labor Force & Unemployment in Chronically Depressed Areas, U.S. Department of Commerce, Economic Redevelopment Research Series (Washington: U.S. Government Printing Office, October 1964).

The areas selected for study are those ten areas which had the highest average rates of unemployment over the 1954-1960 period listed previously. The period is long enough to term the unemployment as chronic. It should be made clear at this point that, unless otherwise specified, all of the data presented for the depressed areas refer to the regions taken as a whole; that, for example, a reference to the unemployment rate of craftsmen in depressed areas should be understood to mean the unemployment rate for the entire set of regions computed by dividing the total number of unemployed craftsmen in the ten SMSA's by the total number of craftsmen in the labor force in the ten areas.

First, note should be made of the occupational structure of the labor force of the depressed areas in 1960. The pertinent data are presented in Table A-22. Included in the table are the same data for the United States for comparative purposes. Perhaps surprisingly, there is very little difference between the two sets of data, with the most sizable discrepancies for managers and operatives. Managers comprise only 9.1 percent of the labor force of chronically depressed areas and 11.9 percent of the nation's labor force. On the other hand, operatives account for 26.0 percent of the labor force of depressed areas, but only 23.2 percent of the nation. Furthermore, on a broad basis, there is more of a concentration of the labor force in the blue-collar occupations--craftsmen, operatives, service workers and laborers--in depressed areas since 3.2 percent more of the percentage distribution of the labor force is in these categories. Other than this, the differences are minor.

Is the occupational distribution of depressed areas unfavorable? That is, would the over-all unemployment rate of depressed areas have been lower if the concentration of the labor force had not been what it was, i.e., among blue-collar workers and operatives in particular? One way of answering this

TABLE A-22

PERCENTAGE DISTRIBUTION OF THE LABOR FORCE BY OCCUPATION, 1960

Occupation	Percentage Distribution	
	Depressed Areas[a]	U.S.[b]
Professionals	11.3	11.4
Managers	9.1	11.9
Clerical	7.9	7.8
Sales	7.2	7.7
Craftsmen	23.6	22.6
Operatives	26.0	23.2
Service Workers	6.3	6.9
Laborers	8.6	8.5

[a]Source: Compiled from Table 122, 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

[b]Source: Table 201, 1960 U.S. Census of Population, United States Summary, Detailed Characteristics, Vol. PC(1)-1D.

question as to the favorability or unfavorability of the occupational distribution of the labor force in depressed areas is to determine what the unemployment rate of the entire male labor force would have been if each occupation had had the same unemployment rate as in the urban United States as a whole (see Table A-23 for these data). This involves weighting the unemployment rates for each occupation in the urban United States by the percent of the total labor force which each occupation represents in depressed areas and then obtaining the appropriate weighted average.[3]

[3]This technique is used by Segal (Ibid.), and the author is indebted to him for the idea. Furthermore, the same results are obtained here and in the Segal study--the occupational structure of depressed areas does not seem to be unfavorable.

TABLE A-23

OCCUPATIONAL STRUCTURE OF MALE UNEMPLOYMENT
IN DEPRESSED AND URBAN AREAS, 1960

Occupation	Unemployment Rate		Percent Distribution	
	Depressed Areas[a]	Urban U.S.[b]	Depressed Areas	Urban U.S.[c]
Professionals	1.7	1.4	2.8	3.8
Managers	1.8	1.3	2.4	3.7
Clerical	4.6	3.4	5.3	6.5
Sales	3.6	2.1	3.8	4.7
Craftsmen	6.7	5.0	23.1	23.9
Operatives	9.3	6.2	35.3	29.1
Service Workers	7.3	5.5	6.8	9.0
Laborers	16.4	11.7	20.6	19.2
Total Labor Force	6.9	4.8	100.0	100.0

[a]Source: Table 122, 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

[b]Source: Table 90, 1960 U.S. Census of Population, United States Summary, General Social and Economic Characteristics, Vol. PC(1)-1C.

[c]Source: Compiled from (b) above and Table 201, 1960 U.S. Census of Population, United States Summary, Detailed Characteristics, Vol. PC(1)-1D.

As indicated in Table A-23, the unemployment rate of males in depressed areas in 1960 was 6.9 percent, while only 4.8 percent for the urban United States as a whole. If each occupation in depressed areas had had the same unemployment rate in 1960 as for the urban United States, the depressed areas would have had a male unemployment rate of only 4.9 percent. The difference between this rate and the 4.8 percent for the urban United States might be due solely to the rounding permitted in carrying out the computations. Anyway, it does not appear that the depressed areas tended to be depressed because of having unusually high proportions of the labor force in occupations which had higher-than-average unemployment rates. As Table A-23 shows, all occupations suffered relatively high levels of unemployment in depressed areas, creating the severity of over-all unemployment noted.

The differences in the structures of unemployment of depressed areas and of the urban United States are of some magnitude. Unlike the data on the occupational composition of the labor force which pertain to the entire nation, unemployment data by occupation for the urban areas of the United States taken as a whole are available and offer a more relevant comparison since SMSA's--the sampling unit of the study--are entirely urban in character. The requisite unemployment data are to be found in Table A-23. Without exception, the unemployment rate of each occupation in depressed areas exceeds the unemployment rate in the urban United States, with the largest differences for operatives and laborers, the differences being quite small in each of the other cases. In terms of the distribution of unemployment, the concentration of the labor force of depressed areas in the operatives category, along with the relatively high unemployment rate of the group, accounts for the concentration of unemployment in depressed areas of operatives. In depressed areas, 35.3 percent of the total male unemployment is among operatives, whereas only 29.1 percent of urban unemployment is due to the unemployment of operatives. The only other occupation for which the concentration is greater in depressed areas is laborers. For all other occupations, the percentage concentration is greater in the urban Unites States. On balance, the result is that blue-collar workers have the misfortune of experiencing a larger share of unemployment in depressed areas compared to urban areas, in general.

Part of the reason for the comparative results for occupations should be attributed to the differences in the response of the various groups to unemployment, as noted in Section V. As had been emphasized repeatedly, white-collar workers show a much better response to unemployment differentials than blue-collar workers and operatives and laborers show the worst response of all. The expectation is that, given that each occupational group experiences a higher unemployment rate in depressed areas, the net effect of migration should be to increase the concentration of the labor force and of unemployment among blue-collar workers. This appears to be what happened, at least as indicated by the distributions of in and outmigration by occupation.

Table A-24 is designed to emphasize the implications of the relative mobilities of occupations upon the composition of the labor force. The first column, as indicated, is the occupational distribution of the labor force for inmigrants, while the second column is the distribution for outmigrants. Columns 3 and 4 are the differences between these respective distributions and the occupational distribution of the labor force of depressed areas in 1960, as shown in Column 1 of Table A-22. So as to illustrate the derivation of the data in the last two columns of Table A-24, consider the inmigration value for professionals of 16.1. This is the difference between 27.4, the percent of the total inmigration of males accounted for by professionals, and 11.3 percent, the percentage of the male labor force in depressed areas who in 1960 were professionals.

Thus, on a broad basis, it may be said that white-collar workers have a greater representation in the migration streams of depressed areas than in the population of such areas, whereas blue-collar workers are, in the same sense, less represented, as shown by the array of positive and negative values. Furthermore, since gross outmigration exceeds gross inmigration for depressed

TABLE A-24

THE OCCUPATIONAL DISTRIBUTION OF MALE IN AND OUTMIGRATION OF DEPRESSED AREAS--1955-1960[a]

Occupation	Percent Distribution In	Percent Distribution Out	Difference in Percentage Distribution from 1960[b] In	Difference in Percentage Distribution from 1960[b] Out
Professionals	27.4	21.8	16.1	10.5
Managers	12.9	13.8	3.8	14.7
Clerical	7.0	7.3	- .9	- .6
Sales	9.1	9.1	1.9	1.9
Craftsmen	16.5	18.9	-7.1	-4.7
Operatives	16.3	17.4	-9.7	-8.6
Service Workers	4.8	6.5	-1.5	.2
Laborers	5.9	5.2	-2.7	-3.4

[a]As in all instances, the migration data are from the Census volume, Mobility for Metropolitan Areas.

[b]Each figure has been computed by subtracting the corresponding percentage in Table A-22 for depressed areas in 1960 from the values in Columns 1 and 2 of this table.

areas,[4] it is clear that the proportion of blue-collar workers in the labor force will grow the greater the volume of net outmigration. The rates of net outmigration by occupation for the depressed areas are as follows: professionals, 1.4; managers, 3.7; clerical workers, 2.3; sales workers, 2.7; craftsmen, 2.5; operatives, 1.9; service workers, 4.0; and laborers, 1.4. The low rates of net outmigration for laborers and operatives are especially significant because, of all the occupations, the highest unemployment rates for each occupation occur with these two occupations in depressed areas, i.e., the positive

[4]The rate of net outmigration of males for the depressed areas as a whole was 2.3 percent.

correlation between occupational unemployment and regional unemployment is highest for laborers and operatives.

The consequences for depressed areas of differences in the efficacies of migration by occupation can also be seen by estimating what the unemployment rates by occupation and the structure of unemployment by occupation would have been in depressed areas if migration had been impossible. To estimate the potential unemployment rates listed in Table A-25, all that is required is to sum the data on potential unemployment used for the regression results of Section V over the ten depressed areas and, likewise, sum the data for the estimates of the potential labor force. When compared with the unemployment rates in 1960, the potential unemployment rates show that migration reduced the unemployment rate of each occupation from what it otherwise would have been.

At the same time the weak reductions in unemployment afforded by the migration of laborers and operatives relative to that of the other groups means that unemployment became, by this standard, even more concentrated in these two categories. In 1960, as indicated in Table A-25, operatives accounted for 35.3 percent of the unemployment in depressed areas. However, if the migration which occurred had been impossible (or if operatives had responded better to differentials in unemployment), the concentration would have been less, in this case, 32.7 percent. For laborers, the concentration of unemployment would have been only 17.1 percent rather than the 20.6 percent it actually was in 1960. Contrast these results with those of the other occupations.

This points to the conclusion that the higher unemployment rates of blue-collar workers, and of operatives and laborers in particular, as well as the concentration of unemployment in these groups is, in part, the consequence of relative immobilities. Furthermore, this creates the possibility that,

TABLE A-25

THE OCCUPATIONAL STRUCTURE OF UNEMPLOYMENT IN DEPRESSED AREAS--ACTUAL AND POTENTIAL

Occupation	1960 Unemployment Rate Actual	1960 Unemployment Rate Potential[a]	1960 Percentage Distribution of Unemployment Actual	1960 Percentage Distribution of Unemployment Potential
Professionals	1.7	3.0	2.8	3.9
Managers	1.8	5.5	2.4	5.7
Clerical	4.6	6.9	5.3	6.2
Sales	3.6	6.2	3.8	5.2
Craftsmen	6.7	9.0	23.1	24.3
Operatives	9.3	11.1	35.3	32.7
Service Workers	7.3	11.0	6.8	8.1
Laborers	16.4	17.6	20.6	17.1

[a]Derived as explained in Section III.

with continued substantial unemployment, the concentrations noted will be incremented by the immobilities of these segments of the labor force.

Since the concentration of the labor force in white-collar occupations declined because of migration, and since these groups tend to have unemployment rates lower than blue-collar workers, does this necessarily mean that the structure of the labor force of depressed areas was worsened by said migration? It was pointed out previously that the occupational structure of depressed areas in 1960 was not unfavorable in the sense that, if each occupational group in such areas had had the same unemployment rate as in the urban United States, the unemployment rate of the depressed areas would have equaled that of the urban areas. Is the occupational structure of the potential labor force, in this way, superior to the actual 1960 structure? The potential labor force was estimated and the urban United States occupational unemployment rates were weighted by the proportions of the potential labor force in each occupation. This yielded an estimated over-all unemployment rate of 4.9 percent, no different from the rate computed earlier for the 1960 labor force. The suggested interpretation of this result is that the observed migration did not significantly alter the occupational structure of the labor force of depressed areas, nor was the structure "before and after" migration unfavorable. Thus, even though there are differences--e.g., more blue-collar workers in depressed areas--the differences are not too large for the period studied.

However, continued migration of the nature observed could eventually worsen the structure of the labor force to an appreciable extent. Moreover, it is worth emphasizing again that migration does seem to have concentrated the unemployment of depressed areas in certain sectors, a problem of some proportion.

The shift in the distribution of the labor force towards blue-collar workers, if large enough over time, could hamper the possible growth of depressed areas. The Manpower Report of the President, 1965, projects the occupational requirements over the next decade, concluding that job opportunities will expand faster than average for professionals, service workers and clerical workers; will expand at an average rate for sales workers, managers and craftsmen; will expand at a rate less than average for operatives; and, finally, will show no employment growth for laborers.[5] Hence, to the extent that the magnitude of labor supplies is important regionally, areas with increasing proportions of their labor force in the blue-collar categories will be operating at an increasing disadvantage in a period in which demand favors white-collar workers.

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[5]U.S. Department of Labor, Manpower Report of the President (Washington: U.S. Government Printing Office, March 1965).

Perhaps there are other dimensions of the occupational structure of the labor force and the structure of occupational migration which merit investigation; however, a selectivity has been asserted here based upon the value judgment that the aspects covered are the most salient features. It has been found that the occupational structure of the labor force in depressed areas is not unfavorable and that, although the share of the labor force practicing blue-collar professions does tend to increase as a result of migration, the changes are not large enough to alter this conclusion. However, if net outmigration occurs for a long period of time, the structure of the labor force could eventually become unfavorable. At the same time, unemployment in depressed areas does tend to become centered in the blue-collar occupations, and, consequently, some of the unemployment of depressed areas is the result of insufficient net outmigration. Some of the ramifications of this will be investigated in the concluding section.

This section, in both purpose and methodology, is patterned upon the preceding section. In purpose, the intent is to examine changes in the male age structure of the labor force and of unemployment in depressed areas resulting from migration. In methodology, the design is to examine the age structure of depressed areas in 1960 and the age structure of migration from 1955-1960, and, from this, estimate the male age structure of the labor force and of unemployment, assuming that migration did not occur.[6]

As Table A-26 shows, the differences in the composition of the labor force by male age group of depressed areas and the urban United States are not major

[6]All references and data apply to the male labor force, not to the male population. Where labor force data were not available, population data were converted to labor force data by use of the 1960 labor force participation rates of each SMSA.

TABLE A-26

PERCENTAGE DISTRIBUTION OF THE MALE LABOR FORCE BY AGE, 1960

Male Age Group	Percentage Distribution: Depressed Areas[a]	Percentage Distribution: Urban U.S.[b]
20-24	8.7	10.4
25-29	11.0	12.1
30-34	13.7	13.5
35-44	28.2	26.9
45-54	22.9	22.2
55-64	15.5	14.9

[a]Source: Table 115, 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

[b]Source: Table 194, 1960 U.S. Census of Population, United States Summary, Detailed Characteristics, Vol. PC(1)-1D.

differences, the largest being only 1.7 percentage points for 20-24 year-olds. There is some tendency, however, for a greater percentage of the labor force to be 35 years of age or over in depressed areas; the exact figure is 2.6 percent. Is the distribution of the labor force by male age group unfavorable in depressed areas? If each group did have the same unemployment rate in the depressed areas as in the urban United States, the over-all male unemployment rate in such areas would have been only 4.5 percent. Thus, this hypothetical rate is nearly identical to the male unemployment rate of 4.6 percent in the urban United States, so as to justifiably conclude that the distribution, in 1960, did not contain an unusually high proportion of the occupations with higher-than-average male unemployment rates.

As the preceding implies and as is shown in Table A-27, the severe unemployment of depressed areas is shared by all age groups, although the largest

TABLE A-27

AGE STRUCTURE OF MALE UNEMPLOYMENT IN DEPRESSED AND URBAN AREAS, 1960[a]

Male Age Group	Unemployment Rate		Percent Distribution	
	Depressed Areas	Urban U.S.	Depressed Areas	Urban U.S.
20-24	12.9	7.8	16.3	16.7
25-29	7.7	4.6	12.3	12.1
30-34	6.3	3.8	12.3	11.4
35-44	5.8	3.7	24.0	22.2
45-54	6.1	4.1	20.4	20.8
55-64	6.4	5.0	14.5	16.7
Total Labor Force	6.9	4.6	100.0	100.0

[a]The sources are the same in each instance as in the preceding table, Table A-26.

differences arise for the younger age groups. But in spite of this and the relatively high unemployment rates of the young, there is no concentration of unemployment among the young. The reason for this is obvious--as Table A-26 indicates, depressed areas have a disproportionately low number of young (20-35) in the labor force. In total, a comparison of the percentage distributions of unemployment in depressed and urban areas shows that there is no unusual pattern of concentration in depressed areas. As a matter of fact, the only difference exceeding one percent is the 1.8 percent difference for 35-44 year-olds.

Did male migration alter these structures of unemployment and of the labor force? Since each age group experiences substantial unemployment in depressed areas, especially the youngest age group analyzed, and because it has been determined in this study that the efficacy of the migration response to unemployment decreases with age, it is reasonable to expect that, without migration, a greater percentage of the labor force and of unemployment of depressed areas would have been accounted for by the younger males. To what extent does the expectation hold?

The relative efficacies of migration, operating with respect to chronically depressed areas, created the distributions of in and outmigration shown in Table A-28. The last two columns of the table are set up in the same way as the similar table for occupations (Table A-24)--from each figure in the first and second columns is subtracted the corresponding percentage from the distribution of the male labor force by age in 1960 in depressed areas. The latter distribution is to be found as Column 1 of Table A-26. In brief, a positive difference means that a greater percentage of the migration stream contained the given group than is represented in the 1960 labor force of depressed areas. Conversely, a negative value means that the given group is less represented in the migration stream, percentage-wise, than it is in the labor force of 1960.

The differences in the migration response to unemployment for the sample of forty-seven SMSA's appear to apply to the depressed areas as well--the proportionate representation in each of the migration streams relative to the labor force of depressed areas declines with age as demonstrated in the last two columns of Table A-28. Given that gross outmigration was larger for depressed areas than gross inmigration, the resultant flow of net outmigration must lead to a larger percentage of the labor force being in the older age brackets. This is also demonstrable by viewing the actual rates of net outmigration by age from 1955-1960, with the potential labor force as the base, which are as follows: the rate is an appreciable 14.1 percent for 20-24 year-olds; 4.9 for 25-29 year-olds; 3.7 for 30-34 year-olds; 5.7 for the 35-44 age group; and 2.6 for the 45-54 and 55-64 brackets.

TABLE A-28

THE AGE DISTRIBUTION OF MALE IN AND OUTMIGRATION OF DEPRESSED AREAS--1955-1960[a]

Male Age Group	Percent Distribution		Difference in Percent Distribution from 1960[b]	
	In	Out	In	Out
20-24	21.1	22.8	12.4	14.1
25-29	20.8	17.8	9.8	6.8
30-34	15.7	16.6	2.0	2.9
35-44	23.2	23.1	- 5.0	- 5.1
45-54	12.5	12.	-10.4	-10.5
55-64	6.8	7.3	- 8.7	- 8.2

[a]Source: The Census volume, Mobility for Metropolitan Areas.

[b]Each figure has been computed by subtracting the corresponding percentage in Table A-26 for depressed areas from the values in Columns 1 and 2 in this table.

Without migration, the unemployment of the young probably would have been more serious, even on a relative basis. This can be seen by considering the potential unemployment rates for the male age groups in depressed areas listed in Table A-29. Should there have been no in or outmigration, it is estimated that the unemployment rate of 20-24 year-olds in depressed areas would have been 25.1 percent. Certainly the net outmigration of the young from depressed areas is not surprising, when the lack of employment opportunity in depressed areas for them is put in this way. Furthermore, every age group would have had a higher unemployment rate than actually experienced, as a comparison of the second column in Table A-29 with the actual rates given in Column 1 shows, although the differences are not as large as for the youngest age group.

Again comparing Column 1 with Column 2, it can be seen that the effect of migration was to decrease the concentration of unemployment among the young

TABLE A-29

THE AGE STRUCTURE OF MALE UNEMPLOYMENT IN DEPRESSED AREAS--ACTUAL AND POTENTIAL

Male Age Group	1960 Unemployment Rate		1960 Percentage Distribution of Unemployment	
	Actual	Potential[a]	Actual	Potential
20-24	12.9	25.1	16.3	22.5
25-29	7.7	12.4	12.3	12.3
30-34	6.3	9.7	12.3	12.2
35-44	5.8	8.8	24.0	22.7
45-54	6.1	8.5	20.4	17.8
55-64	6.4	10.9	14.5	12.5

[a]Derived as explained in Section III.

and, hence, to increase the percentage of total male unemployment among the older segments of the male labor force. With migration, 20-24 year-olds had but 16.3 percent of male unemployment in depressed areas; without migration, this group would have had 22.5 percent of the unemployment, as estimated from the potential unemployment rates. At the same time, there is virtually no difference in the percentage distribution rates for the 25-29 and 30-34 age groups. However, for the remaining groups, the concentration of unemployment shows a tendency to have increased for them because of migration. From this, it may be concluded that the observed concentration of unemployment among the older portions of the male labor force is, at least in part, the consequence of the "reluctance" of these groups to migrate.

How does the potential labor force structure compare with the actual 1960 structure? Which is more favorable by the standard that has been used here, i.e., the unemployment rates of the entire labor force of depressed areas if each component thereof had the same unemployment rate as in the urban United States? Just as for the labor force of the areas in 1960, the computation of this hypothetical rate yields a value of 4.5 percent. Viewed in these terms, the structure was not changed enough to increase unemployment by the migration that actually occurred, even though migration apparently led to a relative reduction of those components of the labor force which for the urban United States as a whole have the highest unemployment rates--the young. Thus, the structure of the potential labor force is not unfavorable.

Of course, should the migration of the form observed continue, there is the distinct possibility that the structure will change noticeably due to migration. But interestingly enough, should the changes become significant, the age structure of the male labor force will improve due to the net outmigration losses of the young. To some this may appear startling, particularly those who maintain that the loss of the young from depressed areas is harmful in the sense that the most vibrant, energetic and resourceful of the labor force are the young and, consequently, the future growth rate of the region must be lessened. The contention may be a sound one within a growth context and does not necessarily clash with the observation here that, on a cross-sectional basis, the structure of the labor force is improved by the net outmigration of the young, since they experience relatively high unemployment rates.

Also, if there is to be a reconciliation of these divergent ideas, it must be on the basis that the argument to the effect that the labor force structure is improved by the net outmigration of the young, at least for the 1955-1960 period, reflects an undue dependence upon the implicit assumption of substantial homogeneity within each age group. In other words, it can be simply argued that the younger age groups contain an unusually high proportion of the productive. While this might be so, a counter-argument is that, if the young are so productive, why do they do so poorly on the national market, at least in terms of employment. In any case, the argument will be left unanswered, with the suggestion that further study as to the composition of the young in terms of attitudes, abilities, educational attainment, etc. is needed.

In conclusion, there are several outstanding features of male migration worth emphasizing once more. The effect of migration is to reduce the percentage distribution of the labor force in the younger age groups, as well as to similarly decrease the proportion of regional unemployment in depressed areas within these age groups. At the same time, the age structure of the male labor force is not unfavorable, nor does migration alter the favorability of the labor force in terms of the over-all unemployment rate.

The age structure of the female labor force in depressed areas is also not too different from the same structure in urban areas in the United States. This can be seen from inspection of TableA-30which shows that the largest difference is a minor 1.2 for 35-44 year-olds.

That the differences are minor is also clear from an analysis of the overall unemployment rate of the female labor force in depressed areas assuming that in 1960 each age group therein experienced the same unemployment rate as in the urban United States. The unemployment rate in 1960 of females 20-64 years of age in urban areas was 5.0 percent; with identical group unemployment rates, the rate would have been 4.9 percent in depressed areas, a difference small enough to conclude that the age structure of females in depressed areas was not detrimental, that the actual 7.0 percent rate was due to above-average unemployment within each age group.

These 1960 unemployment rates are presented in Table A-31. Compared to the urban United States, females fared worse in depressed areas--the unemployment rate is higher in every instance. The dispersions are not too large,

TABLE A-30

PERCENTAGE DISTRIBUTION OF THE FEMALE LABOR FORCE BY AGE, 1960

Female Age Group	Percentage Distribution: Depressed Areas[a]	Urban U.S.[b]
20-24	13.1	12.9
25-29	9.4	9.9
30-34	10.9	10.9
35-44	27.8	26.6
45-54	25.0	24.9
55-64	13.8	14.8

[a]Source: Table 115, 1960 U.S. Census of Population, Detailed Characteristics, Vol. PC(1)-D.

[b]Source: Table 194, 1960 U.S. Census of Population, United States Summary, Detailed Characteristics, Vol. PC(1)-1D.

TABLE A-31

AGE STRUCTURE OF FEMALE UNEMPLOYMENT IN DEPRESSED AND URBAN AREAS, 1960[a]

Female Age Group	Unemployment Rate		Percent Distribution	
	Depressed Areas	Urban U.S.	Depressed Areas	Urban U.S.
20-24	8.0	6.5	15.5	16.8
25-29	7.7	5.9	10.8	11.8
30-34	7.9	5.6	12.7	12.4
35-44	7.0	4.8	28.6	25.9
45-54	5.9	4.2	21.6	21.0
55-64	5.3	4.0	10.8	12.0
Total Labor Force	7.0	5.0	100.0	100.0

[a]In each case, the sources are the same as in the preceding table, Table A-30.

the largest being the 2.3 percent difference for 30-34 year-olds. The only noticeable difference in the distribution of unemployment between depressed areas and the urban United States is the fact that depressed areas have 28.6 percent of their unemployed between 35 and 44 years of age, whereas urban areas have but 25.9 percent.

Both in and outmigration of females, as shown in Table A-32, are similar to male migration in that both migration streams contain a larger percentage of the young compared to the 1960 age distribution of the labor force. Of course, this pattern is not wholly unexpected since the migration response to unemployment by females tends to decline with age. However, the exception to this tendency is the response of 30-34 year-olds which is the lowest of all for the entire sample of forty-seven cities, yet in terms of differences from the 1960 labor force for depressed areas, the response is better than that of the older age groups. The reason for this is not clear; perhaps the movement of women 30-34 years of age from depressed areas is, in addition to female unemployment, due to the movement of husbands, who for this age group have a higher response to unemployment. In any event, the net outmigration rate of women between 20 and 65 years of age from depressed areas for the period was 3.0 percent. By age group, the rates are as follows: for women 20-24 years of age, 5.4 percent; for women 25-29 years of age, 3.2 percent; for women 30-34 years of age, 3.0 percent; for those women 35-44 years of age, 2.5 percent; for 45-54 year-olds, 2.2 percent; and, finally, for 55-64 year-olds, 2.9 percent.

The consequences of these migration patterns for potential unemployment are presented in Table A-33. Once more, every category shows greater potential unemployment than actual 1960 unemployment. At the same time, the primary effect of migration upon the distribution of unemployment has been to decrease the percent accounted for by the youngest age group, a reduction from 18.2

TABLE A-32

THE AGE DISTRIBUTION OF FEMALE IN AND OUTMIGRATION OF DEPRESSED AREAS--1955-1960[a]

Female Age Group	Percent Distribution		Difference in Percent Distribution from 1960[b]	
	In	Out	In	Out
20-24	24.3	19.6	11.2	6.5
25-29	21.1	19.1	11.7	9.7
30-34	15.6	15.8	4.7	4.9
35-44	21.7	23.1	- 6.1	- 4.7
45-54	10.9	12.6	-14.1	-12.4
55-64	6.6	9.7	- 7.2	- 4.1

[a]Source: The Census volume, Mobility for Metropolitan Areas.

[b]Computed by subtracting from each figure in Columns 1 and 2 the corresponding percentage distribution figure for the female labor force of depressed areas in 1960 (see Table A-30).

TABLE A-33

THE AGE STRUCTURE OF FEMALE UNEMPLOYMENT IN DEPRESSED AREAS--ACTUAL AND POTENTIAL

Female Age Group	1960 Unemployment Rate		1960 Percentage Distribution of Unemployment	
	Actual	Potential[a]	Actual	Potential
20-24	8.0	12.9	15.5	18.2
25-29	7.7	10.7	10.8	10.6
30-34	7.9	10.5	12.7	11.9
35-44	7.0	9.3	28.6	27.1
45-54	5.9	7.9	21.6	20.5
55-64	5.3	7.9	10.8	11.7

[a]Derived as explained in Section III.

percent to 15.5 percent. Other than this, the differences are not prominent. Calculating the unemployment rate for the total potential female labor force, on the assumption that the unemployment rates of the urban United States apply, yields a 5.0 percent unemployment rate which is identical to that applying to the urban United States in 1960. By this standard, then, even if migration had not occurred, the female labor force structure would not have been unfavorable, just as the observed 1960 structure of depressed areas is not unfavorable.

Because female migration is similar to male migration, the consequences for depressed areas are nearly the same. With females as well as males, migration decreases the percentage distribution of the labor force in the younger age groups and also decreases the proportion of unemployment in depressed areas within these age groups. While significant migration of the type noted could eventually seriously alter the labor force structure of females, it does not appear to have done so for the 1955-1960 period in that, with or without migration, the female labor force of depressed areas is not unfavorable.

CONCLUSIONS

The efficiency of the operation of the labor market is always of interest; when the unemployment in the market behaves as it did in the 1955-1960 period, understanding the labor market as it functions is imperative, at least from the standpoint of policy. The trend at that time and even before was for ever-increasing unemployment of the nation's labor force, a trend largely unmitigated by cyclical recovery. On a theoretical level, the possible explanations for the phenomena are many.

Instead of a comprehensive study of the problem, the fundamental and modest intent of this study has been the investigation of the efficacy of geographical adjustment in the labor market to determine if migration was instrumental in minimizing over-all unemployment. The role of migration in relation to classical labor market theory was examined in order to provide the necessary theoretical underpinnings with the conclusion that efficiency of operation of the labor market on a geographical basis means that migration should take place in accordance with unequalized differentials in wages (income) and/or unemployment. Furthermore, it was emphasized that the unemployment-migration mechanism is not necessarily inconsistent with traditional labor market theory, but instead is a straightforward consequence of inflexibility of the wage structure, or at least a wage structure which responds slowly to demand and supply conditions.

The ambitious intent of the study involved the application of the classical theory of the labor market and migration to components of the labor force--age and occupational groups--in the hope of obtaining answers to the unemployment dilemma in its geographic dimensions which might otherwise be obscured if only the total labor force were studied. The methodological attack was patterned upon previous studies of migration of the total labor force, utilizing regression models of migration upon total regional unemployment.

However, dissatisfaction was expressed about the specification of the independent variable, unemployment. The high degree of interdependence between unemployment and migration created doubt that average unemployment rates or end-period unemployment rates are the most desirable because their usage overlooks the interdependence. In brief, actual measured unemployment is high or low depending upon the rate and direction of migration occurring prior to the period in which unemployment is measured. Consequently, the rate and direction of migration is not a function of the rate of measured unemployment.

To adjust for this interdependence, a construct called potential unemployment rates was used. This is a hypothetical construct, defined as the rate of unemployment which would exist in a region if migration were impossible. To compute these rates, it is necessary to add the net outmigration of the labor force to the unemployment actually existing in the region at the end of the period studied. This procedure is equivalent to subtracting the actual regional employment at the end of the period from the estimate of what the labor force would have been if migration had not occurred.

It was demonstrated that the concept is both meaningful and valid. The most useful feature is that it implicitly evaluates the quality of the observed migration in terms of the impact of migration upon regional unemployment rates at the end of the period. The validity of the concept is largely determined by the correctness of the assumption that the level of employment of any subgroup of the regional labor force is independent of the rate of net outmigration of the group, a contention which was examined and concluded to be a sound one, at least provisionally.

It also became evident as the study progressed that this was an excellent opportunity to examine some of the interrelationships of total regional unemployment and of migration by age and by occupation. The investigation proceeded on two rather disparate levels: the first was to include the over-all regional unemployment level with potential unemployment in the regression equations, combining the variables in several ways so as to analyze the range of possible interrelationships; the second was to investigate the implications of the structure of migration to and from depressed areas for the over-all unemployment rate of such areas.

On the first level, the regression equations clearly show that the potential unemployment rate is an important explanatory variable of migration of the labor force by groups. In addition, the over-all regional unemployment rate was found to be statistically insignificant, indicating that net outmigration of any segment of the labor force is not the consequence of the performance of the entire regional labor market. Moreover, median income specific to each group was insignificant in most instances.

With occupations, the results are as expected on a broad basis, with the net outmigration of white-collar workers showing a better response to unemployment than that of blue-collar workers. Part of the reason for this was held to be attributable to the better education and income of the more "occupationally-elite." Also, the established channels whereby jobs in other regions are obtained tend to favor the white-collar worker in that he is more likely to be transferred to another region or to have a job waiting for him before he moves. These statements hold for migration in each of the eight occupation categories studied.

Demand is, of course, necessary if rationally-motivated migration is to take place, and, indeed, this was found to be another explicative factor of the differences in the migration response to unemployment by occupation noted.

The response to unemployment falls as relative demand decreases where demand is measured by the various indicators used, such as growth in employment, the total unemployment rate of each occupation over all regions and the potential unemployment rates. The evaluation was made that migration could not in any way reduce the unemployment of operatives and blue-collar workers, since in every city studied unemployment was substantial for these groups so that, even in those cities with the lowest unemployment rates, net inmigration could only add to unemployment and not reduce over-all unemployment. This is the reverse of the experience of the white-collar groups who were able to reduce their unemployment by migration.

For the age groups, the potential unemployment rate was once again highly significant and the coefficient thereof showed a decrease with age, although the pattern was not so acutely marked for females as for males, reaching its minimum for 30-34 year-old females. This divergence from an otherwise clear trend was said to be the result of maternal responsibilities. In both the cases of males and females the general trend seems to be the result of the ease with which the young adjust to economic change, an adjustment which appears to have been facilitated by the superior education of the young. Moreover, viewing migration as an investment, the gains accruing to the young should they migrate exceed those available to the older segments of the labor force.

Unlike the occupational groups, the groups responding best to potential unemployment--the young--seemed to be operating at a relative disadvantage in that demand conditions for them were relatively unfavorable. The young did have the highest unemployment rates as a whole and the rate of growth of employment for the young actually was negative. On the other hand, the unemployment rates of the older portions of the labor force were low and their employment did grow over the period, which pointed to the possibility that higher rates of migration in response to unemployment would have served to reduce the unemployment of these groups. As a minimum, it may be said that the opportunity to reduce unemployment via migration seems to have been better for older workers.

On the second level of investigation, the implications of the structure of migration to and from depressed areas for these areas were examined. The relative efficacies of migration by group observed in the preceding discussion affected the residual labor force of depressed areas as well as the composition of unemployment. The occupational structure of the labor force shifted towards a greater concentration of blue-collar workers as did the distribution of unemployment in depressed areas. However, the changes were not large enough to warrant the conclusion that the occupational structure was significantly altered, although extended migration of the same nature could do so. If so, the occupational distribution of the labor force of depressed areas would become unfavorable in that an unusually high proportion of blue-collar workers might be a handicap in a period where national requirements are for white-collar workers, to the extent that a potential supply of the latter is a determinant of industrial location. Aside from the hiring of white-collar workers themselves, firms quite often find a need for the services of firms which specialize in providing the services of white-collar occupations, such as accounting firms, engineering consultants, etc. The availability of these ancillary services is a possible parameter in the location decision. In any case, the possibility that future regional growth will depend, in part, upon the occupational composition of the labor force must be considered.

Similar to the occupational results, the age structure of the labor force of these areas changed due to migration, but once again, did not change appreciably. Explicitly, migration tended to reduce the proportion of the labor force accounted for by the young, as well as the proportion of unemployment of the same.

Nevertheless, the favorability of the age structure was unchanged, although sustained migration could produce significant adverse change. Should this occur, the age structure would improve in the sense that the labor force of depressed areas would display a comparatively lower percentage of the young who nationally have the highest unemployment rates.

With a national policy of eliminating unemployment in excess of frictional unemployment, the results of the study are an indication of the limits placed upon such a policy by the geographical aspects of the labor market. The efficacy with which the market functions differs by sector of the labor market and the more effective labor market policies are those which take explicit recognition of this.

How could unemployment have been reduced over the 1955-1960 period by altering the migration which actually did occur? An oft-quoted remedy is to increase the rate of migration. It has been demonstrated in this study that greater rates of migration of the entire labor force of the variety which actually did occur would have led to regional unemployment rates being more nearly the same than they actually were in 1960. In effect, the equalization process which did take place would have been enhanced. A good argument can be made that this in itself is desirable because it tends to spread the relief burden over regions instead of concentrating it in those areas least able to handle such burdens, i.e., areas with substantial unemployment. Furthermore, communities with a high proportion of unemployed are likely to experience a morale problem, a problem mitigated by the equalization process.

But would greater rates of migration have reduced over-all unemployment? For white-collar workers, the free response to market incentives of the period did reduce unemployment quite substantially, but, in spite of the low observed migration response to unemployment of blue-collar workers, it appears doubtful that a better migration response would have reduced aggregate blue-collar unemployment at all. Simply put, the unemployment of blue-collar workers was excessive everywhere. Analyzed by occupation, the market seems to have worked quite well where it had to and, consequently, there appears to be little room for improvement by means of greater migration.

A similar conclusion is reached when the labor force is analyzed by age group. The young migrate at high rates to areas with employment opportunity, apparently from areas with inadequate employment opportunity so that it seems unlikely that greater rates of migration would further reduce the unemployment of the young.[1] At the same time, it was shown that greater rates of migration in response to unemployment would tend to equalize the unemployment of the older segements of the labor force, and the analysis suggested that, with some areas having very low rates of unemployment of older workers in 1960, further inmigration might slightly reduce the over-all unemployment rates. However, the evidence was only suggestive and in no way conclusive. In any case, it remains true that the serious unemployment problem is with the young and that significant reductions in the over-all unemployment rate of the nation can only be made by reducing impressively the unemployment of the young.

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[1]Viewing migration as an investment in human capital, further work needs to be done in explaining why the migration response of young workers exceeded that of older workers by the degree indicated for the period studied. Is the difference in accord with the differences in the length of the time horizon over which the returns are discounted? Alternatively, can it be shown that the time horizons of the younger and older worker are in fact different? If not, how are the differences in migration response to be explained? All that can be said at this point is that further work is needed, perhaps along the lines of investigating the variations in capitalized value resulting from variations in the responses could serve as the basis for an evaluation of whether or not the migration response of the younger worker relative to that of the older worker was excessive, insufficient, or as expected.

Thus, the efficacy of migration with respect to unemployment differentials seems to have been adequate. This points to the need for examining other solutions for the unemployment problem. Perhaps the key is greater aggregate demand, as is often suggested; perhaps occupational immobility (mobility other than geographic mobility) is closer to the root of the problem. By restricting the scope of the study to geographical mobility, it was impossible to discern the relative strengths of these other forces. Hopefully though, the study has contributed in indicating that mobility of the geographic form does not appear to be a major fault and, in this way, it eliminates one possible policy remedy for unemployment. In short, if there is a structural element to unemployment, that element does not appear to have a significant geographical dimension.

The conclusion that, at least for the 1955-1960 period, greater migration in response to unemployment would have had little effect in reducing the over-all national unemployment rate of the labor force does not obviate the possibility, even the probability, that a policy designed to facilitate migration would be useful socially and even economically. Migration can be socially valuable if the flow is from areas and jobs with low productivity to jobs in areas where productivity is higher. Moreover, a policy designed to enhance migration can mean less distress for the migrant, to say nothing of easing the relief burden on the communities least able to handle such burdens. These are only a few of the many ways in which such a policy might be helpful.

Let me end on a highly tenuous note. The conclusions I have reached are greatly affected by the disaggregative type of analysis used involving the occupational and age components of the labor force rather than the total labor force. The assumptions used contained no internal contradictions: thus no logical inconsistencies resulted. But there is a question whether my assumptions were descriptively realistic. If they failed that test in whole or in part, the social applicability of my conclusions may (but not necessarily would) be affected. Needless to say, I believe they were descriptively realistic.

APPENDIX B

The Influence of Community Characteristics on the Relationship of Unemployment Changes to Employment Changes in Major Labor Market Areas

AN INTRODUCTION TO THE INQUIRY

A. Statement of the Inquiry

This study is concerned with the relationship between changes in total employment and the corresponding changes in total unemployment occurring within geographically defined labor market areas. It has a two-fold purpose: (1) to measure the extent of variation in this relationship among these labor markets, and (2) to attempt to explain the causes of this variation, i.e., to explain why an increase in employment in one labor market area is associated with a relatively larger reduction in its level of unemployment than an employment increase occurring in another labor market area.

The extent of change in labor force size accompanying a change in employment determines the amount of the corresponding change in unemployment. Furthermore, the major components of a relatively short run change in labor force size are migration and changes in the rate of labor force participation. The fundamental hypotheses of this study can then be stated as follows: (1) As employment opportunities change within labor markets, the response of the labor supply, as evidenced by net changes in labor force size, will vary in extent from one area to another. (2) Variations among areas in the extent of this responsiveness can be explained by differences among them in certain economic and social characteristics. These attributes determine the direction and extent of their net labor migration flows and the sensitivity of their labor force participation rates.

The regions, or labor market areas, which have been employed for analysis in this study represent nearly all of the 150 Major Labor Market Areas defined by the Bureau of Employment Security (BES) of the U.S. Department of Labor. A discussion of the nature and appropriateness of these areas for analysis is contained in Section II. The employment and unemployment figures for these areas are the estimates released bi-monthly by the BES in its publication Area Trends in Employment and Unemployment. A presentation of the methods used by the BES to estimate these levels together with a discussion of their reliability is contained in the last section.

The time period used to examine variation among the regions with regard to the relationship of their employment changes to their corresponding changes in unemployment corresponds closely with a cyclical upswing in national levels of economic activity. Aside from the practical considerations which surround this choice of time periods,[1] it is felt that a time period characterized in this way would serve as the best available approximation of the effect on a region of a change in its employment levels brought about by other means -- such as public policy action designed to effect levels of regional demand -- on its level of unemployment.[2] It is believed that an explanation of variation among regions in the relationship between cyclical changes in employment and unemployment occurring within them can be generalized to provide insights regarding the effect of employment changes on unemployment changes induced by certain types of public policy action.

It should be made clear at this point that the purpose of this study in measuring and explaining the variation among regions in the relationship between the employment and unemployment changes occurring within them should not be interpreted as necessarily measuring and explaining variation among regions in the "impact" of the employment changes occuring within them on their existing volume of unemployment. To measure the impact of, say, an increase in regional employment levels on the existing volume of unemployment requires knowledge of (1) the portion of the employment increase which represents re-employment of those

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[1] These will be discussed in the following section.

[2] The validity of employing the relationship emanating from cyclical forces as an approximation for a region of the relationship of an employment change induced through public policy action to the corresponding change in unemployment rests on the assumption that the labor supply reaction evoked in this latter situation is essentially the same as that associated with the business cycle.

unemployed at the beginning of the period, and (2) what portion of the total change in unemployment occurring in the same time period represents re-employment.

A specification of the components of a change in a region's level of unemployment and employment delineates the information requirements that would be necessary to measure the impact of an employment change on existing unemployment. Using the conventional labor force definitions,[3] the anatomy of a change in a region's level of unemployment can be represented by the following relationship:

$$(1) \quad U_1 + DE - RE + A - R + M = U_2$$

where U_1 and U_2 represent the number of unemployed in two successive time periods. DE is the number of disemployed who remain in the labor force, RE is the number of re-employed, A is the addition to unemployment from outside the labor force of individuals residing in the region at the beginning of the period, R is the reduction in unemployment owing to withdrawal from the labor force by residents, and M represents the change (positive or negative) in unemployment resulting from labor migration during the period.

This expression can be rewritten to yield the components of a change in total employment. Let:

$$(2) \quad \Delta E_r = DE - RE$$

where ΔE_r is that portion of the net total employment change which represents the re-employment of those unemployed at the beginning of the period, and

$$(3) \quad \Delta U_p = (A - R)$$

where ΔU_p represents the net change in unemployment caused by the net change in the labor force participation status of the resident population, and

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[3] The labor force at any point in time is defined as the sum of the employed and the unemployed, i.e., those actively seeking employment (see p. 117F). Thus, the change in unemployment occurring over a period of time is defined as the difference (positive or negative) between the change in labor force size and the change in employment which occurred in the same time period.

(4) $\Delta U_m = M$

where ΔU_m is the addition to unemployment caused by changes in the labor force through migration. Substituting (2), (3), and (4) into (1) expresses the total change in unemployment as:

(5) $\Delta U = \Delta U_p + \Delta U_m - \Delta E_r$

but $\Delta U_p = \Delta L_p - \Delta E_p$

and $\Delta U_m = \Delta L_m - \Delta E_m$

which results in:

(6) $\Delta U = (\Delta L_p + \Delta L_m) - (\Delta E_p + \Delta E_m + \Delta E_r)$

and yields the change in total employment occurring over a time interval as the sum of three components: ΔE_p which represents the portion of the total employment change accounted for by residents of the region at the beginning of the period who were employed by the end of the period, but were not considered unemployed at the beginning of the period, ΔE_m represents the portion of the total employment change accounted for by migrants who entered or left the region and the status of employed during the period, and the remaining portion of the total change in employment, ΔE_r which represents the net re-employment of workers unemployed at the beginning of the period.

Because of the lack of sufficiently detailed labor force data, the information requirements necessary to determine the impact of a change in regional employment levels on its existing unemployment cannot be fulfilled. Though the use of aggregated net changes in employment and unemployment will not necessarily measure the impact of an employment change on existing unemployment, equations (5) and (6) show that the extent of reduction in unemployment associated with an increase in regional employment levels depends upon the extent of labor force change occurring in the same time period.

To gain some insight into the possible forces which would cause variations among labor markets in the relationship between the employment and unemployment changes occurring within them, consider the possible causes of the failure of an increase in the level of total regional employment to have a significant impact on the level of unemployment. This can be attributed to two sets of circumstances regarding the nature of the corresponding labor force change: (1) The employment change was beneficial in the sense that it absorbed a significant number of workers who were unemployed participants prior to the employment increase, but the reduction in the observed level of unemployment which would have occurred was severely offset by the simultaneous addition of unemployed entrants to the region's labor force. With reference to equations (5) and (6), this would imply that $\Delta L_m > \Delta E_m$ and/or $\Delta L_p > \Delta E_p$. In other words, this situation would prevail if the region experienced significant net labor immigration over the period and/or has an existing population whose participation rate responds significantly to changes in local labor demand. (2) The employment change was supply determined; i.e., growth in the labor force was necessary in order for the employment increase to occur. This situation is associated with regions having an industrial "mix" which on balance exhibits a current high rate of growth in labor demand. In such areas, high rates of employment growth can be realized over time only through either the net immigration of labor and/or the increased participation of the existing population. The small volume of unemployment likely to be observed at any point in time in these areas would represent the minimal level of short term unemployment expected in a dynamic labor market.

It is conceivable, however, that an increase in employment levels could be supply determined in a region having a volume of unemployment larger than that which could be attributed simply to such things as voluntary quits and job changes. This situation would indicate that a portion of the unemployment was "structural" in nature in the sense that there is a mis-matching of available labor supply with increments to labor demand. The failure of increased labor demand, to the extent that it is revealed in employment growth, to absorb existing excess unemployment would imply that the region was experiencing either changes in its industry mix or technological change within its existing industry structure which result in increments to labor demand having a different occupational composition than that which generally prevailed in the region.

B. The Relevance of the Study

It is likely that the creation of 100 new jobs in a region will not reduce unemployment by the same amount. Furthermore, the amount by which unemployment is reduced is hypothesized to vary depending upon the nature of the region which experiences the employment change. This investigation is relevant to evaluating the efficacy of that class of public policies designed to reduce the unemployment of labor resources within a region by (1) directly increasing the derived demand for labor through stimulation of industries currently existing within the region or (2) indirectly by increasing the locational advantages of the region (in ways not involving direct operation upon the quality of the existing labor force) in an effort to attract new industry to the area. The impact of such policies in reducing unemployment will depend upon the characteristics of the regions to which they are directed.

The relevance of analyzing the labor force behavior of regional labor markets extends to the national level as well. A net change in employment at the national level can be conceived of as being distributed among a system of labor markets the combined labor supplies of which comprise the national labor force. The manner in which this employment change is distributed among these regions is likely to determine in part its impact on total national unemployment. This will be true if there exist differing propensities of regionally defined populations to participate in the labor force. It will also be true to the extent that regions receive migrants not previously recorded as labor force participants but who fully intend to seek employment upon relocation in areas offering brighter employment prospects.

C. The Plan of the Study

The following sections are arranged to represent the approach taken in this study. The section which follows is devoted to measuring the extent of variation among labor markets in the relationship of the employment changes occurring within them to their corresponding changes in unemployment. It has previously been pointed out that the sources of this variation stem largely from differences among labor markets in the sensitivity of their participation rates and/or the magnitude and direction of their net labor migration flows. Section III serves as a first attempt toward defining the social and economic variables responsible for differences among areas in these labor force characteristics. More specifically, SectionIII surveys literature concerned with the forces causing migration and changes in labor force participation.

Section IV combines this evidence with additional hypotheses which specify a number of regional characteristics believed to be causal influences determining the relationship of a change in a region's employment to its corresponding change in unemployment. To test the empirical support for these hypotheses, the relationships are quantified and subjected to testing with the technique of multiple regression. The results of these tests are presented and interpreted with regard to their correspondence with the hypothesized relationships.

Section V summarizes the entire study and offers an evaluation of its results.

VARIATION IN THE RELATIONSHIP OF EMPLOYMENT CHANGES TO UNEMPLOYMENT CHANGES AMONG LABOR MARKETS

A. Definition of the Labor Market Area

The labor markets employed for observation in this study consist of nearly all of the 150 Major Labor Market Areas (hereafter referred to as MLMAs) defined by the BES for the purpose of reporting and analyzing the adequacy of their overall labor supplies. The criteria used by the BES in geographically delineating these areas is virtually identical to those formulated by the Bureau of the Budget for the purpose of defining Standard Metropolitan Statistical Areas (SMSAs). The geographic definitions of the MLMAs thus correspond, with a few exceptions, to SMSAs.[1] It should be noted, however, that though most defined MLMAs coincide geographically with a corresponding SMSA, not all SMSAs have a corresponding MLMA defined.[2]

It is necessary at this point to develop the conceptual framework and theoretical requirements underlying a meaningful spatial delineation of a set of labor market areas and to compare them with the operational criteria employed

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[1] Of the 144 MLMAs taken for observation in this study, there were only 12 areas whose geographic definition did not coincide with the SMSA defined for the same area. (Defining Labor Market Areas, Bureau of Employment Security, Office of Progress Review and Analysis, B.E.S. #R-186.) Information for these definitions was obtained also from unpublished material at the Bureau of Employment Security in Washington, D. C.

Since the criteria for defining SMSAs and MLMAs is virtually the same, there is no apparent reason for these discrepancies. In noting, however, the changes in MLMA areal definitions which have occurred through time, there is a strong tendency to bring them into conformity with the SMSA definition corresponding to the same area.

[2] At the time of the 1960 Census of Population, there were 212 SMSAs and 150 MLMAs, two of which had no SMSA defined for their general area. These areas were Battle Creek, Michigan and New Brunswick, New Jersey.

for defining a SMSA and/or a MLMA. This is possible since the conceptual framework and the resulting criteria for defining these areas are virtually the same. The considerations necessary for defining a set of labor market areas appear to fall into two categories: (1) what characteristics a geographic area must display to be singled out as a recognizable labor market area; (2) how the boundaries of such recognized areas are to be delineated.

The ability to recognize a set of spatially separated labor markets rests on certain fundamental facts about economic activity. Most basic of all, of course, is the fact that economic activity takes place under the condition of spatial separation. A further fact concerning the distribution of economic activity is that it is not distributed evenly over space but rather tends to cluster at certain points. This tendency toward the agglomeration of economic activity is most commonly attributed to the unequal distribution of fixed resources, which results in some geographic areas being made more conducive to economic undertakings than others. The initial agglomeration of economic activity, for whatever reason, may bring about the existence in the area of certain external economies which causes a further concentration of activity.[3] The tendency for economic activity to agglomerate at points in space is crucial for defining spatially separated labor markets because it implies that a basic requirement for the existence of a labor market is satisfied -- that is, a place characterized by a concentration of labor supply and demand. These characteristics are necessary, but not entirely sufficient, for the consideration of a set of relatively independent, spatially separated labor markets. The fact that labor resources display imperfect mobility between nodal points of economic activity

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[3]For a thorough-going discussion of the causes of the agglomeration of economic activity see: E. M. Hoover, Location Theory and the Shoe and Leather Industry (Harvard University Press, Cambridge, Massachusetts, 1937), especially chapter 6.

is a further necessary condition for the consideration of regional labor markets. In the absence of imperfect mobility, labor market disequilibrium or wage inequalities existing in one or more geographic areas would be corrected virtually instantaneously through labor migration, and the national economy would be considered, for all intents and purposes, one integrated labor market.[4] Thus, the basis by which regional labor markets are recognized consists of the fact that the uneven distribution of economic activity over space and its tendency to agglomerate at certain points, provides relative concentrations of labor supply and demand. These concentrations, when taken with the fact of imperfect labor mobility, are sufficient requirements for a geographic area to be singled out as a recognizable labor market.

A consideration of the geographic boundaries of such areas can be undertaken best by conceiving of the potential labor market area as a system of concentric circles radiating from a central core, which represents the highest concentration of activity. It should be expected, as one moves away from the core in any direction, that the degree of interaction of the last ring encountered, as measured by commutation both to and from the core, would diminish. The expectation of this declining interaction would be justified simply on the basis of what could be termed "spatial friction." This friction will exist whenever movement from one point to another is associated with a cost expressed in terms of a money outlay and/or time outlay and that these costs are positively related to the distance to be traveled. The increasing costs of movement associated with increasing distances from the core will, when they are related to individual income and time constraints, result in a growing reluctance to commute to the core. The labor

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[4]Labor market demand and supply disequilibrium, or the existence of wage level inequalities between labor markets could be corrected through the movement from one labor market to another of other productive resources as well. In the limiting case, labor could be considered a fixed resource of homogeneous quality which combines with other perfectly divisible and mobile productive inputs to equalize wage rates in all markets. This latter solution, however, is not often considered a means for eliminating labor market disequilibrium or wage inequalities.

market boundary would be drawn at the ring, which is associated with some arbitrary small amount of interaction with the core. If it is assumed that after a certain point the population in each ring declines as one moves further away from the core, the measure of interaction might be expressed best as a proportion of the labor force residing in the ring which commutes to the core, as well as the proportion of the employment in the ring accounted for by residents of the core. The area lying within this outer ring would then define an integrated labor market area.[5]

The conceptual framework underlying the methods for defining SMSAs and MLMAs recognizes the two considerations for defining labor market areas discussed above and results in a set of operational criteria for defining such areas. As was stated earlier, these criteria are common to both the formulation of SMSA and MLMA definitions. The statistical unit which serves as a "building block" in constructing and delineating recognizable areas is, with the exception of the New England states, the county. In order that a point of concentrated social and economic activity be recognized as a definable region it must meet both a population size requirement and a requirement of sufficient metropolitan (non-agricultural) character. The population requirement states that each SMSA or MLMA must include at least:

(1) (a) One city with 50,000 or more inhabitants, or

(b) Two cities having contiguous boundaries and constituting, for general economic and social purposes, a single community with a combined population of at least 50,000, the smaller of which a population of at least 15,000.

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[5]For an interesting theoretical discussion of the determination of labor market boundaries in terms of the frequency density of workers' "normal preference areas" within a labor market, see: W. Goldner, "Spatial and Locational Aspects of Metropolitan Labor Market Areas," American Economic Review, Vol. XLV, No. 1 (March, 1955), pp. 113-28.

(2) If two or more adjacent counties each have a city of 50,000 or more (or twin cities under 1b) and the cities are within 20 miles of each other (city limits to city limits), they will be included in the same area unless there is definite evidence that the two cities are not economically and socially integrated.

The following criteria state the requirements of metropolitan character and extent of integration with the county(ies) containing the central city(ies) for adjacent or outlying counties in order for their inclusion as part of the defined metropolitan or labor market area:

(3) At least 75 percent of the labor force of the county must be in the nonagricultural labor force.

(4) In addition to criterion 3, the county must meet at least one of the following conditions:

(a) It must have 50 percent or more of its population living in contiguous minor civil divisions, with a density of at least 150 persons per square mile in an unbroken chain of minor civil divisions, with such density radiating from a central city in the area.

(b) The number of nonagricultural workers employed in the county must equal at least 10 percent of the number of nonagricultural employed in the county containing the largest city in the area, or be a place of employment of 10,000 nonagricultural workers.

(c) The nonagricultural labor force living in the county must equal at least 10 percent of the number of the nonagricultural labor force living in the county containing the largest city in the area, or be the place of residence of a nonagricultural labor force of 10,000.

(5) In New England, the city and town are administratively more important than the county, and data are compiled locally for such minor civil divisions. Here, towns and cities are the units used in defining SMSAs and MLMAs. In New England, because smaller units are used and more restricted areas result, a population density criterion of at least 100 persons per square mile is used as a measure of metropolitan character.

(6) A county is regarded as integrated with the county or counties containing the central cities of the area if either of the following criteria are met:

(a) If 15 percent of the workers living in the county work in the county or counties containing central cities of the area, or

(b) If 25 percent of those working in the county live in the county or counties containing central cities of the area.

Where data for criteria 6a and 6b are not conclusive, other measures of integration are employed. Such measures include average telephone calls per subscriber per month from the county to the county containing central cities of the area, newspaper circulation reports, traffic counts, extent of use of retail shopping facilities in the central cities by residents in contiguous counties, and other measures.[6]

The conceptual framework implicit in the foregoing operational definitions of MLMAs and/or SMSAs fits the theoretical requirements developed earlier for defining a meaningful labor market area. The major difference between the

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[6]Statements of these criteria can be found in several U.S. Government publications. See, for example: U.S. Bureau of the Census, U.S. Census of Population: 1960, General Social and Economic Characteristics, U.S. Summary, Final Report PC(1)-1C (U.S. Government Printing Office, Washington, D.C., (1962), p.X. See also: Bureau of Employment Security, Handbook on Defining Labor Market Areas, B.E.S. No. R-186 (Office of Program Review and Analysis, Washington 25, D.C., March, 1960). This contains a restatement of the criteria contained in the above cited Census publication.

theoretical definition and the operational definition lies in the use of political units as "building blocks" from which the labor market area is constructed instead of concentric rings. Those regional definitions, however, which are formulated for the purpose of empirically analyzing and testing the extent of certain hypothesized economic and social relationships are constrained by the necessity of reconciling theoretical regional concepts with the practical limitation of data availability. The adequacy of the operational labor market demarcating criteria in terms of their theoretical foundation serves as a strong argument for selecting these areas for the purpose of this dissertation.

There are other reasons for selecting the MLMAs as the areas for observation. First, the MLMAs provide a major focus for the implementation of national policies designed to increase employment or reduce unemployment. Such policies can be made more effective in achieving their stated goals if they are able to become "regionally oriented" in nature and direct their impact to those geographic areas whose performance is significantly below national levels. The combined MLMAs in 1960 accounted for 57.6 percent of the United States population, up from 54.6 percent in 1950.[7] The Bureau of Employment Security estimates that these labor markets account for nearly 70 percent of the nation's nonagricultural wage and salary workers. The share of the MLMAs of the total metropolitan population, defined as that segment of the national population residing in SMSA, was nearly 93 percent in 1960.[8] The means of achieving stated national goals regarding total employment and unemployment can be further strengthened when the major subject of their focus involves such a large proportion of the total population.

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[7] U.S. Bureau of the Census, U.S. Census of Population: 1960, General Social and Economic Characteristics, U.S. Summary, Final Report PC(1)-1C, (U.S. Government Printing Office, Washington, D.C., 1962).

[8] Ibid.

The second reason for selecting the MLMAs for observation stems from the nature of the availability of data for employment and unemployment for various geographic areas. Aside from the Decennial Census, the employment and unemployment estimates published bi-monthly for the MLMAs in Area Trends in Employment and Unemployment, a publication of the Bureau of Employment Security, are the only regularly published source of such data for geographic areas smaller than the national economy.[9] This fact alone might well be sufficient reason for selecting these areas for analysis. The other reasons stated serve only to enhance their eligibility.

B. A Method of Observing Variations Among Regions in the Relationship between Employment and Unemployment Changes

Once the labor market areas selected for observation have been defined, the problem arises of discovering a means of yielding a meaningful measure of the relationship between employment and unemployment changes occurring in them over some time interval. To allow comparisons among regions in this relationship, the best general form for this measure to take would be a ratio of the form: $(\Delta U/\Delta E)$.[10] This ratio will state the change in unemployment occurring over a time interval as a proportion of the change in employment occurring over the same time interval for a given region.

The formulation of the measure as a ratio of the two changes has some advantages. First, stating the change in unemployment as a proportion of the change in employment eliminates the arbitrary influence of the absolute size

[9] For an explanation of the derivation of these estimates see last section.

[10] In certain cases there may be merit in expressing the measure in the form of an elasticity, $\Delta U/\Delta E \cdot \frac{E}{U}$, which would state the percentage change in the volume of unemployment associated with a percentage change in employment. The following material presented in this section, however, is meant only to give some indication of the variability in this relationship among regions and the elasticity measure has no special advantage in doing this.

of these changes. Since this influence is removed, the measure allows meaningful comparisons to be made in this relationship for both the various sized labor market areas for a particular time interval and for a specific area over different time periods. Secondly, the use of changes in unemployment and employment as the elements forming this ratio, results in a value which yields a direct and unambiguous measure of the relationship in question once the direction of the change in employment is known. In the following section, values of this ratio will be computed from the employment and unemployment changes occurring within the MLMAs to show the variation which occurs in this relationship among these areas.

The range of values which the ratio ($\Delta U/\Delta E$) can take is an important question for the proper interpretation of the resulting values presented in the following section. It can be answered only by considering all the possible combinations of movements which the numerator and denominator can take. For positive changes in employment the ratio can conceptually tend to values from minus to plus infinity, as the corresponding change in unemployment is characterized by an infinitely large reduction or an infinitely large increase. For negative changes in employment, the ratio can conceptually again tend to values from minus to plus infinity, as the associated change in unemployment is characterized by an infinitely large increase or an infinitely large decrease. Thus, it is important that the direction of change in employment be noted in interpreting the ratio. It might be expected that an increase in employment in a labor market would be associated with a reduction in unemployment, and that a reduction in employment would be associated with an increase in unemployment. This, of course, implies that the ratio is expected to be of negative sign. For reasons which will become clear in the following sections, expectations regarding the absolute value of this ratio, which depends upon the relationship of the absolute values of the two changes, are not as certain.

The following part will describe the observed relationship between employment and unemployment changes for the selected labor market areas and the variation in this relationship among them.

C. The Observed Relation Between Employment and Unemployment Changes in Major Labor Market Areas

The time interval containing the various sub-intervals over which employment and unemployment changes are observed in the regions extended from May, 1961 through September, 1963. Several constraints dictated the choosing of this period. For the purpose of testing hypotheses regarding variations among regions in this relationship, it is desirable to have a time interval which contains the period in which the various social and economic characteristics of the labor market areas were enumerated. The enumeration period of the 1960 Census was in April.[11] However, in the interval surrounding this enumeration period, about 30 of the 150 labor market areas underwent changes in geographic definition. Presumably, these definitional changes occurred as a result of newly received Census information on factors affecting these definitions. Such changes in definition for a labor market area would make an accurate employment

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[11]Enumeration of the population was taken as of April 1. Nearly all population attributes were recorded as of this date also. Labor force and occupational characteristics, however, refer to the calendar week prior to the date on which the respondents were interviewed by enumerators. This week was not the same for all respondents because not all persons were enumerated during the same week.

Eighty-five percent of the population had been enumerated by mid-April; 98 percent by the end of the month. U.S. Bureau of the Census, U.S. Census of Population: 1960, Volume I, Characteristics of the Population. Part I, U.S. Summary. U.S. Government Printing Office, Washington, D.C., 1964, pp. XII, LXI, and LXVII.

and unemployment series for it very difficult. November, 1960 was the earliest possible starting point for a time interval which would avoid having to eliminate those areas undergoing definitional changes. Choosing this point, however, would mean the inclusion of a business cycle through which, according to National Bureau of Economic Research dating techniques, occurred in February, 1961. Given that the direction of change in employment and unemployment levels coincides roughly with cyclical turning points, it is desirable that this analysis exclude such turning points. The earliest feasible starting point was May, 1961.

Six time intervals, beginning with the months of May and July, were defined during this period.[12] For each time interval, the change in employment which occurred along with the corresponding change in unemployment was computed and combined to form a ratio for each of 142 MLMAs. The dates and length of time for each of these six intervals, together with a statistical description of the corresponding distribution of the values of the ratios obtained for the MLMAs is presented in Table B-1.

The months of May and July were selected as the basis for computing the employment and unemployment change in the belief that the random component of the two changes would be at a minimum for these months. It was felt that the other four months contain periods which might cause year-to-year employment and unemployment changes to fluctuate more because of this component. November and January contain a good deal of Christmas retail activity which might fluctuate from year-to-year; March employment and unemployment levels could fluctuate from

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[12] Employment and unemployment data are published for the months of January, March, May, July, September, and November. Eight MLMAs were permanently deleted from the population. They included Ponce, Mayaquez, and San Juan in Puerto Rico. In addition, Battle Creek, Michigan, Tulsa and Oklahoma City, Oklahoma, and Providence, Rhode Island underwent changes in geographic definition during this period and were deleted. Miami, Florida was deleted from the population because, starting with May, 1962, the unemployment estimates contained relatively large increments in the form of Cuban refugees. There was no accurate method for removing the affect of this unusual circumstance.

Table B-1

Characteristics of the Distributions of the Ratio (ΔU/ΔE) Computed for Various Time Intervals

	May 1961-62	July 1961-62	May 1962-63	July 1962-63	May 1961-63	July 1961-63
<u>ΔE > 0</u>						
Number of Observations	124	115	97	110	98%	93%
Mean*	-1.0183	-.7837	-.1160	-.2320	-.7438	-.6055
Median	-.7059	-.5200	-.0870	-.0769	-.4920	-.3542
Variance*	.9773	1.1666	.4192	.6899	.3561	.7416
<u>ΔE < 0</u>						
Number of Observations	13	23	44	33	32%	27%
Mean*	+.4715	+.6606	-.2073	-.1203	+.9950	+.9186
Median	+.3571	+.2000	-.0952	-.1250	+.5772	+.5757
Variance*	.4565	1.1001	1.7664	2.0311	.3750	2.0189

* Indicates that the computations of these measures were performed after eliminating observations having highly extreme values.

year-to-year simply on the basis of the date upon which Easter falls; and September is subject to large labor force fluctuations because of the start of the school year. A comparison of the seasonal adjustment factors of labor force components for the various months show that the employment and unemployment levels for May and July have, on the whole, the smallest seasonal components.[13] It is recognized that the seasonal and random components of an economic magnitude and presumably occur independently of one another; however, to the extent that any positive correlation exists, the minimization of the seasonal element will work in the direction of reducing the random component.

The decision to use several time intervals to relate the resulting changes in employment and unemployment was based on two considerations: (1) It is possible that the distribution of ratio values might depend in some way upon the length of time employed in defining the changes. For example, the occurrence of employment increases in a labor market may be associated with relatively larger reductions in unemployment over a short time interval than over a longer one. In an extreme case, the absolute value of the ratio of employment and unemployment changes occurring within a labor market over a ten year period would be expected to be considerably smaller than the ratio of the two changes occurring over a one year period.[14] To check for this possible variation with respect to time, intervals of one and two years were employed. (2) In forming ratios of changes over a time period of a given length, it is interesting to see if the characteristics of the distributions change as a result of different starting points within the expansion phase of the business cycle. For example, it is possible that values of $\Delta U / \Delta E$ are larger in absolute terms in the early

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[13] U.S. Dept. of labor, Bureau of Labor Statistics, Employment and Earnings, Vol. 11, No. 8 (February, 1965), p. V.

[14] This becomes clear when one considers the components of a change in the level of unemployment. See Section I, p. 3FF.

phases of an expansion (employment increases associated with relatively large reductions in unemployment) than in later periods of the upswing.

In the statistical descriptions of the distributions presented in Table B-1, one of the most significant discoveries in observing the behavior of these labor market areas is the different relationship which exists among them between employment and unemployment changes depending upon whether the change in employment occurring over the time period is positive or not. It is expected that negative changes in employment occurring over short time intervals would be associated with positive changes in unemployment and vice versa, so that the expected sign of the ratio would be negative. However, in 4 of the 6 time intervals, the unweighted means of the ratios for areas experiencing non-positive changes in employment were positive in sign. The corresponding medians were also positive in these four cases. The interpretation of this phenomenon is, of course, that employment, on the average, declined in the face of declining or unchanged employment levels in the same period. This characteristic contrasts with the expected negative sign observed for the means and medians of the distributions composed of positive employment changes.

It is desirable to determine if this apparent assymmetry of the relationship of positive and nonpositive employment changes to unemployment changes is significant or simply a statistical phenomenon of averaging ratios without regard to the sizes of the changes which form them. For example, consider a distribution composed of two ratios computed from employment and unemployment changes in two labor markets A & B. The change in employment in A was -100; the change in unemployment was -300. In B, the changes were -5000 and +3000 respectively. The values of the resulting ratios would be +3 and -.6. The unweighted average of these two ratios would be +1.2 and would incorrectly indicate that, on the average, a decline in employment of 100 workers in these labor markets would be associated with a <u>decline</u> in unemployment of 120 workers! To guard against the possibility of accepting such a perverse statistical result, the nonpositive changes in employment and the corresponding changes in unemployment were summed for each time interval to determine what the overall reaction of unemployment was in those areas which experienced either declining or unchanged employment levels over the time interval observed. The results of these calculations for each of the time intervals along with the corresponding means and medians from Table B-1 are presented together in Table B-2.

The results of this check show that, when taken together, those labor markets which have experienced either declining or unchanged employment levels have also, as a group, experienced declining unemployment as well. There also appears to be some relationship between the length of time over which an area experiences declining employment and the amount of reduction in unemployment. The ratios of aggregate changes over the two year periods show consistently higher values than the one year intervals.

It would appear reasonable that the measured declines in unemployment which are observed in areas with declining employment represent long run labor force adjustments to relatively sparse employment opportunities. The labor force adjustments which manifest themselves in these areas appear too drastic to represent a reaction to a short-run decline in labor demand.

A check was made on those areas which displayed declining employment levels throughout most of the total time interval to get some idea of their prior economic status. The BES, in its publication Area Trends, classifies each of the MLMAs according to the relative adequacy of its labor supply. It was found that the overwhelming majority of the areas which displayed declining employment levels throughout most of the period were classified as areas of "substantial" or "substantial and persistent" unemployment at the beginning of the period used in this study.

Table B-2

Comparison of the Values of the Unweighted Means and Medians of the Distributions of ($\Delta U/\Delta E$) with Ratios of Aggregate Changes for Areas Experiencing Nonpositive Employment Changes

TIME PERIOD	Months	$\Sigma\Delta U/\Sigma\Delta E$	Unweighted Distribution Mean	Distribution Median
May, 1961-63	24	+ .9725	+ .9950	+ .5772
July, 1961-63	24	+ .8242	+ .9186	+ .5757
May, 1961-62	12	+ .7246	+ .4715	+ .3571
July, 1961-62	12	+ .5527	+ .6606	+ .2000
May, 1962-63	12	- .0347	- .0952	- .2073
July, 1962-63	12	- .2676	- .1203	- .1250

This observation supports the notion that the areas with observed employment declines are, in general, labor markets with chronic labor surpluses. The labor supply residing in these areas would be expected to react to this situation by either reducing its participation in the labor force or leaving the region in search of more favorable opportunities. In areas with absolute employment declines, this downward labor force adjustment over time must manifest itself in net reductions in measured unemployment.

In studying the distributions in Table B-2 for any regularities that might appear, certain characteristics common to all or a portion of the distributions can be observed. A characteristic common to virtually all of the distributions is that there is a lack of any tendency for the measure of central tendency to center around the value of -1. The distribution of ratios with positive employment changes displays central tendencies around values generally considerably smaller, in absolute terms, than one. This, of course, indicates that employment increases in labor market areas over a given short run time interval will absorb an amount of unemployment smaller than the additions to employment.[15] The distributions of ratios composed of negative or zero employment changes not only display a lack of any central tendency around the value -1, but also fail to display any common tendencies other than that of taking positive values. Another characteristic common to all of the distributions, and of particular significance for this study, is the rather large variation among regions in the relationship between employment and unemployment changes.[16]

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[15] These results are consistent with the results of studies of a similar nature at the national level discussed in Section III, Part A.

[16] If the labor markets observed at a point in time can be conceived of as experiencing different phases of their respective regional business cycles, part of the variation among them regarding the observed association between employment and unemployment changes may be attributed to this. For example, the labor force behavior and the resulting relationship between employment and unemployment changes, may be different for a region experiencing stable levels of activity than for a region enjoying rapidly rising employment levels.

A check of the frequency densities of the distributions in the category of positive employment changes indicates that these distributions display at least a tendency toward normality. These distributions also display the further characteristic of having their medians smaller, in absolute terms, than their means in all cases. This, of course, indicates that their tendency toward normality is curbed by a skewness to the right, further indicating that the majority of the frequencies are smaller in absolute terms, than the mean of the distribution. Neither of these characteristics exist for the distributions of ratios with non-positive employment changes.

The approximate normality of the distributions of positive employment changes allowed them to be subjected to certain statistical tests. These tests were performed to indicate the validity of a hypothesis which states the following: Distributions of ratios computed for time intervals of equal length and in the same phase of the expansion will not differ as a result of basing the period on different months, i.e., May or July. After ascertaining by means of an F-test that the variances for the two one-year intervals of 1961-62 were equal, a t-test for a difference in the means of the May and July ratios was performed. The hypothesis was upheld at the 1% level; i.e., the mean of the distribution based on May, 1961-62 was not significantly different from the mean of the distribution based on July, 1961-62. The means and variances for the 1962-63 distributions based on May and July were also not significantly different variances, but an approximate test also showed significant difference in their means.[17]

An analysis of variance of the four one-year distributions was performed and the hypothesis of equality of their means was rejected. This is an interesting result and suggests a tentative statement regarding the relationship of

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[17] For a description of the test for differences in means when the hypothesis of equal variance must be rejected see: Edward C. Bryant, Statistical Analysis (New York: McGraw Hill, Inc., 1960), p. 91.

employment changes to the corresponding changes in unemployment at different points within the portion of the cyclical expansion observed here. It was already stated that the means of the two one-year distributions of ratios starting in 1961 were not significantly different from each other. The same result applies to the two one-year distributions starting in 1962. The analysis of variance, in rejecting the hypothesis of equality when the four means are taken together, suggests that the characteristics of the distributions change in response to different starting points within the expansion phase of the business cycle.

The analysis of variance only shows that some differences exist among the means. It does not show where they are. Observing the values of -1.0183 and -.7837 for the distributions of ratios computed for the 1961-62 interval and the values of -.1160 and -.2320 for the 1962-63 interval suggests, however, that employment increases in the early phases of an expansion are associated with larger reductions in unemployment than such increases occurring at later dates within the expansion. This is perhaps a not too surprising conclusion and has a great deal of intuitive appeal.

The same statistical problem of averaging the individual ratios without regard to the size of the changes which form them is present here as well as in the case of the distributions of non-positive employment changes discussed earlier. To guard against this, a procedure identical to that undertaken in presenting the values in the first column of Table B-2 was carried out. That is, for each of the four time intervals, the employment and unemployment changes were summed for those labor markets having positive changes in employment. Ratios of these sums were formed for each time interval to determine if the relationship changed over time. The average value of this ratio, $\Sigma\Delta U/\Sigma\Delta E$, for the one-year intervals starting in 1961 was about -.60. The average value for the two intervals starting in 1962 was about -.13. In other words, for every employment increase of 100 in these areas at this time, unemployment was reduced by about 13 as compared with about 60 for the earlier period. These checks lend considerable support to the idea that employment and unemployment changes will bear a different relationship to each other at different phases of a cyclical expansion.

An inference can be made regarding the relationship of the ratio value to the length of time employed in computing the changes which form it. If, for a given time interval, an employment increase is associated with a relatively larger reduction in unemployment (the ratio, $\Delta U / \Delta E$ has a higher absolute value) in the early phases of a cyclical expansion than in the later phases of the expansion, it would appear that a ratio of changes encompassing both periods would have an absolute value lying somewhere between the ratio value for the early period and the later period. This supposition is borne out in Table B-1. For example, the average ratio value for May, 1961-62 was -1.0183 and for May, 1962-63 it was -.1160. The average value for the period May, 1961-63 was -.7438.

D. Summary and Concluding Remarks

The major purpose of this section has been to examine the extent of variation among major labor markets in the relationship of employment changes occurring within them to their corresponding changes in unemployment. The labor markets selected for study represent nearly all of the 150 metropolitan areas extending across the country which have been designated by the Bureau of Employment Security as Major Labor Market Areas. The criteria used to geographically delineate these areas is virtually identical to those employed to define Standard Metropolitan Statistical Areas.

In each of various time intervals a ratio of the change in unemployment to the corresponding change in employment was formed for each of these labor market areas. The distribution of the values of the ratio $\Delta U / \Delta E$ for each of the selected time periods demonstrated that considerable variation existed among the MLMAs. An alternative way of viewing this phenomenon is to observe that the responsiveness of local labor supplies, as measured by changes in labor force size, varied considerably from one labor market area to another as a proportion of the change in employment levels. As was demonstrated in Section I, increases in labor force size occurring simultaneously with increases in employment levels serve to reduce or "dilute" the impact of these employment changes on the existing level of unemployment.

The task of the following sectionwill be to discuss the received knowledge regarding those components of labor force change which are likely to react to changes in employment opportunities.

LABOR FORCE BEHAVIOR: SOME THEORIES AND EVIDENCE

As Section I indicated, the association of employment changes with widely differing proportionate changes in unemployment within labor market areas can be explained by differences in the extent of the relative corresponding change in the size of the labor force residing in each of these areas. The components of change in labor force size held to be responsible for this phenomenon are: (1) changes in the local rate of labor force participation, and (2) interregional labor migration.[1]

The remainder of this section will accordingly be devoted to discussing the current state of knowledge regarding the general determinants of the above two components of labor force change and will be divided into three parts. Part A will present existing theories and evidence on the rate of labor force participation. Part B will discuss the theory of and evidence on the determinants of the rate of interregional migration. Part C will in addition to containing a summary and concluding remarks, also discuss the relevance of this information to the problem at hand.

A. Labor Force Participation: Some Theories and Evidence

1. The Concept of a "Primary and Secondary" Labor Force and Theories Regarding the Rate of Total Participation.

There are sound *a priori* reasons for believing that a region's labor force over time will not be a constant proportion of its working-age population. Moreover, it might be expected that the composition of the labor force with respect

[1] The third component of labor force change, natural increase of the working-age population is also relevant in relatively short run periods to the extent that resident labor is supplied inelastically. Evidence on total labor force participation rates, both cyclical and cross-sectional, suggests, however, that such is not the case. It will not be given explicit consideration in the analysis.

to such variables as age and sex will vary with different levels of economic activity. The basis for these beliefs is the observation that certain definable groups within the working-age population seem to experience different degrees of labor force attachment which allows them at least a modicum of choice as to whether or not to participate in the labor force by either immediately gaining employment or actively seeking it in the status of an unemployed entrant. Decisions by individuals in these groups to change their participation rate, in the volume of employment and unemployment and, almost surely in the total unemployment rate as well.

The strength of a group's labor force attachement depends on the extent to which a "representative" individual in that group is able to exercise his choice over time between employment and the pursuit of undertakings not associated with labor force activity. This choice is revealed at any point in time by whether or not he is participating in the labor force. A non-duplicative, exhaustive classification of the working-age population can then be based on the extent to which "representative" individuals in each of these groupings can exercise this choice. At one extreme of the classification are those groups which have a very high labor force commitment; i.e., they can exercise little choice as to whether or not they participate in the labor force. These groups would consist of "prime age" males between the ages of, say, 25-55 and unmarried, childless females in roughly the same age brackets. These groups (perhaps with slight variation in definition) are often referred to as comprising the "primary" labor force. The remaining groups, by implication, are conceived as having a larger degree of choice regarding participation in the labor force. They would, for example, consist of teenage males and females, married women, and older males and females, which together are referred to as forming the "secondary" labor force. Since the groups forming the primary labor force are conceived of as having little choice but to participate, variation in the total labor force participation rate must then be attributed largely to those groups which have some degree of long run choice regarding participation. An understanding of the causes of variations in labor force size, as they can be attributed to changes in participation rates, requires a knowledge of the forces which either attract or repel members of the secondary labor force from participation.

The theory of choice by the individual worker between increments to income or leisure, as set out in neoclassical microeconomic theory, has provided the foundation for theories of the determinants of labor force behavior.[2] This analysis of worker reaction to wage rate or income changes is based on a consideration of the anticipated income and substitution effects of such changes. On the assumption that leisure time is a desirable or "normal" good, and has a positive income elasticity of demand, it is to be expected that existing workers will consume more of it as their income rises. Thus, the income effect, considered by itself, implies a "backward bending" individual supply curve of labor after a certain wage rate or income level has been attined. Further rises in wages and income allow the worker to consume additional amounts of leisure; i.e., he will forego a portion of his time previously devoted to labor in order to partake of more leisure time. Presumably, the wage rate or income level at which the labor supply curve begins to bend backward is sufficient to yield an income level which can provide the basic necessities of life.

The analysis, however, cannot stop at this point because the substitution effects of a wage increase have to be considered. A rise in wages implies that the opportunity cost, or "price," of leisure has also risen. The standard theory of demand concludes that substitution will take place against this relatively

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[2]Expositions of microeconomic theories of aggregate labor force behavior can be found in J.R. Hicks, The Theory of Wages (2nd edition, New York: St. Martins Press), Chapter V, Lionel Robbins, "The Elasticity of Income in Terms of Effort," Economica, Vol. 10 (June, 1930), pp. 123-29. A diagrammatic exposition of the choice between income and leisure of the individual worker can be found in Tibor Scitovsky, Welfare and Competition (Chicago: Richard D. Irwin, Inc., 1951) p. 83ff.

higher priced good, leading to an increase in the amount of labor time supplied. Because individual subjective valuations determine the relative strength of these two opposing effects, no conclusive _a priori_ statement can be made concerning the direction of a net change in the quantity of labor supplied as a result of wage and income changes.

The theory of choice, employing income and substitution effects can be adapted to hypothesize the direction of changes in labor force size as evidenced by changes in the participation rate, in response to changes in the general level of economic activity. There are essentially two theories regarding the direction of change in labor force size in response to changing economic conditions. They have been labelled the "additional" and "discouraged" worker hypotheses.

The "additional" worker hypothesis, first advanced by W.S. Woytinsky,[3] was an obvious product of an attempt to analyze the volume of unemployment which existed in the Great Depression. An additional worker was defined by Woytinsky as a "...person who is in the labor market because of the unemployment of the usual breadwinner in his family and who otherwise would not be seeking work: he may be a new worker, a reentrant, or a person who remained in the labor market beyond the age at which he otherwise might have retired.[4]

This theory states that the aggregate supply curve of labor has a negative slope at less than normal levels of income and employment. The general cause of this negatively sloped supply curve in this range stems from the assumption that the negative income effect of a fall in wage receipts overwhelms the positive substitution effect of a fall in the "price" of leisure measured in terms of its opportunity cost. More specifically, the concept of "income" which is implicit

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[3] W.S. Woytinsky, _Additional Workers and the Volume of Unemployment in the Depression_, Washington, Social Science Research Council Pamphlet Series No. 1, 1940.

[4] _Ibid._, p. 1.

in this theory is that of income which represents the pooled earnings and consumption power of the family unit. When the total income of the primary labor force falls with their rising unemployment, the resulting reduced family income can be conceived of as a reduction in income for all members of the family unit. The substitution effect of this phenomenon would, by itself, dictate a rise in the demand for leisure as its relative price, measured in terms of income foregone, diminishes. The income effect, however, which is hypothesized to dominate over the substitution effect of this reduction is to reduce the demand for leisure (an income elastic good) by family members and increase their demand for work.

The result of this alleged phenomenon is that the labor force would expand in the face of declining employment and earnings opportunities. This depression labor force would contain not only those workers with normally high labor force attachments as either employed or unemployed, but would be expanded from the size associated with normal prosperity levels by an increment of "additional" workers seeking employment in an attempt to maintain at least minimum levels of family income. A result of a labor force expansion consisting of large numbers of entrants seeking temporary employment during a period of depressed economic activity is that the observed volume of unemployment will be inflated by the entrance of workers into the labor force who intend to withdraw at a later date when income and employment return to normal levels.

If this theory, implying a dominant income effect, is assumed to be reversible and applicable to a situation of both high and rising levels of real income, the implication would be that continually decreasing amounts of labor would be supplied as members of the working-age population purchase greater amounts of leisure. Such a conclusion would be in keeping with the views of some earlier economists in this regard.[5] It would be, however, incorrect to

[5]Clarence D. Long, The Labor Force Under Changing Income and Employment, Princeton, N.J. Princeton University Press. 1958 p. 34ff presents some excerpts of earlier thinking on this matter.

infer these conclusions from Woytinsky's theory. He states: "In periods of exceptional demand for labor, additional workers are an important part of the reserve from which labor shortages are met..."[6] Thus, a complete statement of the additional worker hypothesis, applying to both period of abnormally low levels of activity as well as to periods of exceptionally high levels of demand would imply that the dominant element in determining an individual's choice between income and leisure will depend upon whether activity levels are high and rising or low and falling. In the case of high and rising activity levels the substitution effect gains dominance over the income effect as individuals recognize the high opportunity cost of leisure and attempt to substitute by seeking and obtaining employment. In low levels of activity, the income effect becomes dominant and results in the labor force behavior described above. Woytinsky's theory of labor force behavior at various levels of economic activity can be represented in figure B-1.

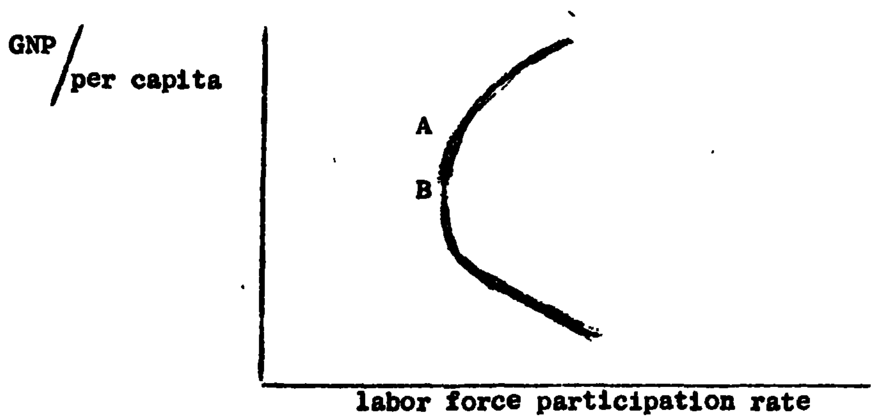

FIGURE B-1

The range AB reflects the labor force participation rate at what could be considered "normal" levels of activity. Points on the curve above A and below B represent the inflows of "additional" workers as they reveal their choices between income and leisure.

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[6]Woytinsky, loc. cit., p. 1.

The second of the major theories of labor force behavior again has particular reference to the behavior of the aggregate labor supply in periods of less than normal economic activity. The "discouraged worker" hypothesis implies a behavior on the part of the labor supply in periods of declining activity, of an opposite nature than that conceived of in the "additional worker" hypothesis. It rather states that, as levels of activity and employment decline below normal levels, individuals not only in the secondary, but also in the primary labor force, who become unemployed and consider themselves as having a small probability of gaining new employment, simply cease to participate in the labor force. The fall in the labor force participation rate is brought about not only by exits from the labor force, but also by the postponement of entry into it by those individuals attaining an age or position which would normally be associated with labor force entry. This postponement of entry is conceived of as being caused by the scant possibility of obtaining employment.

The "discouraged worker" hypothesis, in asserting the opposite effect of depressed activity levels on labor force size and the measured volume of unemployment, implies that the substitution effect of a fall in wages and income overwhelms the corresponding income effect of this change. This can be explained as follows: When income and employment fall in periods of depression, the subsequent effect is the lowering of the "price" of leisure in terms of its opportunity cost of income foregone. The "discouraged worker" can be conceived of as computing the "price" of nonlabor force activities by attaching a subjectively determined probability of gaining employment to the anticipated stream of income which he would receive if he did become employed. The assignment of a low probability to this quite possibly reduced income stream in periods of depression will result in a subjectively determined price for leisure low enough to induce him to remain out of the labor force. His incentive to participate in the labor force during depression periods would be further diminished by the increased psychic costs of seeking employment which detracts from the possible income which may be earned. These psychic costs could be caused by the anxiety an individual may experience when seeking employment during a period of recognized slack labor demand, the discouragement felt by being frequently turned away by employers, or the probability that he will have to increase the size of his geographic employment preference area in an attempt to enhance his probability of gaining employment.

The depression labor force and the corresponding volume of unemployment under the "discouraged worker" theory, far from being inflated as it would be if the "additional worker" theory was assumed to hold, would be understated by this "hidden" unemployment which would manifest itself only if employment opportunities were revealed as increasing.

An easily drawn inference from the assumptions underlying the "discouraged worker" hypothesis in applying it to predicting labor force behavior in periods of rising income and employment is that labor force participation will increase with these rising levels of activity. This inference is based on the assumed continued dominance of the substitution effect over the income effect of wage and income changes over a wide range of activity levels. With falling levels of activity, the substitution effect displays its dominance in inducing potential labor force participants to increase their consumption of relatively inexpensive leisure in spite of falling incomes. With rising levels of activity, the substitution effect again displays its dominance by causing individuals to forego increasingly expensive leisure time in favor of additional work in spite of rising income levels.[7]

The extent to which public policies designed to reduce unemployment are pursued depends to a large degree on the observed volume of unemployment. Both

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[7]It is easily seen that a labor supply curve in which the substitution effect dominates in the relevant range will have the traditional positive slope. Conversely, a labor supply curve in which the income effect dominates in the relevant range will have a negative slope.

the "additional" and "discouraged" worker hypotheses indicate that this measured volume of unemployment will differ from the volume of unemployment which would exist if participation rates had remained stable. If the depression labor force was characterized by the "additional worker" hypothesis, there would be a tendency for unemployment policies to over-react to the situation by proposing a larger than necessary stimulus to employment demand based on observations of measured unemployment consisting of a large proportion of secondary workers. As employment and income begin to head for normal levels, the "additional" workers would consider their job done, voluntarily withdraw from the labor force, and reduce unemployment by either giving up their search for employment or vacating jobs which would be filled by unemployed members of the primary labor force. On the other hand, if the depression labor force had behaved in accordance with the "discouraged worker" hypothesis, it is likely that policies designed to alleviate measured unemployment would represent an inadequate reaction to the "true" unemployment situation. As employment and income headed for normal levels, it is conceivable that the volume of unemployment would be reduced only slightly, if at all, as formerly "hidden" unemployment manifested itself in the form of a continuing inflow of new entrants and reentrants into the labor force encouraged by the brighter prospects of employment. Unemployment policies in this situation must be designed to cope with not only the measured volume of unemployment, but also with this inflow of labor force entrants.

2. Evidence of the Economic Determinants of the Rate of Total Participation

The behavior of the labor force and its effect on the observed volume of unemployment existing in periods of depressed levels of economic activity has been shown to have special significance for the formulation of policies designed to stimulate aggregate demand and the derived demand for labor. The two hypotheses discussed in the previous section postulate different labor force responses to declining income and employment levels with the result that the measured volume of unemployment will either overstate or understate the volume of unemployment which would have existed if participation rates had remained at previous levels. To gain insight into the actual behavior of the labor force in response to changing economic variables, several empirical studies have been undertaken. Some of these will be reviewed here.

Woytinsky, in gathering evidence to support his "additional worker" theory, used several sources of data on unemployment during the Great Depression.[8] The support for his hypothesis from these data is based on inference from the distribution of unemployment among various groups of labor force participants plus an analysis of the expected incidence of unemployment in families classified by the number of workers. The special census of unemployment conducted in January, 1931, in 21 selected urban areas showed that from the time of the 1930 decennial Census of the previous April there was a proportionately larger increase of unemployment among women than among men, although the industries in which the heaviest lay-offs had occurred between the two enumerations employed principally men. Furthermore, the composition of female unemployment changed as the number of unemployed in the groups from 15 to 24 and from 35 to 49 years of age increased markedly. Also, the number of unemployed married women increased by 304.9% during this period, as against 197.8% for single women and 155.2% for widows and divorcees. Woytinsky cites these observations as support for his additional worker theory.

The fundamental basis of the "additional worker" hypothesis is that the unemployment and consequent loss of income suffered by an individual has an impact on the labor force behavior of those individuals closely related to and dependent upon the unemployed worker. More specifically, when the main breadwinner becomes unemployed, other members of the family would be expected to join

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[8] Woytinsky, op. cit., p. 13ff.

him in the labor market in seeking employment in an attempt to raise the income level of the family. If this hypothesis is true, one would expect to find that the incidence of unemployment by family would be characterized by a pattern which would differ from the one resulting from simple probability. Woytinsky, using Philadelphia labor market statistics, presented evidence which supported his theory. The method he employed in deriving this evidence is as follows: Given the number of households in an area, the number of workers, the number of unemployed, and the number of households with unemployment, the expected number of families with unemployment can be derived on a probability basis with the simplifying assumption that the risk of unemployment for the individual does not vary with the number of workers in the household. Woytinsky found that the number of families reported to have unemployment was "unduly small" when compared with the rate of unemployment among individuals and the average number of workers per household. In other words, he found that in families with unemployment, more unemplcyed persons were reported than probability would lead one to expect. This excess of the job seekers was attributed to "additional workers." Evidence was also found in the unemployment statistics collected by the United States Public Health Service in the winter of 1935-36 that the proportion of family members (14 and over) working or seeking employment was higher in those families where the family head was unemployed than in those families where he was employed.

Long, in his exhaustive studies of labor force behavior, reached opposite conclusions regarding the behavior of the labor force in severe depressions. He asserts that in periods of depression: "Statistics overwhelmingly indicate that more people have been driven out of the labor force by the unavailability of jobs ...than have been driven into it by joblessness of family breadwinners."[9] In another study he states that: "There was no net influx of desperation workseekers in the great depression.... Actual increases (in participation) of 2 percent of

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[9]Clarence D. Long. The Labor Force under Changing Income and Employment, (Princeton: Princeton University Press, 1958), p. 14, Chapter 10.

(the working age) population obtained...for the United States and its individual states and cities at various dates during 1934-40."[10] In observing the behavior of the labor force over long periods of time through 1956, a theme which continually recurs in Long's writing is the stability of this magnitude as a proportion of the working-age population. This conclusion is drawn despite long-run changes in the labor force participation rate of various age-sex groups within the population. Long concludes that the labor force is probably influenced by changes in employment only in the case of severe depressions of the type experienced in the 1930's. Even in this case, however, "very large increases in unemployment are required to induce a small net decrease in the...overall participation rate."[11]

It can be argued, however, that the appearance of an insensitivity of the labor force participation rate to changes in economic conditions is not sufficient proof of the nonexistence of "discouraged" or "additional" workers in periods of depression. Changes in the participation rate over any time period represent the algebraic sum of gross flows into and out of the labor force and, therefore, represent the net change in the proportion of the population participating in the labor force. An observed stability in the overall participation rate in the face of worsening economic conditions could mask significant, offsetting flows of individuals into and out of the labor force which would represent the coexistence of both "additional" and "discouraged" workers. The extent to which this rate remains stable under these conditions would then imply that the "additional" and "discouraged" worker effects are approximately equal in their relative importance.

Data are available for certain time periods stating gross additions to and reductions from the national labor force and its components, employment and

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[10]C.D. Long "Impact of Effective Demand on the Labor Supply," American Economic Review, Vol. XLIII. No. 2, May, 1953. P. 460. For comments contemporary to the period in which Woytinsky wrote see: D.D. Humphrey, "Alleged Additional Workers in the Measurement of Unemployment," Journal of Political Economy, June, 1940, Pp. 412-419.

[11]Long, Labor Force under Changing Income and Employment, P. 30.

unemployment. W.L. Hansen employed these data for much of the postwar period through 1959 in an attempt to analyze the components of change in the volume of unemployment between different time periods.[12] The results of his study showed that significant gross flows did occur. In observing the gross additions and reductions in the volume of unemployment as the result of unemployed entrants and exits to and from the labor force, he concluded that the "additional" and "discouraged" worker flows did occur but concluded that they tended to be offsetting. In guarding against any over-generalization of these results, Hansen was correct in pointing out that the cyclical variations in economic activity which occurred in this time period were of a mild nature and that the results of the relative importance of these flows may be substantially changed in periods of sharper changes in economic activity.

More recent studies tend to give unqualified support to the idea that the total labor force responds positively even to the relatively mild fluctuations in economic activity which have characterized the post war period. The simplest of these studies designed to test the net responsiveness of the labor force to changes in employment opportunities was undertaken by Alfred Tella.[13] Using annual changes from 1948 through 1962, he disaggregated employment (including armed forces) by sex and expressed them as percentages of their respecting working-age populations. Regression equations were formed with these ratios with time added as a second independent variable (1948 = 1). The estimated equations and their standard errors (in parentheses) are:

Males

$$\begin{aligned}(L/P) &= 51.48 + \underset{(.08373)}{.40401}\,(E/P) - \underset{(.044081)}{.17433t}\end{aligned}$$

Females

$$\begin{aligned}(L/P) &= 12.73 + \underset{(.13690)}{.62346}\,(E/P) + \underset{(.041779)}{.174582t}\end{aligned}$$

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[12] W. Lee Hansen, "The Cyclical Sensitivity of the Labor Supply," American Economic Review, Vol. LI, No. 3, June, 1961, Pp. 299-309.

[13] Alfred Tella, "The Relations of Labor Force to Employment," Industrial and Labor Relations Review, Vol. 17, No. 3, April, 1964, Pp. 454-469.

The coefficients show a net positive response of the labor force to changes in employment opportunities. The coefficient of female responsiveness is larger than the one corresponding to male, as a priori considerations of their relative overall degree of labor force attachment would suggest. The signs of the time trends variables reflect the empirical facts of an overall downward time trend in male labor force participation coexisting with an opposite time trend in female participation. These results are interpreted to yield unqualified support to the "discouraged" worker hypothesis, at least for the time period used in estimating the relationship.[14]

Coefficients obtained by regressing L/P on E/P yield the average net responsiveness of the labor supply to employment opportunities. The dominant of the two effects will determine the sign of the coefficient, and the equation will yield little information regarding the relative strength of, in this case, the "additional worker" effect. Dernberg and Strand undertook a study of the determinants of total labor force behavior which attempted to separate the previously combined "discouraged" and "additional" worker effects in an effort to judge their relative importance at different phases of the business cycle.[15]

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[14] Sophia Cooper and Dennis Johnston, using quarterly trend adjusted data to regress U/P on E/P, obtain very similar results for the values of their regression coefficients when the regressions are translated into L/P on E/P regressions. See their "Labor Force Projections for 1970-80" Monthly Labor Review, Vol. 88, No. 2, February, 1965, Pp. 129-140.
L.C. Hunter found an inverse relationship between cyclical fluctuations in labor force participation and employment which also supports the "discouraged worker" hypothesis for the United Kingdom in the period 1951-60. See "Cyclical Variations in the Labor Supply: British Experience, 1951-60, Oxford Economic Papers, Vol. 15, July, 1963, Pp. 140-153.

[15] Kenneth Strand and Thomas Dernberg, "Cyclical Variation in Civilian Labor Force Participation," Review of Economics and Statistics, Vol. XLVI, No. 4, November 1964, Pp. 378-391.

It was observed in the period from 1947-62, that when E/P fell at the start of a cyclical downturn, L/P fell much more sharply in relation to E/P than it did at later times in the downswing. A theoretical explanation for this phenomenon could be that certain workers with low labor force attachments are easily discouraged from seeking employment and thus, drop out of the labor force. When falling income and employment levels reach a certain point, however, the movement of discouraged workers out of the labor force is offset in part by an inflow of "additional" workers seeking to supplement the family income when the main income-earner suffers from unemployment or reduced income.

A test of this hypothesis by Dernberg and Strand took the form of a regression equation written as:

$$(L/P)_t = a + b_1 (E/P)_t + b_2 (X/P)_{t+2} + b_3 \frac{1}{(P)}_t + e_t$$

where: $(X/P)_{t+2}$ = the ratio of the change in the total number of number of unemployment compensation exhaustions two periods later to the adult population.

$(1/P)_t$ = a trend variable and used to offset any changes in P not accompanied by changes in L, E, or X.

The sign of the coefficient for (E/P), a measure of employment opportunities, is expected to be positive and reflect the presence of the "discouraged" worker effect. The sign of the coefficient for (X/P), a proxy for the duration and intensity of cyclical changes, is also expected to be positive and reflect the presence of the "additional" worker effect. Using monthly data for the period 1953 through 1962, the equation was estimated as:

$$(L/P)_t = a + .9490 (E/P)_t + 12.699 (X/P)_{t+2} - 5326.1 \frac{1}{(P)}_t + e_t$$

$R^2 = .8766$ SEE = .00206

All coefficients are of the expected sign and are highly significant.[16] Seasonal

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[16] Jacob Mincer, while agreeing with the substantive meaning of these results, raises some questions of a statistical nature about the study. See "Labor Force Participation and Unemployment: A Review of Recent Evidence," Paper given at University of California Conference on Unemployment, New York, June, 1965, (mimeo).

adjustment of the data was accomplished through the use of 12 dummy variables which had the effect of shifting the intercept. The same equation but with the (X/P) variable deleted was estimated for the same period and yielded:

$$(L/P)_t = A + .4890(E/P)_t - .4073.1 \frac{1}{(P)}_t$$

$$(R^2 = .5254 \qquad SEE = .00403$$

The regression coefficient for (E/P) indicates that, holding population constant, every increase (decrease) in employment of 100 workers was, on the average, associated with an increase (decrease) in the labor force of approximately 50 persons over the time period observed. This indicates that for every increase in employment, holding population constant, measured unemployment will be reduced by roughly one-half of the employment change. It is evident from the difference in the percentage of variation in (L/P), which is "explained" in the two equations, that the addition of a variable designed to capture the "additional worker" effect is important.

3. Evidence on the Postwar Trends and Sensitivity of the Participation Rates of Various Population Groups.

In spite of some disagreement among students of labor force behavior concerning the degree of responsiveness of the aggregate labor force participation rate to cyclical changes in economic activity, there is rather widespread agreement that the labor force participation rates of the various age-sex subsets of the adult population display different degrees of responsiveness to short term changes in economic activity. Moreover, there are discernible differences in the long term trends of the participation rates of these groups which will be examined before the evidence relating to their cyclical responsiveness is presented.

Table B-3 presents annual average total labor force participation rates from 1948 through 1965, sub-classified by age, sex, and color. In spite of the

TABLE B-3; LABOR FORCE PARTICIPATION RATES, by Color, Sex, and Age: Annual Averages: 1948-1965[1]

	1965	1964	1963	1962	1961	1960	1959	1958	1957
Total Labor Force Participation Rate[2]	57.5	57.4	57.3	57.4	58.0	58.3	58.3	58.5	58.7
All Males[2]	78.3	78.6	78.8	79.3	80.3	81.2	81.7	82.1	82.7
White Males[3]	78.6	77.9	78.1	78.6	79.7	80.5	81.0	81.3	82.0
14-19		41.0	40.7	40.8	41.7	43.6	44.0	43.5	45.4
20-24		85.7	85.8	86.5	87.6	87.8	87.3	86.7	86.7
25-34		97.5	97.4	97.4	97.7	97.7	97.5	97.2	97.2
35-44		97.6	97.8	97.9	97.9	97.9	98.0	98.0	98.0
45-54		96.1	96.2	96.0	95.9	96.1	96.3	96.6	96.6
55-64		86.1	86.6	86.7	87.8	87.2	87.9	88.2	88.0
65 & over		27.9	28.4	30.6	31.9	33.3	34.3	35.7	37.7
Nonwhite Males[3]	76.0	75.6	75.8	76.4	78.0	79.4	79.1	80.4	80.8
14-19		37.7	37.8	38.4	41.5	45.0	44.0	44.0	46.0
20-24		89.4	88.6	89.3	89.7	90.4	90.8	88.7	89.6
25-34		95.9	94.9	95.3	95.9	96.2	96.3	96.3	96.1
35-44		94.4	94.9	94.5	94.8	95.5	95.8	96.4	96.5
45-54		91.6	91.1	92.2	92.3	92.3	92.8	93.9	93.5
55-64		80.6	82.5	81.5	81.6	82.5	82.5	83.3	82.4
65 & over		29.6	27.6	27.2	29.4	31.2	33.5	34.5	[illegible]

TABLE B-3 (continued)

	1956	1955	1954	1953	1952	1951	1950	1949	1948
Total Labor Force Participation Rate[2]	59.3	58.7	58.4	58.5	58.8	58.9	58.4	58.0	57.9
All Males[2]	83.7	83.6	83.9	84.4	84.7	84.9	84.5	84.5	84.7
White Males[3]	83.0	82.8	83.0	83.1	83.6	84.0	84.1	84.0	84.2
14-19	47.4	45.6	45.4	46.4	47.6	49.2	50.3	49.4	50.7
20-24	87.6	85.6	86.4	87.4	87.6	88.4	87.5	86.5	84.4
25-34	97.4	97.8	97.5	97.5	97.6	97.0	96.4	95.9	96.0
35-44	98.1	98.3	98.2	97.9	97.9	97.6	97.7	98.0	98.0
45-54	96.8	96.7	96.8	96.4	96.3	96.0	95.9	95.6	95.9
55-64	88.9	88.4	89.2	87.7	87.7	87.4	87.3	87.6	89.6
65 & over	40.0	39.5	40.4	41.3	42.5	44.5	45.8	46.6	46.5
Nonwhite Males[3]	81.8	81.8	82.0	83.0	83.8	83.6	83.3	84.5	84.8
14-19	48.3	48.8	48.7	50.3	49.5	55.3	56.1	59.2	58.3
20-24	88.9	89.7	91.1	92.3	92.8	88.7	91.4	89.7	85.6
25-34	96.2	95.8	96.2	96.7	96.2	95.7	92.6	94.1	95.3
35-44	96.2	96.2	96.6	97.3	97.2	96.4	96.2	97.3	97.2
45-54	94.4	94.2	93.2	93.9	95.0	95.1	95.1	95.6	94.7
55-64	83.9	83.1	83.0	86.7	85.7	84.6	81.9	86.0	88.6
65 & over	39.8	40.0	41.2	41.1	43.3	49.5	45.5	51.4	50.3

TABLE B-3 (continued)

	1965	1964	1963	1962	1961	1960	1959	1958	1957
All Females[2]	38.0	37.4	37.0	36.7	36.9	36.7	36.1	36.0	35.9
White Females[3]	37.0	36.4	35.9	35.6	35.8	35.5	35.0	34.8	34.7
14-19		29.0	29.0	29.7	30.6	30.7	30.2	29.7	31.2
20-24		48.8	47.3	47.1	46.9	45.7	44.5	46.1	45.8
25-34		35.0	34.8	34.1	34.3	34.1	33.4	33.6	33.6
35-44		43.3	43.1	42.2	41.8	41.5	41.4	41.4	41.5
45-54		50.2	49.5	48.9	48.9	48.6	47.8	46.5	45.4
55-64		39.4	38.9	38.0	37.2	36.2	35.7	34.5	33.7
65 & over		9.9	9.4	9.8	10.5	10.6	10.2	10.1	10.2
Nonwhite Females[3]	46.1	46.0	45.6	45.6	46.2	46.3	45.8	46.2	45.5
14-19		22.8	23.4	24.0	24.6	25.8	22.7	24.8	25.9
20-24		53.6	49.2	48.6	47.7	48.8	48.8	48.3	46.6
25-34		52.8	53.3	52.0	51.2	49.7	50.0	50.8	50.4
35-44		58.4	59.4	59.7	60.5	59.8	60.0	60.8	58.7
45-54		62.3	60.6	60.5	61.1	60.5	60.0	59.8	56.8
55-64		48.4	47.3	46.1	45.2	47.3	46.4	42.8	44.3
65 & over		12.7	11.8	12.2	13.1	12.8	12.6	13.3	13.6
Married Females[4]		34.4	33.7	32.7	32.7	30.5	30.9	30.2	29.6

TABLE B-3 (continued)

	1956	1955	1954	1953	1952	1951	1950	1949	1948
All Females[2]	35.9	34.8	33.7	33.6	33.9	33.8	33.1	32.4	31.9
White Females[3]	34.8	33.7	32.5	32.0	32.7	32.6	31.8	31.0	30.6
14-19	32.3	30.5	30.3	30.5	31.7	32.5	31.6	32.4	32.8
20-24	46.5	45.8	44.4	44.1	44.8	46.7	45.9	44.4	45.1
25-34	33.2	32.8	32.5	31.7	33.8	33.6	32.1	31.7	31.3
35-44	41.5	39.9	39.4	38.8	38.9	38.0	37.2	36.1	35.1
45-54	44.4	42.7	39.8	38.7	38.8	38.0	36.3	34.3	33.3
55-64	34.0	31.8	29.1	28.5	27.6	26.5	26.0	24.2	23.3
65 & over	10.6	10.5	9.1	9.4	8.7	8.5	9.2	9.1	8.6
Nonwhite Females[3]	45.6	44.4	44.7	42.3	44.2	44.9	45.7	45.8	44.4
14-19	28.6	25.3	25.7	25.4	28.3	28.9	31.0	32.8	30.5
20-24	44.9	46.7	49.6	45.1	43.9	45.4	46.9	49.8	47.1
25-34	52.1	51.3	49.7	48.1	50.1	51.1	51.6	50.9	50.6
35-44	57.0	56.0	57.5	54.9	54.0	55.8	55.7	56.1	53.3
45-54	55.3	54.8	53.4	51.0	52.7	55.5	54.3	52.7	51.1
55-64	44.5	40.7	41.2	35.9	42.3	39.8	40.9	39.6	37.6
65 & over	14.5	12.1	12.2	11.4	14.3	14.0	16.5	15.6	17.5
Married Females[4]	29.0	27.7	26.6	26.3	25.3	25.2	23.8	22.5	22.0

TABLE B-3 (continued)

Notes:

(1) Data for 1948-1964 inclusvie was drawn from:

U.S. Dept. of Labor, Manpower Report of the President, U. S. Government Printing Office, Washington, 1965, Tables A-1, A-4, B-1

Data for 1965 was drawn from:

U.S. Department of Labor, Employment and Earnings, Vol. 12, No. 7, January, 1966, Tables A-10, A-16

(2) Percent of non-institutional population in the labor force, including Armed Forces.

(3) Percent of civilian non-institutional population in the civilian labor force.

(4) Spouse present. Annual estimates are based on employment status in either April or March of each year.

relative stability of the total labor force participation rate (the range of variation was 2 percentage points), it can be seen that this obscured rather significant postwar shifts in the proportion of labor force participants in several age-sex subsets of the working age population.

Total male participation has shown an almost steady decline in the postwar period from 84.7 percent of the population in 1948 to 78.3 percent in 1965. Beginning with 1954, the decline becomes more evident. The rate of decline in participation is slightly larger for nonwhite males. The middle age groups (25-54) show a relatively high degree of stability for both white and nonwhite categories. It is not difficult then to see that large declines in the participation rates for the very young (14-19) and the older (65 and over) male groups, both white and nonwhite, were in large part responsible for pulling down total male participation.

Declining male participation in the labor force has been largely offset by significant rises in female participation. The proportion of females age fourteen and over in the labor force rose from 31.9 percent in 1948 to 38.0 percent in 1965. This upward trend is not evidenced, however, to the same extent in the white and nonwhite female categories. White female participation increased 6.4 percentage points or by 21 percent of its 1948 base while nonwhite female participation increased by only 1.7 percentage points or 3 percent of its 1948 base.

Table B-4 shows that the upward trend in female participation in nearly all age groups has smothered the effect of substantial declines in the participation of very young (14-19) females. White female participation in this age group fell 3.8 percentage points or by 11 percent of its 1948 base. Nonwhite female participation in this same age group fell by 7.7 percentage points or by over 25 percent of its 1948 base. All other categories of female participation increased with the exception of the age 65 and over nonwhites.

Table B-4: Changes in Female Labor Force Participation Rates by Age and Color: 1948 - 1964

	Participation Rate - 1948	Percentage Point Change to 1964	Percent Change from 1948
White			
14-19	32.8	- 3.8	-11.6
20-24	45.1	3.7	8.2
25-34	31.3	3.7	11.8
35-44	35.1	8.2	23.4
45-54	33.3	16.9	50.8
55-64	23.3	16.1	69.1
65 & over	8.6	1.3	15.1
Nonwhite			
14-19	30.5	- 7.7	-25.2
20-24	47.1	6.5	13.8
25-34	50.6	2.2	4.3
35-44	53.3	5.1	9.6
45-54	51.1	11.2	21.9
55-64	37.6	10.8	28.7
65 & over	17.5	- 4.8	-27.4

SOURCE: Table 3-1

Frequent references are made to the increasing labor force participation rates of married females. The data in Table B-3 show that this rate has increased persistently over the postwar period from 22.0 percent of this population in 1948 to 34.4 percent in 1965, an increase of over 56 percent. In 1965, on the average, more than 1 out of 3 married women were employed or actively seeking employment.

Several studies undertaken in the last few years seek an answer to the question: How does the labor supply offered by various age-sex groupings, as measured by their participation rates, respond to changes in economic activity levels? This question may be restated in terms of the two hypotheses regarding labor force participation: Given a change in economic activity levels, will the net effect of this change on the participation rate for any given group support the "discouraged worker" or the "additional worker" hypothesis? A regression which relates the labor force participation rate of a particular group to some measure of changing activity levels would support the "discouraged worker" hypothesis if the resulting regression coefficient was positive in sign or, if negative, the "additional worker" theory.

Table B-5 presents a summary of regression estimates of the responsiveness of the labor force participation rates of various age-sex groups to changes in economic activity. All studies except that of Bowen and Finegan obtained their estimates by regressing the labor force rate of group i on either the ratio of total employment to population or the ratio of employment in group i to its population using monthly or quarterly time series data within the period 1947-1964. Employment is expressed as a percentage of population to avoid spurious negative correlation which would result from using labor force in the denominator. Bowen and Finegan obtained their sensitivity estimates on a cross-section basis using 1960 Census data to relate labor force participation rates to unemployment rates (U/L) in SMSAs.

Table B-5: Labor Force Sensitivity Estimates by Age and Sex[17]

	Tella	Cooper & Johnston	Bowen & Finegan	Dernberg & Strand	Mincer
Males					
14-19	+.36	+.58	-1.94	+.70	+.28
20-24	+.46	+.46	*	+.26	+.37
25-34	+.20	+.23		*	+.17
35-44	+.07	.00	- .24	*	0
45-54	+.14	+.18		+.07	+.14
55-64	+.46	+.24	- .66	-.31	-.16
65 & over	+.74	+.88	-1.62	+.74	+.40
All Males	+.40	+.35	*	+.36	+.17
Females					
14-19	+.40	+.74	- .73	+.93	+.41
20-24	+.44	+.59	*	+.42	-.15
25-34	+.52	*	*	+.46	0
35-44	+.51	+.71	*	+.57	0
45-54	+.69	+.94	*	+.68	+.72
55-64	+.63	+.74	*	+.83	+.26
65 & over	+.70	+.99	*	+.86	0
All Females	+.62	+.72	*	+.70	+.33

* indicates that no estimate was made

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[17] The estimates in this table were obtained from the following sources: Alfred E. Tella, "Labor Force Sensitivity to Employment by Age and Sex," Industrial Relations, Vol. 4 (February, 1965), Pp. 69-83. Cooper & Johnston, loc. cit., W.G. Bowen & T.A. Finegan, "Labor Force Participation & Unemployment," Employment Policy and the Labor Market, ed. A.M. Ross (Berkeley: University of California Press, 1965), Pp. 115-161. T. Dernberg & K. Strand, "Hidden Unemployment 1953-62: A Quantitative Analysis by Age and Sex," American Economic Review, Vol. 56 (March, 1966), Pp. 71-95. Mincer, loc. cit.

There is a considerable amount of agreement in the results. For nearly all age-sex groups, the labor offered in terms of participation in the labor force was found to be positively related to a measure of employment opportunities. This net positive reaction of labor supply to employment levels is rather strong support for the dominance of the "discouraged worker" effect -- at least for the postwar period.

In spite of the agreement regarding the direction of response of the labor supply offered by these various population groups, there is some criticism of the methodology employed in obtaining the estimates. The variables employed to test this sensitivity, as well as the manner in which they are related, will affect the degree of sensitivity recorded. Mincer fears the likelihood of upward bias in the regression coefficients obtained by regressing time series observations of the labor force rate of a particular group on its own employment ratio.[18] Since L is derived as the sum of E & U, and since E is a large proportion of L, any sampling error contained in E will be reflected in L. The result of this would be an upward bias in the regression coefficient. Tella attempted to correct for this by lagging his employment levels by one period. Another source of upward bias in the sensitivity estimates could stem from the possibility of fluctuations in labor demand and supply for a particular group which occur independently of the overall state of labor demand and supply. If the purpose of the sensitivity estimates is to gauge the responsiveness of a particular group to the overall cyclical state of demand, these specific fluctuations will tend to overstate the responsiveness of the group to general changes in economic activity. Mincer's sensitivity estimates recorded in Table B-5 are the result of a statistical adjustment designed to reduce this bias.

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[18] Mincer, loc. cit.

The estimates of labor force responsiveness determined from cross-section regressions of labor force rates on unemployment rates, as in the work of Bowen and Finegan, tend to be higher than those obtained from time series data. One possible cause of this would be a bias introduced by differences across regions at a point in time in the seasonal component of unemployment and labor force. Except for the summer months, the seasonal component of the labor force is inversely related to the seasonal component of unemployment. A cross section regression of (L/P) on (U/L) could result in a negative relationship between the two ratios based simply on different seasonal factors when no longer run relationship, in fact, existed. However, it is very doubtful that the relationship which was found to exist could be attributed to this.

Another source of downward bias in the cross section estimates could stem from interregional migration. A relationship has been found to exist between population growth in regions and their unemployment rates.[19] Those regions having the highest rate of population growth tend to have the lowest unemployment rates. Furthermore, the migration causing the rapid population growth in these areas tends to be employment-connected, causing higher labor force participation rates in the faster growing areas relative to the slower growing areas also having higher unemployment rates. Thus, at least a portion of the observed negative relationship between (L/P) and (U/L) should be attributed to this phenomenon and not lower participation rates of residents in areas having high unemployment.

B. Interregional Labor Migration: Some Theories and Evidence

1. The Significance of Interregional Labor Migration

Migration is an important component of changes in regional labor force size. This factor can be safely excluded in an analysis at the national level because of the negligible size of the relevant net immigration flows. Within a system of

[19] Mincer, loc. cit.

open regions, however, substantial proportions of population and labor force changes can be accounted for by interregional migration. By way of illustration, it is estimated that the rate of total net migration in the period 1950-60 ranged from + 264.0 percent of the 1950 population of Fort Lauderdale, Florida to - 17.6 percent for Wilkes-Barre -- Hazleton, Pennsylvania.[20] The significance of interregional migration flows, as a component of relatively short run population change, coupled with the recognized strong economic motivation behind these flows necessitates a consideration of their determinants in analyzing the causes of labor force change when the regional labor market is the level of observation. The importance of the economic motivations behind migration flows is illustrated in one survey which reported that economic and occupational reasons were mentioned as factors by 73 percent of the movers surveyed. For 60 percent of the movers surveyed, economic and occupational reasons were the only ones mentioned.[21]

The role of labor force migration in effecting the relationships of regional employment changes to regional unemployment changes is clear. The impact of a given increase in employment on unemployment will be smaller in those regions simultaneously receiving net additions to their labor forces through migration than in those regions not experiencing such net immigration. These immigrants could be expected to dilute the impact of an employment change on unemployment by either (1) taking jobs which might have been filled by unemployed residents or (2) in the event that employment is not immediately obtained, adding to the volume of regional unemployment as job-seekers. Likewise, by a reverse process, the impact of employment declines on unemployment will be mitigated to the extent that net labor outmigration simultaneously occurs in the region.

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[20] U.S. Bureau of the Census, Current Population Reports, Series P-23; No. 7, "Components of Population Change, 1950 to 1960, for Counties, Standard Metropolitan Statistical Areas, State Economic Areas, and Economic Subregions."

[21] John B. Lansing and Nancy Barth, The Geographic Mobility of Labor: A Summary Report (U.S. Department of Commerce, Economic Redevelopment Series.) Washington: U.S. Government Printing Office, Sept., 1964, p. 18.

2. The Theory of Labor Migration

The movement of people and labor resources from one location to another occurs for any number of reasons, some of which bear little direct association with economic factors. It appears undeniable, however, that economic considerations bear heavily in explaining a good deal of the migration flows occurring over a given period of time. The purpose of this section is to specify those regional economic and social attributes of a labor market which could be expected to influence the volume of net labor migration occurring within it. The migration flows which are relevant here are those accounted for by either the movement between geographically defined labor markets, or between rural locations and urban labor markets, of individuals who are either current or potential labor force participants.[22]

The theory of labor migration is but a subset of the more general theory of labor mobility which seeks to explain not only the forces accounting for the movement of labor resources among occupations at a point in space, but also the movement of these resources among spatially separated labor markets of the type considered in this study. The concern here is with those facets of the theory of labor mobility which account for the spatial movement of labor resources.

Basically, the theory of labor migration rests upon the most fundamental proposition of economics; i.e., economic units will behave as if they were attempting to maximize their stream of net returns over time. Placing this

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[22] This specification of the relevant migration flows contrasts with the more broadly defined flow of simply "population" which consists of all individuals who migrated across county lines in a specific period of time, regardless of their labor force status. It is evident that the migration of retirees, young children, or other individuals with little inclination for participation is not relevant for an analysis of the impact of labor force migration on the relationship between regional employment and unemployment changes. Likewise, the relevant migration flow is that flow occurring between defined labor markets, or between rural areas and urban labor markets, and not simply movement across county lines. Many labor markets consist of more than one county and a move from one county to another within the same labor market area could hardly be termed "migration" in the economic sense of labor resource allocation among markets.

proposition in the context of the theory of labor migration would imply that labor resources will distribute themselves among a set of labor markets in such a way as to reflect a rational attempt on the part of each worker to maximize his stream of real income over time. Thus, one would expect to observe a net flow of resources from areas of relatively sparse economic opportunities to areas offering more favorable rewards.

The general concept of a labor market's relative "level of opportunity" as it serves to induce a net migration flow in or out of it, must be more carefully specified. If it is assumed that a labor markets' level of opportunity for a worker is roughly synonomous with the stream of real income which could be obtained by locating these, a more precise specification of this phrase is possible. The determinants of the size of a worker's income stream, given his location and abilities, are: (1) future real wages and (2) the continuity of future employment. Accordingly, a first specification of the opportunities offered by a labor market can be obtained in these terms. Each of these broadly defined measures of economic opportunity will be considered in turn.

Holding constant for the moment equality in the expected continuity of employment opportunities, the proposition that unequal real wage rates between two labor markets will induce migration from the low to the high wage area has some implicit assumptions regarding the nature of these wage differences. In particular, the proposition implies that the wage differentials are "non-equalizing."[23, 24]

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[23] For a discussion of this concept see: Bertil Ohlin, Interregional and International Trade. (Cambridge, Harvard University Press, 1957) Chapter XI, p. 212 ff.

[24] This proposition also implies that migration involves zero costs to the worker. The act of migrating indeed has private costs associated with it which must be viewed as an investment by the worker in himself. The decision to make this investment, i.e., the decision to migrate is made by comparing the present value of the potential addition to the worker's income stream with the money and non-money costs of moving. For a further discussion of migration as an investment see: Larry A. Sjaastad, "The Costs and Returns of Human Migration," Journal of Political Economy, Vol. LXX, No. 5, part 2 (October, 1962).

A difference in real wages between two labor markets can be said to be "equalized" if the differential offered by the high wage area represents a premium or compensation for certain disagreeable conditions which exist there. For example, an equilibrium between two labor market areas in which one is characterized by, say, a disagreeable climate or general lack of amenities can be achieved only by unequal real wage rates. The higher real wage prevailing in the relatively disagreeable area represents a necessary compensation for its environment. Conversely, those areas offering a high level of amenities will be able to effectively compete with other areas for labor supplies with a real wage level which is lower by an amount which is less than the worker is willing to pay to enjoy these amenities.

Two general conditions can be identified as necessary to support the existence of equalizing real wage differentials; i.e., in general, wage differentials which fail to induce net migration. Neither of these conditions are sufficient by themselves to support such wage differentials. The first condition is that differences must exist between areas in those environmental elements which effect the level of amenities offered by them and which enter into an individuals' assessment of the overall standard of living available to him in various labor markets. This condition, however, is not sufficient to support equalizing wage differentials unless a second condition prevails which specifies that worker preference functions are more or less similar with respect to their valuation of these various environmental elements. What may be desirable to one worker may be undesirable to another. Such heterogeneity of preferences may exist to such an extent among workers that disagreeable areas (by one set of preferences) find no problem in attracting and retaining an adequate labor supply with a real wage level similar to other areas. If worker preference functions are similar in such respects, disagreeable areas can be defined and will be forced to include a compensating increment in their real wage level. It is easily seen that if environmental conditions are the same everywhere, significant differences in worker preference functions will be unable to support equalizing wage differentials simply because such preferences cannot be expressed.

In summary, labor migration could be expected to result from non-equalizing real wage differentials, other things the same. However, the separation of those real wage differentials which reflect disequilibrium among labor market areas from those which are equalizing differentials is not an easy task. Casual observation and intuition support the idea that the conditions sufficient to support equalizing differentials exist to a significant extent.

The second element mentioned as a determinant of both a worker's income stream and the level of opportunity offered by a labor market area was the continuity of future employment. Unlike real wages, the relationship of difference among areas in the overall continuity of the employment offered within them can be handled in a straightforward manner. Simply stated, those areas having an industrial mix and/or a competitive disadvantage vis-a-vis other regions which result in a relative lack of assurance on the part of workers, regarding its ability to provide continuous future employment could expect to experience a net outmigration of its labor supply, other things the same.

3. Evidence of the Determinants of Labor Migration

The increasing availability of migration data has allowed the implementation of models designed to test hypotheses regarding the determinants of population and labor force redistribution. As discussed earlier, the factors which determine the pattern of this redistribution among labor market areas are important in assessing the relationship of employment changes occurring within them to their changes in unemployment.

A useful distinction has been made by Warren Mazek which results in the following classification of migration models:[25] those designed to estimate or

[25] Warren Mazek, "The Efficacy of Labor Migration with Special Emphasis on Depressed Areas" (unpublished Ph.D. dissertation, Department of Economics, University of Pittsburgh), p. 54ff.

predict the flows of migration without the specification of causal relationships and those designed to relate migration flows to hypothesized causal influences. The first class of models generally represent the adaptation of gravity models to migration flows.[26] The gravity model technique, however, expresses the interaction between two points (in terms of population flows) as a function of the product of the population masses at the two points and the distance between them. In spite of improved variations of the gravity model techniques applied to migration,[27] it offers little toward answering the following questions: Why should anybody migrate from point i? And (2) Why should anybody migrate to point j?

For the preceding reasons, the class of models to be discussed here fall under the second category; i.e., those designed to relate migration flows to hypothesized causal influences. The methodological approach employed by those models is generally that of multiple regression. The independent variables selected generally reflect hypotheses similar to those discussed in the previous section.

It was hypothesized earlier that non-equalizing income (wage) differentials among regions would induce net inmigration flows to those areas offering opportunities for relatively higher real incomes. A test of this notion by Sjaastad took the approach of first ascertaining, in a statistical sense, whether or not observed income differentials among States are non-equalizing.[28] The hypothesis

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[26]For a discussion of gravity models and their applications, see Walter Isard, Methods of Regional Analysis: An Introduction to Regional Science (New York: The Technology Press of the Massachusetts Institute of Technology and John Wiley and Sons, Inc., 1960); Chapter 11.

[27]For a review of this literature, see Mazek, loc. cit.

[28]Larry A. Sjaastad, "The Relationship Between Migration and Income in the United States." Papers and Proceedings of the Regional Science Association, Vol. VI, 1960. Pp. 37-64.

was formed that if the income coefficient was not significantly different from zero in a series of equations regressing gross migration to and from California to each of the other States on income, the income differentials which exist will be considered equalizing.[29] In spite of the weakness of the computed income coefficient, Sjaastad concluded that non-equalizing income differentials existed among States.

With this question settled, Sjaastad went on to investigate the determinants of the net migration for three male age groups with the assumption that non-equalizing income differentials did exist. Of the different variables employed in the regressions, the most conclusive relationship to net migration flows was found in the income variable. The strength of the relationship declined, however, with increases in age. This is a not surprising result when one considers the investment nature of the outlays (as discussed above) and psychic costs associated with the act of migration.

The internal flows of labor migration observed over some arbitrary time period represent a reaction to a set of economic phenomena which must be specified not only as to their nature, but also with respect to the point in time in which they existed. The flow of labor migration occurring within a short time period represents, in most cases, the implementation of a decision to do so made in a previous time period. Furthermore, the economically motivated decision to move from one labor market to another will be based, in most cases, on a set of expectations regarding real income and employment opportunities which are likely to have been formulated on the basis of a comparison among labor markets of the opportunities which they have offered in the past. Thus, migration flows occurring over relatively short time intervals can be conceived of as a reaction

[29] It should be noted that an insignificant relationship between income and migration could also be interpreted to imply that migrants do not act rationally in an economic sense when confronted with non-equalizing income differentials among regions.

to non-equalizing wage and employment opportunities (which, at the time the decision to migrate was made, were expected by the individual to prevail in the future) existing among a set of labor markets in a previous time period.[30] The significance of these statements will become clear in the following discussion of additional evidence on the determinants of net migration flows.

Stating the potential migrants objective as that of maximizing his stream of real income over time with respect to location takes account of the notion that migration could be expected not only in response to non-equalizing wage or income differentials existing among markets, but also in response to expectations regarding the continuity of employment opportunities among labor markets. The expected continuity of employment will, of course, depend upon the adequacy of labor demand over time in the region.

A common measure of the adequacy of regional labor demand used in several migration studies is the region's rate of unemployment. This measure, however, when used as an independent variable to account for the rate of internal migration must be carefully specified because of its interdependence with labor migration. For example, a hypothesis which relates the flow of migration occurring over a specified period with the rate of unemployment in the same period could be subjected to the criticism that the measured unemployment which supposedly motivated the migration would itself be affected by the rate of migration. In fact, the more efficient is migration among labor markets in the sense of reducing

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[30] This concept of past opportunities determining current migration is also employed by D. E. Kaun and A. E. Fechter in their comment on J. D. Tarver "Metropolitan Area Intercounty Migration Rates," Industrial and Labor Relations Review, Vol. 18 (January, 1966), p. 278.

The validity of this notion is inversely related to the length of time chosen to observe the migration flows in question. For example, a time period during which migration flows are measured could be of such a duration to include both the external economic influences on the decision to migrate as well as the act of migrating.

differential rates of unemployment, the less significant this unemployment variable would be in explaining the migration.[31]

A possible way out of this dilemma is to use an average of the unemployment rates for periods which precede the period in which migration is to be observed. This procedure is entirely in keeping with the theory of the decision to migrate discussed earlier. This measure of employment opportunities is not, however, without shortcomings of its own. If a depressed area was also depressed in the period used to compute the unemployment rates, this measure will understate the lack of employment opportunities previous to migration to the extent that the unemployment rate was reduced by lower participation and outmigration in this earlier period. It will also understate the lack of opportunity to the extent that the measured unemployment was long term in nature. It is conceivable that an area of rapid employment growth will display an unemployment rate which would appear to belie the region's economic health. This higher than expected volume of unemployment would represent in some sense an "overreaction" by the labor supply through increased net inmigration and participation to the high rate of employment growth. However, the unemployment observed in this situation would be short term in the sense that the time necessary for entrants to obtain employment is of short duration.

Some recent migration studies have obtained very good results in explaining internal migration rates with the use of a variable measuring "prospective" or "potential" unemployment. Essentially, the variables measure for a region what the rate of unemployment would have been at the end of a period in which migration was observed if migration had not occurred. Cicely Blanco's measure of "prospective" unemployment measures the rate of change in unemployment which would have

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[31] Garver, op. cit., regressed migration flows among SMSAs from 1955-60 on the unemployment rates recorded in the 1960 Census and stated that "...the study fails to establish any significant relationships between unemployment and migration rates after adjustment for the other variables." To the extent that migration is efficient in the sense of equalizing unemployment rates among labor market areas, this result should be expected if end-perior unemployment rates are used in the analysis.

occurred in the absence of migration.[32] In other words, the rate of outmigration is a function of the rate of change in the demand for labor (measured by the rate of change in employment) relative to the rate of change in the labor supply (measured by the rate of change in the working age population) in the absence of migration.

The concept of "potential" unemployment developed by Warren Mazek was designed to remedy a shortcoming of Blanco's measure. Mazek observed that the construction of the "prospective" unemployment measure did not take account of the labor supply and demand situation at the beginning of the period. He states that, because of this, "the Blanco migration concept would imply that the rate of net outmigration should be the same from a region moving from a 2 percent unemployment level to a possible 4 percent without migration as from a region with a possible rise from 12-14 percent since the change in unemployment is the same in both instances."[33] The concept of "potential" unemployment was then designed to yield the unemployment rate which would obtain in a region at the end of the period studied if no migration took place during the period. It is estimated simply by deriving the labor force size at the end of the period, assuming no migration and subtracting from it the actual employment at the end of the period.

Ira Lowry developed a migration model which explicitly contained the rate of employment growth as an independent variable to serve as a proxy for the abundance of job opportunities and the region's ability to offer steady employment. The variable was highly significant and it yielded the expected positive relationship with net migration flows.[34]

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[32] Cicely Blanco, "Prospective Unemployment and Interstate Population Movements," Review of Economics and Statistics, Vol. 46 (May, 1964), p. 221.

[33] Mazek, op. cit., p. 91.

[34] Ira S. Lowry, Models of Internal Migration. Institute of Government and Public Affairs, Los Angeles: University of California, 1965.

The validity of this technique, however, rests on the assumption that changes in employment are demand determined. To the extent that employment growth in a region is determined by the availability of suitable workers (i.e. supply determined) the regression becomes tautological in nature. In such a case, holding participation rates constant, a rate of employment growth greater than the addition to the labor force occurring through natural increase must necessarily be determined by the inmigration of labor. Lowry was aware of this "identification" problem, especially for areas of net inmigration, but argued that the existence of high unemployment rates in the areas he used led him to conclude that the basic force determining short run employment growth was demand.

C. Summary and Concluding Remarks

Part A of this section has shown that the national labor force demonstrates a net positive responsiveness to employment conditions. Evidence on the direction of this responsiveness indicates that the labor force tends to expand, through rising participation rates, with rising employment rates and contract with falling employment rates.[35] Evidence was also presented to show that the degree of responsiveness varies among different age-sex subsets of the working age population. The female labor force tends to be more responsive to employment conditions than the male labor force, and the labor force participation of younger and older workers tends to be more responsive than that of the middle age groups.

This evidence indicates that a general increase in employment relative to population at the national level will not result in an unemployment reduction equal to this increase. Furthermore, the impact which an employment increase has on unemployment will vary to the extent that it favors one population group more than another. For example, an increase in labor demand which favors male

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[35] It must be stressed that the preponderance of evidence supporting the dominance of the "discouraged worker" hypothesis is based on the postwar experience -- a period of relatively minor fluctuations. Evidence on the behavior of the labor force in periods of sharper fluctuations does not seem as conclusive.

workers in the middle age groups will have a greater impact on existing unemployment than would a similar increase in labor demand which brightens the employment outlook for young females.

The results of these studies are certainly relevant to an analysis of the problem at hand. They not only provide an expectation regarding the activeness of this component of labor force change at the regional level, but also give an indication as to the direction which this change will take with changes in regional employment levels. Estimates of the sensitivity of national labor force participation rates, however, must be considered a measure of central tendency for a range of such sensitivities prevailing in the various regional labor markets existing within the national economy. Thus, there is little reason to expect that the sensitivity of the labor force participation rate to changes in activity levels for a given area will be the same as for the nation as a whole; some labor markets may be characterized by a relatively volatile labor force while others may display highly stable participation rates. The degree of stability, or instability, will depend upon the economic and social characteristics prevailing in the region.

While explanations for variations in the size of the national labor force provide useful insights in anticipating the behavior of one component of regional labor force change, the analysis was extended to take into account the important component of interregional migration of labor. The hypotheses underlying the investigations of the determinants of labor migration lack the conflicting nature of those pertaining to the responsiveness of labor force participation whose appropriateness can be determined only through empirical investigation. Accordingly, investigations of the causes of labor migration reflect the intention of determining the extent of correlation of a series of potential causes whose relationship to migration can be well specified on deductive grounds. Migration studies have shown that people do move, as expected, from areas of low income and high unemployment to areas having the opposite characteristics. Furthermore, it has been found that these variables "explain" in a statistical sense the overwhelming proportion of the variation in migration flows. The migration response to economic stimuli has been found to decline with age. As discussed earlier, this fact is not surprising when the costs associated with the act of migrating are placed in the context of an investment by an individual in himself.

The economic and social attributes of a labor market which account for the responsiveness of its participation rate and the rate and direction of net migration also account for the relationship of a local change in employment to the corresponding change in unemployment. Viewed in this way, the empirical evidence presented in the section provides important insights which will aid in the formulation and testing of hypotheses designed to account for that variation among labor market areas in the relationship of their employment changes to their corresponding changes in unemployment. These tasks will be undertaken in the following section.

SOME FACTORS DETERMINING THE RELATIONSHIP OF CHANGES in UNEMPLOYMENT TO CHANGES IN EMPLOYMENT IN LABOR MARKET AREAS

Certain social and economic variables which describe the nature of a labor market and the labor force residing in it will be specified in this section as determinants of the relationship which an employment change occurring in such an area bears to the corresponding change in unemployment. This relationship has been defined in Section II as the ratio ($\Delta U_t/\Delta E_t$). (Since the numerator and denominator of this ratio always refer to the same time period, the subscript t will be dropped.) Following this multiple regression techniques will be employed to test the extent of empirical support for the hypothesized relationships.

The remainder of this section is divided into three parts. Part A will describe the general nature of the regression equations formulated to test the hypothesized relationships. Part B will identify the independent or explanatory variables included in the regressions. Their specification reflects an elaboration of the theoretical discussions contained in Section III to include a consideration of influences generally manifested at the local labor market level. The regression results are presented and interpreted in Part C to evaluate the extent of empirical support for the hypotheses which they reflect.

A. The Nature of the Structural Equation

The value of the ratio ($\Delta U/\Delta E$) for any given labor market area reflects the extent of change in labor force size occurring simultaneously with the change in employment. For example, the larger the increase in labor force size relative to a simultaneously occurring increase in employment, the smaller will be the absolute value of ($\Delta U/\Delta E$). The position taken here is that the main components of these labor force changes for a labor market area in the short run are those stemming from changes in the local rate of labor force participation and those resulting from the net flow of labor resources to or from the region.

A single equation regression model will be used to determine the extent of empirical support for the hypotheses which specify the factors influencing values of $(\Delta U/\Delta E)$. Since net labor migration flows and changes in rates of participation determine the value of the dependent variable, $(\Delta U/\Delta E)$, the independent variables are in turn expected determinants of the behavior of those components of labor force change. Observations are obtained on a cross-section basis. Employment and unemployment changes are from the period May, 1961, to May, 1963.

It would be desirable to be able to determine what proportion of relatively short run changes in labor force size are attributable to changes in the local rate of participation and what proportion can be accounted for by migration. Further, for each of these components it would be desirable to know the variables which account for its behavior. With this information not only would the variables influencing $(\Delta U/\Delta E)$ be identified, but also the component of labor force change through which they exert this influence would be identified.

The data required to perform such calculations consist of a number of time series for each labor market area which would yield: working age population, employment, unemployment, and changes in labor force size by source of change -- i.e., migration and changes in the rate of participation. To estimate the parameters of possible influences on the extent of labor force change by other than cross-sectional means requires the collection of time series data for each labor market on values of a number of its economic and social characteristics. Aside from the employment and unemployment estimates collected by the BES and the data contained in the Decennial Census of Population, the required information is not available.

Theoretical considerations provide then the only means for deducing the component of change over which the variable in question has influence. In any case the contribution of each of the two components to the total labor force change will remain unknown. Such limitations of the structural equation are a direct result of the lack of appropriate data but in any event should be made clear at the outset.

The relatively large number of specified variables reflects an attempt to explain a phenomenon undoubtedly influenced by a host of factors. There is no reason to anticipate that they could be neatly summarized in a few well chosen variables. This should not, however, be interpreted as a so-called "shotgun" approach which lists all conceivably possible variables with little analysis or specification of their anticipated influence. The important objection to such an approach is that, with a lack of sufficient theoretical analysis, computed parameters would be accepted at their face value. This means of acceptance may lead to wrong conclusions if the operationally defined independent variable also reflects an influence other than the one it was designed to capture. The following identification of anticipated determinants of ($\Delta U/\Delta E$) attempts to minimize this possibility by analyzing in each case the variable's expected relationship with the dependent variable.

In the analysis that follows, the selected variables are written with capital letters to facilitate their identification by the reader.

B. Specification of the Independent Variables

Available evidence indicates that certain age/sex subsets of the working-age population display participation rates which are sensitive to changes in employment opportunities. The "primary" labor force, consisting largely of males in the 25-64 age group, is classified as such because its members display a high degree of insensitivity to factors which could affect a decision as to whether or not to participate in the labor force.[1] Much of the variation in the overall national labor force participation rate must then be caused by variations in the participation rates of those population groups associated with the "secondary" labor force.[2]

If all relevant social, demographic, and economic characteristics existed in the same degree among a set of labor markets except for the PROPORTION OF THEIR POPULATION IN SECONDARY LABOR FORCE CATEGORIES then, on the basis of experience at the national level, variations in the value of ($\Delta U/\Delta E$) among labor markets could stem simply from differences existing among them in this population characteristic. Those areas having high proportions of their populations in age/sex categories characterized nationally by high degrees of labor force sensitivity could be expected to experience a greater influx of new labor force entrants with increases in their levels of employment opportunities than those areas having smaller proportions of their population in these categories. Thus, the expected sign of the regression coefficient for this variable is positive since it serves to reduce the "negativity" of the ratio ($\Delta U/\Delta E$); i.e., increases in labor force size which accompany increases in employment tend to reduce the normally negative value of this ratio by causing its numerator to approach zero.

The population groups defined here as having "secondary" labor force attachment are: teenagers aged 14-19, females aged 20 and over, and males aged 55 and over. The lack of sufficiently detailed data prevents a finer specification of these population groups.

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[1]Martin Segal and R.B. Freeman, however, found that participation rates for males in the age group 40-64 were significantly lower in certain depressed areas when compared with the same rates for the urban U.S. See <u>Population, Labor Force, and Unemployment in Chronically Depressed Areas</u>. (Economic Redevelopment Research Series of the Department of Commerce.) Washington: U.S. Government Printing Office, 1964.

[2]See Section III, Table B-5.

Assuming that differences in the age/sex structure of regional labor market populations are negligible, what other factors are likely to produce differences among them in the responsiveness of their participation rates to employment changes? This is actually a question of evaluating the possible causes of differences among regions in the degree to which currently non-participating members of their populations are willing and able to substitute nonlabor for labor market pursuits. This former group of activities is composed of: (1) leisure time, (2) time devoted to the production of goods and services not entering the market (generally, production of household services), and (3) time devoted to investment in oneself.

The degree to which currently nonparticipating members of a region's population will be willing to enter the labor force with an increase in the general level of regional employment opportunities can be evaluated in terms of: (1) the extent to which a general increase in regional employment can be interpreted as an inducement for nonparticipants to enter the labor force, and (2) the ease with which they can leave nonlabor market activities. The willingness of nonparticipants to enter the labor force will be influenced by their assessment of the probability of obtaining employment and the rewards which could be expected from it. Their willingness will also be influenced by factors which determine the ease with which they feel they can abandon nonlabor force pursuits which compete for the time they would devote to labor market activity. It is suggested that the existence of conditions which would exert a "pull" on individuals to enter the labor force may not be sufficient to actually cause their participation because of circumstances unfavorable to the ease with which they can leave nonlabor force pursuits. The converse of this statement is also relevant.

A prime determinant of the "pull" exerted on an individual to attain labor force status would be the extent of employment opportunities in the region.

The phrase "employment opportunities" must be elaborated upon to specify more carefully its meaning within the present context. The most common measure of such opportunities would be the PREVAILING RATE OF UNEMPLOYMENT. Assuming that the "discouraged worker" psychology prevails in the region, relatively high rates of unemployment would serve to deter the labor force entry of "secondary" workers because of the low probability of obtaining employment. Thus, the rate of unemployment would be expected to be negatively related with the ratio ($\Delta U/\Delta E$).[3] The measure of unemployment used here is total unemployment and not simply the unemployment of workers in the "secondary" labor force. This is for two reasons: (1) The measured unemployment of the secondary labor force will probably understate the extent of labor redundancy in the region because of their ability to leave the labor force. (2) Unemployed members of the "primary" labor force could be expected to compete for any additional jobs which are created even if it may involve a degree of underemployment. This will further lower the probability of employment for an individual considering labor force entry from that which would appear by observing only the volume of unemployed "secondary" workers.

There are additional factors stemming from the region's industrial and occupational structure which could be expected to influence a potential entrant's assessment of the probability of obtaining employment. The increment to the labor force which occurs through an increase in participation will generally come from those population groups having a relatively low degree of labor force attachment over time, and therefore, are referred to as forming the "secondary"

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[3]A change in this relationship may occur if the observations contain a number of labor markets with chronically high unemployment rates. Section III showed evidence that employment decreases in many of these areas were associated with decreases in unemployment. In such cases, the rate of unemployment was positively related to ($\Delta U/\Delta E$); i.e., high unemployment rates were associated with positive values of ($\Delta U/\Delta E$). Such relationships undoubtedly reflect the influence of other factors.

labor force. The jobs for which these individuals would consider themselves suited would probably be those existing at relatively low skill levels as well as those which could be filled by females.[4] It would appear reasonable that the relevance of the employment opportunities displayed by a region, as they induce increased labor force participation, would depend upon the extent to which they could be interpreted as opportunities for the employment of individuals with these occupational characteristics. An increase in employment opportunities composed of an increased demand in the region for professional and technical personnel would appear to serve as little inducement for the entrance of, say, teenagers, and females. An increase in opportunities which would serve as a more likely inducement for labor force entry by these groups would be one composed of jobs which could be described as being more or less suited to the anticipated employment qualifications of these "secondary" workers.

What sort of regionalindustrial and occupational structure would be associated with relatively large increased in participation accompanying increases in labor demand? An increment to labor demand within a region characterized by an existing industrial and occupational structure with a relatively high proportion of jobs in the categories of, say, operatives, laborers, and service workers as well as one favorable to the employment of females could expect a relatively large accompanying increase in participation, other things equal.[5] Conversely, those regions with an occupational structure characterized by a high proportion of employment in more sophisticated occupations and fewer opportunities for female employment would not be expected to have a secondary

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[4]This statement will be incorrect to the extent that increased participation is the result of the reentrance of workers who possess recognized, marketable skills.

[5]This assumes that the income effect accompanying the increase in employment opportunities does not outweigh the substitution effect to produce a decrease in participation.

labor force with a particularly responsive participation rate. Increases in employment opportunities similar in composition to the existing occupational structure in the latter type of region could not generally be filled by members of the "secondary" labor force and would therefore be expected to serve as little inducement for their entry into the labor market.

A crude indication of the expected change in opportunities for female employment, manifested by a change in total local employment, can be derived from a demand for female labor index. The variable derived from this concept is designed to measure both the "femininity" of the region's industrial mix and, for reasons discussed below, its occupational skill mix. Table B-6 lists ratios of female to total employment in each of some 39 industrial sectors at the national level. The usual manner of constructing the index from these ratios can be described as follows. For each region, the total employment in each of these sectors is multiplied by its corresponding sex ratio computed on the basis of national relationships. This will yield the expected number of females employed in each sector in the region. The products are summed and divided by total regional employment, yielding the expected proportion of total employment accounted for by females. This proportion is then interpreted as an index of the conduciveness of the labor market to the employment of women. A high value of this index for any region would indicate, based on studies of the responsiveness of female participation to changes in employment opportunities, that an overall increase in its labor demand would tend to have the effect of increasing the size of the labor force through the increased participation of women rather than having a substantial impact on unemployment. The expected sign of the regression coefficient for this variable would then be positive.

The construction of the foregoing index for each of the over 140 MLMAs employed in this study would be a time consuming task. A short cut method was sought. If the "femininity" of a labor market's industrial composition accounts

Table B-6: U.S. Ratios of Female to Total Employment by Industrial Sector: 1960

Sector	Female / Total Employment
Agriculture	.096
Forestry and Fisheries	.078
Mining	.048
Construction	.040
Furniture, and lumber and wood products	.082
Primary metal industries	.072
Fabricated metal industries	.173
Machinery, except electrical	.136
Electrical Machinery, equipment and supplies	.342
Motor vehicles and motor vehicle equipment	.111
Transportation equipment, except motor vehicle	.131
Other durable goods	.268
Food and kindred products	.236
Textile mill products	.438
Apparel and other fabricated textile products	.746
Printing, Publishing, and allied products	.264
Chemical and allied products	.191
Other nondurable goods (incl. not spec. mfg.)	.283
Railroad and Railway express service	.056
Trucking service and warehousing	.076
Other transportation	.129
Communications	.519
Utilities and Sanitary service	.122
Wholesale trade	.201
Food and dairy products stores	.336
Eating and drinking places	.588
Other retail trade	.381
Finance, Insurance, and Real Estate	.457
Business services	.373
Repair services	.067
Private households	.902
Other personal services	.539
Entertainment and Recreation Services	.313
Hospitals	.747
Educational services: Government	.632
Private	.627
Welfare, Relig. and Nonprofit membership orgns.	.454
Other professional and related services	.469
Public administration	.285
Industry not reported	.393

Source: U.S. Census of Population: 1960, Detailed Characteristics, U.S. Summary, Final Report PC(1)-D, table 214.

for the actual proportion of total employment accounted for be females, why not use the observed percentage? To test this notion, the "expected" number of employed females was computed by the method described above for several areas chosen to represent both differing industrial structures and geographic locations. The results are shown in Table B-7.

Table B-7 : Sample Comparisons of "Expected" vs. Actual Female Employment for Selected Cities: 1960

MLMA	"Expected" proportion of female employment	Actual proportion of female employment	Expected/ Actual
Bridgeport, Conn.	31.3	32.9	.951
Charleston, W. Va.	31.6	30.2	1.046
Davenport, Ill.	30.1	31.5	.956
Duluth, Minn.	30.2	30.6	.987
Los Angeles, Calif.	33.5	34.0	.985
Pittsburgh, Pa.	29.4	28.8	1.021

The actual proportion of female employment corresponds very closely with the proportion expected on the basis of the "femininity" of a region's industrial composition, implying that it is not a bad indicator of the conduciveness of the region to the employment of females. The ratio, then, of FEMALES EMPLOYED TO TOTAL EMPLOYED will be used as the demand for female labor index.

It was stated earlier that areas having an industrial composition conducive to the employment of workers possessing relatively low skills might expect a larger labor force reaction to increasing employment opportunities through increasing participation than those labor markets having an industrial composition more compatible with higher skilled workers. The reasoning behind this conclusion stems from an assumption that "secondary workers" are essentially workers possessing relatively low levels of marketable skills.

A variable designed to capture this potential source of variation could be included in the model. A likely form for such a variable, given the data limitations, would be the number of employed workers in low skill occupations stated as a percentage of total employment. The "low skill" occupations were selected from the 12 occupational classifications defined for SMSAs and would include the following groups: clerical and kindred workers, sales workers, operatives, private household workers, service workers, farm and nonfarm laborers.

Since the "femininity" index is designed to account for variations in the responsiveness of female participation, the occupational skill index must then attempt to explain variations in the responsiveness of other population components of the "secondary" labor force. The question arises as to what extent an index of occupational skill would be correlated with the "femininity" index. Table B-8 yields information regarding the proportion of total employment by occupation accounted for by females. It is easily seen that those occupations which have been defined as low skill in nature are also those having a high proportion of females. It would appear, then, that the "femininity" index and the occupational skill index could be expected to be highly correlated with each other. This implies that those areas conducive to the employment of women are also likely to have a large proportion of employment in occupations requiring little training or skill and the explicit inclusion of an occupational skill index would add only little, if any, explanatory power to the model. It will not, therefore, be included.

The expected pay-off from seeking employment will be determined not only by the probability of obtaining employment, but also by the earnings which are likely to be made if employment was obtained. Other things equal, those areas offering relatively high rates of pay in occupations likely to be filled by secondary workers could expect a larger increase in participation with increases

Table B-8: U.S. Ratios of Female to Total Employment
by Occupation Group: 1960

Occupation Group	Female / Total Employment
Professional, Technical, and kindred workers	.381
Farmers and Farm managers	.047
Managers, Officials, and Proprietors (except farm)	.144
Clerical and kindred workers	.676
Sales workers	.358
Craftsmen, Foremen, and kindred workers	.029
Operatives and kindred workers	.274
Private household workers	.965
Service Workers (except private household)	.523
Farm laborers and Farm Foremen	.168
Laborers (except farm and mine)	.035
Occupation not reported	.376

Source: U.S. Census of Population: 1960. Detailed Characteristics, U.S. Summary. Final Report PC(1)-D, Table 206.

in employment opportunities than those regions with lower wage offerings in these occupations. To allow for interregional differences in overall money wage levels, the variable defined here is a RATIO OF FEMALE TO MALE EARNINGS IN 1959. It is necessary to express anticipated earnings of "secondary" workers as a relative figure because significant absolute money wage differences exist among regions of the country, with the result that a given absolute money wage rate may elicit different labor force responses between regions depending upon the extent of difference among them in their general level of money wages. For example, assuming all other factors equal between two regions, an expected wage of $1.25 an hour for secondary workers in both a Northern and Southern labor market may induce a much larger increase in participation in the Southern area simply because it compares more favorably with the lower level of overall money wages which generally prevails in the South.

The earnings figures used here are median values of all individuals with earnings in 1959. "Earnings" should not be confused with "income" which consists not only of wage or salary and self employment earnings, but also rents, interest, and transfer payments. The median earnings figures are given without regard to the duration of employment in 1959. Thus, a low value for the ratio could reflect not only a low earnings rate for females relative to males, but also the possibility that female earners were employed for a shorter duration in 1959 than males. Unfortunately, median income by number of weeks worked is not published for SMSAs of less than 250,000.

There are certain costs (other than alternative costs) of being employed which exist in differing degrees among regions which could be expected to affect the ease with which individuals can enter the labor market. A lowering of such costs could be expected to enhance the expected reward from seeking employment. One such cost deserving consideration is the time spent each day in the journey to and from work. The amount of time spent for this will be related to the intraregional locational pattern of work places and residences as well as the efficiency and adequacy of human transport facilities.

It would be expected that labor markets displaying a scattered pattern of residential development relative to places of work and also lacking transport facilities adequate to overcome this situation would display lower degrees of labor force responsiveness than areas in which this situation did not prevail.[6]

A variable measuring INTRAREGIONAL ACCESS TO JOBS RELATIVE TO RESIDENCE has been specified to yield at least a crude measure of the intraregional access of potential workers to places of employment. The best available information yields a ratio of the percentage of total employment located in the central city to the percentage of workers living in the central city. A value of 1 for this ratio would, of course, indicate that the proportions of employment located within the central city equaled the proportion of workers residing there. On the assumption that commutation of workers among the major rings surrounding the central city is not an important phenomenon, such a situation would indicate a close proximity of work places to residences.[7] This, together with the possibility that the extent of job information increases with increases in the proximity of residences to work places, would indicate that this variable would be positively related to $(\Delta \bar{U}/\Delta E)$. A reduction in the cost of seeking and holding a job would be expected to result in a labor force which expands along with growing employment opportunities.

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[6] This idea is offered as a partial explanation for the lower female participation rates in the Pittsburgh area. See: Pittsburgh Regional Planning Association, Region in Transition (Pittsburgh, University of Pittsburgh Press, 1963) p. 38.

[7] If the commutation of workers among rings is a significant factor in the labor market, the conclusion drawn here is incorrect. Inter-ring commutation indicates that the jobs located in the central city are not held by people residing there and the variable does not describe the phenomen it was designed to measure.

Up to now, consideration has been given only to those factors which might possibly determine the ease with which a nonparticipating member of the population could be induced to enter the labor force with a change in overall employment levels. A judgment regarding the anticipated responsiveness of labor force participation to employment increases based solely on the strength of regional characteristics which serve to "pull" individuals into the labor force may be incomplete in that it fails to consider the ease with which individuals can substitute labor force for nonlabor force activities. The smaller the extent of substitutability available to an individual between labor and his current nonlabor force activities, the less inclined he will be to undertake participation in the labor force with a given increase in regional activity levels. It is doubtful, except in cases involving mental or physical incapacity, that there will be a complete lack of substitutability between the two activities. However, the greater the difficulty involved in abandoning nonlabor force pursuits, the stronger must be the inducements stemming from the labor market to draw individuals into it.

On the assumption that the consumption of leisure is income elastic, an increase in the income of a family member would be associated with an increase in the leisure consumer by the family. An increase in one individual's income may not result in a decrease of <u>his</u> hours of work, but in those of other family members. Thus, a high INCOME RECEIVED BY MALE FAMILY HEADS could reduce the inclination of wives to participate in the labor force. This relationship has been verified in numerous cross sectional studies. The observed secular relationship between these two variables, however, contradicts this notion. It is common knowledge that rising real incomes of husbands over time have been associated with an increased willingness on the part of wives to participate in the labor force.

It is not appropriate here to attempt a lengthy explanation of this apparent contradiction.[8] Suffice it to say that, while high earnings of husbands create an income effect which by itself would impede the substitutability by wives of work for leisure, it is reasonable to presume that external labor market forces relevant to the employment of women have changed in such a manner over this period to cause a net substitution effect in favor of employment. Furthermore, the theory does not specify that the expected increased consumption of leisure must be at the expense of market employment. Evidence would seem to indicate that, aside from the extraordinary set of demands for household services resulting from the presence of small children and pampered husbands, the demands for household services are of diminishing importance in determining the ease with which wives can abandon nonlabor force pursuits in favor of labor market activity. The introduction of food products requiring little time in preparation for eating, not to mention the vast array of household "capital goods" of a labor-saving nature, serve to illustrate this point. To the extent that an increase in leisure can be obtained by a reduction in the hours spent in the production of household services, not through a reduction in their output, but by substitution in the production function of labor saving inputs, this will lessen the influence of rising male income on the decision to participate in the labor force.

The expected sign of the income coefficient cannot be specified because this variable should also capture the influence of non-equalizing income differentials among labor markets. Other things the same, net immigration of labor could be expected to characterize those labor markets offering high earnings opportunities. This situation would call for a positive relationship of the

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[8]For a convincing reconciliation of this problem see Jacob Mincer, "Labor Force Participation of Married Women" in Aspects of Labor Economics, a report of the National Bureau of Economic Research (Princeton University Press, Princeton, 1962), p. 63. Also see Clarence D. Long, The Labor Force under Changing Income and Employment, Chapter 7.

income variable to ($\Delta U/\Delta E$). On the other hand, the income effect discussed above would call for a negative relationship as rising incomes reduce the inclination of potential secondary labor force members to participate. The sign which this variable should take is an empirical question and would reflect the relative strengths of these influences.

This variable is specified as the median income of husband - wife families, head as earner, with two children under 18. A better variable would be simply income of household heads, but this was not published for the areas used in this study. Median male income would not be appropriate because it would include incomes of both part time and single male workers. Family income, of course, would not be appropriate since it would include the incomes of other (often secondary) workers in the family unit.

Consider the factors affecting the ease with which teenagers can remove themselves from nonlabor force pursuits. The major alternative to participation for individuals in this group is school enrollment.[9] Leisure and the production of household services are, of course, other alternatives. The pursuit of educational opportunities would seem to be a viable alternative to labor force participation in this age group, so a variable defined as the PROPORTION OF TEENAGE POPULATION ENROLLED has been included in the equation. This viability is suggested by the inverse relation which has existed over time between falling participation

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[9] This statement may be open to question to the extent that school enrollment and labor force participation are not mutually exclusive categories. Census figures for 1960 show that 38 percent of all urban males age 14-34 who were enrolled in school were also members of the labor force. The corresponding figure for females was 21.7 percent. As would be expected, the proportion participating increases with age, rising from 13.5 percent for 14 year old males to 45.8 percent for 19 year olds. The corresponding figures for females were 5.4 and 37.5 percent. It should be noted, however, that 85 percent of the enrolled teenage males who were also employed were employed on a part-time basis; for females 82 percent. Source: U.S. Bureau of the Census, U.S. Census of Population: 1960. Vol. I. Characteristics of the Population. Part I, U.S. Summary, U.S. Government Printing Office, Washington, D. C., 1964, Table 197.

rates for both males and females in this age group and the proportion enrolled in school. Evidence to suggest that this does not, in general, represent a "forced" choice because of lack of economic opportunity and a reduced incentive to participate can be inferred by observing the length of time over which this tendency has persisted. These phenomena have also been associated with rising levels of real family income. On the plausible assumption that the demand for time to be devoted to formal education is elastic with respect to real (family) income, this relationship is to be expected. This notion that increased school enrollment, and the corresponding apparently reduced willingness to enter the labor force, is at least in part caused by increased real income of parents, is strengthened by noting in Table B-9 the larger rate of increase in the proportion

Table B-9 : Percentage Enrolled in Schools by Age and Sex, 1950 and 1960

Age	1950 Male	1950 Female	1960 Male	1960 Female
14 - 17	84.3	82.2	91.4	89.2
18 - 19	35.2	24.3	47.8	30.0
Total	69.1	62.5	79.2	70.9

Source: U.S. Bureau of the Census, Statistical Abstract of the United States: 1965 (85th edition, Washington, D.C., 1965), p. 108.

of 18 and 19 year olds enrolled. In general, this increase represents college enrollment -- an action involving significant money outlays and prior planning. Labor force entry by these individuals is not likely to be induced by the "pull" of current increased employment opportunities, but rather by a "push" of worsening personal circumstances.

The foregoing leads to the conclusion that the component of regional labor force change attributable to changes in teenage participation will be smaller in those labor markets having high proportions of this population group enrolled. Accordingly, the sign of the coefficient for this variable is expected to be negative.

The degree of inclination which a member of the "secondary" labor force has to enter the labor market and pursue an increase in employment opportunities will be directly related to his LEVEL OF EDUCATIONAL ATTAINMENT. Available evidence indicates a positive relationship between education and ability within the economic sphere.[10] Some question may still exist as to whether higher levels of education (especially below the college level), in fact, cause a worker to be more productive or whether the relationship exists because those individuals who are inherently more able in an economic sense tend to invest more in education. It is not necessary here to attempt to resolve this question. It is believed only that areas having secondary labor forces with relatively high levels of educational attainment will experience a growth in labor force size with expanding employment opportunities. The basis for expecting this could stem from the greater knowledge of employment opportunities which could be expected to accompany higher educational levels, or the belief that better educated people who are not currently participants, feel that they could easily obtain desirable positions upon entering the labor market in a period of expanding activity levels.

Median number of school years completed by females aged 25 and over was selected as the best available measure of the educational attainment of the secondary labor force.

Expected major determinants of net labor migration flows, as they contribute to the determination of the value of $(^{\Delta U}/_{\Delta E})$, have been included in the analysis in the form of two additional variables. The first of these, AVERAGE UNEMPLOYMENT RATE: 1957-60, was defined to reflect the discussion contained in

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Gary S. Becker, <u>Human Capital</u> (National Bureau of Economic Research, New York, 1964) p. 79.

Charles C. Killingsworth "Structural Unemployment in the United States," Paper prepared for Conference on Employment Problems of Automation and Advanced Technology, sponsored by International Labor Office, Geneva, July 20-24, 1964. (mimeo)

Section III. This presented the hypothesis that current migration flows represent the implementation of decisions made in previous periods and, furthermore, these decisions were based on economic information pertaining to still earlier periods.[11] To allow for whatever shortcomings the unemployment variable possesses, a variable consisting of the RATE OF EMPLOYMENT GROWTH: 1950-60 has been included. Unlike the unemployment variable, it is anticipated that its sign will be positive. The greater the relative rate of employment growth displayed by a region in the past, the greater will be the current flow of labor immigration and the smaller will be the impact of current employment changes on the level of existing unemployment.

This completes both the identification of the independent variables to be considered in the analysis and the nature of their expected influence on $(\Delta U/\Delta E)$. Attention will now be directed to determining the extent of empirical support for these hypotheses.

C. Interpretation of the Empirical Results

The first set of regression equations were computed using all observations (except for a few highly extreme values). This set contained a series of equations in which $(\Delta U/\Delta E)$ was regressed on both individual and various combinations of the variables presented above. It would be an understatement to say that the results were unsatisfactory. The coefficients of correlation, corrected for degrees of freedom (hereafter simply referred to as R^2), varied between .0000 and .1113 with most of them close to zero.

The analysis of the distribution of $(\Delta U/\Delta E)$ values presented in Section II and summarized in Tables B-1 and B-2 led to the suspicion that a major factor in bringing about these unsatisfactory results was the inclusion in the observation set of a few MIMAs whose $(\Delta U/\Delta E)$ values for this period reflected a relationship highly dissimilar from that demonstrated by the other MIMAs. In general, this

[11] See Section III, part B, subsection 3.

dissimilarity was manifested in significantly positive values of $(\Delta U/\Delta E)$ where ΔE was negative. This situation implies that the reported decline in the labor force was larger than the decline in employment. In Section II, it was stated that those MLMAs which reported reductions in both employment and unemployment over this time period were generally areas which have experienced chronic labor surpluses for a considerable period of time.

A second series of regressions was computed without these observations (they number about 12) and yielded a considerable improvement in the explanatory power of the equations. From this, it appears that the $(\Delta U/\Delta E)$ computed for those MLMAs experiencing long run economic decline bear a different relationship to the specified variables than that hypothesized for the more general situation. Figure B-2 illustrates this idea by taking as an example the simple regression of $(\Delta U/\Delta E)$ on the current unemployment rate. The plotted observations are for

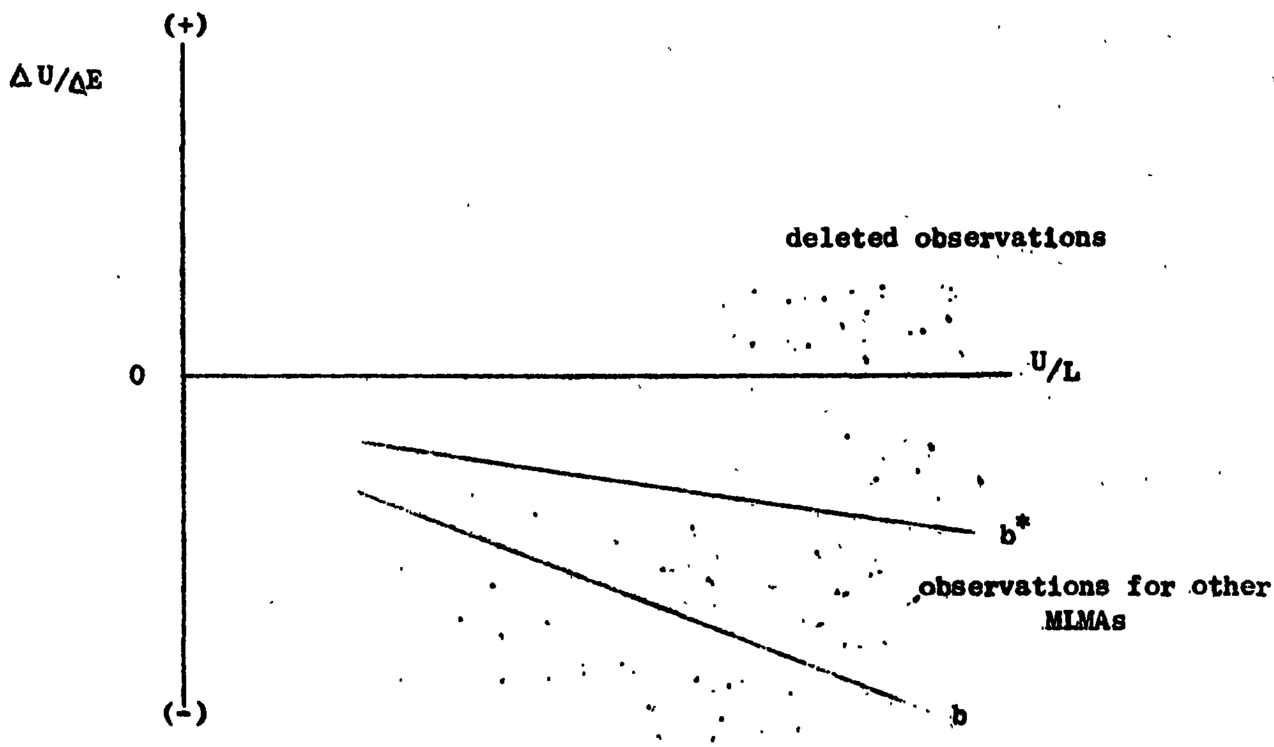

Figure B-2

Simple Regression of $(\Delta U/\Delta E)$ on the Current Unemployment Rate illustrative purposes only, but are indicative of the actual scatter. It would be expected that a regression coefficient (b*) computed using all observations would have a smaller negative slope than a coefficient computed after deleting those few observations described above. This is simply because, in the former case, the presence of those observations on declining labor market areas would cause a regression line generated by least squares methods to reflect their influence and thereby lie closer to the horizontal axis. Furthermore, since the regression line does not pass through any one body of observations, but instead lies in between them, the amount of variation in $(\Delta U/\Delta E)$ which it could "explain" would be very small.

The computed results lend support to this idea. The computed coefficient for the regression using all observations (b*) was -.075 with an $R^2 = .0140$. The coefficient computed from the modified observation set was -.175 with an $R^2 = .335$.

The decision was made to exclude those few observations pertaining to areas the ratios of which display relationships highly dissimilar from those reflected in the bulk of the observations. The generality of the model will be reduced somewhat by this decision, but it was clear that the presence of these unusual observations would effectively hinder any attempts to test the general validity of the hypotheses formulated earlier. It must be stressed that this decision does not result in the deletion of all observations involving negative employment changes, but only those few where the corresponding change in unemployment is so perversely large in an unusual direction as to clearly indicate a labor force contraction in response to the multitude of factors associated with long run decline.

Using the modified observation set of $\Delta U/\Delta E$ for May, 1961-63, simple regressions were computed for each of the variables hypothesized earlier. The results are presented in Table B-10 and are generally encouraging from the point

Table B-10: Simple Regressions of $(\Delta L/\Delta E)$ on Designated Independent Variables

Equation Number	Independent Variable	Intercept*	Regression Coefficient*	Corrected Coefficient of Determination (R^2)
1	X_1 - Averaged Current Unemployment Rates	+ .440243 (3.1317)	- .175718 (7.6735)	.3348
2	X_2 - Averaged Past Unemployment Rates	+ .210982 (1.5163)	- .139521 (6.0743)	.2379
3	X_3 - Female Employment/Total Employment	-2.94592 (5.1652)	+6.90454 (4.1553)	.1239
4	X_4 - Rate of Total Employment Growth, 1961-63	- .866287 (9.0688)	+5.75393 (3.4837)	.0883
5	X_5 - Median Years of Education Attained by Females	-2.6870 (4.1631)	+ .190408 (3.2669)	.0776
6	X_6 - Income of Male Family Head	-2.3496 (4.1565)	+ .0002764 (3.1345)	.0713
7	X_7 - Female earnings/male earnings	-1.60523 (3.8873)	+2.13946 (2.4904)	.0433
8	X_8 - Proportion of Population in "secondary" labor force categories	+1.14425 (1.4986)	-2.52182 (2.2704)	.0349
9	X_9 - $X_3 \cdot X_{13}$	-1.08277 (3.1667)	+ .0181431 (1.4734)	.0101
10	X_{10} - Rate of total employment growth 1950-60	- .612193 (10.8370)	+ .074158 (1.4395)	.0092
11	X_{11} - Proportion of aged 14-19 enrolled	+ .37028 (.5243)	- .0129103 (1.3567)	.0073
12	X_{12} - $X_8 \cdot X_7$	- .986608 (2.7071)	+1.22736 (1.1136)	.0021
13	X_{13} - Proportion of employment in central city/ Proportion of workers residing there	- .166804 (.3947)	- .005207 (.9980)	.0000

*t - values are placed in parentheses.

of view of substantiating the hypothesized relationships presented earlier in this section, yet they are not particularly heartening when considered with respect to their power in accounting for variation in

The signs of the regression coefficients, aside from X_8 (proportion of the population in secondary labor force categories), support the hypotheses discussed earlier. However, little empirical support can be claimed from those variables whose coefficients are likely not to be significantly different from zero. It will be recalled that the sign of X_6 (income of male family heads) could not be specified in advance since this variable is expected to account for both an income effect, which would tend to reduce the responsiveness of participation to changes in employment opportunities, and a measure of inducement for labor force growth through migration. The highly significant positive sign reflects the net effect of these opposing influences and supports the conclusion that local increases in income will dilute the effect of employment increases on unemployment because of its effect on local labor force growth through migration. To the extent that changes in the income of male family heads follow overall changes in earnings levels, increases in such levels could be expected to induce some substitution of non-labor market activities for market employment. If this effect is not trivial, it will aid the migration effect in offsetting the negative influence on labor force expansion caused by the income effect.

Of the significant coefficients, the sign of X_8 is the only one which does not correspond with expectations. Two explanations can be put forward to account for the persistent negativity which it displays throughout the empirical tests. First, the operational definition of the variable which the data permitted may have resulted in it, reflecting not the extent of potentially available secondary workers, but rather the proportion of the population <u>not</u> available for labor force entrance. If this is so, it implies a relatively unresponsive participation rate.

A further implication is that employment increases would be associated with relatively larger reductions in unemployment because of the limited influx of labor force entrants, other things the same.

A second possible explanation is derived from a three-way relationship which could exist between "depressed" areas, the distribution of their populations among various age/sex categories, and observed values of ($\Delta U/\Delta E$). In general, those areas which could be termed economically "depressed" displayed relatively high absolute values of ($\Delta U/\Delta E$). Segal and Freeman,[12] in studying the age/sex distributions for 14 chronically depressed areas, found that such areas tend to have larger proportions of their populations in the 14-19 age categories than does the urban U.S. Such areas also had a slightly larger proportion of females in their populations. Also, in the 14 areas taken as a whole, 18.9% of the male population was in the age category 55 and over as compared with 16.8% for the urban U.S. Because of the lack of more detailed data, the proportion of the working age population in these three groups defined X_8. It is possible then, that this variable was not measuring the flexibility of a region's labor supply, but instead was serving as a proxy for a state of "depression." If this is true, and employment increases in such areas are associated with relatively large reductions in unemployment, then a minus sign would be expected. A check, however, on the extent of intercorrelation between X_8 and other variables, which could be interpreted as reflecting the existence of a state of "depression" or "stagnation," do not reveal any significant relationships (see Table B-11).

In general, the power of the individual variables in explaining variation in ($\Delta U/\Delta E$) (as opposed to their empirical support for the hypothesized relationships) among labor markets is something less than astounding. These results do, however, support the earlier contention that such variation could not be accounted

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[12] Op. cit., p. 12.

Table B-11: Matrix of Simple R^2 (sign indicates nature of relationship only)

	X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_2^*	.761						
X_3	-.110	-,048					
X_4	-.049	-.017	-.016				
X_5	-.206	-.232	-.008	.065			
X_6	-.119	-.157	-.070	.062	.391		
X_7	-.003	.006	.221	-.004	-.003	.002	
X_8	.050	.061	.002	-.001	-.032	-.023	.002

* See Table B-10 for definition of variables.

for by a few well chosen relationships. The variable X_1 (the current rate of unemployment) does, however, stand far above the rest with its corrected R^2 of .3348.

There are grounds for supposing that some of the relationships hypothesized may be nonadditive; i.e., the effect of one explanatory variable may depend on the value of another one. For example, the effect of a labor demand structure favorable to the employment of females on the responsiveness of labor force participation may also depend on their access to jobs. To test for such possibilities, X_9 and X_{12} were formed as "compound regressors" or products of the values of X_3 and X_{13} and X_7 and X_8 respectively.[13] Their results did not encourage further efforts along these lines.

The surprisingly poor results obtained with X_{10} (total employment growth, 1950-60) led to experimentation with current employment growth rates (X_4). It should be immediately recognized, however, that regressing ($\Delta U/\Delta E$) on ($\Delta E/E$), where the employment changes refer to the same time period, introduces the possibility of upward bias in the estimated regression coefficient to the extent that there is systematic error in the estimation of ΔE. The extent and direction of such error cannot be discerned. But the likelihood of its presence should lead to a cautious interpretation of the relationship.

The combination of independent variables was sought which would provide the greatest explanatory power (i.e., the highest corrected R^2) while, at the same time, allowing for estimates of the individual coefficient values. This constraint recognizes the problem of obtaining estimates of individual parameters

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[13] For a brief discussion of interactions and the use of compound regressors see Arthur S. Goldberger, Econometric Theory (New York: John Wiley & Sons, Inc., 1964), p. 216.

when two or more of the independent variables are highly intercorrelated.[14] Unfortunately, the two objectives are not always compatible.

The first computed equation consisted of variables X_1 through X_8 (except X_4) together with X_{10}, X_{11} and X_{13}. (The variables can be identified from Table B-10.) This equation produced or corrected $R^2 = .42$ and a series of parameter estimates with values not significantly different from zero. The regression results are presented in Table B-12. The significant variables (t values > 1.8) consisted of the following: X_1 (current unemployment rates), X_3 (ratio of female to total employment), X_6 (earnings of male family heads), and X_{11} (proportion of aged 14 - 19 enrolled). The sign of each of these variables corresponded with expectations. The signs of the other parameters were generally in accord with expectations; however, four of the six t ratios had values less than one.

The results of this equation suggested that it was indeed preliminary in nature and that further refinements could be made in terms of reducing the number of explanatory variables. Initial candidates were those variables which showed no significant explanatory power, either singly or when combined with other variables. This set included X_{10} (rate of employment growth 1950-60) and X_{13} (proportion of the population working and living in the central city).

The remaining variables were then separated into two groups. In the first group were those which demonstrated significance in equation 1 and contained X_1, X_3, X_6, and X_{11}. Table B-10 shows that, with the exception of X_{11}, these variables also demonstrated significant explanatory power when correlated individually with ($\Delta U/\Delta E$). The second group contained the remaining variables, i.e., X_2, X_5, X_7 and X_8. In addition, X_4 (current rate of employment growth) was defined at this point and was also included in this last group.

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[14] This interdependence of variables is referred to as "multicollinearity." For a more detailed discussion see Goldberger, op. cit., p. 192 FF or J. Johnston, Econometric Methods (McGraw-Hill, New York, 1963), p. 201 FF.

Table B-12: Equation 1

Variables	Parameters	(t-values)	
Intercept	-1.09317	(.8302)	
X_1	- .15346	(3.2283)	
X_2	- .03894	(.8337)	
X_3	+3.57941	(1.8354)	R^2 = .4155
X_5	+ .05597	(.8282)	N = 116
X_6	+ .00022	(2.0808)	
X_7	+1.01632	(1.2117)	
X_8	- .72346	(.7901)	
X_{10}	+ .03525	(.8772)	
X_{11}	- .02053	(2.2825)	
X_{13}	- .00655	(1.5745)	

Equation 2 in Table B-13presents the results of regressing ($\Delta U/\Delta E$) on only the four variables contained in the first group. The difference in explanatory power between this equation and equation 1 (roughly one percentage point, corrected for degress of freedom) does not bode well for the inclusion of these additional variables. Before rejecting these variables, however, an attempt will be made to discern the reasons for their apparent lack of contribution.

X_2 (averaged past unemployment rates) had considerable explanatory power in a simple regression but was totally insignificant in equation 1. Its high correlation with X_1, however, suggested that the latter was usurping this power. To test this, equation 3 containing only these independent variables was computed. The results show that X_2 makes no contribution to the explained sum of squares. In fact, the resulting R^2, corrected for degrees of freedom (as are all R^2 mentioned in this paper), was lower than that which contained only X_1. Unfortunately then, past unemployment rates reflect no measurable influences on current labor force behavior, which cannot be explained by current unemployment rates.

Equation 4, 5, and 6 in Table B-13 illustrate respectively the behavior of X_5 (educational attainment of females), X_7 (ratio of female to male annual earnings), and X_8 (proportion of population in secondary labor force categories) when combined individually with the variables of group one. It will be recalled from Table B-10 that, individually, each of these three variables had significant explanatory power. Table B-11, a matrix of intercorrelations, indicates that X_5 is moderately intercorrelated in a positive manner with X_6 (earnings of male family heads) and in a negative manner with X_1 (current unemployment rates). A partial explanation for the insignificance of X_5 can be made in terms of the possibility that X_6 captures a portion of the influence of education on labor force behavior. Some support for this exists in the fact that a comparison of

Table B-13: Estimated Parameters of Additional Equations

Variables	Equation Number: 2	3	4	5	6	7
Intercept	-2.17597 (2.0125)	+ .435543 (3.0754)	-2.35955 (2.0518)	-2.81165 (2.7180)	-1.66942 (1.4068)	-1.18921 (1.0537)
X_1	- .11845 (4.5007)	- .19161 (4.0787)	- .113643 (4.0248)	- .133104 (4.8711)	- .113184 (4.2234)	
X_2		- .01708 (.3879)				
X_3	+5.19928 (3.2376)		+5.23866 (3.2467)	+4.20055 (2.1664)	+5.37929 (3.3312)	
X_4						
X_5			+ .0318321 (.4817)			+ .265154 (4.3934)
X_6	+ .000271 (3.0591)		+ .000251 (2.5461)	+ .000180 (2.0459)	+ .000263 (2.9607)	
X_7				+ .873893 (1.0669)		+2.55532 (3.2455)
X_8					- .944065 (1.0342)	- .136671 (1.3149)
X_{11}	-. 01657 (2.0686)		- .017644 (2.1153)		- .015240 (1.8788)	- .023515 (3.0554)
R^2	.4062	.3298	.4021	.3896	.4066	.2149

(t values in parentheses)

equations 2 and 4 reveals that the parameter and significance of X_6 drop slightly when X_5 is included in the regression. This, coupled with the intercorrelation with X_1, was evidently sufficient to strip X_5 of any gross association it may have had with the dependent variable. The lack of a net association of X_7 with the dependent variable can apparently be attributed to its intercorrelation with X_3 (ratio of female to total employment). Evidence of support for this inference can be obtained by observing the slight reduction in the size and significance of the parameter for X_3 when X_7 is included in the equation. Evidently, the sources of variation captured by X_3 are sufficient to reduce to an insignificant amount the additional variation for which X_7 could account. X_8 still retains its negative sign, but equation 6 shows that its parameter is not significantly different from zero at the 20% level of confidence. An earlier discussion explored some possibilities regarding the actual influence for which this variable was serving as a proxy. Since no truly viable conclusions could be drawn, the reason for its subsequent insignificance must go largely unexplained.

The four variables of group two were then rejected as making no significant improvements in equation 2. The explanatory power which they had in the absence of X_1, X_3, and X_6 was removed when these latter variables were added. Support for this is provided by equation 7 in Table B-13, which results in highly significant parameters for X_5 and X_7 in the absence of these three group one variables. The mysterious X_8 appears insignificant.

The only remaining variable to be tested was X_4 (current rate of employment growth). The result of its addition to the four group one variables of equation 2 is presented here in equation 8:

$$(8) \quad (\Delta U/\Delta E) = \underset{(2.4354)}{-2.55670} - \underset{(3.9538)}{.102425\, X_1} + \underset{(3.7931)}{5.94454\, X_3}$$

$$+ \underset{(3.0691)}{4.16808\, X_4} + \underset{(2.8467)}{.0002445\, X_6} - \underset{(2.1480)}{.0165904\, X_{11}}$$

As usual, the t-values are placed in parentheses beneath the estimated parameters for quick reference. The corrected R^2 is .4481 and is significant at the 1% level of confidence. The equation has 110 degrees of freedom and the high t-value for X_4 indicates that it makes a significant net contribution to the explained sum of squares. Additional tests revealed that no significant improvements could be made to this equation.

Equation 8 then fulfills the objective stated earlier of determining that combination of relationships which provided statistically significant parameter estimates while at the same time providing the greatest possible explanatory power. On the first count, all of the parameter estimates are significant at at least the 5% level. Furthermore, each parameters has the expected sign. On the second count, the equation accounts for only a little less than half the variation in ($\Delta U/\Delta E$) among labor market areas. It is unfortunate that the results are not more glamorous in this respect. More will be said on this count in the following section.

Turning to the interpretation of the results it will be recalled that if an increase in employment is associated in the same time period with an equally sized reduction in unemployment the ratio will equal -1 and, to the extent that employment increases are associated with smaller reductions in unemployment, the ratio will move in a positive direction toward zero, reflecting labor force expansion. All other things the same, increases in variables having parameters of a positive sign could be expected, with increases in employment levels, to induce proportionately larger increases in labor force size. This results, of course, in positive movements (toward zero) of the ratio ($\Delta U/\Delta E$) as the proportionate reduction in the level of unemployment is reduced.

Thus a one percentage point incrase in X_3 (ratio of female to total employment) would be associated, on the average, with roughly a six percentage point positive change in ($\Delta U/\Delta E$), other things the same. In a more operational sense, the relationship indicates that a change in the structure of local employment opportunities, which results in increased opportunity for female employment, will proportionately reduce the reductions in unemployment which accompany general increases in future employment levels. As discussed earlier, this variable is likely to reflect the influence of occupation skill mix and, viewed in a more general sense, the results offer evidence that employment increases in areas with high female employment opportunities and a labor demand structure favoring lower skilled occupations will be associated with proportionately smaller reductions in unemployment than areas with fewer such opportunities.

The variable for averaged current unemployment rates (X_1) throughout the analysis consistently displayed the expected sign and was most significant in a statistical sense. It will be recalled from Table B-10 that this variable by itself accounted for roughly 33 percent of the variation in ($\Delta U/\Delta E$). As in the case of X_3 above, the units of measurement for this variable were percentage points, e.g., 4.8, 6.4, etc. Thus, the parameter estimate indicates that, other things the same, an area having an unemployment rate one percentage point higher than another area could expect to have a value of ($\Delta U/\Delta E$) which would be smaller by roughly 1/10 of one percentage point.

An illustration may be useful at this point. Suppose that an area had an unemployment rate of 4.0 percent and a ($\Delta U/\Delta E$) ratio equal to -.6. All other things remaining the same, this would indicate that a general increase in employment of 100 would be associated with a decrease of 60 in the number of unemployed. Suppose that the unemployment rate increases from 4.0 percent to 5.0 percent. The estimated relationship indicates that the ($\Delta U/\Delta E$) ratio would fall to -.7, on the average. All other things again remaining the same, this would indicate that a general increase in employment of 100 would now be associated with a decrease of 70 in the number of unemployed.

These results are generally consistent with the body of theory and evidence presented in SectionIII. The proportionately larger reduction in unemployment associated with a given increase in employment under conditions of relatively high rates of unemployment reflects a proportionately smaller accompanying increase in labor force size. Such a labor force reaction in the face of high unemployment is entirely consistent with earlier evidence.

The high intercorrelation of X_1 with the discarded variable X_2 (averaged past unemployment rates) introduces an element of uncertainty regarding which of the two components of labor force change is largely responsible for the reduced overall labor force reaction. It will be recalled that X_2 was defined to measure the extent of employment opportunities in the region in previous periods, as they may influence the net labor migration flow in current periods. Presumably, the higher the value of X_2, the smaller would be the net additions to labor force size through migration in current periods. The parameter of X_1 would then serve to reflect the extent of change in labor force size due to changes in participation which could be expected with changes in X_1. Unfortunately, the intercorrelation between these two variables prevented their both being included, which results in an inability to observe the relative importance of thse two components of labor force change. Thus, the relationship which X_1 bears to the dependent variable reflects not only its influence on the responsiveness of participation rates, but also, through its interdependence with X_2, it is likely to reflect the influence of past unemployment rates on current labor force changes. In brief, higher values of X_1 effect the value of $(\Delta U/\Delta E)$ not only through its influence on the extent of labor force expansion attributable to changes in participation; but, to the extent that it is correlated with past unemployment rates, it will reflect the portion of change attributable to net migration as well.

The current rate of employment growth (X_4) and income of male family heads (X_6) could be interpreted as reflecting the inducements offered by the area for labor force growth through migration. It will be recalled that a positive sign for X_6 would indicate that its primary effect was on the migration component of labor force change rather than participation. The variable was measured in numbers of dollars and the parameter estimate indicates that a $100 increase in income would be, on the average, associated with a positive movement in ($^{\Delta U}/\Delta E$) of .027.

The parameter of X_4 should be interpreted with a great deal of caution for two reasons: (1) Its possible upward bias because of the inclusion of ΔE on both sides of the equation, and (2) the possibility that it is not measuring long term growth in employment opportunities, but instead is heavily loaded with a cyclical component. The original variable measured growth in employment from 1950-60, but was discarded when it failed to show any significance. The reason for its definition in the first place stemmed from the hypothesis that an area's past growth in employment would be a determinant of migration flows in the current period, reflecting the notion, of course, of a lagged migration response to a relevant stimulus. The main justification for the inclusion of X_4 in the equation was that the time period used in computing the employment and unemployment changes, which formed the dependent variable, was so long (two years) that it could encompass the entire migration process from decision to relocation. This variable is expressed as a percentage (i.e., .04, etc.) as opposed to the percentage point basis which measured previously discussed variables.

The last variable in the equation, X_{11} (proportion aged 14-19 enrolled in school), has the correct sign, but is just significant at the 5% level of confidence. The variable is measured in percentage points which indicate that a one percent increase in enrollment would reduce the dependent variable by roughly .016.

A question which is frequently posed is one which asks which of the independent variables is in some sense most important. It is clear that the mere size of the regression coefficient is no measure, since its size can be changed by changing the units of measurement of the variable. Two possible criteria of importance will be put forth here: (1) The contribution of the individual variables to the total explained sume of squares, and (2) beta coefficients.

The criterion of importance which involves comparing individual contributions to the total explained sum of squares is not unambiguous. If the variables are not orthogonal (i.e., the coefficients of intercorrelation are not equal to zero), then the contributions derived will depend on the order in which the variables are listed. In the present case, however, intercorrelation is not a large problem so some indication of relative importance can be achieved. Taking the most important variable first, the regression of $(\Delta U/\Delta E)$ on X_1 resulted in an R^2 equal to .3348. The individual contributions of the remaining variables in the order of their addition are as follows:

Variable	Addition to Sum of Squares
X_3	.0267
X_6	.0273
X_4	.0413
X_{11}	.0180

Another criterion of importance involves comparing the effect on the dependent variable of typical or "equally likely" changes in the independent variables. If Δ_i is a likely change in X_i, then $b_i \Delta_i$ is the expected effect on the dependent variable and, according to this criterion, X_i is more important than X_k if $b_i \Delta_i > b_k \Delta_k$.

"Equally likely" changes in the values of the independent variables can be compared in terms of their standard deviations. Beta coefficients, defined as $B_i = b_i \frac{S_i}{S_y}$, where S_i and S_y, are the standard deviations of X_i, and the dependent variable respectively and b_i is the regression coefficient, provide a ready means of comparing the expected effects of the independent variables. Table B-14 compares the rankings of the coefficients in terms of their contribution to the explained sum of squares and in terms of their beta coefficients.

A comparison of the rankings reveals that the only change in positions is that of X_3 and X_4. In terms of contribution to sum of squares, X_4 is more important than X_3 (though the difference is slight). In terms of beta coefficients, X_3 becomes second in importance, and X_4 is relegated to the fourth position. An interpretation of these results is that though X_4 has greater explanatory power, its expected range of variation is relatively small when compared with that of X_3. It can be concluded that because of the disparity in the "equally likely" changes in X_3 and X_4, the former variable could be expected to have a greater effect on $(^{\Delta U}/\Delta E)$.

Unfortunately, little can be said on the basis of these results regarding the relative importance of the two components of labor force change in effecting the dependent variable. X_1 appears without question to be the most important variable. However, because of its high intercorrelation with past unemployment rates, there is no apparent way of telling what portion of its effect on the dependent variable is a reflection of its influence on migration flows and what portion can be attributed to its influence on participation. Furthermore, over half of the variation in the dependent variable is still left unexplained. Even if the effects of all of the defined variables could be unequivocally assigned as influencing changes in participation (which is not the likely case), there is no reason not to expect that the remaining variation could be explained by variables which influence migration.

Table B-14: Ranking of Regression Coefficients by Two Criteria of Importance

Ranking by Contribution to Sum of Squares		Ranking by Beta Coefficients	
Variable	Contribution to Explained Sum of Squares	Variable	Beta Coefficients
X_1	.3348	X_1	-.3402
X_4	.0413	X_3	+.3123
X_6	.0273	X_6	+.2492
X_3	.0267	X_4	+.2247
X_{11}	.0180	X_{11}	-.1620

SUMMARY AND CONCLUSIONS

This study has had two broad objectives. The first was to measure the variation among major labor market areas in the relationship which a change in their employment levels has to the corresponding change in their unemployment levels. The second objective was to identify some causes of this variation.

To measure this variation, a ratio ($\Delta U / \Delta E$) was defined where the numerator measured the change in the number of unemployed over a specified period and the denominator measured the change in the number of employed over the same time period. The time period selected to measure these changes and form the ratio corresponded with the cyclical upswing in national levels of economic activity which began in the spring of 1961. The reason for choosing such a period was that it would serve as the best available approximation of the effect on a region's level of unemployment of an increase in its level of employment caused by public policy actions having this former purpose.

An interesting finding of this investigation was that the central tendency of ($\Delta U / \Delta E$) across areas changed depending upon which phase of the national upswing in activity was used to measure and relate the two changes. In particular, the measures of central tendency for the distribution of ($\Delta U / \Delta E$) computed over an early period in the upswing suggest that employment increases were associated with considerably larger reductions in measured unemployment than employment increases computed over later periods in the upswing. This further indicates that labor force expansion within labor market areas rose as a proportion of the expansion in employment as the upswing progressed.

Considerable variation was found to exist among labor market areas in the value of ($\Delta U / \Delta E$). Differences among areas in the relative extent of changes in their labor force size were responsible for this variation. The components of change responsible for this variation consisted of net labor migration flows and changes in labor force participation. A number of variables were defined as expected determinants of these components of labor force change and, therefore of $(\Delta U/\Delta E)$. Their specification reflected insights and evidence obtained from previous studies of labor force behavior together with a series of hypotheses regarding influences generally manifested at the local labor market level.

Multiple regressions were used to evaluate the extent of empirical support for the hypotheses. Of the variables specified, the following set yielded the greatest ability to explain variations in $(\Delta U/\Delta E)$: (1) the current rate of unemployment, (2) the ratio of females employed to total employment, (3) the current rate of employment growth, (4) the income of male family heads, and (5) the proportion of aged 14-19 enrolled in school. Each of these variables had parameter estimates with the expected sign, and each parameter was significantly different from zero at at least the 5% level. Approximately 45 percent of the variation in $(\Delta U/\Delta E)$ was accounted for.

Several possible reasons exist for the relatively low explanatory power of the equation. First, of course, is the fact that the variables contained in the equation do not exhaust all of the factors influence $(\Delta U/\Delta E)$. These unaccounted for influences are responsible for over half of the total variation in the ratio. There is reason to expect, however, that this remaining variation represents the collective influence of a large number of factors any one of which has the ability to account for only a very small portion.

Another possible reason for the relatively low explanatory power of the selected variables could stem from errors in the measurement of the dependent variable. The last section points out that it is likely that significant errors exist in the estimation of unemployment changes. Such error can be translated into an addition to the disturbance term on the right hand side of the equation. In doing so, however, it does form a "hard core" source of variation in the dependent variable in the sense that additional explanatory variables will be unable to account for it.

Finally, another possible reason for the inability of the equation to account for a larger portion of the variation is that the quantification of the hypothesized influences on $(\Delta U/\Delta E)$ was not sufficiently refined. The process of empirically testing and measuring hypothesized sets of relations which are supposed to describe the functioning of a part of an economic system requires the definition of operational or quantifiable measures of these relationships. Seldom do these variables totally reflect the true phenomena they are assigned to measure. This inability can be attributed to either the lack of appropriate data on phenomena technically amenable to quantification or to the shortcomings which stem from attempts to quantify essentially qualitative variables; e.g., the quality of the environment. Whatever the case, the likelihood exists that the measured relationships will not adequately display the true relationship. Turning to the results of this study, the likelihood then exists that the measured ability of the variables to explain variation in $(\Delta U/\Delta E)$ reflects not only their conceptual soundness, but also the extent to which existing statistics adequately measure the hypothesized influences.

Because of the large amount of variation in $(\Delta U/\Delta E)$ which the estimated structural equation has left unexplained, its use as a predictive device is limited. The equation does, however, fulfill its purpose of providing quantitative estimates of the strength and relevance of certain factors expected to influence the relationship between overall changes in employment and unemployment. The results indicate that community characteristics are not likely to be trivial in their influence on the extent to which general improvements in local employment levels result in reductions in measured unemployment.

METHODS USED TO ESTIMATE EMPLOYMENT AND UNEMPLOYMENT IN MAJOR LABOR MARKET AREAS

The purpose of this section is to describe, in some detail, the methods used by the Bureau of Employment Security (BES) to estimate the levels of employment and unemployment in the MLMAs. There are essentially two methods in use for estimating total levels of employment and unemployment. The first method is the familiar monthly household survey conducted by the Bureau of the Census for the Bureau of Labor Statistics (BLS) and is an attempt to estimate total employment and unemployment in the National economy. The survey is a sample of about 35,000 households in 357 areas throughout the country and is based on the activity or status reported by surveyed persons for the calendar week including the 12th day of the month. The second method for estimating total employment and unemployment is the one used by the BES, in cooperation with State Employment Security Agencies, for the 150 MLMAs. This method is characterized by the extensive use of readily available data sources on certain types of employment and unemployment and by the estimation of the remaining categories of employment and unemployment on the basis of their past relationship to those categories for which data can be readily obtained.

I. BES Methods of Estimating Employment and Unemployment in each of the 150 MLMAs

A. Employment Estimating Techniques

An operational definition of employment would classify an individual as employed at some point in time if he applies a portion of his efforts at this point in time for the purpose of pecuniary gain. Whether or not he is fully employed depends upon the demand for his efforts (which could be measured in time units), at any given rate of remuneration, relative to the supply which he is willing to offer at that rate.[1] With this criterion of employment, several types of activity must be accounted for in attempting to measure the volume of employment in a labor market area. A possible method would be to separate total employment into its agricultural and non-agricultural components. Within each of these categories, employment can be further classified into wage and salary employment, self-employment, and unpaid family workers. Consideration should also be given to those individuals who, during the time period considered, were not actually employed in the sense of performing labor for pay, but still had a sufficient job attachment to be considered employed. Examples of such cases would be vacations, illnesses, unfavorable weather conditions, and labor-management disputes.

In estimating the level of total employment in a labor market, the BES must obtain estimates of the volume of employment in each of the above mentioned categories. In order to facilitate this, these employment categories are recast by the BES in terms of whether or not they are "covered" or "noncovered" with respect to their participation in unemployment insurance programs. The sum of the various categories of employment and unemployment to be estimated provides an estimate of total employment and unemployment. To facilitate the exposition of the estimating

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[1]In the current methods of estimating employment, no distinction is made between individuals who are "fully employed," i.e.; who are employed for a normal work-week and those who are only partially employed. A person is counted as employed in the BLS survey if he did any work at all during the survey week, or was temporarily absent from a job because of illness, vacation, etc. It also includes as employed unpaid workers in family-operated enterprises who worked more than 15 hours during the survey week.

The BES criteria of employment will reflect the fact that their estimates are based primarily on establishment payroll data. These estimates will exclude those individuals who might be counted as "employed" in the household survey who were not on an establishment payroll.

For a general discussion of the BLS criteria see: U.S. Dept. of Labor, Bureau of Labor Statistics; Monthly Report of the Labor Force, any issue; Washington, D.C. Also: U.S. Dept. of Labor, Bureau of Employment Security, Estimating Unemployment, BES No. R-185, Office of Program Review and Analysis, March, 1960, p. 10f.

techniques employed by the BES, reference will be made to these categories as they are listed in Table B-15.[2]

Estimates of total covered employment (line 4) would appear to have a high degree of accuracy. State Unemployment Insurance (UI) covered employment is reported, generally quarterly, by participating employers. Interim estimates are provided from payroll data from a sample of the participating firms. Likewise, accurate estimates of Federal covered employment (line 2) in the area are readily available. Railroad employment on interstate railroads, covered by the Railroad Unemployment Insurance Program, is frequently reported. It is estimated that the State UI covered employment alone covers, on the average, approximately 75% of all wage and salary workers.

Noncovered employment consists of the eight sectors listed in lines 5 through 11. For clarity, the employment estimating technique for each of these categories will be considered separately.

a. Small Firms: This employment sector exists only in those States where there is a size-of-firm exemption on participation in the State UI program. Estimates of employment in this sector are generally based on surveys showing past relationships between growth in covered employment and growth in employment in this sector. On the basis of an average relationship, estimates can be derived from changes in employment in this sector. These surveys are conducted either locally by State agencies or periodically by the BLS.

b. Nonprofit Institutions: Estimates of employment in this sector are made through the use of establishment payroll data.

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[2]The following exposition is drawn from information provided in: Bureau of Employment Security, loc. cit. U.S. Dept. of Labor, Bureau of Employment Security, Estimating Area Employment of Self-employed, Unpaid Family, and Private Household Workers-Nonagricultural Total, BES No. R-187 (K7-63) Office of Program Review and Analysis, August, 1963; Washington, D.C. Interview with Mrs. Anna C. Waters, Reports and Analysis Division, Pennsylvania Bureau of Employment Security, Pittsburgh Office, March 4, 1966.

TABLE B-15 EMPLOYMENT AND UNEMPLOYMENT CATEGORIES

Current Employment

1. State UI-covered
2. Federal Government
3. Railroad
4. Total Covered Employment (sum of lines 1,2, and 3)

5. Small Firms
6. Nonprofit institutions
7. Domestics
8. Nonagricultural self-employed and unpaid family workers
9. Agricultural wage and salary
10. Agricultural self-employed and unpaid family workers
11. State and local government
12. Total noncovered employment (sum of lines 5 through 11)

13. Current Employment (sum of lines 4 and 12)

Current Unemployment

14. Insured less partials unemployment claims
15. Unemployed exhaustees
16. Unemployed Disqualified
17. Delayed filers and never filers
18. Total Unemployment Related to State Covered Employment (sum of lines 14 through 17)

19. Federal covered unemployment
20. Railroad covered unemployment
21. Total Covered Unemployment (sum of lines 18, 19, and 20)

22. Small firms
23. Nonprofit institutions
24. Domestics
25. Nonagricultural self-employed and unpaid family workers
26. Agricultural wage and salary
27. Agricultural self-employed and unpaid family workers
28. State and local government
29. Total Noncovered Unemployment (sum of lines 22 through 28)

30. New Entrant and Reentrant Unemployment

31. Current Unemployment (sum of lines 21, 29, and 30)

32. Work Force (sum of lines 13 and 31)

c. Domestics, Nonagricultural Self-Employed and Unpaid Family Workers: These employment categories are estimated jointly on the basis of their relationship to movements in wage and salary employment. Regression analysis was employed to compare the relationship between the relative change in wage and salary employment and the relative change in employment in these three categories for 140 areas using 1950 and 1960 Decennial Census data. A very high correlation was found to exist; furthermore, the relationship was also very close to the national relationship. Thus, the best estimate of the employment level in these categories for any point in time would be to multiply the area rate of growth in wage and salary employment from the latest benchmark to the current period by a ratio relating growth in national wage and salary employment to growth in these categories for the same time period. The result will yield a factor which, when multiplied by the level of employment of domestics, nonagricultural self-employed and unpaid family workers existing at the latest benchmark available (usually the 1960 Census) will state the current estimated employment in these categories. Thus, the assumption is that the rate of growth in employment of the sum of these three categories for any of the MLMAs will have the same relationship to its rate of growth in wage and salary employment as the one which exists for the national economy. Intercensal estimates of these values for the national economy are based on the BLS household survey.

d. Agricultural Wage and Salary, Self-Employed and Unpaid Family Workers: These categories could be expected to represent a small proportion of total employment in a metropolitan labor market. The methods for estimating them appear to vary from one labor market to another, depending upon their relative importance as a component of total employment. Estimates can be derived for these categories on the basis of reports by agricultural associations, periodic sample surveys by local or State agencies, or simply estimating changes in employment levels in these categories on the basis of a past demonstrated relationship with changes in other employment categories.

e. State and Local Government: This category of employment refers to all State employees working in the labor market area as well as all employees of local and municipal governments working in the area. Estimates of employment in this group have a high degree of accuracy, as at least the larger governmental employers make frequent employment reports to the State Employment Agency based on their payrolls. Employment in those governmental units which do not participate on a regular basis are estimated from payroll surveys.

B. Unemployment Estimating Techniques

There are several ways of defining the state of being unemployed and each of these definitions would yield a different count of the unemployed at any point in time. It may be used to define a condition -- that of not being employed; an activity -- that of seeking employment; an attitude -- that of desiring a job under certain conditions; and a need -- that of needing a job. Whatever definition is chosen, problems will be associated with it regarding the inclusion of certain groups. However, in all cases where the volume of unemployment is expressed in terms of the number of individuals so classified instead of in terms of the number of man-hours supplied at a given rate of remuneration for which there is no demand, a discrepancy will surely arise between the true volume of unemployment (however it is defined) and the measured volume of unemployment.[3]

[3]For an attempt to measure the significance of unemployment defined to include, in addition to the full-time unemployed, the unemployment resulting from involuntary part-time employment of those available for full-time employment see: Albert Rees, "The Meaning and Measurement of Full Employment," in Measurement and Behavior of Unemployment, A Conference, National Bureau of Economic Research, Princeton University Press, Princeton, N. J., 1957, p. 13-60.

The definition of unemployment used by the agencies reporting these figures, including the BES, is based primarily on the activity of the individual during the period in question. Basically, the individual must not have been employed and engaged in the activity of seeking employment if he is to be considered unemployed and thus a member of the labor force. There are, however, some minor differences between the BLS criteria of unemployment and the criteria employed by the BES. These differences are not caused by conceptual differences between the two reporting agencies, but are, rather, the result of the nature and extent of the information obtainable from the two different methods of estimating unemployment. The BLS, with its household interview method, is able to obtain a finer breakdown of the various categories of labor force status than the BES and thus include among the unemployed individuals, who, for example, would have been looking for work except that they were temporarily ill or believed no work was available in their occupation or in the community, or those engaged in labor-management disputes who revealed to the interviewer that they were seeking other employment. These additions to the unemployed would generally not be revealed in the BES estimates which are based primarily on UI claims. The BES method of unemployment estimation, to which we shall now turn does, however, have the advantage of avoiding errors which are common to the interview method of unemployment determination and provides evidence of actively seeking employment through the filing by individuals of unemployment insurance claims and registrations.[4]

The BES method of estimating the unemployment in a labor market can be conceived of as a series of building blocks of which the foundation is UI claims. The total unemployment existing in a labor market can be classified, within the context of the Employment Security Agencies, as either (1) covered unemployment,

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[4]For a discussion of sources of error in the household survey see: O. Morgenster, On the Accuracy of Economic Observations (2d ed. rev.; Princeton, New Jersey: Princeton University Press, 1963), p. 228 ff.

(2) uncovered employment, and (3) unemployment caused by new entrants and reentrants to the labor force. All of the unemployed can be classified in one, and only one, of these categories. The problem is then to estimate the volume of unemployment in each of these categories.[5]

1. Covered Unemployment

This category of the unemployed consists of those individuals whose last job was with a firm which participated in the UI program and thus qualifies their employees for unemployment benefits. On the average, this category accounts for from 70-75 percent of the total unemployed in an average labor market area. This category consists of several groups for which individual estimates must be obtained in order to arrive at a figure for the total unemployment in this category.

a. Insured Unemployment: This group consists of those who are unemployed and claim benefits for the week for which the estimates are prepared (estimate week). Persons filing for partial benefits, i.e., those who had some employment during the period, are excluded from the unemployment count, the insured unemployed from the State UI program, the Unemployment Compensation program for Federal workers, and the Unemployment Compensation program for railroad workers are used in the estimates.

b. Unemployed Exhaustees: This groups consists of those who have exhausted their benefit rights but are still unemployed. The procedure used for estimating this group is based on past relationships between the unemployment experience of exhaustees and that of claimants. On the basis of these studies, it has been determined that, on the average, the "drop out rate" for first month exhaustees is equal to the "drop out rate" for claimants and that in subsequent

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[5] The following description of the BES method of estimating unemployment is drawn from their Estimating Unemployment.

months, the rate for exhaustees is about one-half that for claimants. The "drop out rate" is defined, for a monthly period, as the ratio of those no longer in the status of unemployed at the end of the period to the total number of claimants or exhaustees during the period.

c. Unemployed Disqualified: This group generally consists of those unemployed whose last job was in a covered firm, but who have not accumulated sufficient wage credits to receive benefits. No estimate is made for this group in states where they are not required to register, because it is estimated that this group is cancelled out by those whose last job was with an uncovered firm but still have sufficient wage credits with previous employers.

d. Delayed Filers and Never Filers: This groups consists of workers from covered firms who, even though they have qualifying earnings for benefits, delay filing claims or do not file at all. A number of studies have been conducted to obtain information regarding this group. These studies have resulted in an estimating equation for the number of delayed and never filers for any period. The essential relationships in this equation are the number of claims filed during the week following the estimate week, which is positively related to the number of delayed and never filers, and the unemployment rate in the area, which varies inversely with the number of delayed and never filers.

2. Noncovered Unemployment

This block includes unemployed workers from the following noncovered employment sectors: small firms, nonprofit institutions, domestic employment, self-employed and unpaid family nonagricultural workers, agricultural wage and salary workers, self-employed, and unpaid family workers, and State and local government workers. The estimates of unemployment of workers from these employment categories are based on past demonstrated relationships at the national level between the unemployment rates in these various categories and unemployment rates in other categories where accurate information is more readily available at the local level. The source of information used to determine these relationships is unpublished data collected by the BLS in household surveys.

Given the unemployment rate which is expected to exist in each of these categories and the corresponding estimated volumes of employment, a method has been devised to estimate the volume of unemployment in each category. The base for computing unemployment rates is the labor force or work force, which is the sum of the employed (E) plus the unemployed (U). The volume of unemployment in any category can be written as:

$$U = r\ (E+U)$$

To estimate U, given r and E, this equation can be rewritten as:

$$U = r/1-r(E)$$

which allows estimates of unemployment to be derived. The following is a description of the application of this general technique for each of the non-covered categories.

a. Small Firms: This group consists of workers from firms in covered industries excluded from the UI program because of size-of-firm limitations. Studies of unemployment by size of firm indicate that the same unemployment rate as that for covered workers should be used.

b. Nonprofit Institutions: Employment in this sector, in the overall, is usually stable with the result that unemployment is quite low. Furthermore, the unemployment pattern in these activities does not appear to react in any significant degree to cyclical changes. A constant rate of 2 percent is used based on the average unemployment rate for this sector in previous years.

c. Domestics: The best estimate of the unemployment rate for this sector is three-fourths that of the covered unemployed.

d. Nonagricultural self-employed and Unpaid Family Workers: This group consistently has a relatively low unemployment rate. The best estimate for this group is about one-fifth that for the covered unemployed.

e. Agricultural wage and salary workers: This group shows some variation in their rate as compared to the covered unemployment rate, depending upon the time of the year. During December, January, and February the unemployment rate for this sector is twice that for State covered unemployment; in March and November, the rate is 1.5 that of covered workers; and in all other months, the rate tends to be the same as that for covered unemployment.

f. Agricultural self-employed and unpaid family workers: This rate is one-tenth of the covered worker rate.

g. State and local government: Generally, the unemployment rate for this group is three-fourths that for Federal workers in the area. If Federal employment in the area is small, and it is not feasible to use this rate, one-third of the State covered unemployment rate is used.

3. New Entrant and Reentrant Unemployment

Unemployed new entrants and reentrants are defined as individuals whose present period of unemployment has not been immediately preceded by employment. These may either be (a) new workers looking for their first job or, (b) individuals with prior work experience who have reentered the labor market after an absence of sufficient time to avoid being double-counted. In estimating the contribution to current unemployment made by these groups, the two groups are combined and simply termed "unemployed entrants."

The size of the unemployed entrant figure is conceived to be related to the size of the labor force in the area, the level of unemployment, and the time of the year. This can be stated in the following general formula which was developed on the basis of analysis of published and unpublished BLS data for the national economy:

$$N = AL + BU$$

where: N = unemployed entrants not included elsewhere

L = labor force, excluding the above entrants

U = Unemployed, excluding the above entrants

To adjust for seasonal influences, the "A" factor is equal to "a" times the ratio of the entrant seasonal index to the labor force seasonal index; while the "B" factor for each period is equal to "b" times the ratio of the entrant seasonal index to the experiences unemployed seasonal index. The "A" and "B" factors to be used is estimating this component of unemployment in each MLMA are developed by the BES for each month of the year and are the same for each MLMA.

II. Comparability and Reliability of the Estimates

A. Comparability

Judging the comparability of the employment and unemployment estimates derived by using the methods outlined in the previous section is difficult. The very factors that necessitated the development of these techniques account for this difficulty. The only source of direct comparison are the decennial Censuses of 1950 and 1960. Because of revealed underenumeration errors in the 1950 Census, only a limited comparison with the BES estimates could be made.[6] On a national basis, studies by the Bureau of the Census indicate that the reported unemployment was understated by about 25 percent.[7]

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6. Louis Levine "Unemployment by Locality and Industry" in The Measurement and Behavior of Unemployment - A Conference, National Bureau of Economic Research (Princeton: Princeton University Press, 1957) pp. 325-388.

7. U.S. Bureau of the Census, U.S. Census of Population: 1950, Characteristics of the Population, U.S. Summary, (U.S. Government Printing Office, Washington, D.C.), Vol. II, Part I. p. 52.

Furthermore, the Bureau of the Census is reported to have no information available on the underenumeration error by area, thus definitive conclusions with respect to the results of such a comparison are not possible.

The BES has, however, assembled some information which lends support to the validity of their estimates. This information is based on the comparison of the 1950 Census unemployment rates in the 16 largest MLMAs with the unemployment rates estimated by the BES. In all cases except one, the BES rate was higher than the Census rate. When the comparison was made in terms of ratios of the BES rate to the Census rate, the following results were shown: In three areas, the BES rate is between 5 and 10 percent higher than the Census rate, in seven areas, the BES rate was between 10 and 15 percent higher, and in the remaining five areas, the BES rate was somewhat more than 25 percent higher. When the data for these sixteen areas was aggregated, the resulting BES unemployment rate was higher than the Census rate for this group by about 25 percent, or the estimated understatement in the Census national unemployment estimate. Further support for the BES figures stem from the fact that when the estimates for all MLMAs are blown-up to a national total, the resulting unemployment figures come very close to BLS estimates based on its household survey.

In some recent studies, the BES estimates of local unemployment have been compared with 1960 Census figures.[8] Ullman, in comparing the discrepancies between the Census and BES figures for unemployment at the national, regional, State, and local levels concludes that the larger the area for which estimates are obtained, the more comparable are the BES estimates with the Census figures. This implies that the rather large differences which exist between the two figures

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[8] Joseph C. Ullman, "How Accurate are Estimates of State and Local Unemployment?" Industrial and Labor Relations Review, Vol. 16, No. 3 (April, 1963), pp. 435-452. John H. Lindauer, "The Accuracy of Area Unemployment Estimates Used to Identify Depressed Areas," Industrial and Labor Relations Review, Vol. 19, No. 3 (April, 1966), pp. 377-389.

in smaller areas tend to be averaged out as the level of aggregation increases. Various hypotheses were tested by Ullman to determine if the extent of difference between the two figures was correlated with regional characteristics. The only statistically significant result was that the Census figures are highest relative to the BES estimates in areas having the most rapid rate of population growth. This would imply that the BES estimating techniques are not sufficiently flexible to handle large changes in labor force and unemployment caused by migration flows. Another source of inflexibility in the unemployment estimating techniques exists to the extent that rapidly growing areas have higher and more volatile participation rates than other regions.

B. Reliability

I have chosen to separate the reliability of the BES estimates from their comparability with other data; they may all be incorrect. In judging the reliability of estimates of most economic magnitudes, it is important to distinguish between the reliability of estimates of levels and the reliability of estimates of changes in the levels. The estimate of the level of any economic magnitude for any point in time, can be conceived of as the initial level of this magnitude at the time of its first estimation, plus the sum of the estimated changes to the time in question. Thus, there are two sources of error in estimating the levels of economic magnitudes; the error in the initial estimate of the level, and the error in estimating the subsequent changes in this initial level. The employment and unemployment figures used in this study represent only the changes in the levels of these magnitudes, thus avoiding one source of unreliability in these data.[9]

The reliability of data depends, of course, on the reliability of the sources from which it is drawn. A large proportion of both the employment and

[9] The two sources of error will not be quite independent from each other, as in this case, when some components of change in the magnitudes are estimated on the basis of past levels.

unemployment estimates for a given month in these MIMAs would appear to contain a high degree of reliability. This proportion is composed of those workers in the covered employment sectors. There is a good reason to suspect that the reliability of the change in employment might be further enhanced if one assumes that these changes are likely to be composed of a higher proportion of covered employees than the total level of employment. In other words, if the employment in the covered sectors is more volatile than the employment in the noncovered sectors, then the estimated changes in employment would display a high degree of reliability because of the relatively accurage data sources for such large proportions of these changes.

The estimates of changes in the level of unemployment appear to have a lower degree of reliability, when the estimating techniques and data sources are compared with those used in estimating employment changes. This is primarily because of the fact that, aside from the data collected from benefit claims, there are no information sources which act as collection points to record the individual decisions regarding the labor force status of that segment of the working-age population who are not recorded as currently employed.

Particular dissatisfaction rests with the method described for estimating new entrants and reentrants into the labor force. This component of unemployment can be conceived of as the sum of subjective individual decisions to seek employment during the time period in question. Furthermore, unless these individuals register their desires with a central employment bureau, the only reliable way of revealing their number is through sample surveys which seek to record and enumerate those who have made the decision to seek employment and thus enter the labor force. This relatively sensitive method for tabulating these subjective decisions contrasts with the crude attempt employed by the BES for estimating this component of unemployment. Recall that the flow into the unemployment category accounted for by this group in any given labor market area is estimated on the basis of the behavior of this group at the national level. The major hypothesis of this study, however, is that differences exist, in the extent of this group, among labor market areas. Thus, the BES method of estimating this component of change in unemployment would act to overestimate unemployment reductions in areas experiencing significant employment increases and characterized by a responsive "secondary" labor force.[10] This responsiveness would be observed for such areas in relatively small absolute values for the ratios of their unemployment and employment changes if their labor force responsiveness is recorded. Conversely, in those MLMAs characterized by a relatively constant labor force, the association between employment increases and unemployment reductions would be understated, as the estimates of unemployed entrants and reentrants to the labor force would be too high. The effect of this estimating technique for accounting for these increments to unemployment is to tend to equalize the labor force responsiveness between MLMAs and thus suppress real differences which may exist among them.

Employment and unemployment levels for the MLMAs for any of the given months are published and estimated three different times. The first published figures which appear two months later, e.g., figures for March levels will appear in the following May issue of Area Trends. An adjusted estimate of these preliminary figures appears two months later. These adjusted estimates are undoubtedly based on more complete information. The third and final estimate of the employment and unemployment levels for a given month appear one year after the second estimate. Presumably, the justification for publishing these last estimates is that they are based on still more complete information than the second estimate and, hence, are the most accurate available. In order to minimize the error in the employment

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[10] This will explain Ullman's observation that the BES tends to underestimate unemployment in areas of rapid population growth and overestimate unemployment in areas of slower population growth.

and unemployment changes used in this study, the third and final estimates were employed in virtually all cases.[11]

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[11] In a few cases, some areas experienced a change in geographic definition in the period between the second and third estimate. In such cases, the second estimate was used.

APPENDIX C

Programs for Computerized Location Models

for Assessing Regional Shifts in Industrial Location

```
C     PROGRAM NO. 4

C           EFFECT OF REDUCED PROCESSING COST AT ONE LOCATION
C           TP8 = TRANSPORT COST OF PRODUCT FROM LOC. 8 TO MARKET, PER TON
C           CAL8 = ASSEMBLY COSTS OF MATERIALS AT LOC. 8, PER TON OF PRODUCT
C           CDL = MINIMUM (INITIAL) DELIVERED COST OF PRODUCT AT MARKET
C           JN = INITIAL IDENTIFICATION OF PROCESSING LOCATION SERVING
                  SPECIFIED MARKET
C           A,B = PARAMETERS OF DEMAND FUNCTION AT MARKETS
                  (SALES = A - B*DEL. PRICE)
            DIMENSION RY(10), TP8(10), NO(10), CDL(10), Y(10),
      1     NRY(10), JN(10), Q(10), A(10), B(10), V(10)
            READ 1, CAL8
      1     FORMAT (F 10.2)
            READ 3, TP8
      3     FORMAT (10F7.2)
            READ 2, CDL
      2     FORMAT (10X, 10F6.2)
            READ 5, JN
      5     FORMAT (10X, 10I5)
            DO8 K = 1,1
            NO (K) = K
            READ 204, A(K), B( K)
    204     FORMAT (30X, 2F10.2)
      8     Y(K) = CDL(K) - TP8(K) - CAL8
C           RANK Y-S AS RY-S IN DESCENDING ORDER
            DO 11 K=1,10
            M=1
            DO 12 L= 1,1
            IF (K-L) 21,12,21
     21     IF (Y(K)-Y(L)) 13,20,12
     20     PRINT 22, Y
     22     FORMAT (H* Y TIE* 10 F 8.2)
            GO TO 998
     13     M=M+1
     12     CONTINUE
            RY(M)= Y(K)
     11     NRY(M) = K
            DO 16 M = 2,10
            IF (RY(M)) 17,17,16
     17     ML = M-1
            GO TO 18
     16     CONTINUE
            ML = 10
     18     DO 299 N=1,ML
            SQ=0.
            SV = 0.
            K = NRY(N)
            KOD = JN(K)
            JN(K) = 8
            DO 14 L=1,N
            K=NRY(L)
     14     CDL(K) = CAL8 + RY(N) + TP8(K)
            DO 30 K=1,10
            Q(K) = A(K) - B(K)*CDL(K)
            SO = SQ + Q(K)
            V(K) = Q(K)*CDL(K)
```

```
C          BASIC PROGRAM
C        MARCH 1966
C          OI, AI = NORTH AND EAST COORDINATES OF MATERIAL SOURCE
C          CM = COST OF PRODUCING MATERIAL AT SOURCE, PER TON
C          OJ, AJ = NORTH AND EAST COORDINATES OF PROCESSING LOCATION
C          CP = COST OF PROCESSING, PER TON OF PRODUCT (CONSTANT)
C          OK, AK = NORTH AND EAST COORDINATES OF MARKET
C          A,B = PARAMETERS OF DEMAND FUNCTION AT MARKETS.
                 (SALES = A - B*DEL. PRICE)
C          TERM = TERMINAL COST PER TON ON SHIPMENTS OF MATERIAL
C          TLM = LINE HAUL COST PER TON MILE ON SHIPMENTS OF MATERIAL
C          TERP = TERMINAL COST PER TON ON SHIPMENTS OF PRODUCT
C          TLP = LINE HAUL COST PER TON MILE ON SHIPMENTS OF PRODUCT
        DIMENSION AI (9), OI (9), CM (9), SUMM (9), AJ (8), OJ (8), SUMP (8),
       1 IN (8), CAL (8), CP (8), AK (10), OK (10), JN (10), CDL (10), Q (10),
       2 A (10), B (10), V (10), SM (9,8), TM (9,8), CA (9,8), SP (8,10),
       3 TP (8,10), CD (8,10)
        DO 1  I = 1,9
      1 READ 2, OI (I), AI (I), CM (I)
        DO 3  J = 1,8
      3 READ 2, OJ (J), AJ (J), CP (J)
        DO 4  K = 1,10
      4 READ 5, OK (K), AK (K), A (K), B (K)
        READ 6, TERM, TLM, TERP, TLP
        READ 7, AMI
      2 FORMAT (10X, 2F10.0, F10.2)
      5 FORMAT (10X, 2F10.0, 2F10.2)
      6 FORMAT (4F10.2)
      7 FORMAT (F10.2)
        SQ = 0.
        SV = 0.
C       COMPUTE TRANSPORT COSTS
        DO 10  J = 1,8
        DO 10  I = 1,9
        IF (AI (I) - AJ (J)) 11, 12, 11
     12 IF (OI (I) - OJ (J))  11, 13, 11
     13 TM (I,J) = 0.
        GO TO 10
     11 TM (I,J) = TERM + TLM*SQRTF ((AI (I) - AJ (J))**2. + (OI (I) - OJ (J))**2.)
     10 CONTINUE
        DO 14  K = 1,10
        DO 14  J = 1,8
        IF (AJ (J) - AK (K)) 15, 16, 15
     16 IF (OJ (J) - OK (K)) 15, 17, 15
     17 TP (J,K) = 0.
        GO TO 14
     15 TP (J,K) = TERP + TLP*SQRTF ((AJ (J) - AK (K))**2. + (OJ (J) - OK (K))**2.)
     14 CONTINUE
C       ASSEMBLY COSTS AND SOURCE ASSIGNMENT
        DO 20  J = 1,8
        SUMP (J) = 0.
        CA (1,J) = AMI*(CM (1) + TM (1,J))
        CAL (J) = CA (1,J)
        IN (J) = 1
        DO 20  I = 2,8
```

```
      CA (I,J) = AMI*(CM (I) + TM (I,J))
      IF (CA (I,J) - CAL (J)) 21, 90, 20
 90   PRINT 91
 91   FORMAT (H* TIE AT 90*)
      GO TO 999
 21   CAL (J) = CA (I,J)
      IN (J) = I
 20   CONTINUE
C     DELIVERED PRICES AND MARKET ASSIGNMENT
      DO 30 K = 1,10
      CD (1,K) = CAL (1) + CP (1) + TP (1,K)
      CDL (K) = CD (1,K)
      JN (K) = 1
      DO 31 J = 2,8
      CD (J,K) = CAL (J) + CP (J) + TP (J,K)
      IF (CD (J,K) - CDL (K)) 32, 92, 31
 92   PRINT 93
 93   FORMAT (H* TIE AT 92*)
      GO TO 999
 32   CDL (K) = CD (J,K)
      JN (K) = J
 31   CONTINUE
C     SALES IN MARKETS AND TOTAL
      Q (K) = A (K) - B (K)*CDL (K)
      V (K) = Q (K)*CDL (K)
      SQ=SQ + Q (K)
 30   SV = SV + V (K)
      Z - SV/SQ
C     PRODUCT SHIPMENTS AND OUTPUTS
      DO 40 K = 1,10
      J = JN (K)
      SP (J,K) = Q(K)
 40   SUMP (J) = SUMP (J) + Q (K)
C     MATERIALS SHIPMENTS AND OUTPUTS
      DO 50 I = 1,9
 50   SUMM (I) = 0.
      DO 51 J = 1,8
      I = IN(J)
      SM (I,J) = AMI*SUMP (J)
 51   SUMM (I) = SUMM (I) + SM (I,J)
      PRINT 60
 60   FORMAT (H*1          SOURCE LOCATIONS AND COSTS*///)
      PRINT 61
 61   FORMAT (H*      NO.          NORTH          EAST          COST*//)
      DO 62 i = 1,9
 62   PRINT 63, I, OI (I), AI (I), CM (I)
 63   FORMAT (I6, F14.0, F9,0, F11.2 /)
      PRINT 64
 64   FORMAT (H*1  PRODUCTION LOCATIONS AND COSTS*///)
      PRINT 61
      DO 66 J - 1,8
 66   PRINT 63, J, OJ (J), AJ (J), CP (J)
      PRINT 67
 67   FORMAT (H*1  MARKET LOCATIONS AND DEMAND PARAMETERS*///)
      PRINT 68
 68   FORMAT (H*                                        (SALES = A - BP) *//)
      PRINT 69
 69   FORMAT (H*  MKT. NO.       NORTH          EAST          A          B*//)
      DO 70 K - 1,10
 70   PRINT 71, K, OK (K), AK (K), A (K), B (K)
 71   FORMAT (I6, F14.0, F9.0, F 10.2, F 7.2 /)
```

```
      PRINT 72
   72 FORMAT (H*1                           TERMINAL COST            LINE COST* / / )
      PRINT 73, TERM, TLM
   73 FORMAT (H* ON MATERIALS* F9.2, F13.2 / / )
      PRINT 74, TERP, TLP
   74 FORMAT (H* ON PRODUCTS * F9.2, F13.2 / / / / / )
      PRINT 75, AMI
   75 FORMAT (H*           MATERIAL TONS PER PRODUCT TON* F6.2)
C     PRINT RESULTS
      PRINT 80
   80 FORMAT (H*1          MATERIAL TRANSPORT COST PER TON* / / / )
      PRINT 81
   81 FORMAT (H*           TO       1       2       3       4       5       6
     17      8* / )
      PRINT 127
      DO 82 I = 1,9
   82 PRINT 83, I, (TM (I,J), J = 1,8)
   83 FORMAT (I8, F8.2, 7F7.2 / )
      PRINT 84
   84 FORMAT (H*1          PRODUCT TRANSPORT COST PER TON* / / / )
      PRINT 85
   85 FORMAT (H*           TO       1       2       3       4       5       6
     17      8      9      10* / )
      PRINT 127
  127 FORMAT (H*        FROM* / )
      DO 86 J = 1,8
   86 PRINT 87, J, (TP (J,K), K = 1,10)
   87 FORMAT (I8, F8.2, 9F7.2 / )
      PRINT 88
   88 FORMAT (H*1        MATERIALS OUTPUTS, SHIPMENTS* / / / )
      PRINT 89
   89 FORMAT (H*           TO       1       2       3       4       5       6
     17      8          TOTAL* / )
      PRINT 127
      DO 100 I = 1,8
  100 PRINT 101, I, (SM (I,J), J = 1,8), SUMM (I)
  101 FORMAT (I8, F8.2, 7F7.2, F11.2 / )
      PRINT 102
  102 FORMAT (H*1        PRODUCT OUTPUTS, SHIPMENTS, SALES* / / / )
      PRINT 103
  103 FORMAT  (H*          TO       1       2       3       4       5       6
     17      8      9      10     TOTAL * / )
      PRINT 127
      DO 104 J =1,8
  104 PRINT 105, J, (SP (J,K), K = 1,10), SUMP (J)
  105 FORMAT (I8, F8.2, 9F7.2, F11.2 / )
      PRINT 106, (Q (K), K = 1,10), SQ
  106 FORMAT (H*         TOTALS* F9.2, 9F7.2, F11.2)
      PRINT 107
  107 FORMAT (H*1        DELIVERED PRICES AT MARKETS* / )
      DO 108 K - 1,10
  108 PRINT 109, K, CDL (K)
  109 FORMAT (I10, F10.2 / )
  110 PRINT 111
  111 FORMAT (H* ASSEMBLY COSTS AT PROCESSING LOCATIONS* / )
      DO 112 J =1,8
  112 PRINT 113, J, CAL (J)
  113 FORMAT (I10, F10.2 / )
      PRINT 114, SV
  114 FORMAT (H* TOTAL DELIVERED COST*F10.2 / / )
```

```
      PRINT 115, Z
115   FORMAT (H*  AVE. DELIVERED COST*F10.2)
999   CALL SYSTEM
      END
$     DATA
```

```
C       PROGRAM NO. 2
C         NMAT = NUMBER OF MATERIALS (MAX. 5)
C         NI = NUMBER OF SOURCES OF A SPECIFIED MATERIAL (MAX. 20)
C         NJ = NUMBER OF PRODUCTION LOCATIONS (MAX. 20)
C         NK = NUMBER OF MARKETS (MAX. 20)
C         OM, AM = ORDINATE AND ABSCISSA OF SOURCE LOCATION
C         OJ, AJ = SAME FOR PRODUCTION LOCATION
C         OK, AK = SAME FOR MARKET
C         CM = COST OF MATERIAL AT SOURCE
C         CP = UNIT PROCESSING COST
C         A,B = PARAMETERS OF DEMAND CURVE   (Q = A - BP)
C         TERM, TERP = UNIT TERMINAL COST ON SHIPMENTS OF MATERIALS AND PRODUCTS
C         TLM, TLP = UNIT LINE-HAUL COST ON SHIPMENTS OF MATERIALS AND PRODUCTS
C         COI = INPUT COEFFICIENT   (MATERIAL PER UNIT OF PRODUCT)
C         QM = MATERIALS OUTPUT AT A SOURCE
C         QP = PRODUCTION LEVEL AT A PRODUCTION LOCATION
C         QK = SALES AT A MARKET
C         NRUNS = NUMBER OF RUNS OF THIS PROGRAM  (MAX. 50)
C         N = NUMBER OF CURRENT RUN
C
          DIMENSION NI(5), COI(5), TERM (5), TLM (5), QM (5,20),
         1 CM (5,20), OM (5,20), AM (5,20), OJ (20), AJ(20), OK(20),
         2 AK(20), A(20), B(20), TM(5,20,20), TP(20,20), QP(20), CAML(5,20),
         3 NOM(5,20), CAL(20), CD(20,20), CDL(20), CP(20), NOJ (20),
         4 Q(20), SP(20,20), SM(5,20,20), SQ(50), Z(50)
          NRUNS = 1
          N = 1
C
C         READ DATA
  500     READ 1, NMAT, NJ, NK, TERP, TLP
          READ 2, (NI(M), M=1,NMAT)
          DO 6 M = 1,NMAT
    6     READ 3, COI(M), TERM(M), TLM(M)
          DO 7 M = 1,NMAT
          NIM = NI(M)
          DO 7 I = 1,NIM
          QM (M,I) = 0.
    7     READ 4, CM(M,I), OM (M,I), AM (M,I)
          DO 8 J = 1,NJ
    8     READ 4, CP(J), OJ(J), AJ(J)
          DO 9 K = 1,NK
    9     READ 5, A(K), B(K), OK(K), AK(K)
    1     FORMAT (3 I 10, 2 F 10.2)
    2     FORMAT (5 I 10)
    3     FORMAT (3 F 10.2)
    4     FORMAT (F 10.2, 2 F 10.0)
    5     FORMAT (2 F 10.2, 2 F 10.0)
C
C         COMPUTE MATERIALS TRANSPORT COSTS
          DO 22 J = 1,NJ
          DO 10 M = 1,NMAT
          NIM = NI(M)
          DO 10,I = 1,NIM
          SM (M,I,J) = 0.
          IF (AM(M,I) - AJ(J)) 11,12,11
   12     IF (OM(M,I) - OJ(J)) 11,13,11
   13     TM (M,I,J) = 0.
```

```
      GO TO 10
   11 TM (M,I,J) = TERM(M) + TLM(M)*SQRTF((AM(M,I) - AJ(J))**2.
     1 + (OM(M,I) - OJ(J))**2.)
   10 CONTINUE
C
C     COMPUTE PRODUCT TRANSPORT COSTS
      DO 22 K = 1,NK
      IF (AK(K) - AJ(J)) 23,24,23
   24 IF (OK(K) - OJ(J)) 23,25,23
   25 TP(J,K) = 0.
      GO TO 22
   23 TP(J,K) = TERP+TLP*SQRTF((AK(K)-AJ(J))**2.+(OK(K)-OJ(J)**2.)
   22 CONTINUE
C
C     SET OUTPUTS AND TOTAL SALES TO ZERO
      SQ(N) = 0.
      SV = 0.
      DO 101 J = 1,NJ
      QP(J) = 0.
      CAL(J) = 0.
C
C     FIND SMALLEST ASSEMBLY COST FOR EACH PRODUCTION LOCATION
      DO 101 M = 1,NMAT
      CAML (M,J) = CM(M,1) + TM (M,1,J)
      NOM (M,J) = 1
      NIM = NI(M)
      DO 15 I=2,NIM
      IF (CM(M,I) + TM(M,I,J)-CAML(M,J)) 16,15,15
   16 CAML(M,J) = CM(M,I) + TM(M,I,J)
      NOM (M,J) = I
   15 CONTINUE
  101 CAL(J) = CAL(J) + COI(M)*CAML(M,J)
C
C     FIND SMALLEST DELIVERY COST TO EACH MARKET
      DO 108 K = 1,NK
      CDL (K) = CAL(1) + CP(1)+TP(1,K)
      NOJ(K) = 1
      DO 109 J = 2,NJ
      SP(J,K) = 0.
      CD (J,K) = CAL(J) + CP(J) + TP (J,K)
      IF (CD(J,K) - CDL(K)) 110,109,109
  110 CDL(K) = CD(J,K)
      NOJ (K) = J
  109 CONTINUE
C
C     COMPUTE SALES AT EACH MARKET, TOTAL SALES, AND AVERAGE PRICE
      Q(K) = A(K) - B(K)*CDL(K)
      IF (Q(K)) 100,100,200
  100 Q(K) = 0.
  200 SQ(N) = SQ(N) + Q(K)
  108 SV = SV + Q(K)*CDL(K)
      Z(N) = SV/SQ(N)
C
C     COMPUTE PRODUCT SHIPMENTS AND OUTPUTS
      DO 111 K =1,NK
      J = NOJ(K)
      SP(J,K) = Q(K)
  111 QP(J) = QP(J) + Q(K)
C
C     COMPUTE MATERIALS SHIPMENTS AND OUTPUTS
      DO 113 M = 1,NMAT
```

```
      DO 113 J = 1,NJ
      NOMMJ = NOM(M,J)
      SM(M,NOMMJ,J) = COI(M)*OP(J)
  113 QM(M,NOMMJ) =QM(M,NOMMJ) + SM(M,NOMMJ,J)
C
C     PRINT RESULTS
  218 PRINT 99
   99 FORMAT (1H1)
      PRINT 219, N
  219 FORMAT (H* CASE* I3/)
      PRINT 220
  220 FORMAT (35X, H* MATERIALS TRANSPORT COSTS AND SHIPMENTS*//)
      PRINT 224
  224 FORMAT (20X, 9H MATERIAL 6X,7H SOURCE 6X ,11H PROD. LOC. 4X, 13H T
     1RANSP. COST   6X, 10H SHIPMENTS     /)
      DO 222 M = 1,NMAT
      NIM = NI(M)
      DO 222 I =1,NIM
      DO 222 J = 1,NJ
  222 PRINT 223, M,I,J,TM(M,I,J), SM(M,I,J)
  223 FORMAT (10X, 3 I 15, F 18.2, F 18.2)
      PRINT 99
      PRINT 225
  225 FORMAT (35X, H* PRODUCT TRANSPORT COSTS AND SHIPMENTS*//)
      PRINT 226
  226 FORMAT (10X, H* FROM PROD. LOC.        TO MARKET        TRANSP. COS
     1TS        SHIPMENTS*/)
      DO 227 J = 1,NJ
      DO 227 K = 1,NK
  227 PRINT 228, J,K, TP(J,K), SP(J,K)
  228 FORMAT (10X, I 10, I 15, F 24.2, F 19.2)
      PRINT 99
      PRINT 229
  229 FORMAT ( 35X, H* MATERIALS OUTPUTS*//)
      PRINT 230
  230 FORMAT (10X, H* MATERIAL          SOURCE             OUTPUTS*/)
      DO 232 M = 1, NMAT
      NIM = NI(M)
      DO 232 I = 1, NIM
  232 PRINT 233, M,I, QM(M,I)
  233 FORMAT (I 15, I 17, F 17.2)
      PRINT 234
  234 FORMAT (1H1, 5X, H* PRODUCTION LEVELS*//)
      PRINT 235
  235 FORMAT (10X, H* PROD. LOC.           OUTPUT*/)
      DO 236 J = 1, NJ
  236 PRINT 237, J, QP(J)
  237 FORMAT   (I 15, F 22.2)
      PRINT 99
      PRINT 238
  238 FORMAT (35X, H* MARKET SALES AND PRICES*//)
      PRINT 239
  239 FORMAT (10X, H* MARKET            SALES          PRICE*/)
      DO 240 K = 1,NK
  240 PRINT 241, K, Q(K), CDL(K)
  241 FORMAT      (I 15, F 18.2, F 13.2)
      PRINT 242, SQ(N)
  242 FORMAT (//// 20X, 25 H TOTAL OUTPUT                        F 10.2//)
      PRINT 244, Z(N)
  244 FORMAT (20X, 25H AVE.DEL.PRICE                       F 10.2)
```

```
  217     IF   (N-NRUNS)  245,1000, 1000
  245     N = N + 1
          GO TO 500
 1000     CALL SYSTEM
          END
$         DATA
```

```
C         PROGRAM NO. 3
C              AMI  =  TONS OF MATERIAL PER TON OF PRODUCT
C              CAL  =  MINIMUM ASSEMBLY COSTS OF MATERIALS, PER TON OF PRODUCT
C              A,B  =  PARAMETERS OF DEMAND FUNCTION AT MARKETS
C                (SALES  =  A  -  B*DEL.PRICE)
C              IN  =  INITIAL IDENTIFICATION OF SOURCE SUPPLYING SPECIFIED PROCESSING
C                   LOCATION
          DIMENSION TM9(8),  CAL(8),A(10), B(10), CP(8), TP(8,10),
         1 W(8), RW(8), NR(8), SUMP(8), IN(8),
         2         CD(8,10), JN(10), CDL(10), Q(10), V(10)
  200     READ 201, (TM9(J), J  =  1,8)
  201     FORMAT   (5X,  8  F6.2)
          READ 202, AMI
  202     FORMAT (F10.2)
          READ 203, CAL
  203     FORMAT (10X,  8  F  6.2)
          DO 205  K=1,10
  205     READ  204,  A(K), B(K)
  204     FORMAT (30X, 2F10.2)
          READ 290, (IN(J), J  =  1,8)
  290     FORMAT  (10X,  8  I5)
          READ 203, CP
          DO 210   J=1,8
          READ 209, (TP(J,K),  K=1,10)
  209     FORMAT  10F7.2)
  210     W(J)  =  CAL(J)/AMI  -  TM9(J)
C         RANK W-S   AS  RW-S   IN DESCENDING ORDER
          DO  11  J  =  1,8
          M=1
          DO  12  L=1,8
          IF  (J-L) 21,12,21
   21     IF (W(J)  -  W(L))  13,20,12
   20     PRINT  22, W
   22     FORMAT (H* W TIE* 8F8.2)
          GO TO 998
   13     M=M+1
   12     CONTINUE
          RW(M)  =  W(J)
   11     NR(M)  =  J
          DO  16  M=2,8
          IF  (RW(M)) 17,17,16
   17     ML=M-1
          GO TO 18
   16     CONTINUE
          ML  =  8
   18     DO 299 N=1,ML
C         SOLVE AT CRITICAL COST LEVELS
          DO  299  N=1,8
          DO  2  J  =  1,8
    2     SUMP(J)=0.
          SQ=0.
          SV=0.
          DO 280 L  =  1,N
          J  =  NR(L)
  280     CAL(J)  =  AMI*(RW(N)  +  TM9(J))
```

```
      KOD = IN(J)
      IN(J) = 9
      DO 40 K = 1,10
      CD(1,K) = CAL(1) + CP(1) + TP(1,K)
      CDL(K) = CD(1,K)
      JN(K) = 1
      DO 31 J=2,8
      CD(J,K) = CAL(J) + CP(J) + TP(J,K)
      IF (CD(J,K) - CDL(K) ) 32, 92, 31
 92   PRINT 93, K, JN(K), J, CDL(K)
 93   FORMAT (H* CD TIE   K, JN(K), J, CDL(K)* 3I5, F10.2)
      GO TO 998
 32   CDL(K) = CD(J,K)
      JN(K) = J
 31   CONTINUE
      Q(K) = A(K) - B(K)*CDL(K)
      SQ = SQ + Q(K)
      V(K) = Q(K)*CDL(K)
      SV = SV + V(K)
      J = JN(K)
 40   SUMP(J)= SUMP(J) + Q(K)
 30   Z = SV/SQ
      S9A = 0.
      DO 241  L = 1,N
      J = NR(L)
241   S9A = S9A + AMI*SUMP(J)
      S9B = S9A - AMI*SUMP(J)
      AVE = (S9A + S9B)/2.
      PRINT 220, N
220   FORMAT (H*1 PHASE* I3//)
      IF (SUMP(J)) 221,221,222
221   PRINT 223, NR(N)
223   FORMAT (3X, H* SOURCE 9 TAKES OVER PROD.LOC.* I3,H*   (IDLE)*)
      GO TO 225
222   PRINT 224, NR(N)
224   FORMAT (3X, H* SOURCE 9 TAKES OVER PROD.LOC.* I3, H*   (ACTIVE)*)
225   PRINT 226, KOD
226   FORMAT (4X, H* SUPPLANTING SOURCE* I3/1)
      PRINT 227, RW(N)
227   FORMAT (5X, H* SOURCE 9 COST* F15.2/)
      IF (SUMP(J)) 228,228,229
228   PRINT 230, S9A
230   FORMAT (5X, H* SOURCE 9 OUTPUT* F13.2/)
      GO TO 236
229   PRINT 231
231   FORMAT (5X, H* SOURCE 9 OUTPUT*)
      PRINT 232,S9B
232   FORMAT (7X, H* BEFORE TAKEOVER* F 11.2)
      PRINT 233, S9A
233   FORMAT (7X, H* AFTER TAKEOVER* F12.2)
234   PRINT 235, AVE
235   FORMAT (9X, H* AVERAGE * F 16.2/)
236   PRINT 237, SQ
237   FORMAT (5X, H* TOTAL SYSTEM SALES* F 10.2/)
238   PRINT 239, Z
239   FORMAT (5X, H* AVE. DEL. PRICE* F 13.2//)
      PRINT 240
240   FORMAT (5X, H* MARKET  SERVED BY PROD. LOC.  SERVED BY SOURCE*/)
      DO 299 K = 1,10
      J = JN(K)
299   PRINT 242, K, JN(K), IN(J)
```

```
 242    FORMAT (I9,  I 20,  I21)
        IF  (ML - 7) 19,19,998
  19    PRINT 243
 243    FORMAT (H* NO FURTHER TAKEOVERS POSSIBLE WITH POSITIVE SOURCE 9 CO
       1ST*)
 998    CALL SYSTEM
        END
$      DATA
```

```
C     PROGRAM NO. 4
C           EFFECT OF REDUCED PROCESSING COST AT ONE LOCATION
C           TP8 = TRANSPORT COST OF PRODUCT FROM LOC. 8 TO MARKET, PER TON
C           CAL8 = ASSEMBLY COSTS OF MATERIALS AT LOC. 8, PER TON OF PRODUCT
C           CDL = MINIMUM (INITIAL) DELIVERED COST OF PRODUCT AT MARKET
C           JN = INITIAL IDENTIFICATION OF PROCESSING LOCATION SERVING
C                SPECIFIED MARKET
C           A,B = PARAMETERS OF DEMAND FUNCTION AT MARKETS
C             (SALES = A - B*DEL.PRICE)
          DIMENSION RY(10), TP8(10), NO(10), CDL(10), Y(10),
         1 NRY(10), JN(10), Q(10), A(10), B(10), V(10)
          READ 1, CAL8
      1   FORMAT (F 10.2)
          READ 3, TP8
      3   FORMAT (10F7.2)
          READ 2, CDL
      2   FORMAT (10X, 10F6.2)
          READ 5, JN
      5   FORMAT (10X, 10I5)
          DO 8 K=1,1
          NO(K) = K
          READ 204, A(K), B(K)
    204   FORMAT (30X, 2F10.2)
      8   Y(K) = CDL(K) - TP8(K) - CAL8
C         RANK Y-S AS RY-S IN DESCENDING ORDER
          DO 11 K=1,10
          M=1
          DO 12 L= 1,10
          IF (K-L) 21,12,21
     21   IF (Y(K)-Y(L)) 13.20,12
     20   PRINT 22, Y
     22   FORMAT (H* Y TIE* 10 F 8.2)
          GO TO 999
     13   M=M+1
     12   CONTINUE
          RY(M)= Y(K)
     11   NRY(M) = K
          DO 16 M = 2,1Q
          IF (RY(M)) 17,17,16
     17   ML = M-1
          GO TO 18
     16   CONTINUE
          ML = 10
     18   DO 299 N=1,ML
          SQ=0.
          SV = 0.
          K = NRY(N)
          KOD = JN(K)
          JN(K) = 8
          DO 14 L=1,N
          K=NRY(L)
     14   CDL(K) = CAL8 + RY(N) 3 TP8(K)
          DO 30 K=1,10
          Q(K) = A(K) - B(K)*CDL(K)
          SQ = SQ = Q(K)
          V(K) = Q(K)*CDL(K)
```

```
30     SV = SV + V(K)
       Z = SV/SQ
       P8A = 0.
       DO 31 L=1,N
       K = NRY(L)
31     P8A = P8A + Q(K)
       P8B = P8A - Q(K)
       AVE = (P8A + P8B)/2.
       GO TO (6,7,6,7,6,7,6,7,6,7) , N
6      PRINT 220, N
220    FORMAT (H*1 PHASE* I3/)
       GO TO 9
7      PRINT 221, N
221    FORMAT (H* PHASE* I3/)
9      PRINT 223, NRY(N)
223    FORMAT (H* LOC. 8 TAKES OVER MARKET NO.* I3)
       PRINT 226, KOD
226    FORMAT (H*    SUPPLANTING PROD.LOC.* I3///)
       PRINT 227, RY(N)
227    FORMAT (5X, 20H LOC. 8 PROC. COST                          F10.2/)
       PRINT 231
231    FORMAT (5X, H* LOC. 8 OUTPUT*)
       PRINT 232, P8B
232    FORMAT (7X, 18 H BEFORE TAKEOVER                       F 10.2)
       PRINT 233, P8A
233    FORMAT (7X, 18H AFTER TAKEOVER                    F10.2)
       PRINT 235, AVE
235    FORMAT (7X, 18H AVERAGE                         F10.2/)
       PRINT 236, Z
236    FORMAT (5X, 20H AVE.DEL.PRICE               F10.2///)
       PRINT 240, (NO(K), K=1,10)
240    FORMAT   (20H MARKET NO.                   10I7,7X,H*   TOTAL*)
       PRINT 241, (JN(K), K=1,10)
241    FORMAT (20H SERVED BY P.L. NO.                   10I7)
299    PRINT 242, (Q(K), K=1,10) SQ
242    FORMAT (23H SALES IN MARKETS               10F7.2,F10.2//////)
       IF  (ML-9) 19,19,999
19     PRINT 243
243    FORMAT(60H  NO FURTHER TAKEOVERS POSSIBLE WITH POSITIVE LOC. 8 COS
      1T                    )
999    CALL SYSTEM
       END
$      DATA
```

```
C       PROGRAM NO. 5
C             TM = TRANSPORT COST ON MATERIALS FROM SOURCE, PER TON
C             I,J,K = SUBSCRIPTS IDENTIFYING SOURCES, PROD. LOCS., MARKETS
C             TP = TRANSPORT COST OF PRODUCT TO MARKET, PER TON
C             AMI = TONS OF MATERIAL PER TON OF PRODUCT
C             CP = COST OF PROCESSING, PER TON (CONSTANT)
C             CAPM, CAPP = CAPACITY AT SOURCE OR PROD. LOC.
C             U = SIZE OF PRODUCT INCREMENT, IN TONS
C             A,B,W,Y = PARAMETERS OF DEMAND FUNCTION
C               Q = A-BP    OR    P = W-YQ
        DIMENSION CM(10), CAPM(10), QM(10), TM(10,10), SM(10,10),
       1 CP(10), CAPP(10), QP(10), TP(10,10), SP(10,10), Q(10), W(10),
       2 Y(10), D(1000), IN(1000), JN(1000), KN(1000), A(10), B(10),
       3 P(10)
        READ 1, NI, NJ, NK, U, AMI
        DO 2 I=1,NI
        READ 3, CM(I), CAPM(I)
        READ 7, (TM(I,J), J=1,5)
        QM(I)=0.
        DO 2 J=1,NJ
    2   SM(I,J) = 0.
        DO 5 J=1,NJ
        READ 3, CP(J), CAPP(J)
        READ 8, (TP(J,K), K=1,5)
        QP(J)=0.
        DO 5 K=1,NK
    5   SP(J,K) = 0.
        DO 6 K=1,NK
        Q(K) = 0.
        READ 4, A(K), B(K)
        Y(K)= 1./B(K)
    6   W(K) = A(K)/B(K)
    1   FORMAT (3I10, 2 F 10.2)
    3   FORMAT (2F10.2)
    4   FORMAT (30X, 2F10.2)
    7   FORMAT (10X, 5F6.2)
    8   FORMAT (5F 7.2)
        N = 0
        DO 15 I = 1,NI
        DO 15 J = 1,NJ
        DO 15 K = 1, NK
        DT = W(K) - Y(K)*(Q(K) + U    ) - TP(J,K) - CP(J) -AMI*(TM(I,J)
       1 + CM(I))
        IF (DT) 15,12,12
   12   N = N+1
        D(N) = DT
        IN(N) = I
        JN(N) = J
        KN(N) = K
   15   CONTINUE
   10   DMAX = D(1)
        NMAX = 1
        DO 16 L=2,N
        IF (D(L)-DMAX) 16,16,18
   18   DMAX = D(L)
```

```
      NMAX = L
 16   CONTINUE
 19   M = NMAX
 17   I = IN(M)
      J = JN(M)
      K = KN(M)
      KA = K
      QM(I) = QM(I) + AMI*U
      QP(J) = QP(J) + U
      Q(K) = Q(K) + U
      SM (I,J) = SM(I,J) + AMI*U
      SP (J,K) = SP (J,K) + U
      IF (N-1) 44,44,89
 89   M = 0
      DO 20 L=1,N
      I=IN(L)
      J=JN(L)
      K=KN(L)
      IF (QM(I) - CAPM(I) 21,20,20
 21   IF (QP(J) - CAPP(J)) 22,20,20
 22   IF (K-KA) 76,77,76
 77   DI = D(L) - Y(K)*U
      IF (DI) 20,88,88
 76   M = M+1
      D(M) = D(L)
      GO TO 121
 88   M = M+1
      D(M) = DI
121   IN(M) = I
      JN(M) = J
      KN(M) = K
 20   CONTINUE
      N=M
      IF (N-1) 44,17,10
 44   PRINT 45
 45   FORMAT (1H1)
      DO 30 I=1,NI
      PRINT 24, I
 24   FORMAT (//H* SOURCE*I2/)
      PRINT 25, CAPM(I)
 25   FORMAT (5X, 10H CAPACITY                    F8,2/)
      PRINT 26, QM(I)
 26   FORMAT (5X, 10H OUTPUT                      F8,2/)
      IF (QM(I)) 30,30,27
 27   DO 30 J=1,NJ
      IF (SM(I,J)) 30,30,28
 28   PRINT 29, J, SM(I,J)
 29   FORMAT (7X, H* SHIPMENTS TO PROD, LOC.*I2,F10.2)
 30   CONTINUE
 46   PRINT 45
      DO 31 J=1,NJ
      PRINT 32,J
 32   FORMAT (//H* PROD.LOC.*I2/)
      PRINT 25, CAPP(J)
      PRINT 26, QP(J)
      IF (QP(J)) 31,31,33
 33   DO 31 K=1,NK
      IF (SP(J,K)) 31,31,34
 34   PRINT 35, K, SP(J,K)
 35   FORMAT (7X, H* SHIPMENTS TO MKT.*I2,F10.2)
 31   CONTINUE
```

```
47      PRINT 45
        SV=0.
        SQ=0.
        DO 36 K=1,NK
        SQ=SQ+Q(K)
        P(K) = W(K) - Y(K)*Q(K)
        SV = SV + P(K)*Q(K)
        PRINT 37, K
37      FORMAT (//H* MARKET*I2/)
        PRINT 38, Q(K)
38      FORMAT (5X, 15H SALES , TONS                  F8.2/)
36      PRINT 39, P(K)
39      FORMAT (5X, 15H PRICE PER TON                 F8.2/)
        Z=SV/SQ
        PRINT 40, SQ
40      FORMAT (////26H TOTAL SALES, ALL MARKETS     F8.2/)
        PRINT 41, Z
41      FORMAT (26H AVERAGE DELIVERED PRICE          F8.2)
        CALL SYSTEM
        END
$       DATA
```

```
C         PROGRAM NO. 6
C           NK = NUMBER OF MARKETS
C           NI,NJ = NUMBER OF SOURCES OR PROD.LOCS.
C           I,J,K = SUBSCRIPTS IDENTIFYING SOURCES, PROD. LOCS., MARKETS
C           TM= TRANSPORT COST ON MATERIALS FROM SOURCE, PER TON
C           IP = TRANSPORT COST OF PRODUCT TO MARKET, PER TON
C           AMI = TONS OF MATERIAL PER TON OF PRODUCT
C           CP = COST OF PROCESSING' PER TON (CONSTANT)
C           CAPM, CAPP = CAPACITY AT SOURCE OR PROD. LOC.
C           U = SIZE OF PRODUCT INCREMENT, IN TONS
C           A,B,W,Y = PARAMETERS OF DEMAND FUNCTION
C                 Q = A-BP   OR  P = W-YQ
C           EXM, EXP = EXTRA COST OF PRODUCING BEYOND INITIAL CAPACITY
            DIMENSION CM(10), CAPM(10), QM(10), TM(10,10), SM(10,10),
     1      CP(10), CAPP(10), QP(10), TP(10,10), SP(10,10), Q(10),W(10),
     2      Y(10), D(1000), IN(1000), JN(1000), KN(1000), A(10), B(10),
     3      P(10), EXM(10), EXP(10), CAPME(10), CAPPE(10)
C           READ DATA
            READ 1, NI, NJ, NK, U, AMI
            DO 2 I=1, NI
            READ 3, CM(I), EXM(I), CAPM(I)
     2      READ 6, (TM(I,J),J=1,NJ)
            DO 5 J=1,NJ
            READ 3, CP(J), EXP(J), CAPP(J)
     5      READ 4, (TP(J K)  K=1 NK)
            DO 7K= 1,NK
     7      READ 8, A(K), B(K)
     1      FORMAT (3  I  10,  2  F  10.2)
     3      FORMAT  (3,  F  10.2)
     4      FORMAT (5F7.2)
     6      FORMAT (10X, 5  F  6.2)
     8      FORMAT (30X, 2F 10.2)
C                 SFT OUTPUTS, SHIPMENTS, AND SALES TO ZERO
            SQ = 0.
            SV = 0.
            SQM - 0.
            CMXT = 0.
            CAPMT = 0.
            CPXT = 0.
            CAPPT = 0.
            IA = 0
            JA = 0
            DO 75 I=1,NI
            QM(I) = 0.
            CAPME(I) = CAPM(I)
            DO 75 J=1,NJ
    75      SM(I,J) = 0.
            DO 97 J=1,NJ
            QP(J) = 0.
            CAPPE(J) = CAPP(J)
            DO 97 K = 1,NK
    97      SP(J,K) = 0.
            DO 112 K = 1,NK
            Q(K) = 0.
C                 COMPUTE DEMAND PARAMETERS W AND Y
            Y(K) = 1./B(K)
```

```
112     W(K) = A(K) / B(K)
        PRINT 67
 67     FORMAT (1H1, 23X, H* ASSIGNMENT OF OUTPUT INCREMENTS*//)
        PRINT 68
 68     FORMAT (23X, H* N*, 4X, H* DMAX* 9X, H* I     J     K* /)
C             COMPUTE INITIAL MARGINS FOR ALL VALID PATHS, ASSIGN NUMBERS
        N = 0
        DO 15 I = 1,NI
        DO 15 J = 1,NJ
        DO 15 K = 1, NK
        DT =W(K)-Y(K)*(Q(K)+U) - TP(J,K) - CP(J) - AMI*(TM(I,J)+CM(I))
        IF(DT) 15,12,12
 12     N = N+1
        D(N)  = DT
        IN(N) = I
        JN(N) = J
        KN(N) = K
 15     CONTINUE
C             IDENTIFY BEST PATH
 10     DMAX = D(1)
        NMAX = 1
        DO 16 L=2,N
        IF (D(L)-DMAX) 16,16,18
 18     DMAX = D(L)
        NMAX = L
 16     CONTINUE
        M = NMAX
 17     I = IN(M)
        J = JN(M)
        K = KN(M)
        KA = K
C             PRINT NUMBER OF PATHS, BEST PATH, MARGIN
        PRINT 69, N, DMAX, I,J,K
 69     FORMAT (10X, I15, F 10.2, I 10,2 I5)
C             ASSIGN OUTPUT INCREMENT TO BEST PATH
        QM(I) = QM(I) + AMI*U
        IF (QM(I) + U*AMI - CAPME(I)) 22,22,21
 21     IA = I
 22     QP(J) = QP(J) + U
        IF (QP(J) + U - CAPP(J)) 19,19,23
 23     JA = J
 19     SM (I,J) = SM (I,J) + AMI*U
        Q(K) = Q(K) + U
        SP (J,K) = SP (J,K) + U
C             REDUCE MARGINS, ELIMINATE INVALID PATHS
        M = 0
        DO 20 L=1,N
        I=IN(L)
        J=JN(L)
        K=KN(L)
        IF (K-KA) 76,77,76
 77     DT= D(L) - Y(K)*U
        GO TO 50
 76     DI = D(L)
 50     IF (I-IA) 401,402,401
402     DT= DT -AMI*EXM(I)
401     IF (J-JA) 124,403,124
403     DT = DT-EXP(J)
124     IF (DT) 20,51,51
C             COUNT VALID PATHS, RENUMBER
```

```
51      M = M + 1
        D(M) = DT
        IN(M) = I
        JN(M) = J
        KN(M) = K
20      CONTINUE
        N=M
C            RELEASE CAPACITY CONSTRAINTS
        IF (IA) 500,500,501
501     CAPME(IA) = 100.*CAPME(IA)
        IA = 0
500     IF (JA) 502,502,503
503     CAPPE(JA) = 100. *CAPPE(JA)
        JA = 0
C            WHEN ONE PATH REMAINS, ASSIGN FINAL OUTPUT INCREMENT
502     IF (N-1) 44,17,10
C            OUTPUT ASSIGNMENTS FINISHED, PRINT RESULTS
44      PRINT 45
45      FORMAT (1H1)
        DO 30 I=1,NI
C            PRINT RESULTS FOR SOURCES AND MATERIAL SHIPMENTS
        PRINT 24, I
24      FORMAT (//H* SOURCE* I2/)
        PRINT 25, CAPM (I)
25      FORMAT (5X, 20H INITIAL CAPACITY                F 8.0)
        PRINT 26, QM (I)
26      FORMAT (5X, 20H OUTPUT                          F 8.0/)
        SQM = SQM + QM(I)
        CAPMT = CAPMT + CAPM(I)
        CMX = CAPM(I) - QM(I)
        IF (CMX) 81,82,80
80      CMXT = CMXT + CMX
        PRINT 83, CMX
83      FORMAT (7X, H* NO EXPANSION, IDLE CAPACITY IS*F4.0)
        GO TO 130
82      PRINT 84
84      FORMAT (7X, 30H INITIAL CAPACITY FULLY USED
        GO TO 130
81      PRINT 84
        GROW = -CMX
        PRINT 85, GROW
85      FORMAT (7X, H* CAPACITY EXPANSION IS*F4.0)
130     IF (QM(I)) 30,30,331
331     PRINT 86
86      FORMAT (1H0)
        DO 30 J = 1,NJ
        IF (SM(I,J)) 30,30,28
28      PRINT 29, J, SM(I,J)
29      FORMAT    (5X, H* SHIPMENTS TO P.L.* I2,F 9.0)
30      CONTINUE
        PRINT 45
        DO 31 J=1,NJ
C            PRINT RESULTS FOR PROD. LOCS. AND PRODUCT SHIPMENTS
        PRINT 32, J
32      FORMAT (//H* PRODUCTION LOCATION* I2/)
        PRINT 25, CAPP(J)
        PRINT 26, QP (J)
        SQ = SQ + QP (J)
        CAPPT = CAPPT + CAPP(J)
        CPX = CAPP(J) - QP(J)
        IF (CPX) 181,182,180
```

```
180     CPXT = CPXT + CPX
        PRINT 83, CPX
        GO TO 230
182     PRINT 84
        GO TO 230
181     PRINT 84
        GROW = -CPX
        PRINT 85, GROW
230     IF (QP(J)) 31,31,332
332     PRINT 86
        DO 31 K = 1,NK
        IF (SP(J,K)) 31,31,128
128     PRINT 129, K, SP(J,K))
129     FORMAT     (5X, H* SHIPMENTS TO MKT.* I 2, F  9.0)
 31     CONTINUE
        EXCM = CMXT + SQM
        EXCP = CPXT + SQ
        POO = EXCM / AMI
        PRINT 45
        DO 36 K =1,NK
        P(K) = W(K) -Y(K)* Q(K)
        SV = SV + P(K) *Q(K)
C             PRINT RESULTS FOR SALES AND DELIVERED PRICES
        PRINT 37, K
 37     FORMAT (//// 15X, H* MARKETS* I2/)
        PRINT 38, Q(K)
 38     FORMAT(20X, 15H SALES, TONS                    F 8.0)
 36     PRINT 39, P(K)
 39     FORMAT(20X, 15H PRICE PER TON                  F 8.2//)
        7 = SV/SQ
C       PRINT SYSTEM RESULTS
        PRINT 150
150     FORMAT (1H1 10X, H* TOTALS  FOR SYSTEM*///)
        PRINT 151
151     FORMAT (15X, 25H SOURCE CAPACITY               )
        PRINT 158, CAPMT
158     FORMAT (16X, 24H INITIAL                       F 6.0)
        PRINT 159, EXCM
159     FORMAT  (16X, 24H EXPANDED                     F 6.0)
        PRINT 160, POO
160     FORMAT (23X, H* (ENOUGH FOR* F 4.0, H* TONS OF PRODUCT)*/)
        PRINT 152, SQM
152     FORMAT (15X, 25H SOURCE OUTPUT                 F 6.0/)
        PRINT 153, CMXT
153     FORMAT (15X, 25H CAPACITY UNUSED               F 6.0/////)
        PRINT 154
154     FORMAT (15X, 25H PROCESSING CAPACITY           )
        PRINT 158, CAPPT
        PRINT 159, EXCP
        PRINT 155, SQ
155     FORMAT(/15X, 25H PROCESSING OUTPUT             F 6.0/)
        PRINT 153, CPXT
        PRINT 156, SQ
156     FORMAT (15X, 25H TOTAL SALES                   F 6.0/)
        PRINT 157, Z
157     FORMAT (15X; 23H AVE. DEL. PRICE               F 8.2)
              CALCULATION OF TOTAL COSTS AND RENTS
        COST = 0.
        DO 170 I = 1,NI
        COST = COST + CM(I) * QM(I)
```

```
      IF (QM(I)-CAPM(I)) 172,172,171
 171  COST = COST + EXM(I)*(QM(I)-CAPM(I))
 172  DO 170 J = 1,NJ
 170  COST = COST + TM(I,J)*SM(I,J)
      DO 173 J = 1,NJ
      COST = COST + CP(J)*QP(J)
      IF (QP(J)-CAPP(J)) 175,175,174
 174  COST = COST + EXP(J)*(QP(J)-CAPP(J))
 175  DO 173 K = 1,NK
 173  COST = COST + TP(J,K)*SP(J,K)
      RENT = SV - COST
      RENTP = 100.*RENT/SV
      PRINT 46, SV
      PRINT 47, COST
      PRINT 48, RENT
      PRINT 49, RENTP
  46  FORMAT (/////20H VALUE OF OUTPUT          F 8.2)
  47  FORMAT (/20H TOTAL COST               F 8.2)
  48  FORMAT (/20H RENT                     F 8.2)
  49  FORMAT (3X, H* (*, F 4.1, H* PERCENT OF OUTPUT VALUE)*)
      CALL SYSTEM
      END
$          DATA
```

```
C         PROGRAM NO. 7
C         MU = 15
C         CAL = MINIMUM ASSEMBLY COSTS OF MATERIALS, PER TON OF PRODUCT
C         TP = TRANSPORT COST OF PRODUCT TO MARKET, PER TON
C         A,B = PARAMETERS OF DEMAND FUNCTION AT MARKETS
C              (SALES = A - B*DEL. PRICE)
C         MU = SCALE INTERVAL IN PROCESSING COST FUNCTION
C         C = COST OF PROCESSING, PER TON (A FUNCTION OF OUTPUT)
          DIMENSION CAL(8), TP(8,10), A(10), B(10), C(9), CP(8), CALT(8,10),
     1    CD(8,10), CDL(10), JN(10), Q(10,8), V(10,8), SQ(8), SV(8), Z(8),
     2    P(8,8), MN(8,9), NO(10)
          READ 3, CAL
     3    FORMAT (10X, 8 F 6.2)
          DO 700 J=1,8
   700    READ 209, (TP(J,K), K=1,10)
   209    FORMAT (10F7.2)
          DO 205 K=1,10
   205    READ 204, A(K), B(K)
   204    FORMAT (30X, 2F10.2)
          READ 7 ,MU
     7    FORMAT (I10)
          READ 6, (C(M), M=1,9)
     6    FORMAT (10X, 9F5.1)
          DO 54 J=1.8
          DO 54 K=1,10
    54    CALT(J,K)=CAL(J)+TP(J,K)
          DO 305 N = 1,10
   305    NO(N) = N
          PRINT 60, NO
    60    FORMAT (30H1 MARKET NO.                    10 I 5//)
          DO 98 N=1,8
          SQ(N) = 0.
          SV(N) = 0.
          DO 53 J=1,8
          IF (N-2) 76,53,53
    76    CP(J) = C(3)
    53    P(J,N) = 0.
          DO 40 K = 1,10
          CD(1,K) = CALT(1,K) + CP(1)
          CDL(K) = CD(1,K)
          JN(K) = 1
          DO 31 J=2,8
          CD(J,K) = CALT(J,K) + CP(J)
          IF (CD(J,K) - CDL(K) ) 32, 92, 31
    92    PRINT 93
    93    FORMAT (H* TIE AT 92*)
          GO TO 999
    32    CDL(K) = CD(J,K)
          JN(K) = J
    31    CONTINUE
          Q(K,N) = A(K) - B(K)*CDL(K)
          V(K,N) = Q(K,N)*CDL(K)
          SQ(N) = SQ(N) + Q(K,N)
    40    SV(N) = SV(N) + V(K,N)
          Z(N) = SV(N)/SQ(N)
```

```
        PRINT 61, N, (JN(K), K=1,10)
  61    FORMAT (I5, 5X, 20H SERVED BY P.L.                10 I5/)
        DO 41 K=1,10
        J = JN(K)
  41    P(J,N) = P(J,N) + Q(K,N)
        DO 9 J=1,8
        NQ = P(J,N)
        MPN = NQ/MU    +1
        IF (MPN-9) 19,19,10
  10    MN(J,N) = 8
        CP(J) = C(9)
        GO TO 9
  19    MN(J,N) = MPN
        M = MN(J,N)
        CP(J) = C(M)
   9    CONTINUE
        IF (N-2) 98,71,71
  71    DO 55 J=1,8
        IF (MN(J,N)-MN(J,N-1))98,55,98
  55    CONTINUE
  96    IS = 1
        GO TO 73
  98    CONTINUE
        IS = 2
  73    L=N
        PRINT  100
 100    FORMAT (H*1 OUTPUTS AT PROCESSING LOCATIONS*///)
        PRINT 101, (NO(N), N = 1,8)
 101    FORMAT (10X, 8 I8, H*          TOTAL                   AVE.DEL.PRICE*/)
        DO 81 N = 1, L
  81    PRINT 103, N, (P(J,N),J=1,8), SQ(N), Z(N)
 103    FORMAT (H*   ROUND*  I3, 8F8.2,  2F12.2/)
        GO TO (149, 151), IS
 149    PRINT 150
 150    FORMAT (H* FINAL ROW IS EQUILIBRIUM SOLUTION*)
        GO TO 200
 152    PRINT 152
 152    FORMAT (H* EQUILIBRIUM NOT REACHED, MORE ITERATION NEEDED*)
 200    PRINT 202
 202    FORMAT (H*1 SALES AT MARKETS*///)
        PRINT 201, (NO(N), N=1,10)
 201    FORMAT (10X, 10 I8, H*           TOTAL*/)
        DO 82   N = 1,L
  82    PRINT 203, N, (Q(K,N), K=1, 10), SQ(N)
 203    FORMAT (H*   ROUND*   I3,  10F8.2, F12.2/)
        GO TO (249,251), IS
 249    PRINT 150
        GO TO 999
 251    PRINT 152
 999    CALL SYSTEM
        END
$       DATA
```

PROGRAM NO. 8

```
C       NMAT = NUMBER OF MATERIALS (MAX. 9)
C       NI = NUMBER OF SOURCES OF A SPECIFIED MATERIAL (MAX.20)
C       NJ = NUMBER OF PRODUCTION LOCATIONS (MAX. 20)
C       NK = NUMBER OF MARKETS (MAX. 20)
C       OM, AM = ORDINATE AND ABSCISSA OF SOURCE LOCATION
C       OJ, AJ = SAME FOR PRODUCTION LOCATION
C       OK, AK = SAME FOR MARKET
C       CM = COST OF MATERIAL AT SOURCE
C       CP = UNIT PROCESSING COST
C       A, B = PARAMETERS OF DEMAND CURVE (Q = A - BP)
C       TERM, TERP = UNIT TERMINAL COST ON SHIPMENTS OF MATERIALS AND PRODUCTS
C       TLM, TLP = UNIT LINE-HAUL COST ON SHIPMENTS OF MATERIALS AND PRODUCTS
C       COI = INPUT COEFFICIENT (MATERIAL PER UNIT OF PRODUCT)
C       QM = MATERIALS OUTPUT AT A SOURCE
C       QP = PRODUCTION LEVEL AT A PRODUCTION LOCATION
C       Q = SALES IN A MARKET
C       QUO = INITIAL OUTPUT AT LOC. 1
C       ADD = INCREMENT TO OUTPUT AT LOC. 1
C       COST = COST OF PRODUCTION AT LOC. 1
C       CRIT = LEVEL OF COST AT LOC. 1 WHICH JUST CAPTURES AN ADDITIONAL MARKET
C       L = ORDINAL NUMBER OF MARKET CAPTURE BY LOC. 1
C       KCAP = MARKET CAPTURED BY LOC. 1
C       JDISP = PROD. LOC. SUPPLANTED IN MARKET CAPTURED BY LOC. 1
C       JSH = PROD. LOC. WITH WHICH LOC. 1 SHARES A MARKET
C       QMIN(L) = OUTPUT AT LOC. 1 WHEN ITS COST IS AT CRIT(L),
C            BEFORE CAPTURE OF KCAP(L)
C       QMAX(L) = OUTPUT AT LOC. 1 WHEN ITS COST IS AT CRIT(L),
C            AFTER CAPTURE OF KCAP(L)
C       SPLIT(K) = 1  INDICATES THAT MARKET (K) IS SHARED BETWEEN LOC. 1
C            AND ANOTHER PROD. LOC. (JSH)
C       SHARE = SALES OF LOC. 1 IN A MARKET SHARED WITH ANOTHER PROD. LOC.
C       SQ = TOTAL OUTPUT IN THE SYSTEM
C       SV = TOTAL VALUE OF PRODUCT AT MARKETS
C       ST = TOTAL TRANSPORT COSTS IN THE SYSTEM
        DIMENSION NI(9), COI(9), TERM (9), TLM (9), QM (9,20),
     1  CM (9,20), OM (9,20), AM (9,20), OJ (20), AJ(20), OK(20),
     2  AK(20), A(20), B(20), TM(9,20,20), TP(20,20), QP(20),
     3  NOM(9,20), CAL(20), CD(20,20), CDL(20), CP(20), NOJ (20),
     4  Q(20), SP(20,20), SM (9,20,20), NEJ(20), CDS (20),
     5  Y(20), CRIT(20), KCAP(20), JDISP(20), QMIN(21), QMAX(20),
     6       SLOPE(20), SPLIT(20), SHARE(20), PROD(4)
C
C       READ DATA
   97   READ 98, IND , USQ
        READ 1, NMAT, NJ, NK, TERP, TLP
        READ 2, (NI(M), M=1,NMAT)
        DO   6 M = 1,NMAT
```

```
 6     READ 3, COI(M), TERM(M), TLM(M)
       DO 7: M = 1,NMAT
       NIM = NI(M)
       DO 7 I = 1,NIM
       QM (M,I) =0.
 7     READ 4, CM(M,I), OM (M,I), AM (M,I)
       NJ1 = NJ
       DO 8 J = 1, NJ1
 8     READ 4, CP(J), OJ(J), AJ(J)
       DO 9 K = 1,NK
 9     READ 5, A(K), B(K), OK(K), AK(K)
       READ 14, PROD (1), PROD (2)
 1     FORMAT (3 I 10, 2 F 10.2)
 2     FORMAT (9 I 10)
 3     FORMAT (3 F 10.2)
 4     FORMAT (F 10.2, 2 F 10.0)
 5     FORMAT (4 F 10.0)
14     FORMAT (2 F 10.0)
98     FORMAT (I 10, F 10.0)
       NRPT = 0
C
C COMPUTE MATERIALS TRANSPORT COSTS
       DO 22 J = 1,NJ1
       DO 10 M = 1,NMAT
       NIM = NI(M)
       DO 10 I = 1,NIM
       SM (M, I, J) = 0.
       IF (AM(M,I) - AJ(J)) 11, 12,11
12     IF (OM(M,I) - OJ(J)) 11, 13,11
13     TM (M,I,J) = 0.
       GO TO 10
11     TM (M,I,J) = TERM(M) + TLM(M)*SQRTF((AM(M,I) - AJ(J))**2.
       1 + (OM(M, I) - OJ(J))**2.)
10     CONTINUE
C
C      COMPUTE PRODUCT TRANSPORT COSTS
       DO 22 K = 1,NK
       IF (AK(K) - AJ(J)) 23,24,23
24     IF (OK(K) - OJ(J)) 23,25,23
25     TP(J,K) = 0.
       GO TO 22
23     TP(J,K) = TERP+TLP*SQRTF((AK(K)-AJ(J))**2.+(OK(K)-OJ(J))**2.)
22     CONTINUE
C
C      FIND SMALLEST ASSEMBLY COST FOR EACH PRODUCTION LOCATION
       DO 101 J = 1,NJ1
       CAL(J) = 0.
       DO 101 M = 1,NMAT
       CAML = CM(M,1) + TM (M,1,J)
       NOM (M,J) = 1
       NIM = NI(M)
       DO 15 I=2,NIM
       IF (CM(M,I) + TM (M,I,J) - CAML) 16,15,15
16     CAML = CM(M,I) + TM(M,I,J)
       NOM (M,J) = I
15     CONTINUE
101    CAL(J) = CAL(J) + COI(M)* CAML
```

```
      DO 108 K = 1,NK
      ODS(K) = CAL(2) + CP(2) + TP(2,K)
      NEJ(K) = 2
      DO 108 J = 3,NJ
      OD(J,K) = CAL(J) + CP(J) + TP(J,K)
      IF (CD(J,K) - CDS(K)) 100,108,108
 110  CDS(k) = CD(J,K)
      NEJ(K) = J
 108  CONTINUE
C
C     ADJUST DEMAND PARAMETERS TO MAKE SQ = USQ
      SQ = 0.
      DO 91 K = 1,NK
  91  SQ = SQ + A(K) - B(K)*CDS(K)
      R = USQ/SQ
      PRINT 90, IND
      PRINT 92
  92  FORMAT (8X, H* K* 4X, H* PRICE* 4X, H* OLD A* 3X, H* ADJ. A*
     1   6X,  H* OLD B* 3X, H* ADJ. B*//)
      DO 93 K = 1, NK
      RA = R*A(K)
      RB = R*B(K)
      PRINT 94, K, CDS(K), A(K), RA, B(K), RB
  94  FORMAT (I, 10, F 10.2, 2   F 10.0, F 12.2, F 10.2/)
      A(K) = RA
  93  B(K) = RB
C
C     DETERMINE LOC. 1 COST FOR SUCCESSIVE MARKET CAPTURES
 112  DO 114 K = 1, NK
      CDL(K) = CDS(K)
      NOJ(K) = NEJ(K)
 114  Y(K) = CDL(K) - CAL(1) - TP (1,K)
      DO 115 K = 1,NK
      L = 1
      DO 116 N = 1,NK
      IF (K-N) 118,116,118
 118  IF (Y(K) - Y(N)) 122,120,116
 120  PRINT 124, K, N
 124  FORMAT (1HO, H* PRICE EQUAL AT MARKETS*  I3, H* AND* I3)
 122  L = L + 1
 116  CONTINUE
      CRIT(L) = Y(K)
      KCAP(L) = K
 115  JDISP(L) = NOJ(K)
      QMIN (1) = 0.
      K = KCAP(1)
      QMAX(1) = A(K) - B(K)*CDL(K)
      SLOPE(1) = B(K)
      DO 132 L = 2,NK
      QMIN(L) = 0.
      K = KCAP(L)
      QINC      = A(K)  -  B(K)*CDL(K)
      SLOPE (L) = SLOPE(L-1) + B(K)
      LM = L - 1
      DO 136 NL = 1,LM
      K = KCAP(NL)
 136  QMIN(L) = QMIN (L) + A(K) - B)K)*(CRIT(L) + CAL(1) + TP(1,K))
```

```
  132   QMAX(L) = QMIN(L) + QINC
        PRINT 90, IND
   90   FORMAT (1H1, H* S.I.C.* I3)
        IF (NRPT) 30,30,32
   30   PRINT 34
   34   FORMAT    (H* LOC. 1 IS YOUGHIOGHENY*///)
        QUO = PROD(1)
        ADD = PROD(2)
        GO TO 40
   32   PRINT 36
   36   FORMAT    (H* LOC. 1 IS UPPER LICKING*///)
        QUO = PROD(3)
        ADD = PROD(4)
   40   PRINT 410
  410   FORMAT (8X, H* L* 5X, H* CRIT* 4X, H* JDISP* 5X, H* KCAP*
    1      10X, H* QMIN* 10X, H* QMAX* 9X, H* SLOPE* ///)
        DO 400 L = 1,NK
  400   PRINT 401, L, CRIT(L), JDISP(L), KCAP(L), QMIN(L),
    1   QMAX (L), SLOPE(L)
  401   FORMAT (I 10, F 10.2, 2 I 10, 3 F 15.0/)
        NTIM = 0
C
C       SYSTEM SOLUTION FOR SPECIFIED LOC. 1 OUTPUT
  402   SQ = 0.
        SV = 0.
        DO 141 J = 1,NJ
  141   QP(J) = 0.
        DO 143 K = 1,NK
  143   SPLIT(K) = 0.
        DO 140 L = 1,NK
        K = KCAP(L)
        QMIN(NK+1) = QUO + 1.
        IF (QUO - QMIN(L)) 999,142,144
  142   COST = CRIT(L)
        GO TO 160
  144   IF (QUO - QMAX(L)) 146, 148, 150
  146   COST  = CRIT(L)
        SPLIT (K) = 1.
        SHARE (K) = QUO - QMIN(L)
        JSH = JDISP(L)
        SP(JSH,K) = QMAX(L) - QUO
        GO TO 160
  148   NOJ(K) = 1
        COST = CRIT(L)
        GO TO 160
  150   NOJ(K) = 1
        IF(QUO - QMIN(L+1)) 152,140,140
  152   COST = CRIT(L) - (QUO - QMAX(L))/SLOPE(1)
        GO TO 160
  140   CONTINUE
  160   DO 175 K = 1,NK
        IF (N8J(K)-1) 202,201,202
  201   CDL(K) = COST + CAL (1) + TP (1,K)
        GO TO 206
  202   IF (SPLIT(K)) 206,206,204
  204   CDL(K) = COST + CAL(1) + TP(1,K)
        Q(K) = A(K) - B(K)*CDL(K)
```

```
      SP(1,K) = SHARE(K)
      QP(1) = QP(1) + SP(1,K)
      QP(JSH) = QP(JSH) + SP(JSH,K)
      GO TO 174
206   J = NOJ(K)
      SP (J,K) = A(K) - B(K)*CDL(K)
      QP(J) = QP(J) + SP(J,K)
      Q(K) = SP(J,K)
174   SQ = SQ + Q(K)
175   SV = SV + Q(K)*CDL(K)
C
C     COMPUTE TOTAL TRANSPORT COSTS
      TMT = 0.
      DO 232 J = 1,NJ
      IF (QP(J)) 232,232,234
234   DO 232 M = 1,NMAT
      I = NOM(M,J)
      TMT = TMT + COI(M)*QP(J)*TM(M,I,J)
232   CONTINUE
      TPT = 0.
      DO 236 K = 1,NK
      IF (SPLIT(K)) 238,238,240
238   J = NOJ(K)
      TPT = TPT + SP(J,K)*TP(J,K)
      GO TO 236
240   TPT = TPT + SHARE(K)*TP(1,K) + SP(JSH,K)*TP(JSH,K)
236   CONTINUE
      ST = TMT + TPT
C
C     PRINT RESULTS
      PRINT 90, IND
      IF (NRPT) 229,229,231
229   PRINT 34
      GO TO 237
231   PRINT 36
237   PRINT 244, QUO
244   FORMAT (/H* OUTPUT AT LOC. 1* F 10.0)
      PRINT 242, COST
242   FORMAT (H* COST AT LOC. 1* F 12.2 / /)
      PRINT 420
420   FORMAT (8X, H* K* 8X, H* Q*/)
      DO 260 K = 1,NK
260   PRINT 208, K, Q(K)
208   FORMAT (I 1O,   F10.0)
      PRINT 213
213   FORMAT (1HO/)
      PRINT 430
430   FORMAT (8X, H* J* 7X, H* QP*/)
      DO 226 J = 1, NJ
226   PRINT 228, J, QP(J)
228   FORMAT (I 10, F 10.0)
      PRINT 90, IND
      IF (NRPT) 239,239,249
239   PRINT 34
      GO TO 259
249   PRINT 36
259   KSPL = 0
```

```
      DO 214 K = 1,NK
      IF (SPLIT(K)) 216,216,218
  216 PRINT 220, K, NOJ(K)
  220 FORMAT (H* MARKET* I3, H* SERVED BY LOC.* I3/)
      GO TO 214
  218 PRINT 222, K, JSH
  222 FORMAT (H* MARKET* I3, H* SHARED BY LOCS. 1 AND* I3)
      PRINT 224, SHARE(K), SP(JSH,K)
  224 FORMAT (3X, H* SHARES ARE* F 9.0, H* AND* F 9.0/)
      KSPL = 1
  214 CONTINUE
      IF (KSPL) 44,44,42
   44 PRINT 46
   46 FORMAT (3X, H* NO MARKETS ARE SHARED*)
   42 PRINT 213
      PRINT 209, SQ, USQ
  209 FORMAT (7X, H* SQ* F 15.0,15X, H* U.S. CONTROL TOTAL IS* F 15.0/)
      PRINT 210, SV
  210 FORMAT  (7X, H* SV* F 15.0/)
      PRINT 211, ST
  211 FORMAT  (7X, H* ST* F 15.0)
C
C    REPEAT FOR INCREASED LOC. 1 OUTPUT
      IF (NTIM) 230, 230, 1000
  230 NTIM = 1
      QUO = QUO + ADD
      GO TO 402
  999 GO TO 1000
 1000 CALL SYSTEM
      END
```

APPENDIX D

Economic Base and Input-Output Models and Their Role in Regional Analysis

Economic base models are an outgrowth of studies in the structure of cities which took place in the 1920's and 30's.[1] The starting point of economic base analysis is the partitioning of an area's total activity into exogenous or endogenous sectors. The exogenous sector is considered to be composed of those firms whose activities are directed towards markets outside the local area while the endogenous sector consists of those firms catering to markets within the studies locality.

The major premise of the base multiplier approach is that the growth of an area depends upon those activities in which goods and services produced locally are sold outside the region. Further, these basic activities provide not only the means of payment for imported materials and services which cannot be produced locally, but also the income originating in basic activities is assumed to determine, in large measure, the activity level of the locally oriented or nonbasic sectors.

Symbolically the economic base model takes the following form:

(1) $A_T = A_E + A_X$

(2) $A_E = F\ (A_X)$ where A_T, A_E, and A_X refer to the level of total, endogenous, and exogenous activities respectively.

Implicitly economic base theory defines the function of an area to be the production of goods and services for the purpose of trade with other communities. Local activities are considered to be secondary, existing only

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[1] For a description of the historical development of the concept see Richard B. Andrews, "Mechanics of the Urban Economic Base: Historical Development of the Base Concept," Land Economics, Vol. 39, (May, 1953), pp. 161-167, and John A. Alexander, "The Basic-Nonbasic Concept of Urban Economic Functions," Economic Geography, Vol. 30, (July, 1954), pp. 246-61.

to serve the needs of those engaged in export activities. Moreover, the activity level of the local sector is assumed to be dependent on the export sector, fluctuating only in response to change in the export or basic sector. Consequently, any change in the export or basic sector induces a further change in the nonbasic local sector; the result being a change in the level of all activities, that is a multiple of the initial change in the export sector. As the major limitations of the base multiplier model have been discussed elsewhere, they need not be restated here.[2] However, it should be recognized that the basic-nonbasic formulation indicates only direct exports: direct in the sense that their estimation is based solely on the ultimate flow of commodities out of the area. Consequently, indirect exports or locally produced goods sold to other producers within the area for further processing before being shipped out of the area are ignored. Thus, the magnitude of the base multipliers are dependent on the degree of vertical integration within the area.[3] Further, by not giving explicit consideration to indirect exports, the implication is that interindustry impacts are identically proportionate to the change in exports regardless of the industrial source of expansion. Certainly it does not appear realistic to assume that

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[2] Hans Blumenfeld, "The Economic Baseof the Metropolis," Journal of the American Institute of Planners, (Fall, 1955), pp. 114-132. For a comprehensive discussion and evaluation of various techniques employed in the determination of basic and nonbasic sectors see Federal Reserve Bank of Kansas City, "The Export-Local Employment Relationship in Metropolitan Areas," Monthly Review, Vol. 45, (March, 1960), pp. 1-8. Charles L. Leven, "Measuring the Economic Base," Papers and Proceedings of the Regional Science Association, Vol. 2 (1956), pp. 250-58. J. N. Mattila and W. R. Thompson, "Measurement of the Economic Base," Land Economics, (Summer, 1954), pp. 215-28.

[3] For a thorough discussion of this point see, Charles L. Leven, "An Appropriate Unit for Measuring the Urban Economic Base," Land Economics, Vol. 30 (November, 1954), pp. 369-71.

in New England, for example, the local availability of intermediate products to the textile industry is equal to that of the insurance sector.

Basically, these shortcomings of the economic base multipliers are the result of its preoccupation with the spatial identification of final sales while neglecting the locational characteristics of input purchases by local producers. Within the regional framework, the importance of a precise description of export and import relations is twofold. First, from the perspective of the region's producers, exports represent the sales of products to ultimate consumers. As such they are considered along with other final demands as determinates of the region's aggregate level of activity. Conversely, a region's purchase of other region's produce may take the form of either intermediate or final products. Second, as intermediate products, imports represent the direct purchases of goods and services by the region's producers for further processing. As final products, imports represent shipments of other region's produce directly to local demanders for consumption purposes.

Thus it is that in the "foreign" sector, exports act as a stimulus to the region's activities by increasing the level of final demand. However, imports have an opposite effect: domestic purchases of foreign factor inputs while supplementing local supplies reduce the interindustry component of local purchases while the direct import of products by consumers reduce the level of local final demand.

Since the relations between outputs (sales), inputs, and product purchases vary according to industries as well as regions, any analysis of them must be related to specific goods and services rather than to measurable aggregates.

Moreover, since delineation of industrial and spatial interaction is the prime feature of the multiplier approach, each industry must be considered in relation to all others.

Hence, it is no longer sufficient to know the total value of a region's imports or exports. Rather, an indication of the extent to which foreign sector activity affects and is affected by the production of each industry of any region can be obtained through the identification of imports and exports in terms of the regions and industries from which they are purchased and to which they are sold.

Interindustry or input-output models provide a comprehensive description of the relations of producers with producers and producers with ultimate consumers or final demands. By stressing the interindustry relations they provide a framework within which both the direct and indirect contribution of each industry to the area's exports can be evaluated. In addition, the exogenous sector can be, and usually is, defined so as to include ultimate sales on final demand account to consumers, investors and government in addition to exports. By so doing, input-output analysis is capable of evaluating the impacts of changes that occur through shifts in consumer preferences, technological change, or the introduction of new productive processes.

The input-output or interindustry model essentially is a method of social accounting. Like other accounting models its primary objective is to define some segment of economic activity in an operationally meaningful fashion. Conceptually, input-output analysis views the economy as being comprised of a number of productive sectors or industries each having a linear homogeneous production function. The basic construct of the model is the transactions table which records for each industry that part of its output which is delivered as intermediate products to all industries including itself. That amount of output not delivered to producing industries is sold to ultimate consumers, e.g., household, exports, government, investment, on final demand account. In this manner, total current productive activity of an economy is viewed as a set of transactions which can be arranged in a matrix. Each row of the matrix shows the sales of one industry to all other industries, including itself, and to final demand. Conversely, each column of the matrix gives the amount of each industry's output required by the industry associated with that column to produce its current volume of output.[4] Basically, it tells the reader the amount of each industry's output that is required directly and indirectly to maintain the current level of production in the study area.

Input-output analysis focuses on the interindustry relations as depicted by the sales and purchases of outputs as intermediate products. This being the case, it is possible to trace not only the direct impact communicated to each industry by a change in some element of final demand, but also those indirect impacts which arise out of the change in the purchases of intermediate products required by each industry as it adjusts to the initial change. Consequently, unlike the economic base model, input-output analysis concentrates on the interrelations of industries within and among regions. In addition, the recognition and delimitation of exogenous sectors in addition to exports provides a scheme within which the relative importance of the various income determining activities can be evaluated.

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[4] For a complete description of the theoretical foundation of input-output analysis see: Hollis Chenery and Paul G. Clark, Interindustry Economics (New York: John Wiley and Sons, Inc., 1959); Wassily Leontief, Input-Output Economics (New York: Oxford University Press, 1965); Robert Dorfman, "The Nature and Significance of Input-Output," Review of Economics and Statistics, Vol. 36 (May, 1954), pp. 121-33; Carl F. Christ, "A Review of Input-Output Analysis," in

There has been a good deal of discussion about the limitations and problems of regional input-output analysis and there appears little need to repeat it here.[5] However, it is salient to point out a particular limitation of empirical input-output analysis. Strangely enough, this turns out to be similar to the economic base model's neglect of indirect exports. Almost universally, the indirect exports of any economy are defined to be those which result from interindustry relations which are encompassed wholly within the study area.[6]

This assumes that extra regional effects, the effects that a region has on itself via other regions, are zero. What this implies is that either local purchases from producers outside the study area do not affect the latter's purchase from producers in the study area or that foreign purchases of local produces do not affect local producers' purchases of the former's produce.

Consequently, neither the economic base nor input-output models provide a framework for a comprehensive multiplier analysis. This limitation is

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Input-Output Analysis: An Appraisal (Vol. 18 of Studies in Income and Wealth, National Bureau of Economic Research, Princeton: Princeton University Press, New Jersey, 1955); William H. Miernyk, The Elements of Input-Output Analysis (New York: Random House, 1965).

[5] Charles M. Tiebout, "Regional and Interregional Input-Output Models: An Appraisal," Southern Economic Journal, Vol. 24 (October, 1957), p. 140. Miernyk, op. cit., Walter Isard, et. al., Methods of Regional Analysis, (New York: John Wiley, 1960), Ch. 7, pp. 232-308.

[6] W. Lee Hansen and Charles M. Tiebout, "An Intersectoral Flows Analysis of the California Economy," The Review of Economics and Statistics, Vol. 45, No. 4., (November, 1963), pp. 409-18.

effective regardless of the particular problems of empirical implementation. Rather, it is the natural result of the specific geographic orientation of such models which ignores the extra regional effects that an exogenous change may have on an area's activities.

Certainly, it would be expected that the magnitude of extra region and feedback effects would diminish as the distance between regions increases. However, the nature of resource endowment, historical development and location theory considerations indicate rather than preclude the possibilities of strong, albeit indirect, interindustry ties between widely separated regions. Note Bourque and Tiebout's observations of the indirect relation of the pulp industry in Washington with the auto industry in Michigan via the synthetic fibre (rayon) industry in the east.[7] Interregional transmission and feedback effects are inherent elements in the analysis of regional interdependence. Their neglect will result in an understatement of an area's sensitivity to such change. A comprehensive evaluation of the total impacts of an exogenous change would require a model that incorporates not only the industrial interrelations within the studied area but also those of the studied area with its supply and sales market areas.

Theoretically, the exhaustive specification of regional and interregional transactions within the interindustry or input-output framework requires that each commodity flow be identified by industry and region of origin as

[7] Phillip J. Bourque and Charles M. Tiebout, "An Empirical Regional Input-Output Projection Model: Washington, 1980." (Unpublished memo, University of Washington, Seattle, Washington, 1967).

well as destination.[8] That is, the total transactions of a region are to be presented in a form which, for each industry, those transactions taking place wholly within the region are differentiated from those that are between regions. Moreover, interregional flows are identified as being on either interindustry or final demand account. Likewise, intraregional flows are similarly identified as being directed towards producers or ultimate consumers.

Ideally, for a complete interregional description of imports and exports the following information would be required:

1. On final demand account, the amount of each industry's output in each region delivered to ultimate consumers (by type of consumer) in each region.
2. On interindustry account, the amount of output from each industry in each region delivered to each industry in each region for further processing.

This implies that each transaction must be identified by region and industry of production and region and industry of purchase. Informaticn in this detail is not readily available from secondary data sources. In fact, at present, it can be obtained only by direct field surveys. However, given the high cost of direct field investigation, the collection of original information generally cannot be considered as a realistic prospect. As a practical alternative, what has been proposed is the separation of intersector transactions into a set of (1) production requirements and (2) trade requirements. In this fashion, the economy can then be depicted as a set of regional input-output tables connected to each other by a set of interregional commodity flows.

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[8] Walter Isard, "Regional and Interregional Input-Output Analysis: A Model of a Space Economy," The Review of Economics and Statistics, Vol. 33, (November, 1951), pp. 318-328.

At the practical level, there still remains the problem of obtaining empirical counterparts to these conceptual constructs. As the problems of regional input-output coefficients estimation have been discussed elsewhere they need not be pursued here.[9] What is relevant, at this point, is the manner in which regional exports and imports are described within the interindustry or input-output framework. Two basic approaches have been proposed for this purpose. The first is the Moses' fixed trading patterns model.[10]

Within the Moses framework, the base year description of exports and imports depends on actual observation of interregional commodity flows. Having obtained this data for the regional system of interest, it can be used to derive trade coefficients. The nature and form of these coefficients are similar to the more familiar technical coefficients of the input-output table. Their function in the interregional input-output schema is to provide a description of regional commodity exports and imports.

In order to relate interregional flows to the level of activity of each sector in the receiving region, it is assumed that commodity trading patterns are uniform for all sectors in a region. This implies that the shipments of any commodity to a region from all regions including itself form a supply pool from which each sector in the region draws its requirements.[11]

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[9] See Footnote 5 supra.

[10] Leon N. Moses, "The Stability of Interregional Trading Patterns and Input-Output Analysis," The American Economic Review, Vol. 45, (December, 1955), pp. 803-32.

[11] Hollis Chenery, "Regional Analysis," in The Structure and Growth of the Italian Economy, (Rome, U. S. Mutual Security Agency, 1953).

Essentially, the implication is that in each receiving region the interest of consumers is in commodity purchases and their market prices are not in the location of commodity production, per se. It also assumes an absence of delivered differentiation based on distance of supplier.

The imports of each region's industries are described on a proportionate basis. That is for each industry in each region a given and constant proportion of each input is drawn from outside the region. These import requirements are supplied by each export region on the basis of their percentage contribution to the region's total receipts of the commodity in the original or base observation year.

The question of the appropriateness of this method of import-export description essentially is a question of the underlying assumptions of the model. Consistent description of the interregional flows which would take place at different times or under varying levels of activities requires assuming that the interregional trade coefficients be stable over time. Stability of trade coefficients would be achieved under conditions of constant cost.[12] This condition would be satisfied if "(1) There is excess capacity in the transport network between every pair of regions. (2) Each industry in each region has excess capacity. (3) There is a pool of unemployed labor in each region."[13] These characteristics are, of course, those of a less than full employment economy.

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[12] Moses, op. cit., p. 810.

[13] Ibid., p. 812.

The second or multiregion model of export and import description was designed as "a rough and ready working tool capable of making effective use of the limited amount of actual information with which...economists have to work."[14] The flow of commodities between regions are described as being proportional to the total consumption and total production in the respective regions divided by total production of the commodity in all regions. The element of proportionality is a parameter which reflects various factors, including transfer cost, which affect interregional trade.

The transfer cost parameter may be determined either from base year interregional trade information or from independent estimates of transfer cost. In the case of the first alternative, the data requirements are identical to those of the fixed trading patterns formulation discussed above. That is, for each commodity, it is required that regional source and destination be known for all interregional flows. However, if this information is not available, then special surveys, distance or cost information may be used to estimate the transfer cost parameter. This data along with estimates of regional consumption and production and of total production may be used to predict the value of interregional commodity flows.

Unlike the Moses model, interregional shipments are not limited to proportional changes. Variations in relative costs of production and transportation may cause the pattern of interregional shipments to vary over

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[14] Wassily Leontief in collaboration with Alan Strout, "Multiregional Input-Output Analysis," in Structural Interdependence and Economic Development, Tibor Barna (ed.), (New York: St. Martin's Press, Inc., 1963), Ch. 7.

time. Such change can be integrated into the model if the change in interregional flows can be directly observed or if outside information on transport cost is available.

Both the Moses' fixed trading patterns and multiregional models are designed to provide a description of interregional commodity flows under varying conditions and during different periods. Relatively, the merits of either depends on the accuracy of import-export descriptions obtained from them and the availability of the data required to implement each model.

Evaluating the relative accuracy of the two methods in their descriptions of regional imports and exports is somewhat difficult due to the limited number of available analytical studies. With respect to the interregional model, an examination of the interstate flows of five broadly defined commodity groups over three years indicated only that trade coefficients "have exhibited sufficient stability to warrant their being subjected to further statistical evaluation."[15] For a limited range of commodities--fruits and vegetables, a comparative study of the descriptive power of the interregional and multiregional models indicated a slightly higher degree of accuracy for the latter. However, recognizing the narrow base upon which the test had been applied, the analyst called for additional testing as a means of determining the merits of the alternative models.[16]

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[15] Moses, op. cit., p. 828.

[16] Karen R. Polenske, "A Case Study of Transportation Models Used in Multiregional Analysis," Unpublished Ph.D. Thesis, (Harvard University, Cambridge, Massachusetts, 1966). Summary p. 8-9.

It should be pointed out that the test of the accuracy of the models, in both the cases cited were partial examinations. In the first case, tests were of one element of the model, that of the hypothesized stable trade patterns. In the second, the examination was related to a small number of commodities, the conclusions, of course, being applicable only to the limited coverage of the analysis.

With respect to an evaluation of the comparative accuracy of the models, partial examination must be deemed insufficient. Tests of the hypothesized behavior of particular elements of a model cannot be considered conclusive due to the fact that interest is in the efficacy of the total model rather than certain characteristics of its elements. In this regard it would seem that one highly qualified observer's conclusion that errors in coefficients do not lead to an accumulation of error, but rather that they tend to compensate each other would be relevant.[17] Further, since economic activities are both extremely complex and highly interrelated, model evaluation should be with respect to the total range of activities rather than limited to a few commodities.

In what is apparently the only comprehensive test of the relative accuracy of the two models, the indication was an order of superiority of the interregional over the multiregional model.[18] As an analytical model, the input-output framework developed by Moses represents a general theory of production. The principal assumption of the model is that of coefficient

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17 W. D. Evans, "Input-Output Computations," in Tibor Borna (ed.), The Structural Interdependence of the Economy, 1956.

18 Mario Broderson, "A Multiregional Input-Output Analysis of the Argentine Economy," (Instituto Torcuato Di Tella, Centro de Investigaciones Economicas, Buenos Aires, Argentina), p. 170.

stability. This assumption requires that the coefficients be based on a fixed or constant industrial structure. As the coefficients possess industrial and spatial characteristics, the structure of both must be constant if the stability assumption is to be fulfilled. Note, however, that it is the contribution from each sector as a percent of the receiving sector's total receipt that is assumed constant. Regionally, for a given industrial definition, the stability implies that the contribution of two sector's if taken as one must be constant and equal to their combined contribution. For example, if the contributions from industry i in region k and industry i in region m to the total receipts of industry j in region ℓ are equal to five and ten percent respectively, then the contribution of industry i from both regions where they are considered as one must be equal to their combined contribution, i.e., fifteen percent.

The rigidity in regional definition is a product not of the stability assumption but rather of the empirical procedure by which the coefficients are derived.

APPENDIX E

Mathematical Derivation

of the Interregional Input-Output Model

The data requirements of the static interregional transmission model are: (1) technical input requirement for each industry in each region a_{ij}^{k}, and (2) trade flows for commodities between regions, t_i^{kl} ($t_i^{kl} = r_i^{kl}/R_i^l$ or the ratio of commodity i shipped from region k to region l to the total receipts of commodity i in region l from all regions including itself). The model consists of two basic equations:

$$(1) \quad D^s = A^s X^s + Y^s \qquad s = 1, 2, \ldots m$$

$$(2) \quad X_k = T_k D_k \qquad k = 1, 2, \ldots m$$

Equation (1) states that the total demand of a region for each good, D^s, is the sum of its final demand, Y^s, and its intermediate demand, $A^s X^s$ (A being the usual input coefficients matrix). Equation (2), the innovation of Leon Moses, states the equality of commodity demand, $T_k D_k$, and supply, X_k. Thus, if the total demand for each commodity in each region is known, and if regions acquire each good according to a fixed regional purchasing pattern, the impact on each region of any change in the level of activities can be determined.

When final demands Y^s are given, this system can be solved for outputs, X^s, by eliminating the variables D^s and D_k from (1) and (2). To do this, we write:

$$(3) \quad D_c = AX_c + Y_c$$

$$(4) \quad X_w = TD_w$$

where D_c and Y_c are mn X 1 column vectors of total demands and final demands for all goods by regions. X_w and D_w are mn X 1 column vectors of total and final demands for all regions by commodity. A is an mn X mn diagonal block matrix composed of M X M square submatrices, with all non-diagonal blocks being zero submatrices. Thus,

$$(5) \quad A = \text{diagonal } (A^1, A^2, \ldots, A^n)$$

where $A^s = a^s_{ij}$ or the m x m technical input coefficients matrix for each region. T is an mn X mn diagonal matrix consisting of n X n square submatrices with all blocks off the main diagonal being zero submatrices. Thus,

$$(6) \quad T = \text{diagonal } (T_1, T_2, \ldots, T_m)$$

where $T_k = t^{rq}_k$ or the n X n trade coefficient matrix for the k^{th} commodity.

Define E (see below for an explanation of this matrix) as the mn X mn permutation matrix which converts a commodity arrangement into a regional arrangement. So that

$$(7) \quad Y_c = EY_w; \; D_c = ED_w; \; X_c = EX_w.$$

Equation (4) can be written as $X_w = TE^{-1}ED_w$ and premultiplying by E, we have by (7)

$$(8) \quad X_c = ETE^{-1}D_c$$

Letting $T^* = ETE^{-1}$,

we have $X_c = ETE^{-1}D_c = T^*D_c$. Thus, a commodity arrangement (4) has been converted into a regional ordering (8). Premultiplying (3) by T*,

$$(9) \quad T^*D_c = T^*AX_c + T^*Y_c$$

Substituting from (8), we have:

$$(10) \quad X_c = T^*AX_c + T^*Y_c$$

and $$(11) \quad X_c = (I - T^*A)^{-1}T^*Y_c$$

When demands by the final demand sectors in each region are given, the system converts these demands into a set of shipments on final demand account, T^*Y_c, by region and determines all regional outputs, X_c.

The permutation matrix, E_1, is defined by Moses and Fei as:

$$(12) \quad E = (E_{ij}) \begin{bmatrix} E_{11}, & E_{12}, & \cdots & E_{1m} \\ \vdots & & & \vdots \\ E_{n1}, & \cdots & \cdots & E_{nm} \end{bmatrix}$$

mn x mn

where

$$E_{ij} = \begin{array}{c} \begin{array}{c} \quad\quad\quad i^{th} \text{ column} \\ \quad\quad\quad \downarrow \end{array} \\ \begin{bmatrix} 0 & \cdots & 0 & 0 & 0 & \cdots & 0 \\ \vdots & & \vdots & \vdots & \vdots & & \vdots \\ 0 & \cdots & 0 & 0 & 0 & \cdots & 0 \\ 0 & \cdots & 0 & 1 & 0 & \cdots & 0 \\ 0 & \cdots & 0 & 0 & 0 & \cdots & 0 \\ \vdots & & \vdots & \vdots & \vdots & & \vdots \\ 0 & \cdots & 0 & 0 & 0 & \cdots & 0 \end{bmatrix} \end{array} \begin{array}{l} \\ \\ \\ \\ \text{-- j row} \\ \\ \\ \\ \end{array}$$

where $E_{ij}^{-1} = E'_{ji}$, E'_{ji} being the transpose of E_{ji} written by submatrices as was E in (12).

T* can be computed from T and E.

$$(14) \quad T^*_{ij} = (E_{i1}, E_{i2}, \ldots, E_{im}) \text{ diagonal } (T_1, T_2, \ldots, T_n) \begin{bmatrix} E'_{j1} \\ E'_{j2} \\ \vdots \\ E'_{jm} \end{bmatrix}$$

$$= \begin{bmatrix} t_1^{ij} & & & & 0 \\ & \ddots & & & \\ & & t_2^{ij} & & \\ & & & \ddots & \\ 0 & & & & t_m^{ij} \end{bmatrix}$$

Thus, T* is a scattered trade coefficient matrix.

APPENDIX F

Area Definition

Area	Counties
Youghiogheny River Subbasin	Allegheny, Fayette, Somerset, Westmoreland, Pa.; Garrett, Md.
Upper Licking River Subbasin	Breathitt, Floyd, Johnson, Magoffin, Morgan, Wolfe, Ky.
Appalachia	
Alabama	Bibb, Blount, Calhoun, Chambers, Cherokee, Chilton, Clay, Cleburne, Colbert, Coosa, Cullman, DeKalb, Elmore, Etowah, Fayette, Franklin, Jackson, Jefferson, Lauderdale, Lawrence, Limestone, Madison, Marion, Marshall, Morgan, Randolph, Saint Clair, Shelby, Talladega, Tallapoosa, Tuscaloosa, Walker, and Winston.
Georgia	Banks, Barrow, Bartow, Carroll, Catoosa, Chattooga, Cherokee, Dade, Dawson, Douglas, Fannin, Floyd, Forsyth, Franklin, Gilmer, Gordon, Gwinnett, Habersham, Hall, Haralson, Heard, Jackson, Lumpkin, Madison, Murray, Paulding, Pickens, Polk, Rabun, Stephens, Towns, Union, Walker, White, and Whitfield.
Kentucky	Adair, Bath, Bell, Boyd, Breathitt, Carter, Casey, Clark, Clay, Clinton, Cumberland, Elliott, Estill, Fleming, Floyd, Garrard, Green, Greenup, Harlan, Jackson, Johnson, Knott, Knox, Laurel, Lawrence, Lee, Leslie, Letcher, Lewis, Lincoln, McCreary, Madison, Magoffin, Martin, Menifee, Monroe, Montogomery, Morgan, Owsley, Perry, Pike, Powell, Pulaski, Rockcastle, Rowan, Russell, Wayne, Whitley, and Wolfe.
Maryland	Allegany, Garrett, and Washington
North Carolina	Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Davie, Forsyth, Graham, Haywood, Henderson, Jackson, McDowell, Macon, Madison, Mitchell, Polk, Rutherford, Stokes, Surry, Swain, Transylvania, Watauga, Wilkes, Yadkin, and Yancey.

Appalachia (continued)

Ohio	Adams, Athens, Belmont, Brown, Carroll, Clermont, Coshocton, Gallia, Guernsey, Harrison, Highland, Hocking, Holmes, Jackson, Jefferson, Lawrence, Meigs, Monroe, Morgan, Muskingum, Noble, Perry, Pike, Ross, Scioto, Tuscarawas, Vinton, and Washington.
Pennsylvania	Allegheny, Armstrong, Beaver, Bedford, Blair, Bradford, Butler, Cambria, Cameron, Carbon, Centre, Clarion, Clearfield, Clinton, Columbia, Crawford, Elk, Erie, Fayette, Forest, Fulton, Greene, Huntingdon, Indiana, Jefferson, Juniata, Lackawanna, Lawrence, Luzerne, Lycoming, McKean, Mercer, Mifflin, Monroe, Montour, Northumberland, Perry, Pike, Potter, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Venango, Warren, Washington, Wayne, Westmoreland, and Wyoming.
South Carolina	Anderson, Cherokee, Greenville, Oconee, Pickens, and Spartanburg.
Tennessee	Anderson, Bledsoe, Blount, Bradley, Campbell, Carter, Claiborne, Clay, Cocke, Coffee, Cumberland, DeKalb, Fentress, Franklin, Grainger, Greene, Grundy, Hamblen, Hamilton, Hancock, Hawkins, Jackson, Jefferson, Johnson, Knox, Loudon, McMinn, Macon, Marion, Meigs, Monroe, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Scott, Sequatchie, Sevier, Smith, Sullivan, Unicoi, Union, Van Buren, Warren, Washington, and White.
Virginia	Alleghany, Bath, Bland, Botetourt, Buchanan, Carroll, Craig, Dickenson, Floyd, Giles, Grayson, Highland, Lee, Pulaski, Russell, Scott, Smyth, Tazewell, Washington, Wise and Wythe.
West Virginia	All the Counties of West Virginia.
New York	Allegheny, Broome, Cettaraugus, Chataqua, Chemung, Chenango, Cortland, Delaware, Otsego, Schuyler, Steuben, Tioga, Tompkins.

Ozarka

Arkansas	Baxter, Benton, Boone, Carroll, Clark, Cleburne, Conway, Crawford, Dallas, Faulkner, Franklin, Fulton, Garland, Grant, Hot Spring, Howard, Independence, Izard, Johnson, Lawrence, Logan, Lonoke, Madison, Marion, Montegomery, Newton, Perry, Pike, Polk, Pope, Prairie, Pulaski, Randolph, Saline, Scott, Searcy, Sebastian, Sevier, Sharp, Stone, Van Buren, Washington, White, Yell.
Missouri	Barry, Barton, Benton, Bollinger, Butler, Camden, Carter, Cedar, Christian, Crawford, Dade, Dallas, Dent, Douglas, Greene, Hickory, Howell, Iron, Jasper, Laclede, Lawrence, McDonald, Madison, Maries, Miller, Morgan, Newton, Oregon, Ozark, Phelps, Polk, Pulaski, Reynolds, Ripley, St. Clair, St. Francois, Shannon, Stone, Taney, Texas, Washington, Wayne, Webster, Wright.
Oklahoma	Adair, Atoka, Bryan, Carter, Cherokee, Choctaw, Coal, Craig, Creek, Delaware, Garvin, Haskell, Hughes, Johnston, Latimer, Le Flore, Lincoln, Love, McClain, McCurtain, McIntosh, Marshall, Mayes, Murray, Muskogee, Nowata, Okfuskee, Okmulgee, Ottawa, Pittsburg, Pontotoc, Pottawatomie, Pushmataha, Rogers, Seminole, Sequoyah, Wagnoner.

APPENDIX G

Industrial Definition

Industry Number	Description	Standard Industrial Classification Number	National Input-Output Number
1	Agriculture, Forestry, & Fishing	01,02,07,08,09	1,2,3,4
2	Products of Mines	10,11,12,14	5,6,7,9,10
3	Crude Petroleum and Natural Gas	13	8
4	Printing and Publishing	27	26
5	Tobacco, Food and Kindred Products	20,21	14,15
6	Textiles, Apparel, Paper, and Allied Products	22,23,26,31	16,17,18,19, 24,25,33,34
7	Chemical and Allied Products	28	27,28,29,30
8	Petroleum and Coal Products	29	31
9	Rubber and Plastic	30	32
10	Lumber and Wood Products excl. Furniture	24	20,21
11	Furniture, Fixtures and Misc. Manufactures	25,39	22,23,64
12	Stone, Clay and Glass Products	32	35,36
13	Primary Metal Industries	33	37,38
14	Fabricated Metal Industries	34	39,40,41,42
15	Machinery not Electrical	35	43,44,45,46,47, 48,49,50,51,52
16	Electrical Machinery	36	53,54,55,56 57,58
17	Transportation Equipment	37	59,60,61
18	Instruments incl. Watches and Clocks	38	62,63
19	Transportation, Communication and Public Utilities	40,41,42,44,45, 46,47,48,49	65,66,67,68
20	Wholesale and Retail Trade	50,52,53,54,55 56,57,58	69
21	Finance, Insurance, and Real Estate	60,61,62,63,64, 65,66,67	70,71
22	Services	70,72,73,75,76, 78,79,81,89	72,73,74,75,76
23	Construction	15,16,17	11,12

APPENDIX H

Wholesale Sector Survey

In the original design of this study, one of the subsidiary objectives was to develop trade coefficients for the wholesale sector. Estimation of these coefficients requires that product shipments be identified by geographic point of origin and destination. At present information of this nature is not available. As an alternative to indirect estimation, a direct mail survey of the wholesale sector was proposed.

In its original conception, the mail survey was to consist of two stages. The purpose of the first stage of the survey was to determine which size class of wholesale establishments could be eliminated from the second, more intensive stage of the survey. Specifically, it was expected that for a large number of small firms, sales outside their immediate locality would account for an insignificant proportion of their total sales. The second stage of the sample was designed as an intensive survey of wholesale in those size classes for which the first stage indicated that a significant proportion of sales were shipped outside the wholesalers immediate locality. The information obtained from the second stage of the sample was then to be used (in conjunction with employment and sales data of the 1963 Census of Business) in the estimation of trade coefficients for the wholesale sector.

However, after councilation with members of the Statistics Department of the United States Bureau of the Budget, a decision to modify the survey design was made.[1]

At the suggestion of the Bureau of the Budget, the survey was redesigned to consist of single stage in which emphasis was to be placed on obtaining the highest possible rate of response. Consequently, the survey's content and procedures had to be respecified and resubmitted to the Bureau of the Budget for approval. As a result, the actual mailing of the revised questionnaires was delayed until mid-July.

Copies of the covering letter and questionnaire are shown in Figures 1 and 2. In addition, Figure 3 presents a second covering letter which along with the original covering letter and questionnaire was sent to those wholesalers who failed to respond to the initial inquiry.

In order to maximize the response rate, the questionnaires were intended to be as easy to answer as possible. Questions 1 through 4 were designed to identify the type and level of activities of the respondent wholesaler. The purpose of question 5 was to identify the percentage distribution of shipments from wholesalers. Thus, under question 5, respondents were asked to estimate the per cent of their total sales made in 1) their home counties, 2) surrounding counties, 3) the rest of their home state, 4) adjoining state, 5) the rest of the U. S. and 6) outside the U. S.

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1 The Federal Government requires that Bureau of the Budget approval be obtained for surveys which are conducted as part of a Federal Government sponsored project and in which more than nine interviews are taken.

Figure H-1

COVERING LETTER FOR WHOLESALE SECTOR SURVEY

WASHINGTON UNIVERSITY

St. Louis, Missouri, 63130

Institute for Urban and Regional Studies
246 McMillan Hall

July 14, 1967

Gentlemen:

The Institute for Urban and Regional Studies at Washington University currently is undertaking a study of interregional trade. This is part of a larger study of interregional effects of regional development policies which is being undertaken by the Institute on behalf of the U. S. Corps of Army Engineers. This study will permit a better understanding of the nature of economic relations between industries and market areas.

An understanding of the interrelations of economic activities can really be gained only by going to the business community itself. Thus, one of the most important ways in which we will gather information is through contacting people engaged in the various trades and professions. In drawing a sample to represent a cross-section of the business community, your firm has been selected as one of those to receive a questionnaire. If you could fill out the enclosed form and return it promptly, it would be most appreciated. Your cooperation is necessary if our study is to be a success.

As indicated in the questionnaire, only approximate answers to the questions are called for. We know that many of you will be able to give only approximate answers on some items, such as proportion of total 1965 sales in countries other than the one in which your firm is located. Also, we have no desire to question you on the exact details of your business. It should be noted that no information for individual firms will be published, but only composites for industry groups. In those cases where you do not have records to which you can refer, your informed opinion will be satisfactory.

We would very much appreciate receiving your reply by August 1, 1967. If you have any questions about the project please feel free to contact us.

Sincerely yours,

Charles L. Leven
Director

CLL/cm/Encs.

Figure H-2

Form approved
Bureau of the Budget
No. 0495-670001

SURVEY OF SPATIAL DISTRIBUTION OF
WHOLESALE ACTIVITY

CHECK ONE:

This firm operates at only one location ________

This firm operates at more than one location ________
(If this is the case, give answers only for the establishment at the location to which this questionnaire is addressed.)

1. Major product(s) or product lines sold (use reverse if more space is needed): ____________________

____

____

2. Average employment in 1965? ____________________

3. Total sales volume in 1965 (to nearest $100,000) $__________

4. Cost of goods sold in 1965 (to nearest $100,000) $__________

5. Please estimate the approximate proportion of total sales in 1965 in the areas indicated below:

____(home)____ County	________%
____(surrounding counties)____ counties combined	________%
Rest of ____(home state)____	________%
State of ____(adjoining state)____	________%
State of ____(")____	________%
State of ____(")____	________%
State of ____(")____	________%
State of ____(")____	________%
State of ____(")____	________%
State of ____(")____	________%
Elsewhere in U. S.	________%
Outside U. S.	________%
TOTAL	100%

Figure H-3

FOLLOW-UP LETTER FOR WHOLESALE SECTOR SURVEY

WASHINGTON UNIVERSITY

St. Louis, Missouri, 63130

Institute for Urban and Regional Studies
246 McMillan Hall

August 9, 1967

Gentlemen:

Last month you received a questionnaire from the Institute for Urban and Regional Studies of Washington University. The purpose of the questionnaire as outlined in the covering letter is to provide information on the size and sales distributions of the nation's wholesalers.

The questionnaires are specifically designed so that their completion requires only your informed opinion and not an examination of company records. In accordance with the specifications of the supervising agency, U. S. Bureau of the Budget, individual company responses will not be disclosed. In fact, the information will be used only to estimate national averages.

Copies of the questionnaire and its covering letter are enclosed. The cooperation of the business community is essential for the successful completion of the study. This being the case, I sincerely hope that your cooperation in promptly completing and returning the questionnaire is forthcoming.

Sincerely,

Charles L. Leven
Director

CLL/cm

Encs.

Firms to which questionnaires were sent were randomly selected by National Business List, Inc., Chicago, Illinois from their file of 207,615 wholesalers.[2] Of the 2,000 selected firms, seven were located outside the contigous United States and therefore were eliminated from the survey. The questionnaire and covering letter, Figures 1 and 2 were then mailed to the remaining 993 establishments on July 14, 1967. On August 9, 1967, a second letter, Figure 3, along with the original covering letter and questionnaire was mailed to those establishments which had failed to respond.

As of August 5, the first mailing had produced 356 returns. Of these, 213 were complete, 74 were returned because the firm had gone out of business, the address was insufficient or the respondant refused to answer the questions. In addition, 69 returned questionnaires that were invalid due to incomplete or inconsistent answers. In total, the first mailing produced 356 returns, i.e., 35.85% of the sample.

Response to the second mailing was somewhat better than to the first, an additional 370 questionnaires were returned. Of these, 246 were complete, 78 contained incomplete or inconsistent information and 36 were returned because of refusal to answer, out of business or incorrect address.

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[2] National Business List, Inc., 162 N. Franklin Street, Chicago 60606. The wholesaler's file made up of 209,615 presently active wholesaler establishments. The list, categorized by SIC, is based on Dunn and Bradstreet's Reference Book. It is updated and duplications eliminated by continued cross reference with telephone and credit directories.

In total, 726 or 73.11% of the sample were accounted for by returns. However, only 459 or 46.22% of the sample contained complete and consistent information. Unfortunately, the responses rate, even after the second mailing was far below that stipulated by the Bureau for meaningful results, i.e., eighty per cent. While it may have been possible to increase the number of usuable returns by further contact with respondants, the time that it would require in addition to that needed to classify, code, and process the questionnaires would have extended the study beyond its completion date. Consequently, survey returns could not be included in the study. Hopefully, the survey information can be of use in future work which then could be incorporated into this study.

APPENDIX I

Combination Transforms for the Aggregation of Interregional Commodity Flows

For each of the twenty-three commodities, a matrix of interregional flows between the eighteen substate areas and the Rest of the United States were obtained from the data and procedures described in Chapter III. Each matrix consists of nineteen rows and columns, one corresponding to each of the substate areas in Appalachia, Ozarka, and The Rest of the U.S. Subarea enumeration in the twenty-three commodity flow matrices was of the following form:

Row and Column Number	
1	New York-Appalachia
2	Pennsylvania-Youghiogheny
3	Pennsylvania-Appalachia
4	Ohio-Appalachia
5	Missouri-Ozarka
6	Arkansas-Ozarka
7	Oklahoma-Ozarka
8	Georgia-Appalachia
9	North Carolina-Appalachia
10	South Carolina-Appalachia
11	Alabama-Appalachia
12	Kentucky-Upper Licking
13	Kentucky-Appalachia
14	Tennessee-Appalachia
15	Maryland-Yonghiogheny
16	Maryland-Appalachia
17	Virginia-Appalachia
18	West Virginia-Appalachia
19	The Rest of the U. S.

A combination transform defines an interregional system in terms of subareas, each row defining a region in terms of subareas. The non-zero elements in each row indicate the subareas which are to be combined to form the region associated with that row.

COMBINATION TRANSFORMS

INTERREGIONAL SYSTEM A

Subarea Region	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Appalachia	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Ozarka	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Rest of U.S.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

INTERREGIONAL SYSTEM B

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Upper Licking	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Rest of Appalachia	1	1	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	0
Rest of U.S.	0	0	0	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	1

INTERREGIONAL SYSTEM C

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Yonghiogheny	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Rest of Appalachia	1	0	1	1	0	0	0	1	1	1	1	1	1	1	0	1	1	1	0
Rest of U.S.	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1

APPENDIX J

Interindustry Analysis Tables
for Appalachia, Ozarka and
Rest of the United States

Table J-1

NATIONAL INTERINDUSTRY TECHNICAL COEFFICIENTS
(dollars)

Industry	1	2	3	4	5	6	7	8	9	10	11	12
1	.295418	-	-	-	.426060	.029470	.000564	-	-	.018925	.000190	.000076
2	.013728	.104758	-	-	.007064	.019459	.076769	.014033	.003199	.000267	.000400	.082767
3	-	.000092	.022300	-	-	-	.002216	.856156	-	-	-	-
4	.000948	.000158	.000079	.126215	.010748	.013515	.005137	.000079	.001660	.002608	.002450	.001423
5	.042188	-	-	-	.165133	.004556	.005724	.000154	.000015	-	.000520	.000034
6	.003197	.000789	.000166	.046922	.032036	.379010	.015592	.001972	.014833	.002305	.019080	.003990
7	.048612	.005464	.002210	.007513	.022040	.091640	.256438	.023364	.052629	.005349	.008638	.015467
8	.053787	.005445	.002889	.000611	.015947	.010501	.044118	.069067	.000745	.004390	.001500	.005112
9	.027341	.008726	.004508	.002182	.022397	.054685	.033159	.001018	.030105	.007353	.048866	.012507
10	.011700	.002925	.000675	.000112	.012600	.078862	.005062	.000225	.001237	.292153	.067500	.007620
11	.000387	.000483	-	.003672	.003575	.036719	.002609	.000676	.003189	.003733	.046371	.002512
12	.002955	.011615	.000408	-	.062048	.010188	.022415	.003770	.006928	.004331	.015690	.110748
13	.000068	.005290	.000339	.000509	.001492	.001017	.013700	.000102	.000916	.000950	.022332	.001730
14	.005879	.001764	.003038	.001176	.088290	.010583	.021264	.015434	.004993	.004606	.023469	.006173
15	.008230	.012305	.005753	.001718	.000679	.005513	.006912	.000160	.001358	.001313	.003276	.001199
16	.001408	.001126	.002159	.000657	.001643	.001361	.001079	.000329	.001220	.000563	.004787	.002065
17	.002025	.000725	.000225	.000475	-	.000075	.000025	-	.000475	.000200	.000700	.000075
18	-	-	.000191	.009943	-	.004589	.008604	.000191	.002103	-	.003059	.001338
19	.019111	.006544	.005517	.006192	.049349	.024292	.017916	.018284	.003694	.008061	.004475	.012843
20	.020924	.002415	.001449	.003171	.026089	.018635	.007265	.001942	.002499	.004073	.006415	.003381
21	.030279	.003359	.017023	.006606	.007401	.007510	.004909	.002850	.001256	.001301	.002353	.001968
22	.019069	.000937	.006434	.010706	.039633	.011719	.023701	.006813	.003136	.002415	.004145	.003370
23	.008847	.000087	.000058	.000635	.003363	.001010	.000505	.000361	.000101	.002165	.002598	.000058

Industry	13	14	15	16	17	18	19	20	21	22	23
1	-	-	.000057	-	-	.000076	.000702	.002901	.041208	.000271	.004494
2	.328269	.001196	.002399	.001999	.002665	.000399	.077036	.001066	.004565	.005331	.100760
3	-	-	-	-	-	-	-	-	.011150	.000092	-
4	.003003	.002450	.001423	.001502	.001897	.000158	.015807	.018573	.035644	.434284	.000711
5	.000113	-	.000015	-	-	.000169	.001406	.007495	.000914	.000239	.000233
6	.002969	.004858	.002782	.006332	.009758	.003343	.002678	.019828	.005274	.015343	.008595
7	.018842	.008678	.003977	.013378	.011329	.005022	.004058	.009923	.005385	.020203	.008825
8	.010502	.005612	.006057	.001834	.005223	.000500	.098961	.040396	.025395	.016731	.075624
9	.011489	.016289	.039703	.049011	.111402	.007563	.039558	.034468	.014107	.063700	.054328
10	.003712	.012037	.006637	.005287	.014175	.000450	.003262	.016875	.002925	.000552	.416019
11	.002706	.008310	.006667	.018359	.011595	.003575	.006957	.013238	.003365	.059716	.062711
12	.035354	.016811	.018033	.033010	.040652	.007030	.003362	.023026	.002649	.019562	.489047
13	.253459	.207746	.106586	.065145	.120083	.008749	.006036	.000780	.001050	.001356	.123779
14	.034983	.063155	.052915	.046154	.108133	.007692	.010681	.010387	.001175	.008319	.348016
15	.121934	.031482	.145705	.022893	.055813	.006432	.006193	.009708	.004475	.043148	.033714
16	.011780	.013376	.057728	.152063	.063641	.014925	.013535	.008823	.002376	.060350	.032977
17	.001825	.006375	.015650	.004100	.241013	.002825	.014025	.007225	.001200	.109470	.000100
18	.002294	.019694	.015870	.049140	.062906	.062715	.004971	.014914	.002486	.104971	.039379
19	.017119	.008537	.008889	.007173	.014698	.001579	.100446	.050943	.025226	.050223	.036374
20	.010919	.007528	.010268	.009165	.012147	.002436	.013764	.018557	.013900	.017795	.066572
21	.003744	.003122	.004626	.003990	.003450	.000939	.024748	.074969	.121921	.052813	.008246
22	.005605	.005299	.007642	.011337	.012760	.002740	.038570	.106373	.051600	.062282	.052267
23	.001905	.002020	.004330	.000274	.001371	.000029	.030321	.011185	.086866	.004185	.000115

Table J-2

1963 TRADE COEFFICIENTS

Appalachia, Ozarka and The Rest of the United States

Industry	From \ To	Region I	Region II	Region III
1) Agriculture, Forestry and Fishing	Region I	.69371	.00000	.05188
	II	.00000	.75129	.00000
	III	.30629	.24871	.94813
2) Products of Mines	I	.96870	.02279	.24568
	II	.00064	.65466	.00492
	III	.03066	.32255	.74970
3) Petroleum and Natural Gas	I	.13131	.00012	.01148
	II	.00524	.16286	.03694
	III	.86345	.83702	.95158
4) Publishing and Printing	I	.11413	.12330	.02308
	II	.00000	.00000	.00000
	III	.88587	.87670	.97692
5) Tobacco, Food and Kindred Products	I	.31833	.02676	.03955
	II	.00557	.12125	.01034
	III	.67610	.85199	.95011
6) Textiles, Apparel and Paper Products	I	.31808	.10251	.08100
	II	.00601	.04319	.00523
	III	.67591	.85429	.91325
7) Chemicals and Allied Products	I	.46062	.06467	.08592
	II	.00207	.01485	.00402
	III	.53731	.92048	.91006
8) Petroleum and Coal Products	I	.07032	.07661	.01088
	II	.00099	.12672	.00523
	III	.92869	.79667	.98389
9) Rubber and Plastics	I	.13988	.05700	.06103
	II	.00992	.01977	.00779
	III	.85020	.92324	.93118
10) Lumber and Wood Products	I	.66241	.01348	.04676
	II	.01183	.06720	.01705
	III	.32576	.91932	.93619
11) Furniture, Fixtures and Miscellaneous Manufactures	I	.23394	.07104	.04540
	II	.00815	.04590	.00631
	III	.75791	.88306	.94829
12) Stone, Clay, and Glass Products	I	.71424	.08139	.11033
	II	.03116	.60516	.00947
	III	.25460	.31345	.88021

Table J-2 (Cont.)

Industry	To / From	Region I	Region II	Region III
13) Primary Metals	Region I	.72873	.18701	.15575
	II	.00123	.00333	.00133
	III	.27004	.80466	.84293
14) Fabricated Metals	I	.28294	.07262	.05681
	II	.00217	.02443	.00194
	III	.71489	.90295	.94125
15) Machinery not Electrical	I	.12281	.06054	.04226
	II	.00256	.02199	.00320
	III	.87463	.91747	.95454
16) Electrical Machinery	I	.08557	.03660	.04874
	II	.00313	.00463	.00253
	III	.91130	.95877	.94872
17) Transportation Equipment	I	.14550	.00820	.01993
	II	.00225	.00309	.00139
	III	.85225	.98871	.97869
18) Instruments, Watches and Clocks	I	.09237	.03150	.04513
	II	.00437	.00518	.00424
	III	.90326	.96332	.95062
19) Transportation, Communication, and Public Utilities	I	.42421	.40386	.39071
	II	.05182	.05592	.05210
	III	.52397	.54022	.55719
20) Wholesale and Retail Trade	I	.89462	.00006	.11427
	II	.00000	.88243	.00084
	III	.10538	.11751	.88499
21) Finance, Insurance, and Real Estate	I	.22364	.21008	.20143
	II	.02902	.03082	.02825
	III	.74735	.75910	.77032
22) Services	I	.07900	.07355	.06922
	II	.02007	.02109	.01917
	III	.90093	.90536	.91160
23) Construction	I	.76144	.00000	.24428
	II	.00000	.75059	.00716
	III	.23856	.24941	.74856

Table J-3

Interregional Interindustry Requirements Matrix

APPALACHIA

INDUSTRY		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
APPALACHIA	1	0.28494	0.00000	0.00000	0.00000	0.29557	0.02044	0.00046	0.00000	0.00000	0.01343	0.00013	0.00005	0.00000	0.00000	0.00004	0.00302	0.00000	0.00005	0.00049	0.00201	0.02859	0.00010	0.00312
	2	0.01330	0.10148	0.00800	0.00300	0.00604	0.01885	0.07437	0.01359	0.00310	0.00026	0.00059	0.00018	0.31799	0.00116	0.00232	0.00194	0.03254	0.00039	0.07402	0.00183	0.00452	0.00516	0.09703
	3	0.00000	0.00001	0.00293	0.00000	0.00030	0.00000	0.08029	0.31242	0.00038	0.00000	0.00000	0.00000	0.00800	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00146	0.00001	0.00000
	4	0.00611	0.00002	0.00001	0.01440	0.00123	0.00154	0.00059	0.00001	0.83019	0.00030	0.00028	0.00016	0.00034	0.00028	0.00016	0.00017	0.03022	0.00002	0.00100	0.00214	0.00401	0.04956	0.00008
	5	0.01343	0.00000	0.00000	0.00000	0.05257	0.00145	0.80182	0.00005	0.00000	0.00000	0.00017	0.00003	0.00004	0.00000	0.00000	0.83303	0.80000	0.00005	0.00045	0.00239	0.00029	0.00006	0.00006
	6	0.00102	0.00025	0.00005	0.81492	0.01019	0.12056	0.80496	0.00043	0.00473	0.00073	0.00607	0.80286	0.00094	0.00155	0.80088	0.03201	0.00310	0.80106	0.00085	0.00031	0.00168	0.00448	0.00273
	7	0.02239	0.00252	0.00102	0.83146	0.01057	0.04221	0.11812	0.01099	0.02424	0.00302	0.00398	0.00712	0.00068	0.08400	0.00113	0.03618	0.00522	0.00231	0.00187	0.00457	0.80248	0.00931	0.02802
	8	0.00378	0.00038	0.00020	0.00304	0.00112	0.00074	0.00310	0.00486	0.00037	0.00031	0.00011	0.00036	0.00074	0.00039	0.00043	0.80013	0.00037	0.00004	0.00049	0.00284	0.00179	0.00116	0.00532
	9	0.08362	0.00122	0.00863	0.00031	0.80313	0.00765	0.00464	0.00014	0.03421	0.00110	0.00044	0.08175	0.00161	0.80228	0.80555	0.00046	0.91556	0.00106	0.00553	0.00002	0.00147	0.08891	0.00767
	10	0.00775	0.00194	0.00045	0.00007	0.80835	0.05224	0.00335	0.80015	0.00082	0.19353	0.04471	0.00505	0.00246	0.00797	0.00440	0.80350	0.00939	0.00030	0.00216	0.01118	0.00196	0.06037	0.27558
	11	0.00669	0.00011	0.00000	0.00066	0.80084	0.00859	0.00061	0.00016	0.00075	0.00000	0.01092	0.00059	0.00063	0.00194	0.00156	0.00429	0.08271	0.00084	0.00163	0.00310	0.00090	0.01397	0.01467
	12	0.08211	0.00030	0.00029	0.00000	0.04432	0.00328	0.81681	0.00269	0.00495	0.00313	0.01121	0.07910	0.02525	0.01781	0.81268	0.04358	0.02904	0.00502	0.00246	0.01845	0.00189	0.01397	0.34930
	13	0.00065	0.00385	0.08025	0.00017	0.00139	0.00874	0.00998	0.00007	0.80067	0.00005	0.01031	0.08126	0.18470	0.15139	0.07747	0.04747	0.00751	0.00038	0.00044	0.00097	0.00077	0.00099	0.04020
	14	0.00166	0.00850	0.00866	0.00033	0.82498	0.03299	0.00602	0.00437	0.80141	0.00130	0.00044	0.00175	0.00990	0.01747	0.01497	0.01406	0.03060	0.00218	0.00302	0.00294	0.00033	0.00250	0.09467
	15	0.00101	0.00151	0.80071	0.00021	0.08038	0.80868	0.00085	0.00002	0.00017	0.00010	0.00040	0.00015	0.01497	0.00387	0.01749	0.00281	0.30645	0.08079	0.00076	0.00119	0.00055	0.00530	0.00475
	16	0.00012	0.00810	0.00018	0.00006	0.80814	0.08812	0.08809	0.88003	0.00010	0.00005	0.00041	0.00018	0.00101	0.00114	0.00494	0.01331	0.38545	0.00128	0.00153	0.00135	0.00021	0.00569	0.00710
	17	0.00029	0.00011	0.00083	0.80037	0.80080	0.00001	0.00800	0.80000	0.00007	0.00003	0.00010	0.00001	0.00027	0.00093	0.00228	0.00000	0.33507	0.00041	0.00204	0.00005	0.00617	0.01593	0.00001
	18	0.00600	0.80600	0.00002	0.00892	0.08030	0.00042	0.00079	0.00082	0.00019	0.00000	0.00028	0.00012	0.00621	0.00182	0.00147	0.00454	0.00561	0.80579	0.00046	0.00136	0.00023	0.00970	0.00364
	19	0.00811	0.00278	0.00234	0.00263	0.02093	0.01030	0.00760	0.00776	0.80157	0.00342	0.00190	0.06545	0.00726	0.00362	0.00377	0.00304	0.00624	0.00067	0.04201	0.02161	0.01070	0.02151	0.01569
	20	0.01872	0.00216	0.00138	0.80284	0.02334	0.01667	0.80650	0.00174	0.00224	0.00369	0.00574	0.00302	0.00977	0.00673	0.80919	0.00820	0.01087	0.08213	0.04241	0.01080	0.01244	0.01592	0.05956
	21	0.00677	0.00075	0.00381	0.08148	0.00166	0.00168	0.00110	0.00064	0.03028	0.00029	0.00053	0.00044	0.00044	0.00070	0.00383	0.00089	0.00077	0.80021	0.00553	0.01077	0.02727	0.00734	0.00184
	22	0.00151	0.00007	0.00851	0.00885	0.00313	0.00093	0.80187	0.00054	0.00025	0.00019	0.08833	0.00027	0.00044	0.00042	0.00060	0.00890	0.00101	0.00022	0.00365	0.00840	0.00408	0.00492	0.00413
	23	0.08674	0.00087	0.00804	0.82048	0.08256	0.08077	0.00038	0.00027	0.08088	0.00163	0.00192	0.00604	0.00145	0.80159	0.00330	0.00321	0.38104	0.00002	0.02369	0.00852	0.00814	0.00319	0.00000
OZARKS	1	0.00000	0.08600	0.00080	0.08000	0.00000	0.00900	0.00008	0.00000	0.05080	0.00000	0.00800	0.00000	0.00000	0.00060	0.00000	0.00303	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	2	0.00001	0.00087	0.00080	0.00800	0.03830	0.00001	0.00085	0.00081	0.08003	0.00000	0.00000	0.00003	0.00021	0.80030	0.03003	0.00000	0.00000	0.03000	0.00003	0.00000	0.00000	0.00000	0.60004
	3	0.00000	0.00080	0.08012	0.08600	0.00000	0.00000	0.00001	0.00449	0.00800	0.00000	0.00000	0.00080	0.00000	0.00000	0.00000	0.00303	0.00000	0.00380	0.00000	0.00000	0.00000	0.00000	0.00000
	4	0.00000	0.00000	0.00000	0.08030	0.08800	0.00000	0.00008	0.00000	0.03030	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000
	5	0.80023	0.00000	0.00000	0.00000	0.08092	0.00003	0.00003	0.00000	0.03000	0.00000	0.00000	0.00008	0.00000	0.00030	0.00000	0.03303	0.30030	0.00000	0.00001	0.00004	0.00001	0.00000	0.00000
	6	0.00002	0.00000	0.00000	0.00028	0.00019	0.00228	0.00009	0.00081	0.03009	0.00001	0.00011	0.00003	0.00002	0.00003	0.00002	0.00034	0.00036	0.00002	0.00002	0.00012	0.00003	0.00009	0.00003
	7	0.08010	0.00001	0.00000	0.00002	0.08805	0.00019	0.08053	0.00005	0.03011	0.00001	0.00002	0.00003	0.00804	0.08382	0.80001	0.03033	0.30352	0.03081	0.00004	0.00002	0.00001	0.00064	0.00013
	8	0.00005	0.00001	0.00038	0.80000	0.08002	0.80001	0.08004	0.00037	0.03803	0.00000	0.00000	0.00001	0.00001	0.88001	0.08581	0.00303	0.30601	0.00000	0.00018	0.00006	0.00003	0.00002	0.00007
	9	0.00027	0.00009	0.00004	0.88002	0.08022	0.08054	0.80033	0.88001	0.03038	0.00000	0.00048	0.00012	0.00011	0.00016	0.00039	0.00044	0.38111	0.00000	0.00024	0.00035	0.00014	0.00063	0.00054
	10	0.00014	0.00003	0.00001	0.00000	0.88015	0.00093	0.00806	0.00000	0.00001	0.00340	0.00000	0.00009	0.08004	0.00014	0.00060	0.00006	0.30017	0.08301	0.00004	0.00020	0.00003	0.00801	0.00492
	11	0.08000	0.00000	0.08000	0.00003	0.00003	0.00038	0.80002	0.03003	0.05003	0.00003	0.00038	0.00002	0.00002	0.00007	0.00005	0.00015	0.08009	0.00003	0.00006	0.00011	0.00003	0.00049	0.00051
	12	0.00009	0.00036	0.00001	0.00000	0.00193	0.00032	0.08078	0.00018	0.00072	0.00019	0.00049	0.00343	0.00110	0.00052	0.60056	0.00102	0.00127	0.00028	0.00016	0.00072	0.00004	0.00861	0.01524
	13	0.00000	0.80001	0.00008	0.03000	0.00000	0.00000	0.00082	0.00000	0.00000	0.00000	0.00003	0.00000	0.00041	0.00026	0.00018	0.00008	0.00019	0.00001	0.00001	0.00000	0.00060	0.00000	0.00015
	14	0.00001	0.00008	0.00001	0.03000	0.00019	0.00002	0.00005	0.00035	0.03001	0.00001	0.00005	0.00001	0.00000	0.00014	0.00011	0.30013	0.30023	0.00002	0.00004	0.00002	0.00000	0.00063	0.00070
	15	0.00002	0.00003	0.00001	0.00000	0.00000	0.80001	0.00002	0.00008	0.00003	0.00000	0.00001	0.00000	0.80031	0.00006	0.00037	0.30336	0.00314	0.00002	0.00004	0.00002	0.00001	0.00011	0.00010
	16	0.00000	0.00000	0.00001	0.00000	0.00001	0.00000	0.00008	0.00000	0.00330	0.00000	0.00001	0.00001	0.00004	0.00004	0.08018	0.03044	0.38026	0.00005	0.00005	0.00003	0.00001	0.00022	0.00026
	17	0.00000	0.00000	0.00000	0.83000	0.00000	0.00000	0.00000	0.80000	0.03000	0.00000	0.00000	0.00000	0.00000	0.00031	0.00036	0.30301	0.30059	0.00001	0.00003	0.00002	0.00000	0.00025	0.00000
	18	0.00000	0.00000	0.00000	0.00004	0.03000	0.00002	0.80034	0.08088	0.00001	0.00000	0.00001	0.00001	0.00001	0.08009	0.80007	0.00021	0.00027	0.80027	0.00002	0.00007	0.00001	0.00046	0.00017
	19	0.00099	0.00034	0.00829	0.30332	0.00256	0.08126	0.00093	0.00095	0.03819	0.00002	0.00023	0.00067	0.00389	0.00044	0.00046	0.60337	0.00078	0.00000	0.00521	0.00264	0.00131	0.00260	0.00191
	20	0.00000	0.00000	0.00000	0.00000	0.00030	0.03000	0.00008	0.00000	0.03000	0.00000	0.00000	0.00000	0.00800	0.00000	0.00000	0.00003	0.00600	0.00000	0.00000	0.00300	0.00060	0.00000	0.00000
	21	0.00008	0.00010	0.00049	0.08019	0.08021	0.00022	0.80014	0.85004	0.00004	0.00004	0.00007	0.00000	0.00001	0.00000	0.00013	0.00013	0.00616	0.08863	0.00072	0.00214	0.00356	0.00096	0.00026
	22	0.00036	0.06001	0.00013	0.06021	0.00040	0.09974	0.00048	0.80014	0.05008	0.00000	0.00006	0.00001	0.00001	0.00011	0.00019	0.00021	0.01626	0.00009	0.00077	0.00214	0.00188	0.00149	0.00169
	23	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00890	0.00000	0.80000	0.00000	0.00300	0.00000	0.00000	0.00000	0.00030	0.00000	0.30000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
REST OF THE U.S.	1	0.09048	0.00000	0.00000	0.00000	0.13050	0.00903	0.03028	0.00000	0.03000	0.00500	0.00006	0.00002	0.80000	0.00000	0.00882	0.00040	0.00380	0.00002	0.00022	0.00089	0.01262	0.00004	0.00138
	2	0.00042	0.80321	0.00000	0.88000	0.00022	0.00060	0.00235	0.08843	0.00318	0.00001	0.00001	0.00254	0.01004	0.00004	0.00087	0.00006	0.33088	0.00801	0.00230	0.00003	0.00014	0.00016	0.00309
	3	0.00000	0.00008	0.01925	0.00000	0.03834	0.00008	0.00191	0.73925	0.80000	0.00000	0.00000	0.00036	0.00000	0.00000	0.00000	0.00300	0.08030	0.08000	0.00004	0.00000	0.06963	0.00004	0.00000
	4	0.00086	0.00014	0.00007	0.11181	0.00952	0.01197	0.00455	0.00007	0.08147	0.00231	0.00217	0.00126	0.00260	0.00217	0.00126	0.00133	0.00188	0.00014	0.01900	0.01645	0.03156	0.38472	0.00003
	5	0.02452	0.06000	0.00000	0.08800	0.11148	0.00308	0.00387	0.00010	0.03081	0.00000	0.00035	0.00006	0.00600	0.00000	0.00001	0.00008	0.00000	0.00011	0.00095	0.00307	0.00082	0.00016	0.00016
	6	0.00418	0.00053	0.00011	0.03172	0.02148	0.25618	0.01054	0.08135	0.01005	0.00156	0.01290	0.00608	0.00201	0.00128	0.00188	0.03428	0.00000	0.00226	0.00161	0.01540	0.00356	0.01087	0.00381
	7	0.02612	0.00294	0.00119	0.00404	0.01233	0.04924	0.13774	0.01282	0.02828	0.00352	0.00464	0.06031	0.01012	0.00466	0.00214	0.83719	0.30609	0.00270	0.00216	0.00535	0.00289	0.01086	0.03268
	8	0.04995	0.80506	0.00268	0.08057	0.01481	0.00975	0.04097	0.00414	0.83088	0.00408	0.00139	0.00075	0.00975	0.08521	0.00563	0.00470	0.30465	0.00046	0.00190	0.03752	0.02358	0.01558	0.07023
	9	0.02325	0.80742	0.00343	0.00186	0.01909	0.04649	0.02819	0.08087	0.02560	0.00048	0.04155	0.01061	0.00477	0.01385	0.05376	0.04067	0.39471	0.00643	0.03303	0.02430	0.01199	0.05416	0.04601
	10	0.00381	0.00095	0.00022	0.00004	0.00410	0.02569	0.00165	0.08007	0.03040	0.00517	0.02199	0.00248	0.00121	0.08392	0.00236	0.00372	0.00462	0.00015	0.00100	0.00550	0.00095	0.00018	0.13552
	11	0.80029	0.00037	0.08000	0.00278	0.00271	0.02783	0.00198	0.00051	0.80242	0.00260	0.03537	0.00190	0.00265	0.08630	0.00505	0.31591	0.00879	0.00271	0.00527	0.01603	0.00293	0.04528	0.04753
	12	0.80075	0.00296	0.00010	0.03080	0.01580	0.00259	0.00571	0.00096	0.08176	0.00122	0.03399	0.00240	0.88908	0.00426	0.00459	0.00840	0.81035	0.00179	0.00000	0.00580	0.00067	0.00496	0.12451
	13	0.00002	0.00143	0.00064	0.83814	0.00040	0.00027	0.00370	0.00003	0.03025	0.00026	0.00406	0.00062	0.00044	0.05610	0.02678	0.01759	0.33243	0.00236	0.00103	0.00321	0.00020	0.00037	0.03343
	14	0.00420	0.00126	0.00217	0.00044	0.06312	0.80757	0.01520	0.01133	0.00357	0.00349	0.01670	0.00001	0.02581	0.84515	0.03763	0.01400	0.37730	0.00550	0.00784	0.00743	0.00084	0.00630	0.24839
	15	0.08720	0.01076	0.00503	0.03150	0.00059	0.00482	0.08605	0.00014	0.03119	0.00119	0.08287	0.00103	0.10665	0.02756	0.02744	0.02002	0.04882	0.00363	0.00342	0.00849	0.00391	0.03774	0.03386
	16	0.00126	0.08103	0.08197	0.00060	0.00150	0.00124	0.00098	0.00030	0.00111	0.00051	0.00430	0.00100	0.01074	0.01219	0.09261	0.13657	0.05630	0.01360	0.01416	0.00804	0.00218	0.06279	0.07502
	17	0.00173	0.00062	0.00019	0.08040	0.08030	0.00006	0.00002	0.00000	0.03040	0.00017	0.00060	0.00000	0.00156	0.80543	0.01334	0.00249	0.20540	0.00241	0.01493	0.00016	0.00102	0.04330	0.00009
	18	0.00000	0.00000	0.00017	0.00898	0.00000	0.00415	0.03777	0.00017	0.00198	0.00000	0.00276	0.00121	0.00207	0.01779	0.01433	0.01439	0.25642	0.03665	0.00499	0.01347	0.00225	0.04982	0.03579
	19	0.01081	0.00343	0.00289	0.00324	0.02900	0.01273	0.80939	0.00958	0.80194	0.00042	0.00234	0.00071	0.80097	0.00467	0.08466	0.00176	0.30776	0.00083	0.05203	0.02669	0.01322	0.02632	0.01932
	20	0.00220	0.88825	0.00015	0.00433	0.08275	0.00196	0.08077	0.00020	0.03026	0.00003	0.00006	0.00030	0.00115	0.00079	0.00308	0.00097	0.30128	0.00026	0.00495	0.00196	0.00146	0.00168	0.00702
	21	0.02263	0.00251	0.01272	0.00494	0.00553	0.00501	0.00367	0.00213	0.08094	0.00007	0.00170	0.00142	0.00420	0.00233	0.00346	0.00240	0.30258	0.00070	0.01050	0.05603	0.09112	0.02452	0.00616
	22	0.01718	0.00084	0.00380	0.00965	0.03571	0.01456	0.02135	0.00016	0.00283	0.00216	0.00373	0.00304	0.00505	0.00477	0.00066	0.01021	0.01150	0.00247	0.03475	0.04503	0.04049	0.05611	0.04709
	23	0.00211	0.00002	0.00001	0.00815	0.00000	0.00024	0.00012	0.00009	0.00082	0.00052	0.00003	0.00601	0.00003	0.00046	0.00103	0.00007	0.00033	0.00001	0.00744	0.00267	0.02072	0.00100	0.00003

Table J-3 (Cont.)

OZARKS

	INDUSTRY	1	2	3	4	5	6	7	8
APPALACHIA	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00030
	2	0.00031	0.00239	0.00000	0.00000	0.00016	0.00044	0.00175	0.00332
	3	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00010
	4	0.00012	0.00007	0.00001	0.01556	0.00135	0.00167	0.00003	0.00001
	5	0.00113	0.00000	0.00000	0.00000	0.00442	0.00012	0.00015	0.00000
	6	0.00033	0.00008	0.00002	0.00481	0.00328	0.03485	0.00160	0.00020
	7	0.00314	0.00035	0.00014	0.00049	0.00148	0.00593	0.01658	0.00154
	8	0.00412	0.00042	0.00022	0.00005	0.00122	0.00080	0.00328	0.00529
	9	0.00156	0.00050	0.00026	0.00012	0.00128	0.00312	0.00189	0.00036
	10	0.00016	0.00004	0.00001	0.00000	0.00017	0.00106	0.00007	0.00000
	11	0.00003	0.00003	0.00000	0.00026	0.00025	0.00261	0.00019	0.00005
	12	0.00024	0.00095	0.00003	0.00000	0.00505	0.00083	0.00182	0.00031
	13	0.00001	0.00099	0.00006	0.00010	0.00328	0.00019	0.00256	0.00002
	14	0.00063	0.00013	0.00022	0.00049	0.00441	0.00077	0.00154	0.00112
	15	0.00050	0.00074	0.00035	0.00010	0.00004	0.00033	0.00042	0.00001
	16	0.00005	0.00004	0.00008	0.00302	0.00006	0.00005	0.00004	0.00331
	17	0.00002	0.00001	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000
	18	0.00000	0.00000	0.00001	0.00031	0.00030	0.00014	0.00027	0.00031
	19	0.00772	0.00204	0.00223	0.00250	0.01943	0.00981	0.00724	0.02738
	20	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000
	21	0.00036	0.00071	0.00358	0.00119	0.00155	0.00158	0.00103	0.00068
	22	0.00140	0.00007	0.00047	0.00379	0.00292	0.00086	0.00176	0.00090
	23	0.00000	0.00000	0.00000	0.00030	0.00030	0.00008	0.00000	0.00000
OZARKS	1	0.22194	0.00000	0.00000	0.00000	0.32029	0.02214	0.00050	0.00030
	2	0.00849	0.06858	0.00000	0.00000	0.35462	0.01274	0.05026	0.00919
	3	0.00000	0.00001	0.00363	0.00000	0.00050	0.00000	0.00036	0.13943
	4	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00035
	5	0.00312	0.00000	0.00000	0.00000	0.02032	0.00055	0.00069	0.03012
	6	0.00014	0.00303	0.00001	0.00202	0.00138	0.01657	0.00067	0.00009
	7	0.00072	0.00086	0.00083	0.00011	0.00034	0.00136	0.00381	0.00339
	8	0.00082	0.03069	0.00037	0.00008	0.00232	0.00133	0.00559	0.00875
	9	0.00054	0.00017	0.00009	0.05004	0.00044	0.00108	0.00606	0.00332
	10	0.00079	0.00028	0.00005	0.00001	0.00085	0.00530	0.00034	0.00332
	11	0.00002	0.00002	0.00000	0.00012	0.00016	0.00169	0.00012	0.03383
	12	0.00179	0.00703	0.00025	0.00000	0.33755	0.00617	0.01126	0.00224
	13	0.00000	0.00004	0.00000	0.00000	0.00031	0.00001	0.00011	0.03330
	14	0.00014	0.00004	0.00807	0.00003	0.03216	0.13026	0.00352	0.00034
	15	0.00018	0.00027	0.00013	0.00004	0.00001	0.00012	0.00015	0.03730
	16	0.00001	0.00001	0.00001	0.00000	0.00001	0.00001	0.00003	0.00030
	17	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]
	18	0.00000	0.00000	0.00000	0.00005	0.00000	0.00002	0.00006	0.00039
	19	0.00107	0.00037	0.00031	0.00085	0.00276	0.00116	0.03105	0.00102
	20	0.01846	0.00215	0.00128	0.00280	0.02102	0.01644	0.00491	0.03171
	21	0.00093	0.00010	0.00052	0.00020	0.00023	0.00025	0.30815	0.30039
	22	0.00040	0.00002	0.00014	0.00023	0.00084	0.00025	0.00050	0.03014
	23	0.00664	0.00007	0.00004	0.00046	0.00252	0.00076	0.00338	0.01927
REST OF THE U.S.	1	0.07347	0.00000	0.00000	0.00030	0.10547	0.00733	0.03017	0.00030
	2	0.00443	0.03179	0.00000	0.00000	0.00228	0.03628	0.02476	0.00453
	3	0.00000	0.00308	0.01867	0.00000	0.00030	0.00080	0.03185	0.71662
	4	0.00003	0.00014	0.00007	0.11865	0.00942	0.01165	0.00450	0.00007
	5	0.03594	0.00800	0.00000	0.00030	0.14069	0.00388	0.00488	0.00013
	6	0.00273	0.00067	0.00014	0.04008	0.02737	0.32378	0.01332	0.00188
	7	0.04475	0.00302	0.00202	0.00692	0.02112	0.08455	0.23805	0.02197
	8	0.04283	0.00434	0.00210	0.00049	0.01270	0.08837	0.03515	0.35332
	9	0.02524	0.00806	0.08416	0.00281	0.02068	0.05049	0.03061	0.33094
	10	0.01676	0.00269	0.00062	0.00018	0.01158	0.07250	0.00465	0.33021
	11	0.00034	0.00043	0.00000	0.00324	0.00216	0.02243	0.00233	0.03040
	12	0.00093	0.00364	0.00013	0.00080	0.01945	0.00319	0.00705	[illegible]
	13	0.00005	0.08426	0.00027	0.00041	0.00120	0.00882	0.31102	[illegible]
	14	0.00551	0.00159	0.00274	0.00186	0.07972	0.03456	0.01928	0.01194
	15	0.00755	0.01129	0.00528	0.00158	0.30062	0.33586	0.02634	0.03015
	16	0.00135	0.00108	0.00207	0.00363	0.00158	0.00130	0.05105	0.00032
	17	0.00200	0.00072	0.00022	0.00347	0.00030	0.00007	0.03502	0.35330
	18	0.00000	0.00000	0.00018	0.00958	0.00330	0.00442	0.00829	[illegible]
	19	0.01032	0.00354	0.00298	0.00335	0.02444	0.01312	0.00966	0.03768
	20	0.00246	0.00028	0.00017	0.00037	0.00357	0.00219	0.03385	0.03023
	21	0.02298	0.00255	0.01292	0.00501	0.00562	0.00370	0.03373	0.03216
	22	0.01226	0.00085	0.08582	0.00969	0.02568	0.01061	0.02146	0.03617
	23	0.00221	0.00002	0.00001	0.00016	0.00084	0.00025	0.00813	0.00009

	INDUSTRY	9	10	11	12	13	14	15	16
APPALACHIA	1	0.02003	0.00000	0.00000	0.00000	0.00000	[illegible]	0.00000	[illegible]
	2	0.03037	0.00001	0.00001	0.00149	0.06748	0.00003	0.00005	[illegible]
	3	0.03300	0.00000	0.00000	0.00000	[illegible]	[illegible]	0.00000	[illegible]
	4	0.00020	[illegible]	0.00030	0.00018	0.00337	[illegible]	0.00318	[illegible]
	5	0.03330	0.00000	[illegible]	[illegible]	[illegible]	[illegible]	0.00760	[illegible]
	6	0.00152	0.00024	0.00190	[illegible]	[illegible]	[illegible]	0.00329	[illegible]
	7	0.03345	0.00042	0.00056	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	8	0.03337	[illegible]	0.00011	[illegible]	0.00303	[illegible]	0.00046	[illegible]
	9	0.00172	[illegible]	[illegible]	0.00071	[illegible]	[illegible]	0.00226	[illegible]
	10	0.00092	[illegible]	[illegible]	[illegible]	0.00005	[illegible]	0.00339	0.00007
	11	0.03022	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00047	[illegible]
	12	0.03056	[illegible]	0.00120	[illegible]	0.00260	[illegible]	[illegible]	0.06209
	13	0.03317	[illegible]	[illegible]	[illegible]	0.00740	[illegible]	[illegible]	[illegible]
	14	0.03036	[illegible]	[illegible]	[illegible]	[illegible]	0.00450	0.00324	[illegible]
	15	0.03308	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00042	[illegible]
	16	0.03004	[illegible]	[illegible]	0.00308	[illegible]	[illegible]	0.00211	0.00557
	17	0.03348	[illegible]	[illegible]	[illegible]	0.00001	[illegible]	0.00312	[illegible]
	18	0.03307	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00050	[illegible]
	19	0.00149	[illegible]	[illegible]	0.00519	[illegible]	[illegible]	0.00159	[illegible]
	20	0.03000	[illegible]	[illegible]	[illegible]	0.00000	[illegible]	0.00003	[illegible]
	21	0.03326	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00047	[illegible]
	22	0.03323	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00256	[illegible]
	23	0.00000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
OZARKS	1	0.03003	0.01422	[illegible]	[illegible]	[illegible]	[illegible]	0.00534	[illegible]
	2	0.03109	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3	0.00000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	4	0.03000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	5	0.03305	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	6	0.03066	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	7	0.03378	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	8	0.03012	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	9	0.03069	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.03376	[illegible]
	10	0.03336	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	11	0.03715	0.00017	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	12	0.03419	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	13	0.03351	[illegible]	0.00019	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	14	0.03312	[illegible]	0.00057	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	15	0.03003	[illegible]	[illegible]	0.00003	[illegible]	[illegible]	[illegible]	[illegible]
	16	0.03331	[illegible]	[illegible]	0.00001	[illegible]	[illegible]	[illegible]	0.03373
	17	0.02020	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	18	0.03201	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	19	0.03321	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	20	0.00221	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	21	0.03334	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	22	0.00037	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	23	0.03338	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
REST OF THE U.S.	1	0.03033	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	0.03153	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3	0.03093	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	4	0.03196	[illegible]	0.00215	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	5	0.03031	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	6	0.01273	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00301	0.00346
	7	0.04844	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00418	[illegible]
	8	0.00375	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00300	0.00144
	9	0.02779	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.36400	[illegible]
	10	0.03114	[illegible]	[illegible]	[illegible]	[illegible]	0.01107	0.03000	[illegible]
	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	12	0.03217	[illegible]	[illegible]	[illegible]	[illegible]	0.00927	0.03549	0.01325
	13	0.03374	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.03969	[illegible]
	14	0.03931	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.06777	0.03107
	15	0.03179	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.13383	0.02106
	16	0.00117	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.05315	[illegible]
	17	0.03347	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.03967	[illegible]
	18	0.03331	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.01919	[illegible]
	19	0.03733	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.03682	[illegible]
	20	0.03329	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00126	[illegible]
	21	0.03395	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00331	[illegible]
	22	0.03284	[illegible]	[illegible]	[illegible]	0.06967	[illegible]	0.03692	0.31320
	23	0.03803	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00180	[illegible]

	INDUSTRY	17	18	19	20	21	22	23
APPALACHIA	1	0.00500	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	2	0.00006	0.00301	[illegible]	0.00002	0.00011	0.00012	0.00230
	3	0.00000	0.00030	[illegible]	0.00000	0.00000	0.00000	0.00030
	4	0.00023	0.00002	[illegible]	0.00229	0.00429	0.05359	0.00089
	5	0.00500	0.00000	[illegible]	0.00020	0.00002	0.00001	0.00001
	6	0.00100	0.00034	[illegible]	0.00203	0.00054	0.00157	0.00088
	7	0.00372	0.00032	[illegible]	0.00086	0.00035	0.00033	0.00293
	8	0.00648	0.00034	[illegible]	0.00309	0.00195	0.00129	0.00579
	9	0.00635	0.00045	[illegible]	0.00190	0.00080	0.00363	0.00313
	10	0.00319	0.00001	[illegible]	0.00023	0.00004	0.00001	0.00361
	11	[illegible]	0.00025	[illegible]	0.00079	0.00027	0.00424	0.00443
	12	0.00331	0.00057	[illegible]	0.00147	0.00022	0.00159	0.02980
	13	[illegible]	0.00164	[illegible]	0.00015	0.00020	0.00025	0.02315
	14	0.00785	0.00056	[illegible]	0.00675	0.00009	0.00064	0.02527
	15	0.00338	0.00039	[illegible]	0.00034	0.00022	0.00261	0.00224
	16	0.00383	0.00355	[illegible]	0.00032	0.00009	0.00252	0.00304
	17	[illegible]	0.00002	[illegible]	0.00006	0.00001	0.00040	0.00000
	18	0.00194	0.00198	[illegible]	0.00047	0.00008	0.00331	0.00125
	19	[illegible]	0.00064	[illegible]	0.00053	0.01019	[illegible]	0.01449
	20	0.00030	0.00300	[illegible]	0.00000	0.00000	0.00060	0.00000
	21	0.03072	0.00020	[illegible]	0.01575	0.02941	0.00069	0.00172
	22	0.00396	0.00020	[illegible]	0.00782	0.00360	0.00458	0.00184
	23	0.00000	0.00000	[illegible]	0.00000	0.00006	0.00000	0.00000
OZARKS	1	0.00030	0.00006	[illegible]	0.00248	0.03096	0.00020	0.00320
	2	[illegible]	0.00026	[illegible]	0.00020	0.00305	0.00349	0.00546
	3	[illegible]	0.00000	[illegible]	0.00000	0.00182	0.00001	0.00000
	4	0.03030	0.00030	[illegible]	0.00000	0.00000	0.00000	0.00000
	5	0.02038	0.00302	[illegible]	0.00091	0.00011	0.00003	0.00003
	6	0.02342	0.00014	[illegible]	0.00040	0.00028	0.00044	0.00037
	7	0.29317	0.00302	[illegible]	0.00015	0.00000	0.00030	0.00090
	8	[illegible]	0.00306	[illegible]	0.00512	0.00322	0.00213	0.00950
	9	[illegible]	0.00015	[illegible]	0.00008	0.00028	0.00126	0.00108
	10	[illegible]	0.00003	[illegible]	0.00113	0.00020	0.00004	0.02790
	11	0.20333	0.00018	[illegible]	0.00001	0.00010	0.00274	0.00288
	12	0.02460	0.00425	[illegible]	0.01378	0.00160	0.01164	0.29575
	13	0.03133	0.00307	[illegible]	0.00001	0.00001	0.00061	0.00103
	14	[illegible]	[illegible]	[illegible]	0.00025	0.00003	0.00042	0.00050
	15	0.00129	0.00014	[illegible]	0.00021	0.00010	0.00045	0.00085
	16	0.02320	0.00007	[illegible]	0.00006	0.00001	0.00032	0.00014
	17	0.00376	0.00201	[illegible]	0.00002	0.00000	0.00016	0.00000
	18	0.23339	0.00012	[illegible]	0.00000	0.00001	0.00054	0.00021
	19	0.38082	0.00009	[illegible]	0.00289	0.00141	0.00281	0.00206
	20	0.01372	0.00215	[illegible]	0.01040	0.01222	0.01570	0.03875
	21	0.00311	0.00003	[illegible]	0.00231	0.00376	0.00161	0.00025
	22	0.05027	0.00006	[illegible]	0.00226	0.00109	0.00131	0.00110
	23	0.03195	0.00002	[illegible]	0.00440	0.00540	0.00314	0.00009
REST OF THE U.S.	1	0.03338	0.00302	[illegible]	0.00072	0.01025	0.00007	0.00112
	2	0.03380	0.00313	[illegible]	0.00034	0.00150	0.00172	0.03250
	3	0.03330	0.00360	[illegible]	0.00000	0.00933	0.00006	0.00000
	4	0.00160	0.00014	[illegible]	0.01020	0.03125	0.38074	0.00062
	5	0.03330	0.00314	[illegible]	0.00049	0.00678	0.00020	0.00020
	6	0.00059	0.00288	[illegible]	0.01099	0.00491	0.01211	0.00734
	7	0.01063	0.00442	[illegible]	0.00913	0.00495	0.01060	0.03599
	8	0.03916	0.00040	[illegible]	0.00218	0.02023	0.01337	0.04025
	9	0.10289	0.00490	[illegible]	0.03182	0.01302	0.05061	0.05062
	10	[illegible]	0.00041	[illegible]	0.01951	0.00469	0.00052	0.38245
	11	0.01826	0.00318	[illegible]	0.02169	0.00341	0.05273	0.03536
	12	[illegible]	0.00229	[illegible]	0.00722	0.00083	0.00613	0.15329
	13	0.09403	0.00704	[illegible]	0.00043	0.00684	0.00169	0.09900
	14	0.39706	0.00095	[illegible]	0.00938	0.00106	0.00796	0.31624
	15	[illegible]	0.00890	[illegible]	0.00491	0.00611	0.03456	0.03532
	16	[illegible]	0.01931	[illegible]	0.00066	0.00430	0.06401	0.07956
	17	0.23129	0.00279	[illegible]	0.00714	0.00119	0.10023	0.00010
	18	0.00000	0.00341	[illegible]	0.01427	0.00249	0.10112	0.03813
	19	0.03744	0.00305	[illegible]	0.02752	0.01363	0.02713	0.01992
	20	[illegible]	0.00029	[illegible]	0.00210	0.00163	0.00209	0.00742
	21	[illegible]	0.00071	[illegible]	0.05051	0.04255	0.02491	0.00626
	22	0.01155	0.00240	[illegible]	0.09031	0.04672	0.05039	0.04232
	23	0.00084	0.00001	0.00256	0.00229	0.02167	0.00104	0.00003

Table J-3 (Cont.)

REST OF THE U.S.

	INDUSTRY	1	2	3	4	5	6	7	8	9	10	11	12
APPALACHIA	1	0.01533	0.00000	0.00000	0.00000	0.02210	0.00153	0.00005	0.00030	0.00008	[illegible]	0.00001	0.00006
	2	0.00337	0.02574	0.00000	0.00000	0.00174	0.00478	0.01806	0.00345	0.00079	[illegible]	0.00010	0.02033
	3	0.00000	0.00000	0.00026	0.00000	0.00030	0.00000	0.00003	0.00983	0.00060	[illegible]	[illegible]	[illegible]
	4	0.00002	0.00000	0.00000	0.00291	0.00025	0.00031	0.00012	0.00800	0.00004	[illegible]	[illegible]	0.00003
	5	0.00167	0.00000	0.00000	0.03030	0.00653	0.00018	0.00021	0.00001	0.00000	[illegible]	[illegible]	[illegible]
	6	0.00026	0.00006	0.00001	0.00380	0.00259	0.03070	0.00126	0.00016	0.00129	0.00019	0.00135	[illegible]
	7	0.00418	0.00347	0.00019	0.03065	0.00197	0.00707	0.02203	0.00205	0.00452	[illegible]	0.00676	[illegible]
	8	0.00039	0.00006	0.00003	0.00001	0.00017	0.00011	0.00048	0.00075	0.00001	0.00005	0.00002	[illegible]
	9	0.00367	0.00053	0.00028	0.00013	0.00137	0.00334	0.00232	0.00006	0.00184	[illegible]	[illegible]	[illegible]
	10	0.00055	0.00014	0.00003	0.00001	0.00059	0.00369	0.00024	0.00001	0.00006	0.01366	0.00316	[illegible]
	11	0.00062	0.00002	0.00000	0.00017	0.00016	0.00167	0.00012	0.00003	0.00014	[illegible]	[illegible]	[illegible]
	12	0.00033	0.00128	0.00005	0.03300	0.00845	0.00112	0.00247	0.00342	0.00076	[illegible]	0.00173	[illegible]
	13	0.00061	0.00082	0.00003	0.00008	0.00023	0.00016	0.00213	0.00002	0.00016	[illegible]	[illegible]	[illegible]
	14	0.00033	0.00010	0.00017	0.00007	0.00502	0.00060	0.00121	0.00088	0.00028	[illegible]	0.00133	0.00035
	15	0.00015	0.00652	0.00024	0.00007	0.00003	0.00023	0.00029	0.00001	0.00036	[illegible]	0.00014	[illegible]
	16	0.00007	0.00005	0.00011	0.00003	0.00008	0.00037	0.00005	0.00002	0.00006	[illegible]	0.00023	0.00310
	17	0.00004	0.00001	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00001	[illegible]	[illegible]	[illegible]
	18	0.00000	0.00000	0.00001	0.00045	0.00000	0.00021	0.00039	0.00001	0.00009	[illegible]	[illegible]	0.00036
	19	0.00747	0.00256	0.00216	0.00242	0.01920	0.00949	0.00700	0.00714	0.00144	[illegible]	0.00175	[illegible]
	20	0.00239	0.00028	0.00017	0.00036	0.00290	0.00213	0.00003	0.00022	0.00029	[illegible]	[illegible]	[illegible]
	21	0.00010	0.00068	0.00343	0.00133	0.00149	0.00151	0.00099	0.00057	0.00025	[illegible]	[illegible]	[illegible]
	22	0.00132	0.00006	0.00045	0.00074	0.00274	0.00001	0.00164	0.00047	0.00027	[illegible]	[illegible]	[illegible]
	23	0.00216	0.00002	0.00001	0.00016	0.00002	0.00025	0.00012	0.00009	0.00002	[illegible]	[illegible]	[illegible]
UGAMKA	1	0.00000	0.00000	0.00000	0.00300	0.00300	0.00000	0.00000	0.00030	0.00030	[illegible]	[illegible]	[illegible]
	2	0.00007	0.00032	0.00000	0.00000	0.00003	0.00010	0.00038	0.00007	0.00082	[illegible]	[illegible]	[illegible]
	3	0.00000	0.00000	0.00082	0.00300	0.00000	0.00000	0.00001	0.03163	0.00030	[illegible]	[illegible]	[illegible]
	4	0.00000	0.00000	0.00000	0.00300	0.00030	0.00000	0.00000	0.00000	0.00003	[illegible]	[illegible]	[illegible]
	5	0.00044	0.00000	0.00000	0.00000	0.00171	0.00005	0.00006	0.00000	0.00039	[illegible]	[illegible]	[illegible]
	6	0.00002	0.00000	0.00000	0.03027	0.00018	0.00218	0.00009	0.00331	0.00000	[illegible]	[illegible]	[illegible]
	7	0.00020	0.00002	0.00001	0.00003	0.00009	0.00037	0.00103	0.00010	0.00071	[illegible]	[illegible]	[illegible]
	8	0.00028	0.00003	0.00002	0.00000	0.00008	0.00005	0.00023	0.00036	0.00050	[illegible]	[illegible]	[illegible]
	9	0.00021	0.00007	0.00006	0.00002	0.00017	0.03043	0.00026	0.00001	0.00025	[illegible]	[illegible]	[illegible]
	10	0.00020	0.00005	0.00001	0.00000	0.00021	0.00134	0.00009	0.00000	0.00002	[illegible]	[illegible]	[illegible]
	11	0.00000	0.00000	0.00000	0.00302	0.00002	0.00023	0.00002	0.00000	0.00332	[illegible]	[illegible]	[illegible]
	12	0.00003	0.00011	0.00000	0.00000	0.00059	0.00010	0.00021	0.00004	0.00037	[illegible]	[illegible]	[illegible]
	13	0.00000	0.00001	0.00000	0.00030	0.00000	0.00000	0.00052	0.00003	0.00300	[illegible]	[illegible]	[illegible]
	14	0.00001	0.00000	0.00001	0.00300	0.00817	0.00002	0.00009	0.00003	0.00031	[illegible]	[illegible]	[illegible]
	15	0.00003	0.00004	0.00002	0.00001	0.00000	0.00002	0.00002	0.00000	0.00300	[illegible]	[illegible]	[illegible]
	16	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	[illegible]	[illegible]	[illegible]
	17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00300	0.00023	[illegible]	[illegible]	[illegible]
	18	0.00000	0.00000	0.00000	0.00004	0.00300	0.00002	0.00004	0.00000	0.00031	[illegible]	[illegible]	[illegible]
	19	0.00100	0.00034	0.00024	0.00032	0.00297	0.00127	0.00091	0.00095	0.00319	[illegible]	[illegible]	[illegible]
	20	0.00002	0.00000	0.00000	0.00004	0.00302	0.00002	0.00001	0.00330	0.00355	[illegible]	[illegible]	[illegible]
	21	0.00044	0.00009	0.00048	0.00019	0.00021	0.00021	0.00014	0.00338	0.00334	[illegible]	[illegible]	[illegible]
	22	0.00037	0.00002	0.00012	0.00041	0.00076	0.00022	0.00049	0.00013	0.00316	[illegible]	[illegible]	[illegible]
	23	0.00006	0.00000	0.00000	0.00000	0.00002	0.00001	0.00030	0.00030	0.00030	[illegible]	[illegible]	[illegible]
REST OF THE U.S.	1	0.24009	0.00000	0.00000	0.00000	0.40396	0.02796	0.00063	0.03970	0.00050	[illegible]	[illegible]	[illegible]
	2	0.01029	0.07651	0.00000	0.00030	0.00529	0.01438	0.01733	0.01092	0.39740	[illegible]	[illegible]	[illegible]
	3	0.00000	0.00064	0.04122	0.00000	0.00330	0.00000	0.00211	0.41470	0.63030	[illegible]	[illegible]	[illegible]
	4	0.00093	0.00015	0.00008	0.12370	0.01090	0.01320	0.00302	0.03308	0.02147	[illegible]	[illegible]	[illegible]
	5	0.04004	0.00000	0.00000	0.00000	0.15489	0.00433	0.00544	0.00015	0.00331	[illegible]	[illegible]	[illegible]
	6	0.00292	0.00072	0.00015	0.04285	0.02926	0.34613	0.01426	0.00180	0.00158	[illegible]	[illegible]	[illegible]
	7	0.04429	0.00497	0.00201	0.03484	0.02086	0.00340	0.23337	0.07172	0.01793	[illegible]	[illegible]	[illegible]
	8	0.05292	0.00536	0.00284	0.00360	0.01509	0.01053	0.04341	0.36793	0.30393	[illegible]	[illegible]	[illegible]
	9	0.02546	0.00813	0.00420	0.00203	0.02086	0.05092	0.03088	0.33349	0.07833	[illegible]	[illegible]	[illegible]
	10	0.01695	0.00274	0.00063	0.00010	0.01180	0.07383	0.00476	0.33021	0.03116	[illegible]	[illegible]	[illegible]
	11	0.00037	0.00046	0.00000	0.00348	0.30330	0.03482	0.00267	0.03064	0.03307	[illegible]	[illegible]	[illegible]
	12	0.00260	0.01022	0.00036	0.00000	0.39462	0.00097	0.01973	0.03132	0.03610	[illegible]	[illegible]	[illegible]
	13	0.00006	0.00446	0.00029	0.00043	0.00126	0.00066	0.01155	0.00039	0.03377	[illegible]	[illegible]	[illegible]
	14	0.00553	0.00166	0.00286	0.00111	0.00310	0.00996	0.02001	0.01453	0.00470	[illegible]	[illegible]	[illegible]
	15	0.00788	0.01179	0.00549	0.03164	0.00060	0.00926	0.00600	0.03319	0.03150	[illegible]	[illegible]	[illegible]
	16	0.00134	0.00107	0.00205	0.00064	0.00154	0.00129	0.00107	0.03051	0.03116	[illegible]	[illegible]	[illegible]
	17	0.00196	0.00071	0.00022	0.00046	0.04030	0.00007	0.00002	0.03030	0.05364	[illegible]	[illegible]	[illegible]
	18	0.00000	0.00000	0.00018	0.09995	0.00000	0.01436	0.00316	0.03318	0.03788	[illegible]	[illegible]	[illegible]
	19	0.01065	0.00365	0.00307	0.00345	0.02750	0.01354	0.00996	0.31019	0.03286	[illegible]	[illegible]	[illegible]
	20	0.01852	0.00214	0.00120	0.00281	0.02309	0.01049	0.00643	0.30178	0.03471	[illegible]	[illegible]	[illegible]
	21	0.02332	0.00259	0.01311	0.00309	0.00076	0.00579	0.00376	0.03220	0.00091	[illegible]	[illegible]	[illegible]
	22	0.01738	0.00089	0.00582	0.00976	0.00613	0.01068	0.07161	0.08421	0.02786	[illegible]	[illegible]	[illegible]
	23	0.00002	0.00007	0.00004	0.00040	0.00232	0.00076	0.00036	0.00027	0.00001	[illegible]	[illegible]	[illegible]

	INDUSTRY	13	14	15	16	17	18	19	20	21	22	23
APPALACHIA	1	0.00300	0.00000	0.00000	[illegible]	0.00033	0.00330	[illegible]	[illegible]	0.00219	0.00001	0.00023
	2	0.01065	0.00029	0.00059	[illegible]	[illegible]	0.00018	[illegible]	[illegible]	0.00115	0.00131	0.02475
	3	0.03003	0.00000	0.00300	[illegible]	[illegible]	0.00000	[illegible]	[illegible]	0.00013	0.00000	0.00000
	4	0.00007	0.00000	0.00003	[illegible]	[illegible]	0.00000	[illegible]	[illegible]	0.00062	0.01002	0.00002
	5	0.00060	0.00000	0.00300	[illegible]	[illegible]	0.00021	[illegible]	[illegible]	[illegible]	0.00001	0.00001
	6	0.00024	0.00039	0.00321	0.00051	0.00079	0.00027	[illegible]	[illegible]	0.00064	0.00126	0.00070
	7	0.00162	0.00073	0.00036	0.00118	0.00597	0.00043	[illegible]	[illegible]	[illegible]	0.00174	0.00523
	8	0.03011	0.00006	0.00007	0.00302	0.00036	0.00001	[illegible]	[illegible]	[illegible]	0.00018	0.00082
	9	0.00070	0.00049	0.00242	[illegible]	0.00140	[illegible]	[illegible]	0.00210	[illegible]	0.00369	0.00335
	10	0.00017	0.00056	0.00031	[illegible]	0.00066	0.00037	[illegible]	[illegible]	0.00014	0.03003	0.01945
	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00016	[illegible]	0.00179	[illegible]	0.00271	0.00285
	12	[illegible]	0.00185	0.00199	[illegible]	0.00009	0.00370	[illegible]	[illegible]	0.00029	0.00216	0.05396
	13	[illegible]	0.00230	0.01000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00021	0.01928
	14	[illegible]	0.00399	0.03301	[illegible]	[illegible]	0.00344	[illegible]	0.00059	0.00007	0.00050	0.01977
	15	[illegible]	[illegible]	0.00610	[illegible]	0.00736	0.00327	[illegible]	[illegible]	0.00019	0.00102	0.00144
	16	0.00057	0.00061	0.00281	[illegible]	0.00313	0.00373	[illegible]	[illegible]	0.00012	0.00336	0.00406
	17	[illegible]	[illegible]	0.00331	[illegible]	0.00408	0.00300	[illegible]	[illegible]	0.00002	0.00218	0.00000
	18	0.00010	0.00009	0.00372	0.00222	0.00206	0.00783	[illegible]	[illegible]	0.00011	0.00474	0.00179
	19	0.00009	0.00334	0.00387	0.00280	0.00376	0.00362	[illegible]	[illegible]	[illegible]	0.01962	0.01441
	20	0.00125	0.00300	[illegible]	0.00135	[illegible]	[illegible]	[illegible]	[illegible]	0.00159	0.00203	0.00761
	21	0.00675	[illegible]	0.00391	[illegible]	0.00649	0.00319	[illegible]	[illegible]	0.00456	0.00001	0.00166
	22	0.00039	[illegible]	[illegible]	[illegible]	0.00310	0.00319	[illegible]	0.00736	0.00357	0.00431	0.00362
	23	0.00047	[illegible]	[illegible]	[illegible]	0.00033	0.00381	[illegible]	[illegible]	[illegible]	0.00102	0.00003
UGAMKA	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00000	0.00000
	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00063	0.00090
	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00000	0.00000
	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00000	0.00000
	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00000	0.00000
	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00009	0.00005
	7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00008	0.00024
	8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00009	0.00040
	9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00030	0.00043
	10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00001	0.00709
	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00036	0.00049
	12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00019	0.00403
	13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00000	0.00016
	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00002	0.00066
	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00014	0.00012
	16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00017	0.00021
	17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00019	0.00000
	18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00049	0.00017
	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00262	0.00192
	20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00001	0.00006
	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00093	0.00023
	22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00119	0.00100
	23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00063	0.00000
REST OF THE U.S.	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00040	0.00640
	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00400	0.07551
	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00009	0.00000
	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.04420	0.00069
	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00023	0.00023
	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.01401	0.00785
	7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.01039	0.05535
	8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.01051	0.07441
	9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.05932	0.05105
	10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00053	0.30947
	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.05463	0.05947
	12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.01722	0.42046
	13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00116	0.10436
	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00830	0.32757
	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.04119	0.03695
	16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00532	0.07072
	17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.10714	0.00010
	18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.09979	0.03742
	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.02798	0.02055
	20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.01579	0.05692
	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.03428	0.00635
	22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.05478	0.04765
	23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00313	0.00009

Table J-4

Interregional Interindustry Multiplier Matrix

APPALACHIA

INDUSTRY		1	2	3	4	5	6	7	8	9	10	11	12
APPALACHIA	1	1.27151	0.00018	0.00029	0.00101	0.40864	0.03490	0.00259	0.00046	0.00042	0.02147	0.00181	0.00052
	2	0.03615	1.11847	0.00192	0.03415	0.04724	0.04827	0.11556	0.02232	0.01007	0.00526	0.01378	0.10279
	3	0.08169	0.00017	1.00304	0.06009	0.00148	0.00071	0.00152	0.11436	0.00011	0.00020	0.00012	0.00019
	4	0.00150	0.00012	0.00022	1.01539	0.00337	0.00300	0.00156	0.00046	0.00039	0.00059	0.00037	0.00038
	5	0.01497	0.00003	0.00002	0.03011	1.36316	0.00279	0.00242	0.00013	0.00011	0.00634	0.00026	0.00010
	6	0.00391	0.00060	0.00026	0.02852	0.01792	1.15575	0.00870	0.00139	0.00661	0.00165	0.00063	0.00441
	7	0.01822	0.00387	0.00156	0.00661	0.03245	0.06734	1.14243	0.01445	0.02983	0.00602	0.00735	0.01044
	8	0.00569	0.00053	0.00029	0.00021	0.08481	0.00187	0.00407	1.00525	0.00026	0.00004	0.00032	0.00061
	9	0.00718	0.00167	0.00069	0.00115	0.00880	0.01301	0.00712	0.00112	1.00486	0.00199	0.00795	0.00255
	10	0.01893	0.00321	0.00107	0.03267	0.02351	0.00286	0.00752	0.00151	0.00218	1.24458	0.09929	0.00808
	11	0.00095	0.00022	0.00010	0.00137	0.00239	0.01163	0.00130	0.00041	0.00097	0.00131	1.01154	0.00086
	12	0.01283	0.01096	0.00109	0.00148	0.86367	0.01635	0.02464	0.00506	0.00685	0.00632	0.01574	1.08842
	13	0.00753	0.00668	0.00150	0.00196	0.01920	0.00873	0.02106	0.00384	0.00271	0.00306	0.02541	0.00199
	14	0.00576	0.00096	0.00118	0.00091	0.03230	0.00629	0.00067	0.00591	0.00199	0.00249	0.00808	0.00245
	15	0.00232	0.00203	0.00069	0.00047	0.00238	0.00192	0.00217	0.00072	0.00040	0.00047	0.00123	0.00056
	16	0.00091	0.00026	0.00033	0.00026	0.00144	0.00081	0.00067	0.00043	0.00023	0.00025	0.00073	0.00038
	17	0.00076	0.00017	0.00010	0.00018	0.00079	0.00835	0.00030	0.00015	0.00013	0.00012	0.00021	0.00010
	18	0.00067	0.00009	0.00013	0.00123	0.00117	0.00124	0.00149	0.00028	0.00835	0.00013	0.00053	0.00027
	19	0.02152	0.00413	0.00354	0.00560	0.04533	0.02618	0.01621	0.01355	0.00350	0.00096	0.00499	0.06846
	20	0.02790	0.00285	0.00168	0.00397	0.03836	0.02404	0.00959	0.00298	0.00298	0.00575	0.00736	0.00418
	21	0.01362	0.00124	0.00465	0.08257	0.01161	0.00599	0.00337	0.00522	0.00078	0.00125	0.00135	0.00114
	22	0.00386	0.00023	0.00074	0.00136	0.00732	0.00307	0.00329	0.00149	0.00057	0.00061	0.00079	0.00059
	23	0.01221	0.00048	0.00087	0.00122	0.01038	0.00378	0.00105	0.00163	0.00061	0.00284	0.00273	0.00061
OZARKA	1	0.00011	0.00001	0.00003	0.00004	0.00075	0.00025	0.00007	0.00004	0.00002	0.00011	0.00005	0.00002
	2	0.00041	0.00018	0.00005	0.00010	0.00088	0.00060	0.00053	0.00020	0.00011	0.00011	0.00018	0.00043
	3	0.00334	0.00029	0.00012	0.00821	0.08305	0.00155	0.00238	0.00780	0.00023	0.00042	0.00026	0.00018
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00052	0.00000	0.00000	0.00381	0.00138	0.00015	0.00008	0.00001	0.00001	0.00002	0.00001	0.00001
	6	0.00015	0.00002	0.00001	0.00054	0.00054	0.00368	0.00026	0.00005	0.00617	0.00005	0.00023	0.00012
	7	0.00033	0.00003	0.00002	0.00086	0.00039	0.00067	0.00089	0.00012	0.00020	0.00006	0.00008	0.00008
	8	0.00029	0.00003	0.00002	0.00004	0.00039	0.00022	0.00020	0.00017	0.00003	0.00005	0.00004	0.00005
	9	0.00060	0.00013	0.00007	0.00011	0.00078	0.00110	0.00050	0.00012	0.00037	0.00016	0.00068	0.00020
	10	0.00067	0.00009	0.00005	0.00022	0.08101	0.00286	0.00033	0.00011	0.00011	0.00331	0.00143	0.00024
	11	0.00007	0.00001	0.00001	0.00087	0.00016	0.00054	0.00008	0.00003	0.00004	0.00006	0.00043	0.00004
	12	0.00083	0.00054	0.00009	0.00012	0.00340	0.00101	0.00130	0.00032	0.00336	0.00036	0.00040	0.00419
	13	0.00003	0.00002	0.00001	0.00001	0.00008	0.00006	0.00006	0.00002	0.00001	0.00001	0.00006	0.00001
	14	0.00008	0.00001	0.00001	0.00301	0.00032	0.00009	0.00009	0.00006	0.00002	0.00001	0.00007	0.00003
	15	0.00008	0.00005	0.00003	0.00002	0.00011	0.00068	0.00008	0.00034	0.00352	0.00002	0.00004	0.00002
	16	0.00004	0.00001	0.00001	0.00001	0.00007	0.00004	0.00003	0.00002	0.00001	0.00001	0.00003	0.00002
	17	0.00007	0.00000	0.00000	0.00061	0.00003	0.00001	0.00001	0.00001	0.00000	0.00000	0.00001	0.00000
	18	0.00005	0.00001	0.00001	0.00007	0.00010	0.00009	0.00009	0.00002	0.00002	0.00001	0.00003	0.00002
	19	0.00272	0.00054	0.00044	0.00872	0.00971	0.00352	0.00204	0.00171	0.00044	0.00067	0.00061	0.00105
	20	0.00013	0.00002	0.00002	0.00084	0.00025	0.00819	0.00008	0.00006	0.00062	0.00005	0.00004	0.00004
	21	0.00161	0.00016	0.00061	0.00034	0.00137	0.00081	0.00045	0.00072	0.00010	0.00017	0.00018	0.00015
	22	0.00101	0.00007	0.00019	0.00035	0.00184	0.00001	0.00086	0.00040	0.00015	0.00014	0.00020	0.00015
	23	0.00025	0.00003	0.00006	0.00005	0.00053	0.00018	0.00010	0.00011	0.00002	0.00005	0.00004	0.00004
REST OF THE U.S.	1	0.14983	0.00064	0.00126	0.00452	0.34888	0.04996	0.03843	0.00215	0.00183	0.01876	0.00435	0.00164
	2	0.01959	0.00740	0.00203	0.03475	0.33528	0.03040	0.02930	0.00012	0.03595	0.00417	0.00458	0.01010
	3	0.08869	0.00769	0.02476	0.00549	0.07971	0.04860	0.06507	0.02865	0.03611	0.01116	0.00670	0.00996
	4	0.03266	0.00258	0.00590	0.14055	0.00601	0.05907	0.03120	0.01217	0.03600	0.00888	0.00959	0.00675
	5	0.05640	0.00018	0.00017	0.03395	0.17360	0.01244	0.00794	0.00069	0.03078	0.00194	0.00120	0.00054
	6	0.02655	0.00260	0.00171	0.00898	0.07082	0.47225	0.05432	0.00660	0.02174	0.00040	0.02093	0.01489
	7	0.07454	0.00755	0.00385	0.01953	0.09063	0.15871	0.22203	0.02826	0.04807	0.01375	0.01929	0.01967
	8	0.09991	0.00875	0.00547	0.00614	0.09063	0.04389	0.07074	0.07990	0.00682	0.01266	0.00768	0.01120
	9	0.03701	0.01141	0.00693	0.01106	0.07758	0.10607	0.05467	0.01261	0.03296	0.01529	0.05392	0.01836
	10	0.02706	0.00345	0.00221	0.01086	0.05336	0.11496	0.01410	0.00514	0.00514	0.16905	0.04883	0.00679
	11	0.00480	0.00140	0.00126	0.00853	0.01908	0.05835	0.00941	0.00347	0.00431	0.00613	0.04129	0.00429
	12	0.01997	0.00593	0.00211	0.00376	0.05289	0.02530	0.02084	0.00638	0.00537	0.00567	0.01108	0.03711
	13	0.01631	0.00676	0.00346	0.00441	0.04448	0.02067	0.02516	0.00967	0.00882	0.00526	0.02129	0.00560
	14	0.03144	0.00461	0.00487	0.00904	0.11884	0.03528	0.03416	0.02124	0.08701	0.00497	0.02629	0.00891
	15	0.02597	0.01718	0.00820	0.00986	0.33001	0.02393	0.02422	0.01191	0.00470	0.00540	0.01349	0.00600
	16	0.01446	0.00377	0.00437	0.00421	0.02395	0.01305	0.01080	0.00727	0.00330	0.00342	0.00978	0.00492
	17	0.01327	0.00215	0.00211	0.00380	0.01996	0.00904	0.00832	0.00438	0.00210	0.00224	0.00344	0.00202
	18	0.01194	0.00153	0.00224	0.01481	0.02116	0.01865	0.01998	0.00909	0.00460	0.00255	0.00703	0.00378
	19	0.02812	0.00569	0.00454	0.00744	0.05886	0.03440	0.02108	0.01757	0.03457	0.00895	0.00652	0.01071
	20	0.01307	0.00100	0.00100	0.00317	0.02310	0.01675	0.00621	0.00339	0.00170	0.00208	0.00124	0.00178
	21	0.04716	0.00428	0.01586	0.00898	0.04147	0.02138	0.01201	0.01925	0.00275	0.00442	0.00477	0.00399
	22	0.04640	0.00306	0.00869	0.01616	0.00417	0.03758	0.03917	0.01829	0.03604	0.00758	0.00898	0.00703
	23	0.00908	0.00063	0.00140	0.00138	0.01041	0.00458	0.00250	0.00228	0.00052	0.00161	0.00104	0.00079

INDUSTRY		13	14	15	16	17	18	19	20	21	22	23
APPALACHIA	1	0.00062	0.00060	0.00068	0.00051	0.00097	0.00023	0.00198	0.00592	0.03981	0.00167	0.01166
	2	0.46785	0.09128	0.03968	0.04131	0.08172	0.00684	0.10511	0.01836	0.03272	0.03075	0.23727
	3	0.00049	0.00028	0.00026	0.00018	0.00036	0.00004	0.00214	0.00108	0.00242	0.00066	0.00201
	4	0.00096	0.00074	0.00067	0.00369	0.30108	0.00014	0.00312	0.00470	0.00398	0.03349	0.00232
	5	0.00017	0.00009	0.00009	0.00009	0.00015	0.00009	0.00064	0.00283	0.00110	0.00031	0.00064
	6	0.00293	0.00319	0.00248	0.00396	0.00676	0.00166	0.00275	0.01033	0.00455	0.01282	0.00939
	7	0.01673	0.00912	0.00411	0.01642	0.01342	0.00347	0.00637	0.00965	0.00965	0.01719	0.04683
	8	0.00154	0.00046	0.00064	0.00045	0.00100	0.00011	0.00798	0.00361	0.00295	0.00192	0.00698
	9	0.00453	0.00408	0.00791	0.00893	0.02120	0.00149	0.00783	0.00740	0.00473	0.01137	0.01396
	10	0.00799	0.01336	0.00236	0.00598	0.31705	0.00096	0.01405	0.02140	0.03883	0.00727	0.35701
	11	0.00145	0.00238	0.00231	0.00506	0.00405	0.00100	0.00276	0.00445	0.00249	0.01573	0.01735
	12	0.04362	0.02335	0.02322	0.03192	0.04529	0.00665	0.01721	0.02704	0.03502	0.02444	0.40026
	13	1.24981	0.20350	0.11640	0.07294	0.14685	0.01052	0.01627	0.00922	0.01726	0.01983	0.16307
	14	0.01548	1.02214	0.01934	0.01605	0.03372	0.00274	0.00764	0.00619	0.00976	0.00722	0.10818
	15	0.02224	0.00877	1.02235	0.00529	0.01278	0.00123	0.00215	0.00246	0.00219	0.00782	0.01119
	16	0.00268	0.00229	0.00688	1.31512	0.30872	0.00162	0.00252	0.00208	0.00173	0.00844	0.01008
	17	0.00074	0.00126	0.00261	0.00090	1.03819	0.00050	0.00267	0.00185	0.06069	0.01778	0.00096
	18	0.00094	0.00243	0.00239	0.00340	0.00819	1.00615	0.00134	0.00268	0.00140	0.01205	0.00579
	19	0.01713	0.00999	0.01019	0.00432	0.01772	0.00179	1.05401	0.03300	0.02200	0.03458	0.03834
	20	0.01547	0.01055	0.01257	0.01069	0.01609	0.00268	0.01657	1.02046	0.02051	0.02027	0.04992
	21	0.00328	0.00222	0.00278	0.00237	0.00348	0.00054	0.00906	0.02202	1.03386	0.01213	0.00795
	22	0.00152	0.00115	0.00149	0.00170	0.30258	0.00040	0.00457	0.01039	0.00031	1.00721	0.00715
	23	0.00352	0.00293	0.00482	0.00131	0.00322	0.00026	0.02658	0.01133	0.07247	0.00691	1.00511
OZARKA	1	0.00003	0.00003	0.00003	0.00003	0.00005	0.00001	0.00008	0.00018	0.00823	0.00010	0.00023
	2	0.00106	0.00057	0.00049	0.00040	0.00081	0.00008	0.00067	0.00051	0.00050	0.00061	0.00221
	3	0.00100	0.00059	0.00061	0.00039	0.00085	0.00009	0.00409	0.00212	0.00194	0.00137	0.00392
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000	0.00002	0.00008	0.00003	0.00002	0.00004
	6	0.00010	0.00010	0.00009	0.00013	0.00024	0.00005	0.00011	0.00012	0.00017	0.00051	0.00033
	7	0.00015	0.00010	0.00009	0.00012	0.00020	0.00003	0.00018	0.00014	0.00013	0.00023	0.00043
	8	0.00012	0.00002	0.00008	0.00006	0.00013	0.00001	0.00032	0.00022	0.00020	0.00019	0.00035
	9	0.00040	0.00034	0.00065	0.00071	0.00173	0.00012	0.00063	0.00063	0.00042	0.00113	0.00110
	10	0.00034	0.00042	0.00037	0.00031	0.00072	0.00006	0.00053	0.00075	0.00111	0.00060	0.00417
	11	0.00008	0.00012	0.00012	0.00022	0.00021	0.00004	0.00014	0.00023	0.00010	0.00009	0.00072
	12	0.00222	0.00122	0.00125	0.00164	0.00243	0.00034	0.00103	0.00155	0.00198	0.00140	0.01920
	13	0.00051	0.00041	0.00027	0.00018	0.00039	0.00003	0.00006	0.00004	0.00006	0.00010	0.00043
	14	0.00016	0.00020	0.00020	0.00016	0.00040	0.00003	0.00009	0.00006	0.00012	0.00012	0.00092
	15	0.00059	0.00026	0.00358	0.00317	0.00043	0.00004	0.00008	0.00010	0.00029	0.00026	0.00038
	16	0.00012	0.00009	0.00027	0.00058	0.00056	0.00006	0.00011	0.00009	0.00004	0.00034	0.00040
	17	0.00002	0.00005	0.00006	0.00002	0.00068	0.00001	0.00006	0.00005	0.00003	0.00035	0.00004
	18	0.00007	0.00014	0.00015	0.00010	0.00047	0.00038	0.00005	0.00017	0.00010	0.00046	0.00034
	19	0.00215	0.00126	0.00129	0.00106	0.00225	0.00025	0.00088	0.00412	0.00277	0.00434	0.00483
	20	0.00008	0.00005	0.00006	0.00006	0.00011	0.00301	0.00016	0.00019	0.00818	0.00017	0.00027
	21	0.00044	0.00030	0.00037	0.00032	0.00047	0.00007	0.00120	0.00290	0.00444	0.00161	0.00107
	22	0.00040	0.00030	0.00039	0.00044	0.00068	0.00010	0.00118	0.00267	0.00143	0.00187	0.00185
	23	0.00011	0.00007	0.00008	0.00036	0.00012	0.00001	0.00028	0.00036	0.00045	0.00027	0.00026
REST OF THE U.S.	1	0.00252	0.00211	0.00220	0.00222	0.00404	0.00076	0.00542	0.01467	0.03522	0.00817	0.01930
	2	0.02437	0.04039	0.03372	0.02451	0.03332	0.00447	0.02113	0.01672	0.01996	0.02809	0.08027
	3	0.02633	0.01552	0.01547	0.01014	0.02217	0.00257	0.10929	0.05822	0.05944	0.03597	0.10421
	4	0.01750	0.01381	0.01458	0.01551	0.02491	0.00337	0.05050	0.09145	0.08549	0.09866	0.05304
	5	0.00096	0.00062	0.00063	0.00369	0.00118	0.00036	0.00227	0.00831	0.00442	0.00237	0.00373
	6	0.01384	0.01349	0.01273	0.01792	0.03237	0.00621	0.01528	0.04156	0.02325	0.07209	0.09495
	7	0.03622	0.02270	0.02092	0.02829	0.04611	0.00782	0.02368	0.03177	0.03032	0.05366	0.10210
	8	0.02972	0.01755	0.01797	0.01146	0.02521	0.00267	0.12301	0.06259	0.05457	0.04025	0.11753
	9	0.03969	0.03533	0.06191	0.06691	0.16461	0.01167	0.05916	0.06025	0.04126	0.11000	0.11307
	10	0.01444	0.01638	0.01573	0.01338	0.03088	0.00264	0.02165	0.02995	0.04495	0.02870	0.26885
	11	0.00960	0.01234	0.01332	0.02316	0.02966	0.00464	0.01582	0.02561	0.01619	0.06700	0.01281
	12	0.03250	0.02034	0.02443	0.02619	0.04913	0.00590	0.02008	0.02518	0.03549	0.09299	0.10810
	13	0.18418	0.12279	0.09918	0.06608	0.13801	0.01049	0.04664	0.08801	0.06490	0.03782	0.17016
	14	0.00855	0.07141	0.07196	0.05816	0.15041	0.01043	0.03497	0.03107	0.04407	0.03157	0.31779
	15	0.19326	0.00411	0.19054	0.05402	0.13465	0.01207	0.02547	0.02476	0.02699	0.08152	0.11990
	16	0.03852	0.03047	0.08650	0.17613	0.11579	0.01973	0.03391	0.03080	0.02573	0.10830	0.12624
	17	0.01253	0.01392	0.02779	0.01193	0.29158	0.00494	0.02862	0.03652	0.01609	0.14605	0.02420
	18	0.01498	0.02062	0.03126	0.00641	0.10101	0.00949	0.02010	0.03762	0.02204	0.19727	0.07372
	19	0.02209	0.01299	0.01336	0.01093	0.02339	0.00236	0.06808	0.06228	0.82853	0.04458	0.04976
	20	0.00799	0.00363	0.00743	0.00823	0.01310	0.00139	0.00758	0.01009	0.01076	0.01380	0.02208
	21	0.01161	0.00784	0.00984	0.00860	0.01235	0.00190	0.03165	0.07342	0.11837	0.04228	0.02826
	22	0.01837	0.01371	0.01798	0.02034	0.03137	0.00473	0.03588	0.12094	0.07430	0.08934	0.00409
	23	0.00333	0.00235	0.00340	0.00172	0.00371	0.00037	0.01420	0.01044	0.03103	0.00781	0.00836

Table J-4 (Cont.)

OZARKA

INDUSTRY		1	2	3	4	5	6	7	8	9	10	11	12
APPALACHIA	1	0.00785	0.00021	0.00037	0.00871	0.01596	0.00516	0.00104	0.00048	0.00827	0.00127	0.00060	0.00025
	2	0.01413	0.00743	0.00171	0.00351	0.02639	0.02189	0.02423	0.00651	0.00454	0.00340	0.00973	0.00917
	3	0.00144	0.00015	0.00010	0.00009	0.00137	0.00067	0.00114	0.00166	0.00010	0.00019	0.00011	0.00018
	4	0.08128	0.00011	0.00021	0.01855	0.00341	0.00298	0.00154	0.00043	0.00039	0.00058	0.00057	0.00039
	5	0.00251	0.00001	0.00002	0.00007	0.03764	0.00077	0.00043	0.00085	0.00006	0.00011	0.00068	0.00004
	6	0.00252	0.00034	0.00021	0.00939	0.00918	0.06566	0.00449	0.00084	0.00296	0.00088	0.00392	0.00204
	7	0.01044	0.00107	0.00056	0.00284	0.01221	0.02248	0.02920	0.00376	0.00449	0.00196	0.00277	0.00275
	8	0.00616	0.00054	0.00030	0.00019	0.00427	0.00176	0.00405	0.00570	0.00020	0.00061	0.00029	0.00061
	9	0.00403	0.00083	0.00050	0.00089	0.00561	0.00772	0.00390	0.00094	0.00227	0.00109	0.00372	0.00131
	10	0.00344	0.00046	0.00047	0.00169	0.00580	0.01336	0.00208	0.00097	0.00073	0.01211	0.00414	0.00107
	11	0.00067	0.00011	0.00010	0.00048	0.00146	0.00483	0.00072	0.00027	0.00048	0.00050	0.00373	0.00036
	12	0.00952	0.00195	0.00072	0.00109	0.01499	0.00669	0.00627	0.00198	0.00159	0.00172	0.00341	0.01203
	13	0.00590	0.00295	0.00114	0.00145	0.01437	0.00677	0.01013	0.00307	0.00168	0.00187	0.01001	0.00216
	14	0.00293	0.00045	0.00050	0.00055	0.01110	0.00321	0.00330	0.00204	0.00075	0.00091	0.00260	0.00090
	15	0.00157	0.00111	0.00052	0.00035	0.00196	0.00142	0.00146	0.00063	0.00028	0.00032	0.00083	0.00037
	16	0.00076	0.00019	0.00022	0.00022	0.00127	0.00071	0.00058	0.00039	0.00017	0.00018	0.00047	0.00024
	17	0.00036	0.00005	0.00006	0.00011	0.00062	0.00029	0.00026	0.00014	0.00006	0.00007	0.00009	0.00007
	18	0.00061	0.00008	0.00011	0.00061	0.00109	0.00090	0.00090	0.00026	0.00021	0.00012	0.00031	0.00017
	19	0.02095	0.00417	0.00342	0.00554	0.04400	0.02552	0.01573	0.01315	0.00341	0.00671	0.00465	0.00843
	20	0.00251	0.00030	0.00032	0.00084	0.00481	0.00437	0.00174	0.00089	0.00044	0.00069	0.00062	0.00052
	21	0.01307	0.00119	0.00442	0.00247	0.01130	0.00582	0.00327	0.00515	0.00075	0.00121	0.00131	0.00110
	22	0.00370	0.00024	0.00070	0.00129	0.00672	0.00297	0.00313	0.00144	0.00054	0.00058	0.00072	0.00058
	23	0.00334	0.00037	0.00079	0.00069	0.00461	0.00247	0.00131	0.00132	0.00830	0.00074	0.00058	0.00050
OZARKA	23	1.24839	0.00002	0.00003	0.00010	0.42123	0.02955	0.00104	0.00006	0.00004	0.01876	0.00038	0.00013
	24	0.01399	1.07424	0.00009	0.00019	0.01300	0.01537	0.05546	0.01034	0.00260	0.00083	0.00130	0.06259
	25	0.00431	0.00039	1.00369	0.00322	0.00360	0.00174	0.00336	0.14415	0.00025	0.00051	0.00029	0.00046
	26	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	27	0.00496	0.00000	0.00000	0.00002	1.02319	0.00084	0.00077	0.00003	0.00001	0.00012	0.00008	0.00002
	28	0.00034	0.00006	0.00002	0.00231	0.00187	1.01811	0.00086	0.00013	0.00074	0.00015	0.00096	0.00049
	29	0.00116	0.00011	0.00005	0.00519	0.00098	0.00192	1.00425	0.00044	0.00089	0.00016	0.00020	0.00030
	30	0.00932	0.00079	0.00040	0.00014	0.00559	0.00191	0.00593	1.00900	0.00018	0.00079	0.00030	0.00081
	31	0.00096	0.00022	0.00012	0.00014	0.00116	0.00165	0.00091	0.00014	1.00066	0.00024	0.00108	0.00034
	32	0.00178	0.00028	0.00009	0.00026	0.00226	0.00759	0.00067	0.00016	0.00020	1.02215	0.00519	0.00073
	33	0.00013	0.00003	0.00001	0.00022	0.00034	0.00195	0.00019	0.00006	0.00017	0.00021	1.00220	0.00015
	34	0.00650	0.00524	0.00338	0.00032	0.04522	0.00811	0.01568	0.00287	0.00468	0.00321	0.01113	1.07257
	35	0.00004	0.00006	0.00001	0.00001	0.00011	0.00005	0.00016	0.00002	0.00002	0.00004	0.00024	0.00003
	36	0.00034	0.00006	0.00008	0.00609	0.00245	0.00835	0.00058	0.00042	0.00014	0.00015	0.00062	0.00018
	37	0.00031	0.00031	0.00014	0.00005	0.00021	0.00020	0.00023	0.00006	0.00004	0.00005	0.00011	0.00006
	38	0.00005	0.00001	0.00002	0.00001	0.00007	0.00004	0.00083	0.00002	0.00001	0.00001	0.00004	0.00002
	39	0.00003	0.00000	0.00000	0.00001	0.00003	0.00001	0.00001	0.00001	0.00000	0.00000	0.00001	0.00000
	40	0.00005	0.00001	0.00001	0.00008	0.00010	0.00009	0.00010	0.00002	0.00002	0.00001	0.00004	0.00002
	41	0.00283	0.00057	0.00047	0.00075	0.00596	0.00343	0.00213	0.00178	0.00046	0.00091	0.00065	0.00111
	42	0.02507	0.00238	0.00134	0.00295	0.03461	0.01798	0.00618	0.00205	0.00230	0.00424	0.00600	0.00344
	43	0.00168	0.00017	0.00044	0.00035	0.00161	0.00087	0.00046	0.00073	0.00011	0.00017	0.00019	0.00016
	44	0.00104	0.00007	0.00020	0.00036	0.00189	0.00083	0.00088	0.00040	0.00015	0.00016	0.00020	0.00016
	45	0.00904	0.00012	0.00012	0.00056	0.00599	0.00131	0.00056	0.00041	0.00012	0.00187	0.00206	0.00013
REST OF THE U.S.	1	0.17623	0.00068	0.00127	0.03477	0.32106	0.05041	0.00900	0.00217	0.00195	0.02031	0.00523	0.00180
	2	0.02803	0.04438	0.00220	0.00530	0.04401	0.04200	0.04551	0.01379	0.00892	0.00525	0.01450	0.04156
	3	0.06777	0.00781	0.02413	0.00544	0.07918	0.04045	0.06447	0.80497	0.03610	0.01111	0.00670	0.00988
	4	0.03288	0.00258	0.00590	0.13940	0.06798	0.04908	0.03122	0.01218	0.00480	0.00491	0.00960	0.00674
	5	0.06641	0.00019	0.00018	0.00098	0.20750	0.01374	0.00923	0.00074	0.00083	0.00212	0.00134	0.00056
	6	0.02175	0.00283	0.00176	0.07834	0.07824	0.54800	0.03801	0.00712	0.02483	0.00757	0.03291	0.01090
	7	0.10647	0.01028	0.00483	0.02320	0.11028	0.20232	0.33182	0.03863	0.07152	0.01776	0.02375	0.02715
	8	0.09040	0.00797	0.00507	0.03605	0.08520	0.04430	0.06502	0.07062	0.00673	0.01196	0.00744	0.01044
	9	0.05979	0.01255	0.00726	0.01210	0.08042	0.11161	0.05755	0.01278	0.03526	0.01610	0.05767	0.01945
	10	0.04144	0.00401	0.00277	0.01186	0.05985	0.17975	0.01921	0.00565	0.00451	0.34467	0.10003	0.01531
	11	0.00403	0.00149	0.00127	0.00908	0.01983	0.06373	0.00908	0.00358	0.00526	0.00681	0.04732	0.00468
	12	0.02161	0.00724	0.00210	0.00598	0.05973	0.02594	0.02486	0.00689	0.00630	0.00692	0.01308	0.04512
	13	0.01992	0.01065	0.00382	0.00490	0.06928	0.02242	0.03598	0.01043	0.00585	0.00647	0.03653	0.00742
	14	0.03399	0.00508	0.00548	0.00597	0.13493	0.03609	0.03904	0.02435	0.00893	0.01082	0.03123	0.01830
	15	0.02650	0.01764	0.00846	0.00595	0.03433	0.02431	0.02478	0.01197	0.00479	0.00551	0.01343	0.00615
	16	0.01461	0.00384	0.00468	0.00425	0.02372	0.01315	0.01096	0.00731	0.00337	0.00347	0.01003	0.00504
	17	0.01366	0.00227	0.00215	0.00387	0.02014	0.00909	0.08836	0.00439	0.00217	0.00229	0.00355	0.00205
	18	0.01200	0.00153	0.00226	0.01542	0.02124	0.01899	0.02055	0.00305	0.00474	0.00254	0.00724	0.00380
	19	0.02858	0.00565	0.00463	0.00756	0.05993	0.03495	0.02148	0.01789	0.00465	0.00916	0.00664	0.01097
	20	0.01352	0.00126	0.00110	0.00340	0.02439	0.01072	0.00726	0.00309	0.00195	0.00352	0.00382	0.00204
	21	0.06783	0.00433	0.01606	0.00906	0.04173	0.02152	0.01210	0.01931	0.00277	0.00445	0.00481	0.00403
	22	0.04653	0.00306	0.00872	0.01619	0.08442	0.03767	0.03931	0.01833	0.00486	0.00735	0.00901	0.00707
	23	0.00917	0.00064	0.00141	0.00138	0.01051	0.00476	0.00238	0.00230	0.00056	0.00210	0.00177	0.00081

INDUSTRY		13	14	15	16	17	18	19	20	21	22	23
APPALACHIA	1	0.00043	0.00035	0.00036	0.00036	0.00064	0.00011	0.00067	0.00210	0.00270	0.00136	0.00242
	2	0.08018	0.05352	0.03702	0.02546	0.05413	0.00428	0.01932	0.01362	0.01405	0.02183	0.07775
	3	0.00046	0.00026	0.00027	0.00317	0.00036	0.00004	0.00210	0.00106	0.00093	0.00064	0.00192
	4	0.00092	0.00071	0.00065	0.00068	0.00104	0.00013	0.00325	0.00484	0.00629	0.03745	0.00217
	5	0.00008	0.00005	0.00005	0.00006	0.00010	0.00002	0.00015	0.00043	0.00028	0.00016	0.00027
	6	0.00182	0.00178	0.00160	0.00224	0.00404	0.00082	0.00190	0.00541	0.00293	0.00894	0.00569
	7	0.08581	0.00379	0.00329	0.00408	0.00678	0.00109	0.00356	0.00459	0.00437	0.00757	0.01474
	8	0.00142	0.00077	0.00901	0.00041	0.00093	0.00010	0.00463	0.00386	0.00313	0.00200	0.00722
	9	0.00298	0.00246	0.00436	0.00466	0.01136	0.00082	0.00425	0.00453	0.00301	0.00773	0.00816
	10	0.00247	0.00222	0.00215	0.00181	0.00380	0.00038	0.00307	0.00428	0.00550	0.00453	0.02186
	11	0.00078	0.00104	0.00105	0.00192	0.00187	0.00038	0.00125	0.00206	0.00146	0.00574	0.00626
	12	0.01157	0.00743	0.00734	0.08758	0.01335	0.00151	0.00585	0.00749	0.01609	0.00869	0.06017
	13	0.08552	0.06905	0.84568	0.02944	0.86369	0.00456	0.00960	0.00729	0.01033	0.01636	0.07161
	14	0.00614	0.00727	0.00692	0.00557	0.01378	0.00099	0.00337	0.00307	0.00427	0.00440	0.03173
	15	0.01255	0.00536	0.01238	0.00335	0.00817	0.00075	0.00153	0.00176	0.00161	0.00494	0.00737
	16	0.00196	0.00150	0.00395	0.00759	0.00543	0.00088	0.00184	0.00157	0.00131	0.00497	0.00579
	17	0.00036	0.00031	0.00053	0.00028	0.00399	0.00009	0.00064	0.00079	0.00047	0.00224	0.00075
	18	0.00074	0.00118	0.00135	0.00255	0.00418	0.00231	0.00095	0.00170	0.00108	0.00555	0.00317
	19	0.01650	0.00970	0.00993	0.00411	0.01731	0.00175	0.05196	0.03191	0.02137	0.03350	0.03720
	20	0.00284	0.00207	0.00203	0.00159	0.00337	0.00032	0.00216	0.00256	0.00270	0.00334	0.00500
	21	0.00318	0.00215	0.00269	0.00230	0.00341	0.00052	0.00470	0.02097	0.03216	0.01166	0.00772
	22	0.00146	0.00111	0.00143	0.00162	0.00248	0.00038	0.00439	0.00979	0.00599	0.00686	0.00675
	23	0.00172	0.00113	0.00130	0.00095	0.00189	0.00020	0.00327	0.00452	0.06576	0.00348	0.00377
OZARKA	23	0.00009	0.00008	0.00014	0.00007	0.00012	0.00010	0.00099	0.00349	0.04054	0.00047	0.00527
	24	0.23384	0.00274	0.00344	0.00322	0.00462	0.00065	0.05716	0.00300	0.01018	0.00545	0.09121
	25	0.00118	0.00068	0.00070	0.00042	0.00094	0.00010	0.00347	0.00289	0.00416	0.00163	0.00505
	26	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	27	0.00003	0.00001	0.00002	0.00007	0.00002	0.00003	0.00021	0.00100	0.00038	0.00007	0.00015
	28	0.00024	0.00029	0.00021	0.00038	0.00062	0.00018	0.00029	0.00169	0.00002	0.00111	0.00042
	29	0.00043	0.00022	0.00015	0.00031	0.00036	0.00010	0.00016	0.00029	0.00029	0.00051	0.00132
	30	0.00172	0.00006	0.00098	0.00036	0.00049	0.00009	0.01322	0.00336	0.00446	0.00246	0.01061
	31	0.00053	0.00030	0.00104	0.00120	0.00282	0.00020	0.00104	0.00098	0.00061	0.00176	0.00177
	32	0.00366	0.00117	0.00086	0.00065	0.00160	0.00009	0.00136	0.00196	0.00291	0.00075	0.03233
	33	0.00020	0.00044	0.00038	0.00092	0.00066	0.00018	0.00047	0.00076	0.00090	0.00495	0.00319
	34	0.02604	0.01203	0.01145	0.02288	0.02781	0.00470	0.01054	0.01658	0.02387	0.01472	0.32065
	35	1.00233	0.00190	0.00104	0.00864	0.00125	0.00009	0.00014	0.00600	0.00013	0.00018	0.00133
	36	0.00097	1.00163	0.00141	0.00120	0.00283	0.00020	0.00052	0.00039	0.00067	0.00036	0.00676
	37	0.00305	0.00089	1.00343	0.00065	0.00155	0.00016	0.00824	0.00030	0.00024	0.00111	0.00120
	38	0.00013	0.00011	0.00036	1.00081	0.00045	0.00009	0.00043	0.00011	0.00009	0.00044	0.00053
	39	0.00002	0.00003	0.00007	0.00003	1.00087	0.00001	0.00007	0.00006	0.00003	0.00042	0.00004
	40	0.00007	0.00015	0.00016	0.00016	0.00052	1.00035	0.00040	0.00019	0.00011	0.00074	0.00038
	41	0.00223	0.00130	0.00138	0.00109	0.00232	0.00023	1.00710	0.00434	0.00289	0.00495	0.00502
	42	0.01061	0.00695	0.00957	0.00840	0.01122	0.00222	0.01469	1.01753	0.01746	0.01844	0.00145
	43	0.00045	0.00030	0.00030	0.00033	0.00848	0.00007	0.00125	0.00304	1.00467	0.00167	0.00106
	44	0.00040	0.00031	0.00040	0.00046	0.00069	0.00011	0.00123	0.00216	0.00169	1.00194	0.00190
	45	0.00166	0.00166	0.00343	0.00035	0.00126	0.00036	0.02515	0.00895	0.00610	0.00357	1.00099
REST OF THE U.S.	1	0.00265	0.00231	0.00233	0.00234	0.00430	0.00079	0.00563	0.01523	0.03201	0.00831	0.02370
	2	0.21920	0.07598	0.05342	0.03754	0.07910	0.00445	0.05043	0.01698	0.02698	0.03273	0.15078
	3	0.02618	0.01545	0.01579	0.01012	0.02210	0.00236	0.10797	0.05567	0.05871	0.03574	0.10319
	4	0.01754	0.01334	0.01460	0.01553	0.02495	0.00338	0.05032	0.09131	0.08518	0.49466	0.05819
	5	0.00103	0.00065	0.00066	0.00072	0.00123	0.00040	0.00257	0.00479	0.00531	0.00217	0.00403
	6	0.01482	0.01404	0.01390	0.01099	0.03471	0.00693	0.01598	0.04572	0.02460	0.07537	0.04776
	7	0.04686	0.02791	0.02369	0.03483	0.05259	0.01015	0.04801	0.03688	0.03504	0.06300	0.13530
	8	0.02823	0.01685	0.01713	0.01121	0.02451	0.00260	0.10495	0.05700	0.05012	0.03791	0.10704
	9	0.04111	0.03480	0.06506	0.07070	0.17335	0.01227	0.06227	0.06267	0.04278	0.11500	0.11828
	10	0.01963	0.02676	0.02248	0.01821	0.04325	0.00319	0.03209	0.04592	0.06898	0.03148	0.57945
	11	0.01023	0.01356	0.01432	0.02556	0.02639	0.00312	0.01676	0.02767	0.01950	0.07472	0.08147
	12	0.04080	0.02305	0.02811	0.03005	0.85570	0.00606	0.02188	0.02753	0.03910	0.03548	0.22074
	13	0.31463	0.25575	0.16905	0.10912	0.24030	0.01689	0.03209	0.02473	0.03383	0.06127	0.26049
	14	0.06908	0.08485	0.08314	0.06759	0.17292	0.01201	0.03441	0.03388	0.04901	0.05396	0.38641
	15	0.20050	0.08689	0.19765	0.05552	0.13835	0.01242	0.02594	0.03026	0.02742	0.08356	0.12291
	16	0.05922	0.03120	0.08935	0.18365	0.11899	0.02045	0.03477	0.03134	0.02616	0.11167	0.13038
	17	0.01290	0.01488	0.03006	0.01255	0.32558	0.00534	0.03063	0.03157	0.01631	0.16151	0.02442
	18	0.01517	0.02986	0.03228	0.06742	0.10497	0.06724	0.02049	0.03858	0.02238	0.14569	0.07831
	19	0.02256	0.01324	0.01358	0.01110	0.02374	0.00239	0.06977	0.04316	0.02903	0.04544	0.05072
	20	0.01009	0.00718	0.00846	0.00499	0.01471	0.00155	0.00805	0.01062	0.01124	0.01447	0.02381
	21	0.01171	0.00791	0.00992	0.00446	0.01262	0.00192	0.03177	0.07632	0.11089	0.04267	0.02847
	22	0.01842	0.01395	0.01802	0.02041	0.03144	0.00476	0.05402	0.12193	0.07462	0.08563	0.08439
	23	0.00358	0.00256	0.00357	0.00181	0.00390	0.00038	0.01260	0.01066	0.03208	0.00713	0.00717

Table J-4 (Cont.)

REST OF THE U.S.

	INDUSTRY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
APPALACHIA	1	0.03178	0.00032	0.00026	0.00068	0.05278	0.00753	0.00116	0.00040	0.00027	0.00308	0.00066	0.00026	0.00045	0.00036	0.00039	0.00037	0.00066	0.00012	0.00102	0.00243	0.00634	0.00136	0.00314
	2	0.01965	0.01473	0.00171	0.00353	0.03167	0.02737	0.04481	0.01822	0.00556	0.00363	0.01103	0.03240	0.16300	0.05233	0.83716	0.02596	0.05450	0.00443	0.04389	0.01488	0.02227	0.02374	0.11051
	3	0.00125	0.00011	0.00034	0.00808	0.00115	0.00060	0.00091	0.01105	0.00039	0.00016	0.03010	0.00015	0.00039	0.00023	0.00023	0.00015	0.00033	0.00006	0.00153	0.00082	0.00088	0.03056	0.00147
	4	0.00110	0.00004	0.00020	0.00374	0.00219	0.00154	0.00100	0.00042	0.00021	0.00028	0.00030	0.00022	0.00059	0.00044	0.00048	0.00051	0.00082	0.00011	0.00161	0.00289	0.00262	0.01337	0.00193
	5	0.00359	0.00002	0.00002	0.00007	0.01060	0.00087	0.00053	0.00306	0.00006	0.00015	0.00009	0.00004	0.00009	0.00006	0.00006	0.00006	0.00010	0.00003	0.00018	0.00054	0.00037	0.00017	0.00031
	6	0.00247	0.00032	0.00021	0.00411	0.00842	0.05657	0.00413	0.00080	0.00261	0.00063	0.00346	0.00182	0.00175	0.00165	0.00153	0.00208	0.00381	0.00074	0.00164	0.00492	0.00282	0.00864	0.00546
	7	0.01254	0.00027	0.00061	0.00245	0.01410	0.32645	0.03536	0.03431	0.00772	0.00217	0.00299	0.00322	0.00643	0.00395	0.03340	0.00461	0.00706	0.00121	0.00373	0.00491	0.00535	0.00744	0.01650
	8	0.00153	0.00015	0.00010	0.00014	0.00168	0.00090	0.00108	0.00107	0.00013	0.00023	0.00016	0.00022	0.00062	0.00036	0.00036	0.00025	0.00053	0.00086	0.00191	0.00108	0.00105	0.00081	0.00188
	9	0.00427	0.00049	0.00052	0.00049	0.00587	0.00793	0.00407	0.00095	0.00240	0.00114	0.00392	0.00139	0.00309	0.00252	0.00453	0.00487	0.01184	0.00085	0.00460	0.00449	0.00322	0.00749	0.00647
	10	0.00547	0.00067	0.00051	0.00163	0.00769	0.01631	0.00242	0.00103	0.00078	0.02440	0.00710	0.00149	0.00302	0.00287	0.00279	0.00206	0.00454	0.00040	0.00463	0.00401	0.01360	0.00467	0.03938
	11	0.00066	0.00010	0.00010	0.00056	0.00137	0.00380	0.00065	0.00024	0.00031	0.00041	0.00252	0.00030	0.00070	0.00062	0.00048	0.00144	0.00157	0.00079	0.00117	0.00173	0.00151	0.00416	0.00462
	12	0.00649	0.00258	0.00074	0.00114	0.01420	0.00725	0.00734	0.00218	0.00186	0.00215	0.00417	0.01593	0.01344	0.00400	0.00826	0.00871	0.01464	0.00176	0.00493	0.00954	0.01822	0.00981	0.07684
	13	0.00615	0.00282	0.00112	0.00143	0.01431	0.00674	0.00970	0.00305	0.00165	0.00169	0.00916	0.00216	0.07627	0.06128	0.04156	0.02700	0.05926	0.00423	0.00981	0.00745	0.01200	0.01643	0.04654
	14	0.00304	0.00043	0.00045	0.00053	0.00985	0.00304	0.00299	0.00179	0.00068	0.00089	0.00426	0.00081	0.00553	0.00622	0.00608	0.00463	0.01209	0.00086	0.00368	0.00387	0.00563	0.00433	0.02612
	15	0.00139	0.00090	0.00041	0.00331	0.00190	0.00131	0.00134	0.00062	0.00026	0.00033	0.00076	0.00035	0.01022	0.00469	0.00964	0.00293	0.00710	0.00063	0.00143	0.00158	0.00156	0.00414	0.00658
	16	0.00081	0.00021	0.00025	0.00823	0.00132	0.00073	0.00860	0.00840	0.00018	0.00019	0.08053	0.00027	0.00211	0.00167	0.00465	0.00745	0.00621	0.00106	0.00188	0.00170	0.00148	0.00552	0.00682
	17	0.00040	0.00007	0.00006	0.00011	0.00064	0.00030	0.00026	0.00014	0.00006	0.00007	0.00010	0.00007	0.00039	0.00038	0.00071	0.00033	0.00691	0.00013	0.00081	0.00087	0.00049	0.00356	0.00076
	18	0.00063	0.00008	0.00012	0.00075	0.00110	0.00097	0.00102	0.00026	0.00024	0.00012	0.00036	0.00020	0.00077	0.00145	0.00158	0.00323	0.00505	0.00317	0.00105	0.00192	0.00117	0.00698	0.00374
	19	0.02062	0.00408	0.00335	0.00545	0.04324	0.02517	0.01549	0.01290	0.00335	0.00661	0.00478	0.00795	0.01633	0.00957	0.00940	0.00801	0.01710	0.00173	0.05058	0.03122	0.02102	0.03282	0.03463
	20	0.00640	0.00867	0.00049	0.00116	0.00983	0.00664	0.00270	0.00116	0.00075	0.00154	0.00163	0.00102	0.00431	0.00293	0.00328	0.00268	0.00483	0.00061	0.00442	0.00499	0.00621	0.00540	0.01318
	21	0.01274	0.00118	0.00427	0.00241	0.01113	0.00574	0.00323	0.00511	0.00074	0.00119	0.00128	0.00108	0.00314	0.00212	0.00265	0.00226	0.00337	0.00051	0.00648	0.02031	0.03109	0.01136	0.00761
	22	0.00359	0.00074	0.00067	0.00126	0.00650	0.00291	0.00302	0.00141	0.00353	0.00057	0.00078	0.00055	0.00143	0.00108	0.00139	0.00157	0.00242	0.00036	0.00417	0.00932	0.00375	0.00658	0.00650
	23	0.00632	0.00040	0.00081	0.00085	0.00663	0.00285	0.00146	0.00141	0.00833	0.00135	0.00124	0.00353	0.00222	0.00164	0.00238	0.00106	0.00226	0.00022	0.01676	0.00724	0.02713	0.00453	0.00404
OZARKS	1	0.00042	0.00001	0.00003	0.00004	0.00113	0.00027	0.00008	0.00004	0.00002	0.00015	0.00004	0.00002	0.00003	0.00003	0.00003	0.00003	0.00085	0.00001	0.00006	0.00019	0.00023	0.00011	0.00028
	2	0.00052	0.00069	0.00006	0.00311	0.00090	0.00872	0.00097	0.00028	0.00013	0.00012	0.00020	0.00072	0.00294	0.00079	0.00060	0.00045	0.00092	0.00008	0.00104	0.00050	0.00059	0.00063	0.00232
	3	0.00349	0.00031	0.00104	0.00021	0.00313	0.00159	0.00257	0.03523	0.00824	0.00044	0.00027	0.00039	0.00103	0.00061	0.00042	0.00040	0.00087	0.00009	0.00431	0.00221	0.00287	0.00141	0.00410
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00808	0.00000	0.00000	0.00800	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00079	0.00000	0.00000	0.00001	0.00258	0.00016	0.00011	0.00001	0.00001	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00031	0.00000	0.00003	0.00012	0.00306	0.00003	0.00005
	6	0.00015	0.00002	0.00001	0.00053	0.00053	0.00369	0.00026	0.00005	0.00017	0.00005	0.00022	0.00011	0.00010	0.00310	0.00009	0.00013	0.00023	0.00085	0.00011	0.00031	0.00017	0.00050	0.00032
	7	0.00047	0.00004	0.00002	0.00010	0.00048	0.00089	0.00145	0.00017	0.03031	0.00008	0.00011	0.00012	0.00081	0.00013	0.00010	0.00015	0.00023	0.00004	0.00011	0.00016	0.00016	0.00028	0.00059
	8	0.00059	0.00005	0.00004	0.00004	0.00036	0.00079	0.00042	0.00048	0.00004	0.00008	0.00005	0.00007	0.00018	0.00011	0.00011	0.00007	0.00816	0.00002	0.00076	0.00040	0.00034	0.00027	0.00071
	9	0.00052	0.00011	0.00006	0.00011	0.00070	0.00096	0.00058	0.00011	0.00030	0.00015	0.00049	0.00017	0.00036	0.00030	0.00056	0.00860	0.00148	0.00011	0.00054	0.00055	0.00036	0.00899	0.00102
	10	0.00079	0.00011	0.00006	0.00023	0.00115	0.00344	0.00037	0.00012	0.00013	0.00721	0.00188	0.00029	0.00038	0.00051	0.00043	0.00035	0.00083	0.00006	0.00061	0.00089	0.00127	0.00042	0.01090
	11	0.00007	0.00601	0.00001	0.00087	0.00015	0.00046	0.00037	0.00003	0.00804	0.00005	0.00034	0.00003	0.00008	0.00010	0.00010	0.00018	0.00019	0.00004	0.00013	0.00020	0.00015	0.00054	0.00059
	12	0.00065	0.00022	0.00008	0.00011	0.00171	0.00047	0.00065	0.00022	0.00017	0.00021	0.00037	0.00141	0.00109	0.00064	0.00069	0.00075	0.00124	0.00015	0.00075	0.00090	0.00153	0.00090	0.00677
	13	0.00003	0.00002	0.00001	0.00001	0.00039	0.00806	0.00006	0.08032	0.00001	0.00001	0.00006	0.00001	0.00056	0.00043	0.00827	0.80019	0.00041	0.00003	0.00008	0.00034	0.00006	0.00010	0.00044
	14	0.00008	0.00001	0.00001	0.00001	0.00030	0.00008	0.00009	0.09036	0.80002	0.00003	0.00037	0.00002	0.00015	0.00019	0.00018	0.00015	0.00037	0.00003	0.00005	0.00008	0.00012	0.00012	0.00064
	15	0.00009	0.00006	0.00003	0.00002	0.00012	0.00008	0.00039	0.00004	0.00032	0.00002	0.00005	0.00002	0.00089	0.00029	0.00068	0.00019	0.00047	0.00004	0.00004	0.00011	0.00004	0.00029	0.00842
	16	0.00004	0.00001	0.00001	0.00001	0.00037	0.00004	0.00003	0.00002	0.00001	0.00001	0.00003	0.00001	0.00011	0.00008	0.00024	0.80049	0.00032	0.80005	0.00006	0.00009	0.00007	0.00030	0.00835
	17	0.00002	0.00000	0.00000	0.00001	0.00033	0.00001	0.00001	0.00001	0.00803	0.00000	0.00001	0.00000	0.00002	0.00002	0.00004	0.00002	0.00046	0.00001	0.00005	0.00005	0.00002	0.00023	0.00004
	18	0.00005	0.00001	0.00001	0.00007	0.00010	0.00009	0.03809	0.00002	0.00002	0.00001	0.00003	0.00002	0.00067	0.00013	0.00014	0.00030	0.00047	0.00030	0.00809	0.00017	0.00010	0.00065	0.00036
	19	0.00273	0.00054	0.00044	0.00372	0.00573	0.00333	0.00705	0.00171	0.00344	0.00087	0.00063	0.00105	0.00215	0.00126	0.00129	0.00106	0.00226	0.00023	0.00471	0.00414	0.00778	0.00435	0.00484
	20	0.00017	0.00002	0.00003	0.00004	0.00031	0.00021	0.00009	0.00010	0.00002	0.00006	0.00004	0.00004	0.00010	0.00006	0.00007	0.00006	0.00312	0.00081	0.00014	0.00021	0.00023	0.00019	0.00031
	21	0.00178	0.00016	0.00060	0.00034	0.00155	0.00080	0.00045	0.00071	0.00010	0.00017	0.00018	0.00015	0.00044	0.00029	0.00037	0.00031	0.00047	0.00007	0.00118	0.00284	0.00435	0.00159	0.00106
	22	0.00099	0.00007	0.00016	0.00034	0.00179	0.00080	0.00083	0.00079	0.00015	0.00068	0.00049	0.00015	0.00039	0.08030	0.00038	0.00043	0.00067	0.00010	0.00115	0.00257	0.00150	0.00161	0.00179
	23	0.00033	0.00003	0.00006	0.00006	0.00038	0.00019	0.00011	0.00011	0.00002	0.00006	0.00006	0.00004	0.00013	0.00009	0.00011	0.00007	0.00013	0.00031	0.00050	0.00044	0.00107	0.00030	0.00028
REST OF THE U.S.	1	1.43923	0.00069	0.00125	0.00466	3.70435	0.07732	0.00985	0.00219	0.03198	0.03713	0.00548	0.00190	0.06269	0.03234	0.00242	0.00238	0.00435	0.00088	0.00638	0.01620	0.06466	0.00865	0.02797
	2	0.03578	1.04062	0.00223	0.00536	0.05063	0.05118	0.09962	0.02014	0.01044	0.00559	0.01531	0.08020	0.36068	0.07913	0.05612	0.03981	0.08244	0.00687	0.08493	0.02023	0.03032	0.03563	0.28692
	3	0.08878	0.00742	1.02674	0.00549	0.07987	0.04067	0.06549	0.90450	0.00612	0.01124	0.00679	0.00998	0.02640	0.01555	0.01590	0.01016	0.02220	0.00237	0.10471	0.05639	0.06055	0.03606	0.10457
	4	0.03306	0.00260	0.00591	1.15221	0.06920	0.05052	0.03176	0.01219	0.00697	0.00919	0.00986	0.00690	0.01787	0.01361	0.01477	0.01570	0.02517	0.00340	0.05201	0.04326	0.88885	0.53874	0.05843
	5	0.07151	0.00019	0.00018	0.00099	1.22523	0.01431	0.00980	0.00076	0.00083	0.00216	0.00140	0.00059	0.00104	0.00066	0.00067	0.00073	0.00123	0.00042	0.00272	0.01056	0.00553	0.00223	0.00410
	6	0.02200	0.00268	0.00177	0.06140	0.06033	1.57152	0.03898	0.08725	0.02575	0.00771	0.03411	0.01749	0.01502	0.01497	0.01389	0.01960	0.03534	0.00719	0.01617	0.04699	0.02490	0.07688	0.04847
	7	0.10507	0.01014	0.00480	0.02318	0.10888	0.20130	1.32853	0.03835	0.07085	0.01758	0.02363	0.02686	0.04646	0.02785	0.02363	0.03466	0.05264	0.01006	0.02372	0.03669	0.03480	0.06266	0.13228
	8	0.10378	0.00909	0.00563	0.00620	0.89261	0.04679	0.07358	1.88377	0.00694	0.01304	0.00781	0.01154	0.03057	0.01801	0.01841	0.01165	0.02564	0.00272	0.12864	0.06494	0.05632	0.04128	0.12226
	9	0.05999	0.01261	0.00731	0.01212	0.08059	0.11209	0.05779	0.81278	1.03550	0.01616	0.05806	0.01956	0.04117	0.03494	0.06538	0.07109	0.17422	0.01233	0.06254	0.06324	0.04281	0.11551	0.11872
	10	0.04041	0.00597	0.80277	0.01189	0.05904	0.18094	0.01916	0.03561	0.83653	1.38733	0.10058	0.01532	0.01936	0.02677	0.02224	0.01626	0.04328	0.00319	0.02982	0.04527	0.06201	0.03127	0.34375
	11	0.03908	0.00152	0.00127	0.00935	0.02011	0.06625	0.01006	0.00363	0.00548	0.00706	1.05039	0.00466	0.01043	0.01412	0.01477	0.02479	0.02716	0.00535	0.01723	0.02836	0.04977	0.07868	0.08567
	12	0.02599	0.01462	0.00247	0.00411	0.18005	0.03282	0.03880	0.00935	0.01055	0.00999	0.02309	1.11238	0.06388	0.03647	0.03996	0.05025	0.08076	0.01036	0.02858	0.04334	0.05220	0.04814	0.52395
	13	0.01968	0.01082	0.00385	0.00442	0.04937	0.02266	0.03652	0.01045	0.00588	0.00647	0.03753	0.00744	1.32768	0.20499	0.17392	0.11202	0.24559	0.01729	0.03245	0.02459	0.03422	0.06122	0.26665
	14	0.03414	0.00516	0.00559	0.00602	0.13832	0.03652	0.03984	0.02498	0.00912	0.01098	0.03212	0.01055	0.07050	1.08735	0.08521	0.04938	0.17704	0.01231	0.03855	0.03419	0.04820	0.05426	0.39993
	15	0.02689	0.31831	0.00867	0.03402	0.03448	0.02454	0.02505	0.01200	0.00484	0.00557	0.01397	0.00620	0.20519	0.06816	1.20315	0.05640	0.14049	0.01267	0.02615	0.03663	0.02761	0.08517	0.12648
	16	0.01456	0.00383	0.00466	0.00424	0.02368	0.01313	0.01093	0.00730	0.00336	0.00346	0.00498	0.00501	0.03910	0.03106	0.04876	1.10211	0.11833	0.02030	0.03457	0.03123	0.02600	0.11096	0.12953
	17	0.01363	0.00226	0.00215	0.00386	0.02012	0.00909	0.00835	0.00439	0.08217	0.00228	0.00355	0.00204	0.01268	0.01482	0.02990	0.01251	1.32308	0.00531	0.03049	0.03150	0.01629	0.16037	0.02441
	18	0.01198	0.00153	0.00226	0.01529	0.02123	0.01892	0.02043	0.00509	0.08472	0.00234	0.00720	0.00386	0.01514	0.02981	0.03207	0.06079	0.10415	1.08699	0.02040	0.03830	0.02227	0.14938	0.07578
	19	0.02401	0.00574	0.00472	0.00767	0.36893	0.03540	0.02180	0.01821	0.00472	0.00931	0.00872	0.01120	0.02287	0.01340	0.01375	0.01123	0.02401	0.00242	1.07150	0.04405	0.02950	0.04632	0.05146
	20	0.03454	0.00326	0.00224	0.00597	0.05158	0.03413	0.01309	0.00517	0.00393	0.00705	0.00497	0.00996	0.01973	0.01325	0.01671	0.01424	0.02436	0.00366	0.01970	1.02554	0.82508	0.02865	0.07689
	21	0.04627	0.00437	0.01625	0.00916	0.04196	0.02163	0.01216	0.81936	0.00279	0.00448	0.00484	0.00406	0.01176	0.00795	0.00997	0.00651	0.01267	0.00193	0.03260	0.07718	1.31824	0.04306	0.02861
	22	0.04669	0.00307	0.00876	0.01626	0.38473	0.03776	0.03946	0.01830	0.00688	0.00737	0.00904	0.00709	0.01846	0.01399	0.01808	0.02048	0.03153	0.00476	0.05427	0.12211	0.07497	1.08603	0.08476
	23	0.01990	0.00671	0.00146	0.00172	0.01409	0.00550	0.08268	0.00250	0.00060	0.00328	0.00311	0.00087	0.80462	0.00362	0.00580	0.00200	0.00466	0.00041	0.02785	0.01640	0.07575	0.00936	1.00761

Table J-5

Interregional Interindustry and Local Consumption Multipliers

APPALACHIA

INDUSTRY		1	2	3	4	5	6	7	8
APPALACHIA	1	1.46098	0.13565	0.12043	0.13047	0.64646	0.23160	0.17448	0.15615
	2	0.24137	1.23793	0.10865	0.13022	0.32405	0.27952	0.29666	0.20571
	3	0.01887	0.00613	1.00834	0.00605	0.01336	0.01065	0.00974	0.12224
	4	0.03835	0.02582	0.02304	1.04028	0.05044	0.04199	0.03502	0.03129
	5	0.30253	0.21546	0.19074	0.28043	1.41033	0.28869	0.26203	0.22624
	6	0.13478	0.09399	0.08318	0.18984	0.18231	1.29172	0.12747	0.18900
	7	0.12826	0.06369	0.05475	0.06576	0.14869	0.16386	1.22327	0.09090
	8	0.05602	0.03789	0.03338	0.03530	0.06621	0.05319	0.04998	1.04584
	9	0.04260	0.02329	0.02017	0.02342	0.05588	0.05226	0.03856	0.03223
	10	0.17962	0.11472	0.10007	0.11071	0.22759	0.25194	0.15267	0.13538
	11	0.05203	0.03724	0.03292	0.03653	0.06615	0.06432	0.04773	0.04210
	12	0.21574	0.14575	0.12093	0.13478	0.32561	0.23386	0.28680	0.17735
	13	0.14378	0.08887	0.07466	0.08701	0.20111	0.16047	0.14180	0.12413
	14	0.08257	0.05165	0.04626	0.05119	0.13170	0.08885	0.07756	0.07090
	15	0.07364	0.05369	0.04669	0.04954	0.09143	0.07551	0.06700	0.05896
	16	0.06095	0.04330	0.03850	0.04136	0.07672	0.06386	0.05516	0.04970
	17	0.12632	0.09517	0.08421	0.08868	0.15471	0.12721	0.11518	0.10049
	18	0.02483	0.01638	0.01461	0.01723	0.03219	0.02698	0.02322	0.02866
	19	0.27006	0.16648	0.14780	0.16741	0.36827	0.29457	0.23879	0.22616
	20	0.42423	0.29992	0.26479	0.28188	0.52617	0.42634	0.37170	0.32121
	21	0.33354	0.23380	0.21082	0.22313	0.41048	0.33555	0.29432	0.26600
	22	0.16129	0.11548	0.10287	0.11030	0.20274	0.16471	0.14661	0.12939
	23	0.34800	0.25035	0.22224	0.23597	0.42633	0.34702	0.30891	0.27318
OZARKA	1	0.00278	0.00066	0.00062	0.00087	0.00458	0.00334	0.00199	0.00223
	2	0.00380	0.00164	0.00137	0.00185	0.00585	0.00474	0.00342	0.00341
	3	0.01284	0.00449	0.00412	0.00535	0.01680	0.01313	0.01051	0.01699
	4	0.00017	0.00003	0.00002	0.80004	0.00028	0.00022	0.00013	0.00015
	5	0.00390	0.00083	0.00076	0.80112	0.00707	0.08455	0.00278	0.00311
	6	0.00249	0.00091	0.00081	0.80160	0.00407	0.00670	0.00221	0.00221
	7	0.00157	0.00051	0.00045	0.00067	0.00225	0.00221	0.00193	0.00130
	8	0.00183	0.00054	0.00048	0.80071	0.00277	0.00219	0.00147	0.80166
	9	0.00327	0.00146	0.00126	0.80162	0.00455	0.00426	0.00289	0.00261
	10	0.00823	0.00345	0.00309	0.00431	0.01195	0.01207	0.00681	0.00741
	11	0.00136	0.00056	0.00051	0.00071	0.00286	0.00211	0.00117	0.00122
	12	0.01325	0.00757	0.00636	0.80746	0.02035	0.01506	0.81218	0.01127
	13	0.00057	0.00027	0.00023	0.00030	0.08086	0.80069	0.00052	0.00053
	14	0.00109	0.00047	0.00043	0.80055	0.80178	0.00130	0.00095	0.00180
	15	0.00122	0.00044	0.00038	0.00050	0.80187	0.00152	0.00102	0.00109
	16	0.00102	0.00037	0.00033	0.00043	0.00156	0.80126	0.00084	0.00091
	17	0.00129	0.00031	0.00028	0.88041	0.00210	0.00166	0.00102	0.00114
	18	0.00089	0.00038	0.00034	0.00050	0.00132	0.00111	0.00080	0.00081
	19	0.01729	0.00719	0.00643	0.00850	0.02663	0.02081	0.01448	0.81537
	20	0.00402	0.00085	0.00078	0.00115	0.00667	0.00530	0.00313	0.00354
	21	0.01039	0.00359	0.00371	0.00461	0.01438	0.01137	0.00765	0.00868
	22	0.00750	0.00287	0.00271	0.00363	0.01135	0.00870	0.00637	0.00645
	23	0.00409	0.00095	0.00098	0.00128	0.80659	0.00520	0.80316	0.00362
REST OF THE U.S.	1	0.53746	0.12172	0.11204	0.17293	0.85747	0.48087	0.29237	0.34495
	2	0.10780	0.06951	0.05875	0.08951	0.28741	0.24385	0.17187	0.17784
	3	0.36234	0.13972	0.14348	0.15931	0.46821	0.36728	0.30144	1.08800
	4	0.36760	0.15752	0.14578	0.32546	0.54768	0.45291	0.31916	0.33290
	5	0.35969	0.07062	0.06678	0.13250	0.65723	0.42517	0.25589	0.32962
	6	0.30415	0.11077	0.10032	0.21374	0.49347	0.82984	0.27401	0.29103
	7	0.32875	0.11264	0.09911	0.15187	0.45498	0.46623	0.43451	0.27261
	8	0.37136	0.12794	0.11329	0.15278	0.48418	0.37771	0.38307	0.34356
	9	0.33310	0.14148	0.12384	0.16532	0.47190	0.43871	0.29253	0.27611
	10	0.35849	0.13129	0.11866	0.18862	0.53635	0.53187	0.29445	0.33649
	11	0.15310	0.05936	0.05394	0.08369	0.23288	0.23836	0.13191	0.14657
	12	0.30777	0.10850	0.09599	0.14695	0.48688	0.39111	0.26275	0.29889
	13	0.27409	0.11521	0.10174	0.14051	0.41804	0.33589	0.24335	0.26011
	14	0.39918	0.16990	0.15421	0.20620	0.64634	0.48025	0.34960	0.37625
	15	0.26470	0.11726	0.09899	0.13299	0.38695	0.32195	0.22921	0.24878
	16	0.24422	0.10162	0.09322	0.12675	0.35877	0.29593	0.20694	0.23207
	17	0.25987	0.08823	0.08100	0.12557	0.39308	0.32534	0.21526	0.25604
	18	0.17952	0.07841	0.87164	0.10702	0.28178	0.22128	0.16399	0.16597
	19	0.27500	0.08439	0.07727	0.12562	0.43753	0.35594	0.22691	0.27352
	20	0.33826	0.05553	0.05438	0.13339	0.55669	0.47340	0.26816	0.36765
	21	0.41756	0.10767	0.11211	0.17052	0.61978	0.51351	0.31789	0.41122
	22	0.39529	0.13412	0.12027	0.19321	0.60554	0.47888	0.33367	0.36927
	23	0.27598	0.04484	0.04475	0.10798	0.44870	0.37971	0.21721	0.30151

INDUSTRY		9	10	11	12	13	14	15	16
APPALACHIA	1	0.12754	0.17810	0.14358	0.14686	0.23026	0.17320	0.16443	0.15579
	2	0.12622	0.15283	0.15171	0.23568	0.70014	0.26501	0.23489	0.20583
	3	0.00579	0.08730	0.00660	0.00671	0.01123	0.00833	0.00817	0.00762
	4	0.02462	0.03860	0.02778	0.82828	0.04537	0.03409	0.03261	0.03093
	5	0.20038	0.24318	0.22065	0.23187	0.35148	0.26434	0.24628	0.23414
	6	0.09427	0.10971	0.10644	0.10535	0.16143	0.12231	0.11560	0.11116
	7	0.08664	0.07677	0.07178	0.87571	0.12311	0.08893	0.08358	0.08399
	8	0.03511	0.84337	0.03886	0.04879	0.06335	0.04736	0.04445	0.04186
	9	1.02571	0.02827	0.83206	0.02643	0.04522	0.03455	0.03823	0.83746
	10	0.10733	1.37468	0.17734	0.12902	0.20871	0.15811	0.14802	0.13821
	11	0.03564	0.04397	1.85C08	0.04879	0.06366	0.04933	0.04651	0.04698
	12	0.13486	0.16574	0.16091	1.23549	0.28333	0.20320	0.19781	0.19681
	13	0.08194	0.10325	0.11739	0.89476	1.40563	0.32012	0.23292	0.18251
	14	0.05018	0.06247	0.06282	0.05782	0.10401	1.09085	0.08539	0.07842
	15	0.04878	0.85598	0.05503	0.85629	0.10908	0.87406	1.08406	0.06382
	16	0.04060	0.04996	0.04572	0.04684	0.07531	0.05699	0.05879	1.86433
	17	0.08850	0.18816	0.09753	0.10200	0.15606	0.11819	0.11179	0.10449
	18	0.01578	0.81931	0.01797	0.01801	0.02963	0.02396	0.82320	0.02526
	19	0.15797	0.19586	0.18891	0.18584	0.30896	0.22884	0.22377	0.20988
	20	0.27972	0.34452	0.31276	0.32321	0.30407	0.37823	0.35635	0.33729
	21	0.21844	0.26885	0.24315	0.25188	0.39331	0.29549	0.27967	0.26502
	22	0.10830	0.13293	0.12827	0.12472	0.19391	0.14585	0.13781	0.13105
	23	0.23352	0.28856	0.26052	0.26926	0.41699	0.31400	0.29657	0.27834
OZARKA	1	0.00070	0.00154	0.08116	0.00128	0.00208	0.00146	0.80160	0.00154
	2	0.00160	0.88222	0.80210	0.00226	0.00433	0.00313	0.00323	0.00296
	3	0.00456	0.00619	0.00578	0.00530	0.01894	0.00798	0.00859	0.00781
	4	0.00003	0.80810	0.00007	0.00089	0.00812	0.00008	0.00009	0.00009
	5	0.00090	0.00201	0.00152	0.00176	0.00283	0.00196	0.00218	0.00209
	6	0.00108	0.00151	0.00148	0.00141	0.00235	0.00173	0.00183	0.00178
	7	0.00070	0.80081	0.00875	0.00073	0.00137	0.00099	0.00106	0.00103
	8	0.00057	0.00893	0.00081	0.00080	0.00137	0.00112	0.00125	0.00115
	9	0.00170	0.00191	0.00222	0.00174	0.00327	0.00248	0.00289	0.00280
	10	0.00356	0.00992	0.00577	0.80418	0.00826	0.00630	0.00672	0.00621
	11	0.00059	0.00089	0.00116	0.00077	0.00138	0.00107	0.00112	0.00116
	12	0.00717	0.88935	0.00890	0.01234	0.01600	0.01146	0.01154	0.01134
	13	0.00026	0.00035	0.00038	0.00031	0.00108	0.00083	0.00072	0.80060
	14	0.00049	0.00068	0.00066	0.00068	0.00121	0.00098	0.00102	0.80093
	15	0.00042	0.00072	0.00062	0.00063	0.00165	0.00101	0.00140	0.00094
	16	0.00037	0.00862	0.00054	0.00856	0.00104	0.00075	0.00098	0.00125
	17	0.00033	0.80877	0.00058	0.00069	0.00106	0.00074	0.00084	0.80078
	18	0.00039	0.00854	0.80051	0.00040	0.00093	0.00077	0.00082	0.00093
	19	0.00716	0.01811	0.00989	0.00910	0.01733	0.01248	0.01320	0.01220
	20	0.00091	0.00236	0.00178	0.00210	0.00316	0.00214	0.00238	0.00231
	21	0.00359	0.00556	0.00486	0.00489	0.00888	0.00644	0.00693	0.00690
	22	0.00299	0.00428	0.00387	0.00376	0.00699	0.00513	0.00553	0.00527
	23	0.00101	0.00231	0.38179	0.00204	0.00329	0.00226	0.00252	0.80240
REST OF THE U.S.	1	0.13337	0.20928	0.17921	0.14907	0.33932	0.25149	0.28453	0.26299
	2	0.07287	0.09610	0.09785	0.88535	0.23318	0.16543	0.17441	0.15457
	3	0.13928	0.18575	0.17029	0.16140	0.31948	0.23382	0.24719	0.22580
	4	0.16472	0.21726	0.20551	0.18601	0.37230	0.27731	0.29706	0.27849
	5	0.08871	0.13368	0.13350	0.09669	0.28052	0.20620	0.25136	0.23000
	6	0.13732	0.16462	0.17999	0.14491	0.30059	0.22598	0.25031	0.23735
	7	0.15833	0.16857	0.15852	0.14347	0.29419	0.21428	0.23040	0.22272
	8	0.12980	0.17635	0.16236	0.15042	0.31359	0.22855	0.24659	0.22392
	9	0.16469	0.18878	0.21673	0.16799	0.33345	0.25197	0.29502	0.28405
	10	0.14128	0.35472	0.22629	0.16233	0.35028	0.26533	0.29325	0.27028
	11	0.06592	0.88876	0.12004	0.07321	0.15733	0.12189	0.13442	0.13537
	12	0.11698	0.15585	0.15972	0.16223	0.31924	0.23277	0.26499	0.24831
	13	0.11762	0.15648	0.16457	0.13327	0.41926	0.31967	0.31410	0.26567
	14	0.17740	0.23443	0.23834	0.20125	0.44735	0.35903	0.38184	0.34639
	15	0.10932	0.14608	0.14705	0.12417	0.44161	0.26851	0.39284	0.24169
	16	0.10499	0.13951	0.13876	0.11991	0.27695	0.20750	0.27975	0.35576
	17	0.09631	0.13206	0.12963	0.10750	0.25709	0.19491	0.23379	0.20206
	18	0.08311	0.10689	0.10467	0.89288	0.19219	0.16045	0.17262	0.19597
	19	0.09315	0.13377	0.12815	0.10939	0.26258	0.19070	0.21907	0.20036
	20	0.07937	0.12678	0.13147	0.08408	0.29512	0.21593	0.27472	0.24941
	21	0.12382	0.17941	0.17751	0.13783	0.36329	0.26715	0.31720	0.29054
	22	0.14744	0.19968	0.19351	0.16505	0.36994	0.27445	0.31014	0.29055
	23	0.06389	0.10322	0.10657	0.06853	0.23871	0.17473	0.22275	0.20125

INDUSTRY		17	18	19	20	21	22	23
APPALACHIA	1	0.19586	0.12430	0.16606	0.16292	0.21020	0.18245	0.33764
	2	0.31687	0.12010	0.20157	0.19332	0.21768	0.26502	0.61540
	3	0.01036	0.00558	0.01009	0.00888	0.01069	0.01027	0.01837
	4	0.03984	0.02378	0.03521	0.03597	0.03934	0.08984	0.04608
	5	0.28056	0.19559	0.24884	0.23545	0.25596	0.29249	0.47663
	6	0.14148	0.08721	0.11611	0.11888	0.12227	0.13775	0.23467
	7	0.11004	0.05890	0.08415	0.08528	0.09091	0.10946	0.20592
	8	0.05152	0.03412	0.05166	0.04907	0.04821	0.04790	0.09232
	9	0.06090	0.02181	0.03834	0.03742	0.03645	0.05238	0.07833
	10	0.18531	0.10357	0.19304	0.15519	0.12540	0.16521	0.63646
	11	0.05613	0.03483	0.04703	0.04668	0.04883	0.06368	0.10475
	12	0.26305	0.13153	0.19247	0.19781	0.21766	0.23239	0.75873
	13	0.30056	0.08778	0.13368	0.12494	0.14666	0.17152	0.41179
	14	0.12143	0.04975	0.07399	0.07061	0.07892	0.08640	0.24425
	15	0.08553	0.04845	0.06394	0.06143	0.06634	0.07482	0.13326
	16	0.07036	0.04182	0.05453	0.05178	0.05973	0.06949	0.11322
	17	1.16271	0.08676	0.11167	0.18493	0.11355	0.13801	0.21208
	18	0.03390	1.02120	0.02222	0.02285	0.02314	0.03647	0.04825
	19	0.28700	0.15248	1.26880	0.24177	0.24388	0.29343	0.48031
	20	0.41160	0.27281	0.36048	1.34631	0.57670	0.37069	0.73885
	21	0.32909	0.21298	0.28636	0.28639	1.32157	0.31155	0.55470
	22	0.16211	0.10555	0.14106	0.14034	0.14788	1.15341	0.27542
	23	0.34123	0.22779	0.31851	0.29048	0.37505	0.31455	1.57530
OZARKA	1	0.00268	0.00060	0.00277	0.00287	0.00287	0.00314	0.00716
	2	0.00494	0.00151	0.00376	0.00365	0.00378	0.00500	0.00947
	3	0.01287	0.00430	0.01222	0.01048	0.01054	0.01406	0.02273
	4	0.80017	0.00002	0.00021	0.00021	0.00020	0.00020	0.00058
	5	0.00372	0.00075	0.00390	0.00396	0.00384	0.00435	0.01015
	6	0.00293	0.00089	0.00245	0.00267	0.00253	0.00345	0.00604
	7	0.00171	0.00050	0.00127	0.00133	0.00133	0.00106	0.00326
	8	0.00202	0.00051	0.00163	0.00176	0.00174	0.00229	0.00410
	9	0.00495	0.00141	0.00295	0.00298	0.00286	0.00446	0.00642
	10	0.01026	0.00342	0.00702	0.00742	0.00797	0.01067	0.02317
	11	0.00171	0.00056	0.00138	0.00144	0.00143	0.00225	0.00367
	12	0.01628	0.00692	0.01219	0.01255	0.01352	0.01537	0.04561
	13	0.00105	0.00027	0.00854	0.00053	0.00056	0.00079	0.00154
	14	0.00161	0.00048	0.00100	0.00100	0.00107	0.00134	0.00304
	15	0.00173	0.00040	0.00127	0.00129	0.00128	0.00171	0.00334
	16	0.00146	0.00039	0.00112	0.00110	0.00109	0.00156	0.00290
	17	0.00201	0.00028	0.80157	0.00155	0.00149	0.00189	0.00399
	18	0.00147	0.00066	0.00086	0.00095	0.00090	0.00173	0.00214
	19	0.01984	0.00672	0.01965	0.01727	0.01629	0.02286	0.03461
	20	0.80416	0.00072	0.00488	0.00487	0.00473	0.00501	0.01272
	21	0.01048	0.00336	0.00956	0.01131	0.01294	0.01249	0.02122
	22	0.00837	0.00280	0.00724	0.00879	0.00787	0.01007	0.01617
	23	0.00429	0.00084	0.00473	0.00481	0.00479	0.00516	0.01188
REST OF THE U.S.	1	0.45803	0.12875	0.29180	0.31594	0.54032	0.50119	0.71012
	2	0.27970	0.06937	0.16407	0.16663	0.17204	0.27152	0.42329
	3	0.35986	0.13210	0.34341	0.29461	0.30655	0.38724	0.63413
	4	0.44365	0.15718	0.33652	0.38414	0.38780	0.93739	0.71190
	5	0.44331	0.08574	0.25732	0.28559	0.27915	0.49982	0.65861
	6	0.40782	0.11869	0.25627	0.29356	0.27952	0.47686	0.61924
	7	0.36695	0.11439	0.23553	0.25154	0.25553	0.39489	0.59032
	8	0.37063	0.12243	0.35453	0.30103	0.29973	0.40534	0.65342
	9	0.50828	0.13997	0.29515	0.30137	0.29862	0.46916	0.65080
	10	0.46791	0.13510	0.30403	0.32452	0.34474	0.49925	0.94032
	11	0.21308	0.06412	0.13842	0.15333	0.14878	0.26876	0.36263
	12	0.43659	0.11388	0.26423	0.28217	0.29609	0.45407	0.77778
	13	0.48669	0.12000	0.24419	0.24833	0.26016	0.40711	0.67918
	14	0.61475	0.17557	0.34864	0.35359	0.37632	0.54032	1.04092
	15	0.44616	0.11392	0.23050	0.24222	0.24447	0.41329	0.60027
	16	0.41082	0.11874	0.22974	0.23324	0.23331	0.42101	0.58246
	17	0.62522	0.09459	0.23769	0.25101	0.23890	0.50947	0.53099
	18	0.31125	0.13992	0.16326	0.18427	0.17348	0.35988	0.40171
	19	0.36397	0.08850	0.27494	0.26425	0.25170	0.41887	0.56356
	20	0.50611	0.07668	0.27976	0.31100	0.30499	0.57774	0.74293
	21	0.53664	0.11956	0.34375	0.41084	0.45009	0.62490	0.81198
	22	0.49513	0.14156	0.35014	0.43126	0.38962	0.50625	0.79274
	23	0.40879	0.06179	0.23556	0.25749	0.27252	0.47057	0.59862

Table J-5 (Cont.)

OZARKA

INDUSTRY		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
APPALACHIA	1	8.01043	0.00878	0.01715	0.07359	0.05887	0.83452	0.02862	0.01177	0.01902	0.81902	0.01866	0.01473	0.05230	0.03778	8.8362[illegible]	0.83070	0.05792	0.81054	8.03562	0.03767	0.03891	8.05972	0.09757
	2	0.13487	0.05877	0.04696	0.06758	0.20544	0.17804	0.13207	0.11947	0.05760	8.07840	0.87518	8.07042	0.22874	0.15640	0.14399	0.12287	0.21708	0.05526	0.12548	0.12239	0.12793	0.18984	0.33964
	3	0.00580	0.00203	0.00177	0.00237	0.00746	0.00595	0.00485	0.00539	0.00202	0.00276	0.00256	0.00241	0.00543	0.00393	0.00394	0.00354	8.80586	8.00188	0.00582	0.00483	0.00483	0.00627	0.01076
	4	0.01999	0.01005	0.00992	0.02609	0.02882	0.02392	0.01774	0.01640	0.01085	8.01293	0.01769	0.81247	0.02237	0.01696	0.01681	0.01567	8.82241	8.01033	0.01587	0.02124	0.02362	0.07913	0.03594
	5	0.02873	0.00664	0.00515	0.01227	0.05366	0.04548	0.02713	0.01448	0.00757	0.01027	0.01323	0.81087	0.05816	0.03635	0.03145	0.02481	0.04832	0.00632	0.03056	0.03066	0.03128	0.04818	0.88253
	6	0.03551	0.81434	0.01245	0.02716	0.05915	0.11003	0.03470	0.02792	0.01732	0.81988	0.02297	0.01928	0.04598	0.03426	0.83310	0.82490	0.05058	0.01441	0.83321	0.03691	0.03553	0.05625	0.88166
	7	0.04481	0.01578	0.01349	0.02124	0.06349	0.86749	0.06025	0.03424	0.02162	0.02263	0.82261	0.02049	0.84820	0.03491	0.83466	0.03223	0.05383	0.01554	0.03452	0.03627	0.03705	0.05578	0.09083
	8	0.01834	0.00689	0.00596	0.00743	0.02172	0.01675	0.01498	0.01505	0.00645	0.08795	0.08790	0.80807	0.01756	0.01288	0.01226	0.81057	0.81646	0.00609	8.02026	0.01529	0.01517	0.01761	0.03236
	9	0.02396	0.00991	0.00856	0.01182	0.83465	0.83279	8.02159	0.01922	0.01151	0.81361	0.01546	0.81199	0.02613	0.01953	8.02193	0.02077	0.83741	0.00973	0.02181	0.02219	0.02148	0.03451	0.04991
	10	8.04464	0.01519	0.01308	0.02224	0.07054	0.07285	8.04034	0.03618	0.01644	8.03583	0.02658	0.02004	0.05814	0.04263	8.04196	0.03648	0.86584	0.01507	0.04206	0.04413	0.04629	0.06777	0.12363
	11	0.01210	0.08496	0.00433	0.00686	0.81884	0.02032	0.01124	0.00935	0.00537	8.00697	0.01833	0.80637	8.01652	0.01263	0.01214	0.81158	0.01814	0.00506	0.01231	0.01311	0.01291	8.02223	0.83290
	12	0.87876	0.03175	0.02676	0.03947	0.12582	0.10478	0.07273	0.06712	0.03257	0.04521	8.04497	0.04850	0.10321	0.07442	0.07488	0.06784	0.11620	0.03098	0.07262	0.87581	0.08016	0.11416	0.22701
	13	0.08937	0.04222	0.03610	0.04709	0.13480	0.11001	0.08385	0.07972	0.04141	0.85496	0.05965	0.84793	0.18125	8.13984	0.11868	0.09646	0.17072	0.04297	0.08259	0.08156	0.08732	0.12636	0.24286
	14	8.03635	0.01595	0.01425	0.01909	0.05980	0.84530	0.03308	0.03169	0.01644	0.02166	0.02247	0.01918	0.04623	0.03691	0.03686	0.03272	0.05754	0.01609	0.03334	0.03338	8.03570	0.04919	0.10206
	15	0.01708	0.80750	0.00607	0.00863	0.02576	0.02274	0.01580	0.01295	0.00686	0.88908	8.88970	0.00836	0.03412	0.02120	0.02753	0.81650	0.03060	0.00693	8.01655	0.01684	0.01721	0.02767	0.04416
	16	0.01405	0.00533	0.00465	0.08212	0.02194	0.01937	0.01293	0.01116	0.00554	8.00753	0.00791	0.00677	0.02045	0.01502	0.01697	8.01887	0.02511	0.00590	8.01448	0.01454	0.01467	0.02498	0.03812
	17	0.01307	0.00349	0.00278	0.00611	0.02258	0.02143	8.01304	0.00764	0.00390	8.00538	0.00656	8.00544	8.02366	0.01722	0.01535	8.01210	8.02673	0.00338	0.81502	0.81512	0.01517	0.02495	0.03937
	18	0.00896	0.00357	0.00316	0.00504	0.01367	0.01201	0.00847	0.00760	0.00381	0.00509	0.00509	0.00442	0.01125	8.00888	0.08907	0.00943	8.01581	0.00574	0.00868	0.00948	0.00908	0.01746	0.02204
	19	0.13081	0.05395	0.04749	0.86582	0.20510	0.16526	0.11383	0.11139	8.05406	8.07463	0.06968	8.06711	8.14840	0.10692	8.10850	0.09740	0.16277	0.05043	0.15036	0.13170	0.12468	0.18258	0.27123
	20	0.04743	0.01235	0.00989	0.02182	0.08189	0.87817	0.04648	0.02987	0.01400	0.02808	0.02359	0.01988	0.08160	8.05906	0.05299	0.04272	0.08266	0.01207	0.85151	0.05212	0.05338	0.08293	0.13906
	21	0.07764	0.02663	0.02638	0.03635	0.11167	0.89648	0.06344	0.05588	0.02717	0.03452	0.03778	0.03347	0.09504	0.06946	8.06669	0.85744	8.09904	0.02522	0.07195	0.08456	0.09780	0.10856	0.16516
	22	0.03303	0.01155	0.01043	8.01659	0.05267	0.04470	0.03062	0.02393	0.01233	0.01630	0.01715	0.01513	0.04417	0.03239	8.03091	8.02685	0.04657	0.01135	0.03344	0.03900	0.03614	0.05146	0.07956
	23	0.04657	0.01237	0.01045	0.02095	0.87784	0.07201	0.04384	0.03131	0.01375	0.02041	0.82264	0.01841	8.07397	0.05336	0.84890	0.03989	0.07644	0.01203	0.04938	0.05105	0.05331	0.07863	0.12917
OZARKA	1	1.43816	0.11832	0.10961	0.10994	0.59257	0.15134	0.12115	0.12804	0.11030	8.13366	0.11287	0.12454	8.14051	0.11287	0.11391	0.11389	0.11655	0.10993	0.12516	0.12098	0.16944	0.11687	0.17561
	2	0.05973	1.10949	0.03270	0.03324	0.06609	0.05366	0.09253	0.04967	0.03564	8.03559	0.03523	0.09980	0.27714	0.03733	0.03843	0.03806	0.04148	0.83345	0.89514	0.03911	0.04965	0.04241	0.14557
	3	0.01988	0.00947	1.01214	0.00983	0.02432	0.01851	0.01659	0.15845	0.00910	8.01127	0.01042	0.01050	8.01734	0.01295	0.01347	0.01258	0.01794	0.00879	0.01864	0.01579	0.01799	0.01904	0.03151
	4	0.01662	0.01316	0.01219	1.01221	8.01898	0.01347	0.01332	0.01419	0.01226	0.01276	8.01250	0.01383	0.01556	0.01251	0.01261	8.01263	0.01287	0.01222	0.01377	8.01303	0.01430	0.01286	0.01881
	5	0.23687	0.18161	0.16823	0.16861	1.28608	0.18765	8.18508	0.19642	0.16927	0.17648	8.17275	0.19899	0.21548	0.17308	8.17459	0.17468	0.17860	0.16863	0.19875	0.18128	0.19817	0.17859	0.26137
	6	0.08847	0.06303	0.05834	0.06089	0.09379	1.88364	0.06518	0.06867	0.05947	0.06149	0.86058	8.06676	0.07551	0.86068	0.86115	0.06129	0.06336	0.05867	8.06668	0.06402	8.06941	0.06387	0.09276
	7	0.02779	0.02086	0.01925	0.01956	8.03170	0.02393	1.02567	0.02328	0.02826	0.02848	0.02006	0.02216	0.02553	0.02032	0.02046	8.82057	0.02149	0.01938	0.82229	8.02126	0.02324	0.82167	0.03238
	8	0.05455	0.03616	0.03315	0.03311	0.05762	0.03911	0.04227	1.04775	0.03319	0.03536	8.03418	0.03886	8.04426	0.03496	0.03539	0.03475	0.03655	0.03296	0.05073	0.04112	0.04339	0.03816	8.06295
	9	0.01142	0.00776	0.00707	0.08741	0.01376	0.01108	0.00947	0.00927	1.00778	0.00795	0.00859	8.00838	0.01072	0.00852	0.00921	8.80923	0.01205	0.00726	0.00978	0.08539	0.00972	0.01188	0.01564
	10	0.01779	0.01040	0.00934	0.01058	0.02283	0.02382	0.01409	0.01460	0.00994	1.03350	0.01619	0.01176	0.01690	0.01366	0.01376	0.01308	0.01788	0.00970	0.01478	0.01522	0.01703	0.01735	0.05741
	11	0.03232	0.02524	0.02335	0.02371	0.03735	8.02839	0.02605	0.02762	0.02369	0.02482	1.82627	0.02678	0.03049	0.02472	0.02489	0.02540	0.02681	0.02360	0.02718	0.02607	0.02821	0.02829	0.04034
	12	0.12131	0.09693	0.08243	0.88341	0.17839	0.10408	0.10824	0.10131	0.08757	8.09095	8.09639	1.16617	0.13499	0.89909	0.10137	0.10958	0.12017	0.08718	0.10604	0.10926	0.12285	0.10727	0.45685
	13	0.80439	8.00335	0.00305	0.00312	0.00522	0.00378	0.00368	0.00378	0.00310	0.00330	0.08342	0.88351	1.00648	0.00520	0.00439	8.00396	0.00486	0.00315	0.00374	0.00351	0.00389	0.00374	0.00668
	14	0.01248	0.00940	0.00872	0.00881	0.81655	0.01853	0.01037	0.01086	0.00888	0.00937	0.00962	0.01004	0.01247	1.01081	0.01870	0.01045	0.01263	0.00889	0.01060	0.00998	0.81115	0.01019	8.02322
	15	0.04993	0.03938	0.03633	0.03637	0.05705	8.04067	0.84004	0.04248	0.83647	0.03807	0.83732	0.04117	0.04961	0.03827	1.04114	0.03834	0.84025	0.03644	0.04137	0.83924	0.04294	0.03984	0.05791
	16	0.04098	0.03225	0.02988	0.02997	0.04695	0.03342	8.03286	0.03500	0.03007	0.03137	0.03073	0.03393	8.03854	0.03094	0.03147	1.03191	0.03238	0.03002	0.03406	0.03223	0.03532	0.03238	0.04729
	17	0.09846	0.07784	0.07212	8.07224	0.11249	0.07986	0.07889	0.08405	0.07254	0.07553	0.87358	0.08185	0.09222	0.07411	0.07478	0.07479	1.07717	0.07227	0.08164	0.07722	0.08470	0.07669	0.11161
	18	8.01271	0.00981	8.00908	0.00925	0.01476	0.01063	0.01030	8.01089	0.00918	0.00965	0.00945	0.01836	0.01204	0.00972	0.00983	0.00998	0.01066	1.00947	0.01061	0.01817	0.01103	0.01090	0.01531
	19	0.13981	0.10495	0.09697	0.09906	8.16607	0.11965	0.11284	0.11990	0.09821	0.10455	0.10168	0.11147	0.13258	0.10515	0.10651	0.10557	0.11457	0.09745	1.12098	0.11285	0.12129	0.11725	0.17116
	20	0.34805	0.25786	0.23802	0.24000	0.40160	8.27987	0.26573	0.27782	0.24037	0.25212	8.24874	0.27284	0.31312	0.25006	0.25471	0.25373	0.26155	0.23937	0.28174	1.27070	0.29520	0.26664	0.42745
	21	0.24170	0.18814	0.17469	0.17539	0.27717	0.19758	0.19307	0.20600	0.17548	0.18356	0.17959	0.19806	0.22597	0.18113	0.18293	0.18268	0.18901	0.17470	0.20015	0.19152	1.21121	0.19032	0.27761
	22	0.12356	0.09547	0.08850	0.08943	0.14324	0.18216	0.09943	0.10544	0.08923	0.89362	0.09155	0.10069	0.11594	0.09281	0.09385	0.09369	0.09797	0.08879	0.10290	0.09925	0.10730	1.09936	0.14491
	23	0.28036	0.21450	0.19871	0.19956	8.31617	0.22169	8.21806	0.23215	0.19992	0.21002	0.20586	0.22556	0.25589	0.20589	0.20942	0.20646	0.21190	0.19908	0.24804	0.22169	0.29951	0.21414	1.30908
REST OF THE U.S.	1	0.50593	0.11792	0.10280	0.16577	0.82686	0.49968	0.30594	0.33246	0.12868	0.22220	0.18342	0.14639	0.37548	8.27028	0.29242	0.26673	0.47659	0.12181	0.28821	0.31179	0.33284	0.49982	0.78473
	2	0.22772	0.13276	0.88064	0.11262	0.33478	0.29219	0.24144	0.20772	0.09974	0.13363	8.13085	0.14484	0.43763	0.23612	0.22442	0.19604	0.33903	0.09438	0.22057	0.19408	0.20721	0.30192	0.56506
	3	0.35212	0.13259	0.13547	0.15220	8.45804	8.36334	0.29628	1.05554	0.13252	0.18248	8.16464	0.15412	0.31710	0.23040	0.24209	0.22014	0.35626	0.12504	0.33484	0.28703	0.29823	0.38854	0.63462
	4	0.35898	0.15139	0.13828	0.31746	0.53975	0.45355	0.31820	0.32377	0.15864	0.21878	8.20186	0.17995	0.37757	0.27835	0.29474	0.27491	0.44451	0.15046	0.33012	0.37773	0.38087	0.92816	0.72672
	5	0.38384	0.08601	0.07165	0.14041	0.71765	0.47866	0.30044	0.33223	0.10106	0.18853	0.15969	0.11477	0.36554	0.25744	0.28490	0.25673	0.49455	0.09446	0.27376	0.30048	0.29590	0.51834	0.80483
	6	0.31366	0.11940	0.10410	0.22814	0.51476	8.92991	0.29815	0.29448	0.14735	0.19059	8.19688	0.15655	8.34032	0.25097	0.26723	0.25203	0.43396	0.12479	0.26578	0.30523	0.28980	0.48979	0.68792
	7	0.37636	0.13293	0.11393	8.17017	0.50079	8.53707	0.56916	0.29816	0.19682	0.19185	0.18259	0.16984	0.34283	0.24562	0.25480	0.24915	0.39983	0.13155	0.25667	8.27330	0.27964	0.42209	0.68628
	8	0.34718	0.11638	0.10077	0.14126	0.46439	0.37361	0.29286	0.31959	0.11921	0.17434	0.15456	8.13883	0.31467	0.22601	0.23977	0.21613	0.36779	0.11107	0.32991	0.28456	0.28366	0.39344	0.65638
	9	0.33471	0.14181	0.12259	0.16437	0.47475	0.44783	0.29865	0.27403	0.16635	0.19434	8.22160	0.16894	0.34315	0.25785	0.30026	0.28904	0.52138	0.13947	0.29794	0.30349	0.29168	0.47425	8.67176
	10	0.46980	0.21319	0.18818	0.25205	0.66793	0.69443	0.39271	0.41511	0.21556	0.66612	0.35816	0.25283	0.48112	0.36853	0.38476	0.35667	0.57458	0.20660	0.39628	0.41713	0.45330	0.58022	1.42175
	11	0.15652	0.06275	0.05527	0.08612	0.23835	0.25385	0.14084	0.14764	0.06907	0.10000	8.13132	0.07742	0.17414	0.13302	0.14206	8.14319	0.22472	0.06663	0.14302	0.15812	0.15339	0.28035	0.39893
	12	0.32246	0.12237	0.10278	0.15546	0.51394	0.42554	0.29393	0.30558	0.12854	8.19406	8.17963	0.18441	8.37727	0.26897	0.29051	0.27050	0.47432	8.12337	0.27914	0.29594	0.31267	8.47055	0.89211
	13	0.31358	0.15038	0.12866	0.16835	0.46853	0.37888	0.29279	0.29073	0.14727	0.19814	0.21240	0.16834	0.63581	0.49172	0.41875	0.34169	0.60863	0.15431	0.28338	0.28032	0.30054	0.44164	0.84519
	14	8.42142	0.18714	0.16791	0.22041	0.69045	0.50957	0.37862	0.39366	0.19361	0.26239	0.26218	0.22071	8.49312	[illegible]	0.41397	0.37499	0.66299	0.19126	8.36987	0.37234	0.39920	0.56002	1.16545
	15	0.26571	0.11781	0.09663	0.13128	0.38830	0.33206	0.23712	0.24499	0.10876	0.15670	0.15037	0.12473	0.46668	[illegible]	0.40490	0.24631	0.45930	0.11267	0.23093	0.24218	0.24471	0.41617	0.63659
	16	0.24295	0.10149	0.09100	8.12516	0.35967	0.30421	0.21318	0.22872	0.10441	0.14848	0.14145	0.12027	0.29271	0.21651	0.28672	0.36563	0.42213	[illegible]	0.23046	0.23316	8.23345	0.42562	0.61581
	17	0.26541	0.09438	0.08221	8.12824	0.40394	0.34873	0.23445	0.25596	0.10104	0.15747	0.14088	0.11476	0.29602	0.21883	0.25068	0.21410	0.68214	0.09996	0.24606	0.25719	0.24556	0.53244	0.59820
	18	0.17812	8.07766	0.07002	0.10630	0.26125	0.22458	0.16665	0.16378	0.08236	0.10941	0.10534	0.09240	0.19827	0.16469	0.17483	0.19949	0.31816	0.14245	0.16291	0.18433	0.17291	0.36595	8.41587
	19	0.27727	0.08825	0.07557	0.12564	0.44637	0.38070	0.24657	0.27008	0.09557	0.15979	0.13821	0.11464	0.30473	0.21493	0.23336	8.21079	0.38818	0.08887	0.28263	0.26788	0.25606	0.42534	0.63919
	20	0.35051	0.07055	0.05574	8.13894	0.58486	8.53886	0.32092	0.36524	0.09075	0.19458	0.16129	0.10323	0.40315	0.28003	0.31483	0.28024	0.57011	0.08319	0.29590	0.32389	8.32112	0.59747	8.93208
	21	0.42239	0.11535	0.10986	0.17922	0.63539	0.55852	0.35384	0.40536	0.12888	0.22719	0.19642	0.14782	0.44016	0.31161	0.34366	0.31007	0.50091	0.12099	0.35222	0.41756	0.45951	0.63631	0.94908
	22	0.39300	0.13446	0.12340	0.19005	0.60874	0.49969	0.34962	0.36196	0.14665	0.22217	0.20025	0.16651	0.40756	0.29519	0.32098	0.29763	0.51571	0.13878	0.35884	0.43120	0.39012	8.50888	0.86275
	23	0.28476	0.85625	0.04507	0.11162	0.46986	0.43142	0.25911	0.29857	0.07231	0.15799	0.13003	0.08260	0.32537	0.22575	0.25436	0.22535	0.45965	0.06627	0.24802	0.26709	0.28954	0.48560	0.75106

Table J-5 (Cont.)

REST OF THE U.S.

Region	Industry	1	2	3	4	5	6	7	8
APPALACHIA	1	0.88588	0.82459	0.81928	0.02626	0.13179	0.07380	0.84847	0.04138
	2	0.17313	0.11193	0.06992	0.04005	0.24802	0.20865	0.17847	0.14942
	3	0.00595	0.08242	0.00232	0.00262	0.00789	0.00623	0.00503	0.01516
	4	0.01415	0.80625	0.00522	0.01034	0.02130	0.01743	0.81254	0.01126
	5	0.03833	0.01292	0.00622	0.01083	0.06780	0.04732	0.03284	0.01735
	6	0.03966	0.81746	0.81358	0.02606	0.06371	0.10239	0.03724	0.02977
	7	0.05376	0.02134	0.01758	0.02468	0.07346	0.07397	0.07158	0.03967
	8	0.01073	0.00403	0.00269	0.00389	0.01598	0.01264	0.00942	0.00723
	9	0.02720	0.01234	0.01054	0.01365	0.03840	0.03516	0.02410	0.02153
	10	0.06236	0.82770	0.02253	0.03060	0.89089	0.08558	0.05275	0.84754
	11	0.01318	0.08573	0.00432	0.80633	0.02020	0.81937	0.81184	0.00958
	12	0.09993	0.04787	0.83903	0.05067	0.15208	0.11894	0.08905	0.08187
	13	0.09840	0.04899	0.04164	0.85298	0.14497	0.11614	0.09024	0.08626
	14	0.83936	0.01816	0.81550	0.01996	0.86209	0.04664	0.03490	0.03317
	15	0.01898	0.00883	0.80637	0.06845	0.82838	0.02320	0.01708	0.01376
	16	0.01721	0.00773	0.00606	0.08807	0.02578	0.82099	0.01523	0.01302
	17	0.01718	0.00652	0.80350	0.00573	0.02787	0.02247	0.01577	0.00917
	18	0.01085	0.00502	0.00426	0.08612	0.01588	0.01329	0.01002	0.00891
	19	0.14469	0.06493	0.05531	0.07236	0.22123	0.17378	0.12437	0.12085
	20	0.86917	0.02624	0.81623	0.02497	0.18917	0.08794	0.06010	0.03932
	21	0.08877	0.03520	0.02956	0.03716	0.12596	0.10059	0.07137	0.06114
	22	0.03822	0.81552	0.81173	0.81663	0.05921	0.04638	0.03416	0.02623
	23	0.86812	0.02662	0.01841	0.02628	0.10259	0.08168	0.05752	0.04219
OZARKA	1	0.00312	0.00085	0.00084	0.00103	0.00520	0.00360	0.00227	0.00540
	2	0.00438	0.00251	0.00172	0.88219	0.80638	0.00529	0.00428	0.00471
	3	0.01517	0.08629	0.88646	0.00701	0.01942	0.01527	0.01270	0.04633
	4	0.00018	0.00003	0.00003	0.88004	0.00028	0.00023	0.00014	0.00048
	5	0.00471	0.08117	0.80115	0.80140	0.00843	0.00508	0.00327	0.00804
	6	0.00266	0.00101	0.00093	0.08167	0.80419	0.80671	0.00235	0.00389
	7	0.00196	0.08071	0.88064	0.80087	0.08261	0.80266	0.00271	0.00205
	8	0.00262	0.08093	0.88086	0.80186	0.00347	0.00271	0.00213	0.00323
	9	0.00322	0.80146	0.08127	0.00164	0.00450	0.00414	0.80284	0.00278
	10	0.01008	0.80481	0.00432	0.00557	0.01400	0.01423	0.00835	0.00894
	11	0.08138	0.00057	0.80852	0.00071	0.00205	0.08204	0.00118	0.00185
	12	0.00939	0.00421	0.00362	0.00459	0.01429	0.01114	0.00816	0.01019
	13	0.00063	0.00031	0.00027	0.08034	0.00093	0.00074	0.00057	0.00065
	14	0.00114	0.00051	0.00046	0.00058	0.00181	0.00134	0.00100	0.00126
	15	0.00136	0.00053	0.00047	0.00056	0.00199	0.80162	0.00114	0.00216
	16	0.00106	0.00038	0.00036	0.88044	0.80158	0.00128	0.80087	0.00174
	17	0.00135	0.00032	0.08032	0.00039	0.00208	0.00167	0.00106	0.00311
	18	0.00096	0.00043	0.08039	0.00055	0.00139	0.00117	0.00086	0.00109
	19	0.01858	0.00815	0.00735	0.08938	0.82881	0.02196	0.01561	0.01882
	20	0.00441	0.00101	0.00105	0.00124	0.00480	0.00553	0.00343	0.01020
	21	0.01101	0.00402	0.08417	0.00477	0.01492	0.01188	0.00821	0.01378
	22	0.00792	0.00318	0.80303	0.08390	0.01172	0.08906	0.00673	0.00910
	23	0.00473	0.00129	0.08131	0.00156	0.00706	0.00563	0.00364	0.00937
REST OF THE U.S.	1	1.95768	0.26903	0.24617	0.31114	1.42368	0.68232	0.65900	0.49290
	2	0.28731	1.22057	0.12075	0.15363	0.40005	0.34484	0.31752	0.25871
	3	0.38964	0.16175	1.16550	0.17991	0.49985	0.39336	0.32654	1.18588
	4	0.42323	0.20269	0.18682	1.37938	0.61347	0.50773	0.37837	0.37813
	5	0.67298	0.31345	0.28793	0.35987	2.05656	0.71411	0.53018	0.57410
	6	0.43636	0.21590	0.19587	0.32432	0.65303	2.05309	0.39631	0.39720
	7	0.43167	0.17824	0.15746	0.21451	0.56340	0.58339	1.61171	0.34647
	8	0.44318	0.18364	0.16386	0.20467	0.56556	0.44406	0.36793	1.40279
	9	0.37510	0.17405	0.15316	0.19533	0.52039	0.48149	0.33130	0.30828
	10	0.51625	0.25137	0.22632	0.29169	0.72024	0.73683	0.43143	0.45710
	11	0.20856	0.10441	0.09487	0.12657	0.29741	0.29938	0.18297	0.19197
	12	0.46997	0.24437	0.21218	0.26637	0.71605	0.55091	0.42340	0.43001
	13	0.35261	0.18208	0.15934	0.19982	0.51280	0.41214	0.32519	0.32480
	14	0.48000	0.23402	0.21286	0.26611	0.75981	0.55867	0.42664	0.44431
	15	0.34770	0.18360	0.15886	0.19421	0.48075	0.39966	0.30320	0.31441
	16	0.31249	0.15719	0.14388	0.17876	0.43836	0.36165	0.26938	0.28789
	17	0.40053	0.28259	0.18510	0.23260	0.55675	0.46046	0.34348	0.37102
	18	0.20972	0.10297	0.09403	0.13050	0.29700	0.25059	0.19202	0.19065
	19	0.44223	0.22009	0.20881	0.25267	0.63346	0.51708	0.37961	0.41038
	20	0.75426	0.37900	0.34817	0.43699	1.04497	0.87062	0.63551	0.69268
	21	0.72079	0.35396	0.33672	0.40918	0.97261	0.80482	0.59426	0.65894
	22	0.56129	0.26907	0.25124	0.31967	0.79922	0.63859	0.48536	0.50498
	23	0.60735	0.31003	0.28625	0.35655	0.00000	0.00008	0.51503	0.56844

Region	Industry	9	10	11	12	13	14	15	16
APPALACHIA	1	0.02257	0.03329	0.02973	0.02940	0.07325	0.04768	0.04678	0.04169
	2	0.08181	0.10324	0.10306	0.12871	0.33622	0.17837	0.16766	0.14712
	3	0.00733	0.00311	0.00288	0.00282	0.08600	0.00418	0.00426	0.00345
	4	0.00599	0.00805	0.08767	0.00747	0.81740	0.01174	0.01175	0.01068
	5	0.00905	0.01427	0.01482	0.01212	0.06525	0.03590	0.03196	0.02618
	6	0.01826	0.02207	0.02385	0.02223	0.05251	0.03470	0.03397	0.03100
	7	0.02699	0.02766	0.82706	0.02652	0.05664	0.03889	0.03881	0.03677
	8	0.00336	0.88485	0.00471	0.88503	0.01513	0.08907	0.08854	0.00728
	9	0.01364	0.01585	0.01771	0.01454	0.02942	0.02151	0.02409	0.02296
	10	0.02613	0.85829	0.03937	0.03323	0.07636	0.05225	0.05206	0.04656
	11	0.00532	0.80730	0.00918	0.00787	0.01854	0.01215	0.01185	0.01112
	12	0.04535	0.85964	0.05847	0.06850	0.12669	0.08683	0.08816	0.08173
	13	0.04705	0.06127	0.06478	0.85512	0.18148	0.13748	0.12018	0.09980
	14	0.01774	0.02345	0.82353	0.02137	0.04950	0.03693	0.03726	0.83336
	15	0.00733	0.81801	0.01815	0.80989	0.03527	0.02061	0.02508	0.01653
	16	0.00701	0.08948	0.00946	0.00925	0.02476	0.01632	0.01899	0.02220
	17	0.00480	0.00729	0.00752	0.00846	0.03861	0.01734	0.01600	0.01301
	18	0.00495	0.00637	0.08628	0.00596	0.01342	0.01017	0.01038	0.01124
	19	0.06214	0.88414	0.07784	0.07838	0.16582	0.11487	0.11619	0.10557
	20	0.02107	0.03896	0.03137	0.03333	0.10930	0.06413	0.05979	0.05054
	21	0.03091	0.04275	0.04156	0.04217	0.11267	0.07130	0.06949	0.06109
	22	0.01386	0.01989	0.01873	0.01912	0.85261	0.03295	0.03195	0.02838
	23	0.02222	0.03242	0.03196	0.03301	0.09970	0.86826	0.05750	0.04847
OZARKA	1	0.00084	0.08196	0.00132	0.00119	0.00242	0.00162	0.00173	0.00160
	2	0.00195	0.00269	0.00247	0.00285	0.00694	0.08374	0.00370	0.00335
	3	0.00624	0.00823	0.00751	0.00718	0.01348	0.01000	0.01048	0.00964
	4	0.00003	0.00012	0.00806	0.00886	0.00014	0.00008	0.00009	0.00008
	5	0.00116	0.00266	0.00182	0.00167	0.00343	0.00226	0.00243	0.00223
	6	0.00115	0.00172	0.00155	0.00135	0.00254	0.00181	0.00190	0.00181
	7	0.00098	0.00187	0.08096	0.00092	0.00171	0.00122	0.00126	0.08123
	8	0.00092	0.08144	0.00119	0.00113	0.00218	0.00157	0.80165	0.00151
	9	0.00164	0.08193	0.00213	0.00171	0.00327	0.00246	0.00282	0.00271
	10	0.00484	0.01335	0.00757	0.00563	0.01019	0.08790	0.00819	0.00762
	11	0.00059	0.00092	0.00186	0.00071	0.00140	0.00104	0.00109	0.00110
	12	0.00408	0.00587	0.00536	0.00614	0.01063	0.08741	0.00771	0.00743
	13	0.00030	0.88841	0.08042	0.08035	0.00117	0.80090	0.00078	0.00065
	14	0.00052	0.00873	0.80069	0.00060	0.00126	0.00100	0.00103	0.00095
	15	0.00049	0.00087	0.00070	0.00062	0.00189	0.00112	0.00156	0.00101
	16	0.00038	0.80869	0.00055	0.00049	0.00188	0.80075	0.00095	0.00114
	17	0.00031	0.00089	0.00056	0.00050	0.00112	0.00070	0.00078	0.80069
	18	0.00044	0.00061	0.00056	0.00051	0.00181	0.00082	0.00086	0.00097
	19	0.00804	0.81135	0.81003	0.00988	0.01874	0.01352	0.01416	0.01308
	20	0.00098	0.00292	0.00178	0.00163	0.00356	0.00220	0.00240	0.00218
	21	0.00394	0.00632	0.00524	0.00488	0.00960	0.00682	0.00727	0.00812
	22	0.00325	0.08477	0.00415	0.00386	0.00748	0.80544	0.00579	0.00547
	23	0.00126	0.00304	0.00204	0.00186	0.00392	0.00256	0.00277	0.00251
REST OF THE U.S.	1	0.27265	0.38602	0.32992	0.30524	0.54746	0.41803	0.44065	0.41453
	2	0.14145	0.17470	0.17249	0.22720	0.63132	0.28078	0.26862	0.23959
	3	0.16009	0.21078	0.19265	0.18473	0.35062	0.25871	0.27051	0.24845
	4	0.20755	0.26890	0.25164	0.23397	0.43643	0.32860	0.34505	0.32510
	5	0.31818	0.41806	0.38034	0.35378	0.62355	0.48046	0.50846	0.47963
	6	0.24039	0.28467	0.29167	0.25849	0.44986	0.34593	0.36227	0.34701
	7	0.23985	0.23607	0.22886	0.21733	0.39343	0.29058	0.29980	0.29384
	8	0.18223	0.23967	0.21875	0.20941	0.39261	0.29153	0.30564	0.28103
	9	1.19725	0.22571	0.25315	0.20283	0.37980	0.28947	0.33214	0.32090
	10	0.25372	1.10679	0.39743	0.29312	0.52128	0.40844	0.42417	0.39592
	11	0.10984	0.14079	1.17478	0.12134	0.22154	0.17442	0.18344	0.18521
	12	0.24232	0.30881	0.30892	1.37211	0.53819	0.39234	0.41516	0.40314
	13	0.17882	0.22914	0.24460	0.20153	1.68150	0.53279	0.45539	0.37615
	14	0.23879	0.30826	0.30877	0.27017	0.54713	1.44679	0.46243	0.42298
	15	0.17188	0.22833	0.21378	0.19341	0.54565	0.34621	1.47449	0.31111
	16	0.15751	0.20269	0.19536	0.17878	0.35594	0.27088	0.34079	1.41860
	17	0.20433	0.26283	0.24580	0.22846	0.41881	0.32485	0.35686	0.32009
	18	0.10645	0.13404	0.12979	0.11896	0.22704	0.18918	0.19943	0.22361
	19	0.22128	0.28817	0.26594	0.25328	0.45467	0.34409	0.36287	0.33991
	20	0.38516	0.49646	0.46355	0.42815	0.76004	0.58640	0.62414	0.58768
	21	0.35647	0.45944	0.42766	0.39853	0.71115	0.54530	0.57798	0.54373
	22	0.27499	0.35318	0.33065	0.30795	0.56062	0.42693	0.45311	0.42941
	23	0.31445	0.40617	0.37733	0.34926	0.61443	0.47540	0.50582	0.47405

Region	Industry	17	18	19	20	21	22	23
APPALACHIA	1	0.06904	0.02121	0.05033	0.04946	0.05954	0.06676	0.12009
	2	0.24151	0.07849	0.17364	0.14799	0.16259	0.21417	0.40931
	3	0.00615	0.80220	0.80565	0.08493	0.00530	0.00637	0.01097
	4	0.01730	0.00562	0.01351	0.01441	0.01536	0.02947	0.02967
	5	0.04965	0.00762	0.03699	0.03255	0.04141	0.04215	0.09585
	6	0.05161	0.01554	0.03636	0.03787	0.04003	0.85383	0.08722
	7	0.05838	0.01976	0.04061	0.04098	0.04444	0.05895	0.10081
	8	0.01288	0.00301	0.01697	0.00938	0.81097	0.01204	0.82418
	9	0.03995	0.01174	0.02448	0.02445	0.02440	0.03645	0.05372
	10	0.07651	0.02462	0.85768	0.05608	0.06896	0.07493	0.15988
	11	0.01785	0.00499	0.01298	0.01287	0.01430	0.01952	0.03292
	12	0.13060	0.04362	0.09165	0.09088	0.10636	0.12480	0.26696
	13	0.17215	0.04826	0.89011	0.08770	0.09698	0.13095	0.24790
	14	0.05723	0.01729	0.83594	0.03485	0.03999	0.04930	0.10017
	15	0.83000	0.00727	0.01803	0.81724	0.01953	0.02575	0.84633
	16	0.02737	0.00751	0.01717	0.81625	0.01798	0.02601	0.04314
	17	0.03049	0.00424	0.81826	0.01626	0.01986	0.02389	0.04521
	18	0.01783	0.00770	0.81020	0.01088	0.81093	0.01962	0.02485
	19	0.17092	0.05843	0.16041	0.13967	0.13786	0.18653	0.28798
	20	0.09086	0.01883	0.06762	0.06196	0.87583	0.08183	0.17106
	21	0.10269	0.02875	0.08053	0.08808	0.10920	0.10471	0.18071
	22	0.04801	0.01277	0.03732	0.84028	0.04178	0.04904	0.88668
	23	0.08535	0.02025	0.07141	0.06298	0.09358	0.08005	0.15341
OZARKA	1	0.00272	0.00073	0.00305	0.00300	0.00314	0.00324	0.00652
	2	0.00541	0.00183	0.00458	0.00398	0.00420	0.80537	0.00997
	3	0.81491	0.00595	0.01428	0.01233	0.01285	0.81594	0.02622
	4	0.00015	0.00002	0.08823	0.00821	0.00021	0.00020	0.00046
	5	0.00383	0.00099	0.00439	0.00424	0.00431	0.00455	0.00919
	6	0.08294	0.00097	0.00260	0.00273	0.00268	0.00349	0.00568
	7	0.00192	0.00068	0.00145	0.00153	0.00158	0.00209	0.00360
	8	0.00243	0.00086	0.00268	0.00229	0.00229	0.00273	0.00486
	9	0.00471	0.00142	0.00289	0.00291	0.00284	0.00434	0.00624
	10	0.01189	0.00468	0.00849	0.00888	0.00954	0.01207	0.02837
	11	0.00165	0.00056	0.00140	0.00146	0.00144	0.00213	0.00333
	12	0.01151	0.00388	0.00887	0.80885	0.00991	0.01159	0.02470
	13	0.00111	0.00031	0.00059	0.00057	0.00061	0.00084	0.00160
	14	0.80161	0.00051	0.00105	0.00103	0.00111	0.00142	0.00294
	15	0.00181	0.80047	0.00139	0.00136	0.00139	0.00179	0.00319
	16	0.00139	0.00039	0.00114	0.00110	0.00112	0.00151	0.00260
	17	0.00167	0.00025	0.00162	0.00151	0.00153	0.00172	0.00330
	18	0.00152	0.00070	0.00092	0.00099	0.00095	0.00176	0.00215
	19	0.02080	0.00757	0.02874	0.01818	0.01736	0.02377	0.03577
	20	0.00396	0.00076	0.00525	0.00491	0.00508	0.08496	0.01070
	21	0.01080	0.00908	0.01011	0.01167	0.01341	0.01270	0.02037
	22	0.00858	0.00306	0.00760	0.00895	0.00820	0.01025	0.01587
	23	0.00436	0.00107	0.00546	0.00511	0.00589	0.00535	0.01063
REST OF THE U.S.	1	0.62645	0.26557	0.44493	0.46542	0.52916	0.65467	0.99739
	2	0.38423	0.13494	0.29800	0.23736	0.25403	0.34896	0.67804
	3	0.38503	0.15253	0.34657	0.31659	0.33086	0.41019	0.67618
	4	0.49546	0.19913	0.38468	0.43070	0.43878	1.02438	0.79775
	5	0.72053	0.31120	0.50869	0.52847	0.53609	0.75221	1.11816
	6	0.53047	0.21695	0.38553	0.40290	0.39189	0.59057	0.82144
	7	0.44518	0.17511	0.30330	0.31890	0.32650	0.46953	0.74759
	8	0.43428	0.17387	0.41736	0.35825	0.35989	0.46398	0.76297
	9	0.55417	0.17014	0.33143	0.33586	0.32569	0.50768	0.71657
	10	0.61439	0.24675	0.43356	0.45630	0.48589	0.62388	1.47688
	11	0.26687	0.10654	0.18647	0.20061	0.19757	0.32713	0.46046
	12	0.61339	0.23700	0.40418	0.42637	0.44755	0.60138	1.39411
	13	0.64593	0.18540	0.31558	0.31235	0.33171	0.47574	0.89423
	14	0.71397	0.23649	0.41835	0.41973	0.44756	0.60927	1.24321
	15	0.52625	0.17507	0.29861	0.38772	0.31390	0.48470	0.72823
	16	0.47675	0.17085	0.28777	0.28862	0.29214	0.48195	0.69098
	17	1.78714	0.20302	0.35763	0.36521	0.35974	0.64248	0.74728
	18	0.34243	1.16571	0.18895	0.20937	0.19954	0.39050	0.49025
	19	0.51922	0.21431	1.42034	0.40027	0.39560	0.56134	0.82147
	20	0.88412	0.37699	0.62388	1.64404	0.65826	0.92636	1.40732
	21	0.81780	0.34813	0.59877	0.65650	1.71275	0.88147	1.27797
	22	0.69934	0.26686	0.49003	0.96617	0.53263	1.72714	1.04868
	23	0.71236	0.30793	0.52516	0.52617	0.59699	0.74833	2.10106

Table J-6

Regionalized Interindustry Impacts
by Region and Industry of Origin

Appalachia, Ozarka and The Rest of the U.S.

Industry	To / From	Region I	Region II	Region III
1) Agriculture, Forestry and Fishing	Region I	1.51440	.11513	.15383
	II	.01374	1.37447	.01477
	III	.96961	1.00812	2.32914
2) Products of Mines	I	1.15956	.02421	.05211
	II	.00225	1.08813	.00250
	III	.11072	.16014	1.21788
3) Petroleum and Natural Gas	I	1.02635	.01737	.01732
	II	.00206	1.00810	.00279
	III	.11426	.11761	1.12296
4) Publishing and Printing	I	1.07454	.05177	.03799
	II	.00317	1.00928	.00319
	III	.36173	.37847	1.39826
5) Tobacco, Food and Kindered Products	I	1.84673	.21014	.26217
	II	.02334	1.56942	.02341
	III	1.62732	1.71781	3.21177
6) Textiles, Apparel and Paper Products	I	1.52087	.20842	.21152
	II	.01839	1.11373	.01881
	III	1.39616	1.61319	2.70506
7) Chemicals and Allied Products	I	1.38817	.12098	.14527
	II	.01059	1.10132	.01135
	III	.77150	.94793	2.01364
8) Petroleum and Coal Products	I	1.20269	.05199	.06100
	II	.01214	1.17327	.03993
	III	1.11441	1.10394	2.22828
9) Rubber and Plastics	I	1.07672	.02859	.03077
	II	.00246	1.01386	.00237
	III	.19089	.22763	1.23694
10) Lumber and Wood Products	I	1.31426	.03780	.05332
	II	.00809	1.05521	.00997
	III	.32767	.55697	1.58673
11) Furniture, Fixtures and Miscellaneous Manufactures	I	1.18274	.05566	.05830
	II	.00544	1.03344	.00536
	III	.34897	.44809	1.47353
12) Stone, Clay, and Glass Products	I	1.24203	.04492	.07243
	II	.00729	1.14389	.00485
	III	.19883	.25937	1.37033

Table J-6 (Cont.)

Industry	To / From	Region I	Region II	Region III
13) Primary Metals	Region I	1.88167	.24197	.31695
	II	.01016	1.28687	.01120
	III	.82522	1.18819	2.38889
14) Fabricated Metals	I	1.41674	.17521	.16662
	II	.00668	1.03428	.00646
	III	.60226	.81617	1.85261
15) Machinery not Electrical	I	1.31557	.14712	.14379
	II	.00751	1.04291	.00713
	III	.79315	.92617	1.96527
16) Electrical Machinery	I	1.25120	.11278	.11417
	II	.00737	1.04391	.00639
	III	.71849	.82044	1.85655
17) Transportation Equipment	I	1.48961	.22610	.22720
	II	.01374	1.06388	.01238
	III	1.51636	1.72970	2.78016
18) Instruments, Watches and Clocks	I	1.05109	.02243	.02355
	II	.00172	1.01001	.00153
	III	.18464	.20499	1.21239
19) Transportation, Communication, and Public Utilities	I	1.31532	.14194	.17030
	II	.01771	1.13892	.01876
	III	.80847	.86068	1.95252
20) Wholesale and Retail Trade	I	1.24072	.14022	.14394
	II	.01750	1.07712	.01717
	III	.90608	.94700	2.00325
21) Finance, Insurance, and Real Estate	I	1.36103	.14377	.19178
	II	.01684	1.18216	.01772
	III	.87755	.92947	2.04585
22) Services	I	1.33402	.22374	.18457
	II	.01694	1.06322	.01621
	III	1.75552	1.81954	2.90570
23) Construction	I	2.53359	.38969	.44898
	II	.04757	1.55500	.03836
	III	2.19527	2.83180	4.28914

Table J-7

Regionalized Interindustry and
Local Consumption Sector Impacts
by Region and Industry of Origin

Appalachia, Ozarka, and The Rest of the U.S.

Industry	To / From	Region I	Region II	Region III
1) Agriculture, Forestry and Fishing	Region I	4.91313	1.00393	1.23441
	II	.10475	3.46933	.11185
	III	7.29728	7.56438	11.79888
2) Products of Mines	I	3.55263	.38243	.55834
	II	.04034	2.72538	.04466
	III	2.44823	2.72322	6.11407
3) Petroleum and Natural Gas	I	3.14998	.32887	.42177
	II	.03638	2.52386	.04156
	III	2.24950	2.36254	5.58813
4) Publishing and Printing	I	3.37746	.51907	.57490
	II	.04797	2.53567	.05149
	III	3.55244	3.71125	6.98447
5) Tobacco, Food and Kindered Products	I	6.13891	1.57089	1.85464
	II	.15771	3.98076	.16319
	III	11.11104	11.56933	16.35722
6) Textiles, Apparal and Paper Products	I	5.07386	1.42393	1.53367
	II	.12951	2.83850	.13493
	III	9.42600	10.25637	13.75984
7) Chemicals and Allied Products	I	4.46464	.93753	1.10409
	II	.08744	2.78491	.09348
	III	6.10535	6.80146	10.21824
8) Petroleum and Coal Products	I	4.01519	.79652	.92578
	II	.09672	2.96762	.16916
	III	7.50096	7.58535	11.19186
9) Rubber and Plastics	I	3.32783	.40036	.49987
	II	.04106	2.54191	.04434
	III	2.70968	2.93514	6.17325
10) Lumber and Wood Products	I	4.09429	.54613	.68485
	II	.06571	2.65553	.07457
	III	3.78471	4.65123	7.95365
11) Furniture, Fixtures and Miscellaneous Manufactures	I	3.70188	.55941	.66170
	II	.05618	2.59828	.05975
	III	3.67025	4.10401	7.39382
12) Stone, Clay, and Glass Products	I	3.83280	.49094	.67071
	II	.05784	2.86834	.05573
	III	3.02775	3.34489	6.90302

Table J-7 (Cont.)

Industry	To / From	Region I	Region II	Region III
13) Primary Metals	Region I	5.97847	1.42696	1.74775
	II	.10134	3.25928	.10915
	III	7.17754	8.51038	12.35506
14) Fabricated Metals	I	4.49477	1.04290	1.11481
	II	.07330	2.61478	.07694
	III	5.30809	6.12179	9.44811
15) Machinery not Electrical	I	4.25088	.99588	1.08273
	II	.07844	2.63896	.08142
	III	5.61348	6.05754	9.38164
16) Electrical Machinery	I	4.03118	.85729	.95706
	II	.07408	2.63729	.07547
	III	5.61348	6.05754	9.38164
17) Transportation Equipment	I	5.01742	1.50403	1.60434
	II	.12069	2.71790	.12156
	III	9.96133	10.77544	14.14577
18) Instruments, Watches and Clocks	I	3.24788	.37334	.46972
	II	.03833	2.53142	.04130
	III	2.63555	2.80637	6.03850
19) Transportation, Communication, and Public Utilities	I	4.25756	.98130	1.16166
	II	.10439	2.87679	.11082
	III	6.18144	6.46944	9.96970
20) Wholesale and Retail Trade	I	4.06336	.98985	1.09802
	II	.10432	2.72489	.10768
	III	6.54190	6.78620	10.17477
21) Finance, Insurance, and Real Estate	I	4.41862	1.01962	1.25718
	II	.10555	2.98701	.11164
	III	6.59642	6.88788	10.46470
22) Services	I	4.62494	1.52621	1.51720
	II	.13175	2.71892	.13380
	III	10.89550	11.21489	14.70375
23) Construction	I	8.41361	2.47753	2.77820
	II	.25410	3.98341	.23835
	III	15.08618	17.34853	22.01819

APPENDIX K

Regional System B

Table K-1

1963 TRADE COEFFICIENTS

Upper Licking River Basin, Appalachia, and The Rest of the U. S.

Industry	To / From	Region I	Region II	Region III
1) Agriculture, Forestry and Fishing	Region I	.04800	.04176	.00000
	II	.76755	.67829	.05188
	III	.18445	.27995	.95812
2) Products of Mines	I	.01971	.00693	.00613
	II	.87003	.96188	.23955
	III	.11026	.03119	.75432
3) Petroleum and Natural Gas	I	.06826	.02468	.00070
	II	.21548	.10655	.01078
	III	.71626	.86876	.98852
4) Publishing and Printing	I	.00000	.00000	.00000
	II	.04451	.11422	.02308
	III	.95549	.88578	.97692
5) Tobacco, Food and Kindred Products	I	.00104	.00047	.00004
	II	.21705	.31803	.03951
	III	.78191	.68151	.96045
6) Textiles, Apparel and Paper Products	I	.00000	.00000	.00000
	II	.17407	.31314	.08100
	III	.82593	.68186	.91900
7) Chemicals and Allied Products	I	.00000	.00000	.00000
	II	.38522	.46068	.08592
	III	.61478	.53932	.91408
8) Petroleum and Coal Products	I	.00000	.00000	.00000
	II	.14501	.07021	.01088
	III	.85499	.92979	.98912
9) Rubber and Plastics	I	.00000	.00000	.00000
	II	.13407	.13989	.06103
	III	.86593	.86011	.93897
10) Lumber and Wood Products	I	.00420	.00135	.00031
	II	.31926	.66161	.04645
	III	.67654	.33704	.95324
11) Furniture, Fixtures and Miscellaneous Manufactures	I	.00004	.00002	.00001
	II	.15485	.23403	.04540
	III	.84510	.76596	.95460
12) Stone, Clay, and Glass Products	I	.00047	.00028	.00001
	II	.69432	.71402	.11031
	III	.30521	.28570	.88967

Table K-1 (Cont.)

Industry	From \ To	Region I	Region II	Region III
13) Primary Metals	Region I	.00000	.00000	.00000
	II	.64989	.72878	.15575
	III	.35011	.27122	.84425
14) Fabricated Metals	I	.00000	.00000	.00000
	II	.20985	.28306	.05681
	III	.79015	.71694	.94319
15) Machinery not Electrical	I	.00004	.00002	.00001
	II	.05469	.12291	.04225
	III	.94527	.87707	.95774
16) Electrical Machinery	I	.00000	.00000	.00000
	II	.04451	.08566	.04874
	III	.95549	.91434	.95126
17) Transportation Equipment	I	.00171	.00054	.00009
	II	.11281	.14505	.01984
	III	.88548	.85442	.98007
18) Instruments, Watches and Clocks	I	.00000	.00000	.00000
	II	.12098	.09233	.04513
	III	.87902	.90767	.95487
19) Transportation, Communication, and Public Utilities	I	.00075	.00071	.00066
	II	.42099	.42350	.39018
	III	.57825	.57579	.60916
20) Wholesale and Retail Trade	I	.02650	.02523	.00331
	II	.86726	.86940	.11086
	III	.10624	.10538	.88583
21) Finance, Insurance, and Real Estate	I	.00046	.00044	.00040
	II	.22095	.22320	.20112
	III	.77859	.77636	.79849
22) Services	I	.00006	.00006	.00005
	II	.07840	.07895	.06922
	III	.92154	.92099	.93073
23) Construction	I	.00761	.00725	.00239
	II	.76268	.76418	.24189
	III	.22971	.22856	.75572

Table K-2

Interregional Interindustry Requirements Matrix

UPPER LICKING

Region	Industry	1	2	3	4	5	6	7	8	9	10	11	12
UPPER LICKING	1	0.01410	0.00000	0.00000	0.00000	0.02065	0.00141	0.00083	0.00030	0.00030	0.00091	0.00001	0.00000
	2	0.00027	0.00206	0.00000	0.00000	0.00014	0.00038	0.00151	0.00028	0.00006	0.00001	0.00001	0.00103
	3	0.00000	0.00001	0.00152	0.00000	0.00000	0.00000	0.00015	0.05844	0.00000	0.00000	0.00000	0.00000
	4	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00004	0.00000	0.00000	0.00000	0.00017	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000
	6	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	8	0.00000	0.00000	0.00000	0.00000	0.00033	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	9	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00065	0.00001	0.00000	0.00000	0.00005	0.00033	0.00003	0.00030	0.00001	0.00124	0.00024	[illegible]
	11	0.00000	0.00000	0.00000	0.00000	0.00050	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000
	12	0.00000	0.00001	0.00000	0.00000	0.00003	0.00000	0.00001	0.00000	0.00000	0.00000	0.00001	0.00000
	13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	17	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	19	0.00001	0.00000	0.00000	0.00000	0.00004	0.00002	0.00001	0.00001	0.00000	0.00001	0.00000	0.00001
	20	0.00055	0.00008	0.00004	0.00008	0.00069	0.00049	0.00019	0.00005	0.00007	0.00011	0.00017	0.00009
	21	0.00001	0.00000	0.00001	0.00000	0.00030	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	22	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	23	0.00007	0.00006	0.00000	0.00000	0.00033	0.00001	0.00000	0.00000	0.00000	0.00002	0.00002	0.00000
REST OF APPALACHIA	1	0.22675	0.00000	0.00000	0.00000	0.12702	0.02262	0.00051	0.00000	0.00005	0.01453	0.00015	0.00006
	2	0.01199	0.09116	0.00000	0.00000	0.00615	0.01693	0.06679	0.01221	0.09778	0.00023	0.00035	0.07201
	3	0.00000	0.00002	0.00431	0.00000	0.00000	0.00000	0.00048	0.18448	[illegible]	0.00006	0.00000	0.00000
	4	0.00004	0.00001	0.00000	0.00362	0.00040	0.00060	0.00023	0.00030	[illegible]	0.00012	0.00011	0.00006
	5	0.00514	0.00100	0.00100	0.00000	0.31584	0.00098	0.00124	0.00033	[illegible]	0.00000	0.00011	0.01602
	6	0.00056	0.00014	0.00003	0.00067	0.30556	0.06597	0.00271	0.00034	0.00259	0.00040	0.00332	0.00156
	7	0.01873	0.00210	0.80085	0.00489	0.00889	0.03530	0.89478	0.00919	0.02027	0.00292	0.00333	0.00596
	8	0.00780	0.00074	0.00042	0.00009	0.03231	0.00152	0.00840	0.01032	0.00016	0.00084	0.00022	0.00074
	9	0.00387	0.00117	0.00060	0.00029	0.00330	0.00733	0.00445	0.00014	0.03404	0.00105	0.00055	0.00168
	10	0.00376	0.10093	0.00022	0.00004	0.00402	0.02518	0.00162	0.00007	0.00019	0.09327	0.02155	0.00243
	11	0.00514	0.00602	0.00000	0.00057	0.30055	0.03569	0.00040	0.00010	0.03049	0.00056	0.00723	0.00034
	12	0.06209	0.00006	0.00028	0.00000	0.34318	0.00707	0.01556	0.00262	0.03481	0.00364	0.01089	0.07809
	13	0.00004	0.00344	0.00022	0.00003	0.00097	0.00066	0.00890	0.00037	0.03360	0.00082	0.01455	0.06112
	14	0.00123	0.00037	0.00064	0.00025	0.01453	0.00222	0.00446	0.00324	0.00105	0.00097	0.00492	0.00130
	15	0.00045	0.00007	0.00031	0.00009	0.99036	0.00830	0.00018	0.00001	0.00007	0.00007	0.00018	0.00007
	16	0.00066	0.00005	0.00010	0.00003	0.00037	0.00006	0.00005	0.30091	0.03005	0.00003	0.00021	0.00009
	17	0.00123	0.00004	0.00003	[illegible]	0.00000	0.00001	0.00000	0.00000	0.00005	0.00002	0.00008	0.00001
	18	0.00000	0.00000	0.00002	0.00120	0.00030	0.00056	0.00104	0.00002	0.33925	0.00000	0.00037	0.00016
	19	0.00065	0.00275	0.00232	0.00281	0.02078	0.01023	0.80754	0.00770	0.03156	0.00335	0.00188	0.00541
	20	0.01815	0.00209	0.00126	0.00275	0.02263	0.01416	0.00630	0.00168	0.00217	0.00353	0.00556	0.00293
	21	0.00069	0.03074	0.00376	0.00146	0.00164	0.00166	0.00108	0.00063	0.00028	0.00029	0.00652	0.00043
	22	0.00150	0.00007	0.00050	0.00009	0.00311	0.08092	0.08186	0.00853	0.08025	0.00019	0.00032	0.00026
	23	0.00075	0.00007	0.00004	0.00048	0.00256	0.00077	0.00039	0.00028	0.00308	0.00165	0.00198	0.00004
REST OF THE U.S.	1	0.05449	0.00000	0.00000	0.00000	0.07859	0.08544	0.00012	0.00050	0.00000	0.00349	0.00004	0.00001
	2	0.80151	0.01155	0.00000	0.00000	0.00078	0.00215	0.00846	0.00155	0.03335	0.00004	0.00006	0.00413
	3	0.00000	0.00007	0.01597	0.00000	0.00030	0.00000	0.00159	0.01323	0.00000	0.00000	0.00000	0.00000
	4	0.00041	0.00015	0.00008	0.12080	0.01027	0.01291	0.00492	0.00008	0.03159	0.00249	0.00234	0.00136
	5	0.03499	0.00800	0.00000	0.33300	0.12912	0.00356	0.00448	0.00012	0.00051	0.00000	0.00061	0.00007
	6	0.00266	0.00065	0.00014	0.00025	0.02666	0.31304	0.01288	0.00163	0.01228	0.00190	0.01526	0.00743
	7	0.02969	0.00336	0.00136	0.00462	0.01410	0.05634	0.15765	0.01467	0.03236	0.00403	0.00531	0.00951
	8	0.04599	0.00496	0.00247	0.00052	0.01363	0.00890	0.03772	0.05905	0.00081	0.00375	0.00128	0.00437
	9	0.02368	0.00756	0.00390	0.00149	0.31939	0.04735	0.02871	0.00088	0.02607	0.00686	0.04231	0.01083
	10	0.00792	0.00198	0.00046	0.00008	0.00852	0.05335	0.00342	0.00015	0.00084	0.19766	0.04567	0.00516
	11	0.00033	0.00041	0.00000	0.00310	0.00302	0.03103	0.00225	0.00057	0.00270	0.00318	0.03944	0.00212
	12	0.01090	0.00455	0.00012	0.00000	0.01436	0.00311	0.00686	0.00115	0.00211	0.00134	0.00479	0.03386
	13	0.00062	0.08185	0.00012	0.00018	0.30052	0.00036	0.00480	0.00006	0.00032	0.00033	0.00786	0.00081
	14	0.00465	0.03139	0.00240	0.00093	0.06976	0.00836	0.01680	0.01220	0.00395	0.00364	0.01854	0.00468
	15	0.00778	0.01163	0.00544	0.00162	0.00054	0.00521	0.00653	0.00015	0.05128	0.00125	0.00310	0.06113
	16	0.00135	0.00138	0.19206	0.00063	0.00157	0.00130	0.00101	0.00031	0.00117	0.00054	0.00457	0.00197
	17	0.00179	0.00064	0.00020	0.30342	0.00030	0.00007	0.00002	0.00000	0.00042	0.00018	0.00062	0.00067
	18	0.00100	0.00000	0.00017	0.00076	0.00000	0.00403	0.00756	0.00017	0.05185	0.00000	0.00269	0.00118
	19	0.01105	0.00378	0.00319	0.00358	0.02854	0.01405	0.01036	0.01057	0.00214	0.00466	0.00259	0.00743
	20	0.00222	0.00026	0.00015	0.00034	0.00277	0.00198	0.00077	0.00021	0.03327	0.00063	0.00068	0.00036
	21	0.02357	0.00262	0.01325	0.00514	0.30576	0.00585	0.00382	0.00222	0.00098	0.00101	0.00183	0.06193
	22	0.01757	0.00006	0.00593	0.00987	0.03652	0.01080	0.02184	0.00628	0.00288	0.00224	0.00382	0.00311
	23	0.00203	0.00002	0.00001	0.00015	0.00077	0.00823	0.00012	0.00000	0.03002	0.00050	0.00000	0.00001

Region	Industry	13	14	15	16	17	18	19	20	21	22	23
UPPER LICKING	1	0.00000	0.00000	0.80000	0.00000	0.00000	0.00080	0.00003	0.00014	0.00198	0.00001	0.00022
	2	0.00067	0.00002	0.00005	0.00004	0.00005	0.00001	0.00152	0.00002	0.00004	0.00011	0.00199
	3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.06076	0.00001	0.00000
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000
	6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	8	0.00000	0.00000	0.00000	0.00000	0.30000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00002	0.00005	0.00003	0.00003	0.00004	0.00000	0.00001	0.00007	0.00001	0.00006	0.00175
	11	0.00000	0.00000	0.00000	0.00000	0.30030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00002	0.00001	0.00001	0.00002	0.00003	0.00000	0.00000	0.00001	0.00000	0.00001	0.00025
	13	0.00000	0.00000	0.00000	3.80000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.80000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00001	0.00003	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	17	0.00000	0.00001	0.00003	0.00001	0.30041	0.80000	0.00002	0.00001	0.00000	0.00019	0.00000
	18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	19	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000	0.00008	0.00004	0.00002	0.00004	0.00003
	20	0.00029	0.00020	0.00027	0.00026	0.00032	0.00006	0.00038	0.00046	0.00037	0.00067	0.00176
	21	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00003	0.00006	0.00002	0.00000
	22	0.00000	0.00000	0.00000	0.00003	0.30006	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000
	23	0.00001	0.00002	0.00003	0.00003	0.30001	0.00008	0.00023	0.00009	0.00006	0.00003	0.00000
REST OF APPALACHIA	1	0.00666	0.00000	0.00004	0.00000	0.30900	0.00006	0.00054	0.00225	0.03163	0.00021	0.00345
	2	0.28560	0.00104	0.00209	0.00174	0.30232	0.00035	0.00702	0.00009	0.00408	0.00404	0.08766
	3	0.00066	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00240	0.00002	0.00000
	4	0.00013	0.00011	0.00006	0.00307	0.30008	0.00001	0.00076	0.00083	0.00159	0.01953	0.00003
	5	0.06614	0.00000	0.00000	0.00303	0.00100	0.00004	0.00161	0.00204	0.02426	0.14605	0.00005
	6	0.00654	0.00085	0.00048	0.00110	0.00170	0.00058	0.00047	0.00345	0.00692	0.09267	0.00150
	7	0.00726	0.00336	0.00193	0.00515	0.30436	0.00193	0.00150	0.00382	0.00207	0.00778	0.02343
	8	0.00152	0.00081	0.00088	0.00027	0.00676	0.00007	0.01435	0.00568	0.00368	0.00243	0.01097
	9	0.00154	0.00218	0.00532	0.00057	0.01494	0.00101	0.00534	0.00482	0.00189	0.00854	0.00735
	10	0.00119	0.00384	0.00212	0.00169	0.00453	0.00014	0.00164	0.00359	0.00093	0.00616	0.13202
	11	0.00042	0.00129	0.00103	0.00246	0.00180	0.00055	0.00104	0.00205	0.00006	0.00445	0.00921
	12	0.02455	0.01167	0.01252	0.02292	0.02823	0.00488	0.00233	0.01599	0.00184	0.01358	0.33956
	13	0.16472	0.13501	0.06927	0.04234	0.87806	0.08569	0.00392	0.00051	0.00008	0.00088	0.00044
	14	0.00734	0.01325	0.01110	0.00969	0.32269	0.00161	0.00224	0.00218	0.00025	0.00145	0.07303
	15	0.00067	0.00172	0.00797	0.00125	0.30385	0.00035	0.00034	0.00053	0.00024	0.00236	0.00214
	16	0.00052	0.00060	0.00257	0.00077	0.00263	0.00046	0.00065	0.00039	0.00011	0.00316	0.00364
	17	0.00021	0.00072	0.00177	0.00046	0.03719	0.00032	0.00158	0.00082	0.00014	0.01245	0.00001
	18	0.00028	0.00238	0.00192	0.00594	0.00781	0.00759	0.00000	0.00180	0.00030	0.01270	0.00479
	19	0.00721	0.00359	0.00374	0.00302	0.30619	0.00066	0.04229	0.02165	0.01062	0.02114	0.01552
	20	0.00947	0.00653	0.00891	0.00795	0.31053	0.00211	0.01194	0.01609	0.01205	0.01543	0.05774
	21	0.00083	0.00069	0.00102	0.00086	0.00076	0.00021	0.00547	0.01058	0.02694	0.00728	0.00182
	22	0.00046	0.00042	0.00060	0.00049	0.00100	0.00021	0.00302	0.00834	0.00409	0.00468	0.00910
	23	0.00145	0.00154	0.00330	0.00021	0.00105	0.00002	0.02313	0.06853	0.00825	0.00319	0.00009
REST OF THE U.S.	1	0.00000	0.00000	0.00001	0.00000	0.00008	0.00001	0.00013	0.00054	0.00760	0.00005	0.00083
	2	0.03019	0.00013	0.00026	0.00024	0.00029	0.00006	0.00045	0.00012	0.00051	0.00059	0.01111
	3	0.00000	0.00000	0.00000	0.00003	0.30000	0.00000	0.00000	0.00000	0.00799	0.00007	0.00000
	4	0.00287	0.80234	0.00136	0.00144	0.00181	0.80015	0.02510	0.01775	0.03408	0.41445	0.00084
	5	0.00009	0.00008	0.00001	0.00000	0.00000	0.00013	0.00116	0.00586	0.00071	0.00019	0.00019
	6	0.00265	0.00401	0.00230	0.00523	0.00806	0.00376	0.00221	0.01018	[illegible]	0.01207	0.00210
	7	0.01158	0.00514	0.00244	0.00822	0.00696	0.00309	0.00269	0.00810	0.00331	0.01242	0.03739
	8	0.00898	0.00480	0.00518	0.00157	0.80467	0.00043	0.00601	0.03454	0.02171	0.01435	0.00486
	9	0.00995	0.01411	0.03638	0.04264	0.09667	0.00655	0.03425	0.02985	0.01222	0.05510	0.04740
	10	0.00251	0.00816	0.00449	0.00358	0.00959	0.00030	0.00221	0.01162	0.00198	0.00638	0.28145
	11	0.00229	0.00702	0.00563	0.01552	0.00980	0.00302	0.00568	0.01119	0.00327	0.05067	0.05300
	12	0.01078	0.00513	0.00550	0.01007	0.01241	0.00215	0.00116	0.00703	0.00061	0.00547	0.14926
	13	0.08874	0.07273	0.03732	0.02281	0.04204	0.00306	0.00211	0.00027	0.00037	0.00047	0.04334
	14	0.02786	0.04990	0.04181	0.03067	0.38544	0.00608	0.00866	0.00821	0.00093	0.00697	0.27498
	15	0.11526	0.02976	0.13773	0.02166	0.05276	0.00608	0.00585	0.00918	0.00423	0.04070	0.03060
	16	0.01126	0.01278	0.05516	0.14529	0.06081	0.01626	0.01666	0.00063	0.00229	0.00574	0.07928
	17	0.00162	0.00564	0.01186	0.00363	0.21341	0.00250	0.01242	0.00640	0.00106	0.09643	0.00009
	18	0.00242	0.01731	0.01395	0.04320	0.05530	0.05513	0.00637	0.01311	0.00219	0.09227	0.01679
	19	0.00990	0.00496	0.00516	0.00415	0.30850	0.00091	0.05008	0.02946	0.01459	0.02964	0.02132
	20	0.00116	0.00080	0.00109	0.00097	0.00129	0.00026	0.00166	0.00197	0.00148	0.00189	0.00707
	21	0.00292	0.00243	0.00360	0.00311	0.30269	0.00073	0.01927	0.05837	0.09493	0.62555	0.00642
	22	0.00517	0.00488	0.00706	0.01065	0.01176	0.00253	0.04554	0.09441	0.04256	0.05760	0.04812
	23	0.00044	0.00046	0.00099	0.00006	0.30031	0.00001	0.00697	0.00257	0.01995	0.00096	0.00003

Table K-2 (Cont.)

REST OF APPALACHIA

	INDUSTRY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
UPPER [illegible]	1	0.01439	0.00000	0.00000	0.00000	0.81770	0.03123	0.00003	0.00000	0.03000	0.00079	0.00301	0.00000	0.00000	0.00000	0.00000	0.00003	0.00000	0.00000	0.00003	0.00016	0.00172	0.00661	0.00019
	2	0.00016	0.00073	0.00090	0.00630	0.00005	0.00013	0.00055	0.00010	0.85302	0.00000	0.00000	0.00057	0.00227	0.00001	0.00002	0.00004	0.30602	0.00000	0.00038	0.00001	0.00004	0.00004	0.00070
	3	0.00000	0.00066	0.00098	0.00000	0.30000	0.00000	0.00005	0.02113	0.03030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00006	0.00000	0.00025	0.00006	0.00006
	4	[illegible]	[illegible]	[illegible]	[illegible]	0.88036	0.03008	0.03008	0.00000	0.03000	[illegible]	[illegible]	[illegible]	0.00006	0.00006	0.00000	[illegible]	[illegible]	0.00000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	5	0.00002	0.00000	0.00000	0.00000	0.33036	0.00000	0.00000	0.00000	0.03000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00003	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.03080	0.03003	0.00008	0.00000	0.00006	0.00000	0.00000	0.00000	0.00003	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.03030	0.00000	0.03020	0.30090	0.03000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.30000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00060
	8	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00050	0.80030	0.03085	0.00006	0.00000	0.00000	0.00006	0.00000	0.00000	0.00003	0.30006	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	9	0.00000	0.00009	0.00000	0.00000	0.03030	0.83080	0.00000	0.30000	0.03008	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00002	0.00000	0.00000	0.00000	0.30332	0.00011	0.03001	0.00030	0.03000	[illegible]	[illegible]	0.00001	0.00001	0.00002	0.00001	0.00001	0.30002	0.00000	[illegible]	[illegible]	[illegible]	[illegible]	0.00056
	11	0.00000	0.00000	0.00000	0.00000	0.03330	0.00000	0.03000	0.80000	0.03333	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00000	0.00000	0.00000	0.00000	0.30052	0.00000	0.03001	0.00000	0.03000	0.00000	0.00000	0.00003	0.00001	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000	0.00001	0.00000	0.00001	0.00014
	13	0.00000	0.00000	0.00000	0.00000	0.90000	0.03000	0.00000	0.00030	0.03003	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.38036	0.03800	0.00000	0.08890	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.03000	0.00000	0.03088	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	3.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.03030	0.03060	0.00030	0.00030	0.83000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.30000
	17	0.00000	0.00000	0.00000	0.00000	0.00030	0.00000	0.80800	0.00000	0.03808	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00013	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000
	18	0.00000	0.00000	8.00000	0.00000	0.08030	0.03000	0.03003	0.00030	8.03800	0.00000	0.00000	0.00000	0.00006	0.00000	0.00003	0.00000	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	19	0.00001	0.00000	0.00000	0.00000	0.00034	0.03802	0.03001	0.08801	8.08000	0.00001	0.00000	0.00001	0.00001	0.00001	0.00001	0.00001	0.30601	0.00000	0.00007	0.00004	0.00002	0.00004	0.00003
	20	0.00053	0.00006	0.00004	0.00008	0.00368	0.00847	0.50018	0.33335	0.03006	0.00040	0.00016	0.00069	0.00028	0.00019	0.00026	0.00023	0.00031	0.00006	0.00035	0.00047	0.00035	0.00045	0.00168
	21	0.00001	0.00003	0.00001	0.00000	0.00830	0.80080	0.05000	0.07030	0.03080	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000	0.00008	0.00830	0.00000	0.00001	0.00003	0.00005	0.00001	0.00000
	22	[illegible]	0.00000	0.00000	[illegible]	0.03030	0.00006	0.00000	0.03030	0.03000	0.00000	0.00000	[illegible]	0.00000	0.00000	[illegible]	[illegible]	0.00006	0.00000	0.00000	[illegible]	[illegible]	[illegible]	0.00000
	23	0.00106	0.00000	0.00000	0.00000	0.33032	0.80001	0.00003	0.00080	0.03308	0.00002	0.00002	0.00000	0.00001	0.00001	0.00003	0.00000	0.30001	0.00800	0.00022	0.00006	0.00063	0.00003	0.00000
REST OF APPALACHIA	1	0.20058	0.00000	0.00000	0.00000	0.28499	0.31999	0.00845	0.05800	0.00808	0.01284	0.00013	0.00005	0.00000	0.00000	0.00004	0.00005	8.30600	0.00005	0.00048	0.00197	0.02795	0.00018	0.00365
	2	0.01326	0.10076	0.00000	0.00000	0.30679	0.01872	0.07384	8.01350	0.00308	0.00026	0.00038	0.07961	0.31576	0.00115	0.00231	0.00192	0.00256	0.00038	0.07610	0.00103	0.00649	0.00513	0.09692
	3	0.00000	0.00001	0.00238	0.00000	0.09030	0.00088	0.00024	3.09122	0.03350	0.00000	0.00000	0.00000	0.00000	8.00000	0.00000	0.00003	0.00000	0.00000	0.00000	0.00000	0.00119	0.00001	0.00000
	4	0.00011	0.80002	0.00001	0.01442	3.80123	0.00154	0.00059	3.88801	0.03319	0.00030	0.00028	0.00016	0.00034	0.00028	0.00016	0.00017	0.00022	0.00002	0.00181	0.00212	0.00407	0.04906	0.00008
	5	0.00134	[illegible]	[illegible]	[illegible]	3.35252	0.00145	0.00182	0.00005	0.03300	[illegible]	[illegible]	[illegible]	0.00006	[illegible]	[illegible]	[illegible]	0.00006	0.00003	[illegible]	[illegible]	[illegible]	[illegible]	0.00004
	6	0.00102	0.00025	0.00005	0.01443	0.01014	0.12058	0.00496	0.00063	0.03473	0.00073	0.00067	0.00286	0.00694	0.00155	0.00089	0.00201	0.00310	0.00106	0.00085	0.00031	0.00168	0.00468	0.00273
	7	0.02239	0.00252	0.00102	0.00346	0.01057	0.34222	0.11814	0.01399	0.02425	0.00302	0.00348	0.00713	0.00868	0.00400	0.00183	0.00018	0.30522	0.00231	0.00147	0.00457	0.00248	0.00951	0.02802
	8	0.00378	0.00038	0.00020	0.00004	0.00112	0.00074	0.00310	0.00485	0.00007	0.00031	0.00011	0.00036	0.00074	0.00039	0.00043	0.00013	0.00037	0.00004	0.00095	0.00284	0.00178	0.00118	0.00531
	9	0.00382	0.00122	0.00063	0.00031	0.00313	0.00765	0.08464	0.08014	8.00421	0.00116	0.00684	0.00175	0.00161	0.00228	0.00555	0.00486	0.01558	0.00106	0.00553	0.00482	0.00197	0.00091	0.00787
	10	0.00774	0.00194	0.00045	0.00007	0.00834	0.05218	0.00335	0.00015	0.03082	0.19329	0.04400	0.00504	0.00246	0.00796	0.00439	0.00350	0.00938	0.00030	0.00218	0.01118	0.00194	0.00037	0.27526
	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00858	0.00061	0.00316	0.00575	[illegible]	[illegible]	[illegible]	[illegible]	0.00196	0.00156	[illegible]	0.00221	0.00084	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	12	0.00211	0.00829	0.00029	0.00000	0.04430	8.00727	0.01600	0.07269	0.03495	0.00313	0.01120	0.07906	0.02524	0.01200	0.01288	0.02357	0.02903	0.00502	0.00240	0.01044	0.00189	0.01597	0.34919
	13	0.00005	0.00366	0.00025	0.00037	0.03109	0.00874	0.00978	0.00007	0.03067	0.00009	0.01651	0.00126	0.16472	0.15140	0.07768	0.04748	0.04751	3.00638	0.00446	0.00057	0.00077	0.00099	0.09021
	14	0.00188	0.00050	0.00006	0.00533	0.02479	0.00300	0.00602	0.00437	0.08141	0.00136	0.00004	0.00175	0.00990	0.01788	0.01498	0.01306	0.83061	0.00218	0.00302	0.00294	0.00033	0.00250	0.09851
	15	0.00101	0.00151	0.00071	0.00021	0.30006	0.00068	0.00085	0.30082	0.03017	0.00016	0.00040	0.00015	0.01499	0.00387	0.01791	0.00281	0.30686	0.00079	0.00078	0.00119	0.00055	0.00536	0.00678
	16	0.00012	0.80010	0.00010	0.00806	0.03014	0.03012	0.80009	0.80003	0.03010	0.00065	0.00041	0.00018	0.00161	0.00115	0.00494	0.01303	0.00545	0.00128	0.00133	0.00076	0.00021	0.00546	0.00711
	17	0.00029	0.00011	0.00001	0.00037	0.00036	0.00001	0.03003	0.00000	0.00007	[illegible]	[illegible]	[illegible]	[illegible]	0.00092	0.00227	[illegible]	[illegible]	0.00041	[illegible]	[illegible]	[illegible]	0.01588	0.00001
	18	0.00000	0.00000	0.00002	0.00092	0.00030	0.00042	0.03079	0.08052	0.03819	0.00000	0.00028	0.00012	0.80041	0.00182	0.00147	0.00459	0.00581	0.00579	0.00048	0.00138	0.00023	0.00049	0.00365
	19	0.00209	0.00277	0.00234	0.00262	0.02090	0.01029	0.00759	0.08774	3.83156	0.00341	0.00196	0.00344	0.00725	0.00362	0.00376	0.06304	0.00622	0.00067	0.04254	0.02157	0.01088	0.04127	0.01562
	20	0.01819	0.00210	0.00126	3.00276	0.02268	0.01620	0.00632	0.30169	0.03217	0.00354	0.00558	0.00294	0.00497	0.00654	0.00893	0.00797	0.01056	0.00212	0.01197	0.01613	0.01208	0.01547	0.05788
	21	0.00076	0.00075	0.00380	0.00147	0.00165	0.00168	0.05110	0.33864	0.03078	0.00024	0.00053	0.00044	0.00084	0.00070	0.00103	0.00089	0.00077	0.00021	0.00552	0.01873	0.02721	0.01732	0.00144
	22	0.00151	0.00007	0.00051	0.00085	0.80313	0.00093	0.00187	8.00054	8.03825	0.00014	0.00033	0.00027	0.00044	0.00042	0.00060	0.00090	0.00101	0.00022	0.00305	0.00040	0.00467	0.00492	0.00413
	23	0.00676	0.00007	0.00004	0.00049	0.03257	0.00077	0.80039	0.35528	0.03000	0.00165	0.00199	0.00006	0.00146	0.00154	0.00331	0.00021	0.30185	0.00002	0.02317	0.00855	0.00838	0.00326	0.00209
REST OF THE U.S.	1	0.08270	0.00000	0.00000	0.00000	0.11928	0.08825	0.88019	0.03930	0.03000	0.00530	0.00005	0.00002	0.00000	0.00000	0.00002	0.00309	0.30006	0.00002	0.00026	0.00051	0.01154	0.00066	0.00128
	2	0.00043	0.00327	0.00000	0.00000	0.30022	0.00051	0.35239	8.00344	0.03018	0.00061	0.00001	0.00258	0.01024	0.00004	0.00007	0.00508	0.30008	0.00001	0.00240	0.00003	0.00015	0.00017	0.00314
	3	0.00000	0.00008	0.01937	0.00000	0.00030	0.00000	0.00193	8.74379	0.03000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.30000	0.00000	0.00000	0.00000	0.00969	0.00006	0.00000
	4	0.00084	0.00014	0.00007	0.11180	0.00952	0.01197	0.00455	0.00087	0.03147	0.00231	0.00217	0.00126	0.00266	0.00217	0.00126	0.30133	0.00168	0.00014	0.01400	0.01045	0.03157	0.38468	0.00003
	5	0.02475	0.00060	0.00000	0.00030	0.11254	0.00310	0.00390	0.80010	0.03001	0.00000	0.00035	0.00006	0.00008	0.00000	0.00001	0.00000	0.60006	0.00012	0.00098	0.00511	0.00002	0.00016	0.00010
	6	0.00218	0.00056	0.00011	0.01149	0.02186	0.25843	0.01063	0.00134	0.01014	0.00152	0.01301	0.00813	0.00042	0.00331	0.00190	0.00043	0.30665	0.00228	0.00163	0.11354	[illegible]	[illegible]	0.00586
	7	0.02622	0.00295	0.00119	0.03405	0.01237	0.04942	0.13830	0.01287	0.02538	0.00353	0.00466	0.00634	0.01616	0.00688	0.00214	0.00722	0.30611	0.00271	0.00249	0.00535	0.00246	0.01096	0.03280
	8	0.05601	0.80506	0.00269	0.00057	0.01483	0.00976	0.04102	0.36422	0.00088	0.00408	0.00139	0.00475	0.00976	0.00522	0.00563	0.00171	0.00486	0.00046	0.04201	0.03756	0.02361	0.01580	0.07031
	9	0.02352	0.00751	0.00388	0.00188	0.01926	0.04783	0.02852	0.38538	0.07589	0.00675	0.04203	0.01076	0.00988	0.01401	0.03415	0.04215	0.09582	0.00651	0.03402	0.02465	0.01213	0.05479	0.04718
	10	0.00394	0.00099	0.00023	0.00004	0.00425	0.02658	0.00171	0.30008	0.03542	0.09847	0.02275	0.00257	0.00125	0.00408	0.00224	0.30178	0.30478	0.00015	0.00110	0.00589	0.00659	0.00019	0.14021
	11	0.00030	0.00037	0.00000	0.00281	0.03274	0.02813	0.03290	0.00052	8.03244	0.00289	0.03575	0.00192	0.00207	0.00637	0.00511	0.01408	0.80086	0.00274	0.00535	0.01014	0.00298	0.04574	0.04803
	12	0.00068	0.00332	0.00012	[illegible]	0.01273	0.00291	0.00460	0.00198	0.00198	0.00125	0.00458	0.00168	0.01610	0.00680	0.00515	0.00965	0.31141	0.00201	0.00098	0.00458	0.00074	0.11559	0.13972
	13	0.00002	0.00143	0.00009	0.00014	0.00040	0.00028	0.00377	0.00083	0.03025	0.00026	0.00607	0.00047	0.06874	0.05634	0.02891	0.01787	0.83257	0.00237	0.00184	0.00021	0.00028	0.00037	0.03357
	14	0.00421	0.00126	0.00218	0.00084	0.06330	8.00759	0.01525	0.01137	0.03358	0.00330	0.01681	0.00443	0.02506	0.04528	0.03794	0.03309	0.07752	0.00551	0.00788	0.00745	0.00488	0.00032	0.24951
	15	0.00722	0.01079	0.00505	0.00151	0.00050	8.03484	0.80606	0.00014	8.03119	0.00116	0.00287	0.00105	0.10694	0.02761	0.12779	0.02008	0.04895	0.00566	0.00543	0.00851	0.00392	0.03784	0.03395
	16	0.00149	0.00103	0.00197	0.00060	0.00150	0.00124	0.00099	0.88030	0.03112	0.00051	0.00438	0.00189	0.01077	0.01223	0.05278	0.13900	0.05819	0.01365	0.01426	0.00002	0.00219	0.00295	0.07587
	17	0.00173	0.00062	0.00019	0.00041	0.08080	0.83006	0.03002	8.00300	8.03041	0.00017	0.00000	0.06006	0.00150	0.00545	0.01337	0.00350	0.20593	0.00241	0.01198	0.00017	0.00103	0.09353	0.00009
	18	[illegible]	0.00000	0.00017	0.05902	0.00000	0.00617	0.00781	0.00317	0.00191	0.00000	0.00278	0.00121	0.00204	0.01788	0.01400	0.04460	0.05710	0.05492	[illegible]	[illegible]	[illegible]	[illegible]	0.03592
	19	0.01100	0.00377	0.00318	0.00357	0.02841	0.01399	0.01032	0.01053	0.03213	0.00404	0.00258	0.00739	0.00986	0.00492	0.00512	0.00413	0.30846	0.00091	0.05788	0.02433	0.01452	0.02892	0.02123
	20	0.00220	0.00025	0.00015	0.00033	0.03275	0.00196	0.80877	0.30020	8.03326	0.00043	0.00608	0.00636	0.00115	0.00079	0.00100	0.00097	0.30128	0.00026	0.00145	0.00198	0.00198	0.00168	0.00702
	21	0.02351	0.00281	0.01322	0.00513	0.00575	8.00583	0.00381	0.83221	0.00098	0.00101	0.00183	0.00153	0.00291	0.00242	0.00359	0.00310	0.00268	0.00073	0.01921	0.05820	0.09465	0.02547	0.00640
	22	0.01758	0.00086	0.00593	0.00980	0.83650	0.01079	0.02183	0.00627	0.00289	0.00222	0.00382	0.00310	0.00516	0.00488	0.00704	0.01044	0.01175	0.00252	0.03552	0.09737	0.04752	0.05736	0.04814
	23	0.00262	0.00002	0.00001	0.00015	0.00077	0.00023	0.00012	0.00008	0.00002	0.00049	0.00059	0.00001	0.00044	0.00046	0.00099	0.00006	0.00031	0.00001	0.00693	0.00258	0.01965	0.00096	0.00003

Table K-2 (Cont.)

REST OF THE U.S.

	INDUSTRY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
UPPER LICKING	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table K-3

Interregional Interindustry Multiplier Matrix

UPPER LICKING

Region	Industry	1	2	3	4	5	6	7	8
UPPER LICKING	1	1.01446	0.00001	0.00001	0.00084	0.02723	0.00210	0.00012	0.00002
	2	0.00055	1.00721	0.00003	0.00006	0.00064	0.08977	0.03196	0.00038
	3	0.00028	0.00003	1.00154	0.00001	0.00018	0.00009	0.00036	0.05891
	4	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00005	0.00000	0.00000	0.00000	1.00019	0.00001	0.00001	0.00000
	6	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.00003	0.00000
	8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00003	1.00000
	9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00004	0.00001	0.00300	0.00001	0.00004	0.00040	0.00003	0.00000
	11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00001	0.00001	0.00000	0.00000	0.00004	0.00001	0.00001	0.00000
	13	0.00000	0.00000	0.00000	0.00000	0.00008	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00008
	17	0.00001	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	19	0.00004	0.00001	0.00001	0.00001	0.00008	0.00004	0.00003	0.00002
	20	0.00003	0.00008	0.00005	0.00011	0.00113	0.00047	0.00027	0.00009
	21	0.00003	0.00000	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001
	22	0.00000	0.00008	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000
	23	0.00012	0.00000	0.00001	0.00001	0.00010	0.00004	0.00002	0.00002
REST OF APPALACHIA	1	0.30002	0.00015	0.00028	0.00082	0.44588	0.03572	0.08232	0.00045
	2	0.01482	0.10711	0.00187	0.00391	0.04628	0.04428	0.10531	0.02069
	3	0.00185	0.00019	0.00493	0.00009	0.00138	0.00069	0.00183	0.18704
	4	0.00117	0.00010	0.00020	0.00048	0.00249	0.00190	0.00114	0.00941
	5	0.01498	0.00003	0.00002	0.00009	0.04649	0.00223	0.00177	0.00011
	6	0.00338	0.00047	0.00024	0.01297	0.01271	0.09563	0.00620	0.00107
	7	0.03502	0.00338	0.00138	0.00588	0.03134	0.05733	0.12091	0.01260
	8	0.00991	0.00093	0.00050	0.00044	0.00545	0.03256	0.00729	0.01044
	9	0.00710	0.00161	0.00086	0.00110	0.00474	0.01237	0.00684	0.00116
	10	0.01437	0.00194	0.00079	0.00215	0.01923	0.04698	0.00510	0.00144
	11	0.00872	0.00018	0.00010	0.00162	0.00204	0.00923	0.00105	0.00835
	12	0.01276	0.01041	0.00108	0.00141	0.06179	0.01537	0.02369	0.00500
	13	0.00740	0.00026	0.00141	0.00185	0.01809	0.00823	0.01928	0.00369
	14	0.00531	0.00081	0.00045	0.00379	0.02548	0.00522	0.00695	0.00465
	15	0.00177	0.00116	0.00050	0.00035	0.00232	0.00149	0.00165	0.00074
	16	0.00085	0.00021	0.00024	0.00023	0.00138	0.00074	0.00062	0.00542
	17	0.00070	0.00015	0.00009	0.00016	0.00080	0.00034	0.00029	0.00016
	18	0.00067	0.00008	0.00013	0.00151	0.00117	0.00136	0.00173	0.00029
	19	0.02146	0.00430	0.00352	0.00564	0.04512	0.07600	0.01612	0.01350
	20	0.00773	0.00273	0.00162	0.00371	0.03782	0.02230	0.00909	0.00333
	21	0.01355	0.00123	0.00461	0.00255	0.01160	0.00594	0.00335	0.00525
	22	0.00385	0.00025	0.00073	0.00135	0.00700	0.00305	0.00327	0.00149
	23	0.01250	0.00048	0.00088	0.00122	0.01071	0.00375	0.00186	0.00166
REST OF THE U.S.	1	0.15315	0.00066	0.00148	0.00474	0.28914	0.84739	0.00745	0.00216
	2	0.02078	0.01673	0.00210	0.00503	0.03648	0.03422	0.03812	0.00957
	3	0.09159	0.00812	0.02165	0.00564	0.06260	0.04209	0.06679	0.70483
	4	0.03299	0.00254	0.00591	0.14947	0.06889	0.05016	0.03162	0.81220
	5	0.06066	0.00018	0.00016	0.00048	0.19166	0.01311	0.03866	0.08072
	6	0.02123	0.00275	0.00175	0.07707	0.07657	0.53615	0.03716	0.00703
	7	0.03307	0.00608	0.00405	0.02056	0.09213	0.16939	0.24444	0.03022
	8	0.09547	0.00838	0.00528	0.00615	0.00960	0.04542	0.06772	0.07488
	9	0.05768	0.01200	0.00703	0.01203	0.07842	0.10361	0.05552	0.01269
	10	0.03222	0.00480	0.00254	0.01160	0.04957	0.15421	0.01682	0.00331
	11	0.00891	0.00146	0.00127	0.00896	0.01959	0.05228	0.00973	0.00356
	12	0.02086	0.00681	0.00221	0.00396	0.05913	0.02537	0.02309	0.00675
	13	0.01847	0.00740	0.00357	0.00452	0.04567	0.02122	0.02709	0.00983
	14	0.03195	0.00478	0.00511	0.00578	0.12299	0.03443	0.03597	0.02236
	15	0.02661	0.01810	0.00862	0.00600	0.03417	0.02644	0.02432	0.01193
	16	0.01456	0.00383	0.00468	0.00425	0.02368	0.01315	0.01074	0.00730
	17	0.01334	0.00216	0.00213	0.00382	0.01998	0.00906	0.00834	0.00438
	18	0.01199	0.08153	0.00225	0.01460	0.02126	0.01862	0.01982	0.00505
	19	0.03087	0.00605	0.00499	0.00619	0.06469	0.03785	0.02319	0.01930
	20	0.01254	0.00114	0.00188	0.00336	0.02276	0.01820	0.00652	0.00331
	21	0.04421	0.00445	0.01651	0.00934	0.04301	0.02222	0.01248	0.01993
	22	0.04741	0.00312	0.00988	0.01650	0.08602	0.03841	0.04005	0.01868
	23	0.06693	0.00065	0.00144	0.00139	0.01030	0.08476	0.00237	0.00234

Region	Industry	9	10	11	12	13	14	15	16
UPPER LICKING	1	0.00002	0.00130	0.00007	0.00002	0.00003	0.00002	0.00003	0.00604
	2	0.00315	0.00007	0.00017	0.00184	0.00784	0.00089	0.00064	0.00846
	3	0.00001	0.00003	0.00001	0.00003	0.00007	0.00004	0.00004	0.00002
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	6	0.00000	0.00000	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00800	0.00000
	8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	9	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00031	1.00131	0.00031	0.00004	0.00003	0.00008	0.00006	0.00003
	11	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00030	0.00000	0.00001	1.00066	0.00002	0.00001	0.00001	0.00002
	13	0.00003	0.00000	0.00000	0.00000	1.00000	0.00000	0.00800	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	0.00800	0.00008
	15	0.05000	0.00000	0.00000	0.00000	0.00001	0.00000	1.00001	0.00008
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000
	17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00003	0.00001
	18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	19	0.00001	0.00001	0.00001	0.00001	0.00003	0.00002	0.00002	0.00001
	20	0.00009	0.00016	0.00021	0.00012	0.00844	0.00030	0.00036	0.00031
	21	0.00000	0.00000	0.00000	0.00008	0.00061	0.00000	0.00001	0.00000
	22	0.00000	0.00000	0.00000	0.00000	0.00000	0.00800	0.00000	0.00060
	23	0.00000	0.00003	0.00003	0.00001	0.00063	0.00003	0.00005	0.00001
REST OF APPALACHIA	1	0.00035	0.02155	0.00130	0.00044	0.00057	0.00050	0.00055	0.00046
	2	0.00938	0.00542	0.01483	0.09365	0.42550	0.08509	0.05589	0.03874
	3	0.00010	0.00021	0.00011	0.00020	0.00650	0.00028	0.00029	0.00017
	4	0.00826	0.00036	0.00037	0.00027	0.00071	0.00054	0.00054	0.00856
	5	0.00019	0.00040	0.00021	0.00008	0.00015	0.00009	0.00089	0.00609
	6	0.09423	0.00120	0.00555	0.00296	0.06240	0.00238	0.00200	0.00242
	7	0.02533	0.00514	0.00633	0.00905	0.01482	0.00815	0.00560	0.00953
	8	0.00032	0.00094	0.00041	0.00097	0.00227	0.00125	0.00126	0.00857
	9	0.00467	0.00180	0.00761	0.00245	0.08437	0.00394	0.00765	0.00854
	10	0.00148	0.12237	0.03665	0.00475	0.00613	0.00809	0.00636	0.00452
	11	0.00070	0.00094	0.00776	0.00066	0.00119	0.00188	0.00176	0.00355
	12	0.00660	0.00582	0.01515	0.00596	0.04188	0.02236	0.02230	0.03081
	13	0.00251	0.00261	0.02297	0.00370	0.22521	0.18339	0.10507	0.06594
	14	0.00158	0.00190	0.00625	0.00197	0.01254	0.01724	0.01515	0.01246
	15	0.00030	0.00036	0.00097	0.00046	0.01354	0.00638	0.01217	0.00362
	16	0.00018	0.00026	0.00053	0.00028	0.00216	0.00169	0.00447	0.00884
	17	0.00811	0.00311	0.00019	0.00009	0.00065	0.00105	0.00225	0.00075
	18	0.00341	0.00013	0.00061	0.00031	0.00099	0.00299	0.00244	0.00699
	19	0.00358	0.00689	0.00495	0.00839	0.01702	0.00993	0.01013	0.00827
	20	0.00282	0.00524	0.00694	0.00399	0.01462	0.00997	0.01195	0.01019
	21	0.08077	0.00124	0.00134	0.00113	0.00326	0.00220	0.00276	0.00235
	22	0.03056	0.00060	0.00074	0.00059	0.00151	0.00115	0.00148	0.00169
	23	0.00341	0.00274	0.00269	0.00081	0.00349	0.00290	0.00479	0.00138
REST OF THE U.S.	1	0.02190	0.01748	0.00483	0.00172	0.00257	0.00221	0.00226	0.00224
	2	0.02669	0.00446	0.01054	0.01784	0.09943	0.04627	0.03735	0.02697
	3	0.00834	0.01158	0.00703	0.01029	0.02725	0.01607	0.01643	0.01052
	4	0.08693	0.00910	0.00479	0.00886	0.01775	0.01351	0.01471	0.01565
	5	0.03028	0.00195	0.00128	0.00056	0.00099	0.00863	0.00065	0.00070
	6	0.07429	0.00740	0.03224	0.01645	0.01447	0.01434	0.01331	0.01809
	7	0.05356	0.01469	0.02034	0.02115	0.03828	0.02377	0.02152	0.02989
	8	0.09680	0.01242	0.00761	0.01088	0.02910	0.01724	0.01762	0.01141
	9	0.03353	0.01558	0.05487	0.01864	0.04025	0.03384	0.06286	0.06747
	10	0.03595	0.29527	0.07860	0.01231	0.01660	0.02200	0.01906	0.01612
	11	0.00513	0.00658	0.04549	0.00455	0.01002	0.01316	0.01482	0.02687
	12	0.00597	0.00652	0.01246	0.04370	0.03652	0.02274	0.02658	0.02688
	13	0.00583	0.00356	0.02379	0.00590	0.17926	0.14330	0.11069	0.07322
	14	0.09823	0.00948	0.02820	0.00942	0.06365	0.07651	0.07632	0.06191
	15	0.05451	0.00552	0.01340	0.00612	0.20255	0.08676	0.20130	0.05587
	16	0.00337	0.00346	0.01001	0.00502	0.03916	0.03113	0.08919	0.18322
	17	0.09212	0.00225	0.00347	0.00203	0.01264	0.01416	0.02038	0.01210
	18	0.05457	0.00234	0.00698	0.00376	0.01499	0.02821	0.03097	0.06432
	19	0.00503	0.00988	0.00717	0.01180	0.02431	0.01429	0.01469	0.01201
	20	0.00179	0.00330	0.00349	0.00188	0.00847	0.00596	0.00775	0.00647
	21	0.00286	0.00459	0.00498	0.00415	0.01207	0.00815	0.01023	0.00873
	22	0.00699	0.00749	0.00918	0.00720	0.01878	0.01422	0.01837	0.02080
	23	0.03056	0.00196	0.00169	0.00082	0.00344	0.00241	0.08346	0.00178

Region	Industry	17	18	19	20	21	22	23
UPPER LICKING	1	0.00006	0.00001	0.00811	0.00032	0.00268	0.00008	0.00054
	2	0.00093	0.00008	0.00185	0.00024	0.00041	0.00045	0.00342
	3	0.00085	0.00000	0.00046	0.00018	0.00091	0.00010	0.00034
	4	0.00000	0.00080	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00830	0.00800	0.00000	0.00001	0.00000	0.00000	0.00000
	6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	9	0.00000	0.00800	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00088	0.00000	0.00004	0.00009	0.00009	0.00002	0.00188
	11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00002	0.00088	0.00001	0.00001	0.00001	0.00001	0.00025
	13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	14	0.08000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.08000	0.00800	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00080	0.00080	0.00000	0.00000	0.00000	0.00000	0.00000
	17	1.00042	0.00001	0.00003	0.00002	0.00000	0.00017	0.00000
	18	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	19	0.00003	0.00000	1.00004	0.00006	0.00004	0.00006	0.00007
	20	0.00046	0.00003	0.00049	1.00060	0.00066	0.00059	0.00203
	21	0.00001	0.00800	0.00062	0.00004	1.00007	0.00002	0.00002
	22	0.00000	0.00088	0.00000	0.00001	0.00000	1.00000	0.00001
	23	0.00003	0.00000	0.00026	0.00013	0.00072	0.00007	1.00005
REST OF APPALACHIA	1	0.00083	0.00022	0.00197	0.00580	0.04393	0.00168	0.00963
	2	0.87705	0.00644	0.09670	0.01799	0.03216	0.02953	0.22056
	3	0.00037	0.00004	0.00252	0.00121	0.00342	0.00870	0.00224
	4	0.00089	0.00812	0.00194	0.00324	0.00336	0.02276	0.00210
	5	0.00016	0.00007	0.00049	0.00202	0.00107	0.00027	0.00062
	6	0.00514	0.00113	0.00250	0.00715	0.00368	0.00946	0.00777
	7	0.01217	0.00301	0.00605	0.00884	0.00953	0.01524	0.04087
	8	0.00135	0.00014	0.01534	0.00659	0.00486	0.00313	0.01250
	9	0.02041	0.00144	0.00758	0.00717	0.00466	0.01290	0.01340
	10	0.31872	0.00071	0.01263	0.01418	0.02473	0.00054	0.18222
	11	0.00305	0.00871	0.00219	0.00335	0.00257	0.01069	0.01212
	12	0.04265	0.00642	0.01714	0.02050	0.03526	0.02374	0.38834
	13	0.13352	0.00956	0.01556	0.00843	0.01719	0.01887	0.14729
	14	0.03029	0.00215	0.00685	0.00518	0.00473	0.00636	0.08190
	15	0.00873	0.00878	0.00176	0.00176	0.00168	0.00460	0.00724
	16	0.00606	0.00108	0.00188	0.00170	0.00163	0.00558	0.00660
	17	0.03085	0.00040	0.00219	0.00160	0.00065	0.01408	0.00092
	18	0.00995	0.00745	0.00148	0.00369	0.00148	0.01503	0.00689
	19	0.01763	0.00178	0.05300	0.03280	0.02190	0.03438	0.03809
	20	0.01527	0.00257	0.01606	0.01976	0.02005	0.01944	0.00679
	21	0.00346	0.00053	0.00694	0.02180	0.03392	0.01202	0.00790
	22	0.00258	0.00039	0.00454	0.01032	0.00628	0.00717	0.00786
	23	0.00320	0.00026	0.02667	0.01340	0.07264	0.00693	0.00467
REST OF THE U.S.	1	0.00419	0.00077	0.00591	0.01471	0.02864	0.00626	0.02122
	2	0.05988	0.00486	0.02035	0.01737	0.02061	0.03062	0.04576
	3	0.02298	0.00245	0.11202	0.05803	0.05967	0.03720	0.10756
	4	0.02518	0.00339	0.05165	0.04290	0.06009	0.52936	0.05828
	5	0.00121	0.00838	0.00244	0.00916	0.08489	0.00213	0.00386
	6	0.03423	0.00680	0.01582	0.04507	0.02427	0.07546	0.04649
	7	0.04756	0.00831	0.02350	0.03287	0.03678	0.03584	0.18849
	8	0.02499	0.00265	0.11546	0.05483	0.05206	0.03923	0.11236
	9	0.16712	0.01185	0.05994	0.06110	0.04175	0.11159	0.11481
	10	0.03786	0.00295	0.02375	0.03790	0.04760	0.03060	0.44993
	11	0.02587	0.00497	0.01433	0.02844	0.01866	0.07249	0.07875
	12	0.05319	0.00585	0.02115	0.02726	0.03768	0.03513	0.21847
	13	0.17173	0.01198	0.02606	0.02315	0.02916	0.05888	0.18634
	14	0.15923	0.01185	0.03545	0.03197	0.04421	0.05236	0.34500
	15	0.13932	0.01256	0.02601	0.03655	0.02734	0.08479	0.12323
	16	0.11881	0.02041	0.03400	0.03132	0.02593	0.11150	0.13010
	17	0.29998	0.00504	0.02913	0.03680	0.01615	0.14989	0.02426
	18	0.09972	0.06196	0.02006	0.03735	0.02207	0.13645	0.07297
	19	0.02571	0.08259	0.07502	0.04655	0.03136	0.04906	0.05477
	20	0.01357	0.00143	0.00776	0.01036	0.01080	0.01421	0.02344
	21	0.01303	0.00197	0.03271	0.07049	0.12008	0.04376	0.02937
	22	0.03206	0.00483	0.05503	0.12367	0.07602	0.08725	0.08594
	23	0.00383	0.00838	0.01212	0.01080	0.03653	0.00718	0.00699

Table K-3 (Cont.)

REST OF APPALACHIA

	INDUSTRY	1	2	3	4	5	6	7	8	9	10	11	12
UPPER LICKING	1	0.01627	0.00001	0.00001	0.00005	0.02432	0.00201	0.00013	0.00002	0.00002	0.00128	0.00010	0.00603
	2	0.00037	0.00067	0.00003	0.00006	0.33055	0.00052	0.00098	0.00020	0.00011	0.00006	0.00017	0.00078
	3	0.00019	0.00002	0.00056	0.00001	0.00015	0.00007	0.00019	0.02139	0.00001	0.00002	0.00001	0.00002
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00003	0.00000	0.00000	0.00000	0.00009	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000
	6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000
	8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00004	0.00001	0.00000	0.00001	0.00036	0.00019	0.00002	0.00000	0.00001	0.00051	0.00013	0.00002
	11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00000	0.00000	0.00000	0.00000	0.00002	0.00001	0.00001	0.00000	0.00000	0.00008	0.00001	0.00003
	13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00008	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00003	0.00000	0.00000	0.00000
	18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	19	0.00004	0.00001	0.00001	0.00001	0.00006	0.00004	0.00003	0.00002	0.00001	0.00001	0.00001	0.00001
	20	0.00056	0.00008	0.00005	0.00011	0.00110	0.00068	0.00027	0.00008	0.00008	0.00018	0.00021	0.00012
	21	0.00003	0.00000	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000
	22	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000
	23	0.00012	0.00000	0.00001	0.00001	0.00010	0.00004	0.00002	0.00002	0.00000	0.00003	0.00003	0.00001
REST OF APPALACHIA	1	1.26850	0.00018	0.00029	0.00101	0.40417	0.03455	0.00257	0.00046	0.00042	0.02125	0.00180	0.00052
	2	0.03605	1.11763	0.00191	0.03412	0.04717	0.04792	0.11470	0.02217	0.03999	0.00526	0.01566	0.10213
	3	0.00151	0.00015	1.00247	0.00008	0.00127	0.00064	0.00133	0.09298	0.00010	0.00018	0.00011	0.00017
	4	0.00124	0.00011	0.00021	1.01539	0.08328	0.00295	0.00152	0.03042	0.00038	0.00058	0.00056	0.00037
	5	0.01404	0.00003	0.00002	0.03011	1.06344	0.00279	0.03242	0.03013	0.03011	0.00046	0.00028	0.00010
	6	0.03391	0.00060	0.00026	0.02051	0.01792	1.15574	0.00878	0.00135	0.00661	0.00165	0.00862	0.00441
	7	0.03845	0.00347	0.00156	0.00061	0.03276	0.06739	1.14246	0.01445	0.07903	0.00604	0.00736	0.01045
	8	0.00577	0.00052	0.00028	0.00020	0.00412	0.00185	0.00404	1.00523	0.00026	0.00064	0.00032	0.00060
	9	0.00721	0.00167	0.00039	0.00115	0.00884	0.01302	0.00712	0.00112	1.00485	0.00199	0.00795	0.00255
	10	0.01962	0.00321	0.00108	0.00268	0.02362	0.08781	0.00752	0.00152	0.00718	1.24433	0.05923	0.00808
	11	0.00096	0.00022	0.00010	0.00137	0.00239	0.01163	0.00130	0.00041	0.00097	0.00133	1.01154	0.00086
	12	0.01290	0.01096	0.00110	0.00149	0.36382	0.01639	0.02466	0.00589	0.00696	0.00635	0.04575	1.08842
	13	0.00755	0.00688	0.00150	0.00195	0.01923	0.00873	0.02106	0.00384	0.03271	0.03300	0.02541	0.00349
	14	0.00579	0.00096	0.00118	0.00091	0.03234	0.00629	0.00868	0.00551	0.00199	0.00239	0.00804	0.00245
	15	0.00232	0.00203	0.00099	0.00047	0.00238	0.00192	0.00217	0.00071	0.00040	0.00047	0.00123	0.00056
	16	0.00091	0.00026	0.00033	0.00026	0.00145	0.00081	0.00067	0.00042	0.00023	0.00024	0.00074	0.00036
	17	0.00076	0.00017	0.00010	0.00018	0.00080	0.00035	0.00030	0.00015	0.00013	0.00012	0.00021	0.00010
	18	0.00067	0.00009	0.00013	0.00123	0.00117	0.00125	0.00149	0.00028	0.00035	0.00013	0.00053	0.00022
	19	0.02149	0.00432	0.00353	0.00567	0.04526	0.02613	0.01610	0.01352	0.00350	0.00695	0.00498	0.00843
	20	0.02736	0.00277	0.00163	0.00387	0.03765	0.02341	0.00933	0.00291	0.00290	0.00361	0.00716	0.00406
	21	0.01360	0.00124	0.00464	0.00256	0.01159	0.00597	0.00336	0.00520	0.00077	0.00124	0.00135	0.00116
	22	0.00366	0.00025	0.00074	0.00135	0.00732	0.00307	0.00329	0.00149	0.00057	0.00161	0.00075	0.00059
	23	0.01237	0.00049	0.00088	0.00123	0.01056	0.00384	0.00180	0.00166	0.00042	0.00286	0.00275	0.08062
REST OF THE U.S.	1	0.18686	0.00064	0.00127	0.00452	0.32975	0.04859	0.00838	0.00215	0.00183	0.01762	0.00431	0.00163
	2	0.01973	0.00754	0.00206	0.00483	0.03568	0.03082	0.02971	0.00827	0.00603	0.00424	0.00971	0.01041
	3	0.04201	0.00818	0.02508	0.00570	0.08274	0.04215	0.06745	0.03641	0.00634	0.01164	0.00704	0.01033
	4	0.03242	0.00258	0.00591	0.14056	0.06811	0.04912	0.03124	0.01219	0.00680	0.00885	0.00960	0.00876
	5	0.05682	0.00018	0.00018	0.00096	0.17480	0.01255	0.00802	0.00070	0.00079	0.00195	0.00122	0.00054
	6	0.02070	0.00262	0.00173	0.06953	0.07136	0.47604	0.03458	0.00671	0.07191	0.00695	0.02416	0.01501
	7	0.07965	0.00758	0.00387	0.01961	0.09069	0.15933	0.22289	0.02838	0.04906	0.01379	0.01936	0.01975
	8	0.10011	0.00878	0.00549	0.00619	0.09093	0.04613	0.07096	0.08009	0.00686	0.04271	0.00770	0.01126
	9	0.05757	0.01193	0.00700	0.01197	0.07832	0.10796	0.05524	0.01272	0.03332	0.01545	0.05452	0.01854
	10	0.02760	0.00354	0.00226	0.01107	0.04420	0.11769	0.01441	0.00524	0.00525	0.17410	0.05620	0.00901
	11	0.00887	0.00141	0.00127	0.00866	0.01925	0.05859	0.00949	0.00350	0.00406	0.06615	0.04171	0.00434
	12	0.02687	0.00246	0.00218	0.00388	0.05612	0.02435	0.02212	0.00667	0.00572	0.00600	0.01187	0.04127
	13	0.01832	0.00678	0.00347	0.00442	0.34454	0.02071	0.02522	0.00969	0.00403	0.00529	0.02134	0.00561
	14	0.03147	0.00462	0.00488	0.00566	0.11613	0.03336	0.03424	0.02130	0.00783	0.00949	0.02636	0.00693
	15	0.02605	0.01724	0.00822	0.00587	0.03412	0.02401	0.02439	0.01196	0.00471	0.00541	0.01354	0.00602
	16	0.01450	0.00378	0.00459	0.00422	0.02361	0.01309	0.01089	0.00730	0.00331	0.00343	0.00981	0.00493
	17	0.01323	0.00215	0.00212	0.00380	0.01998	0.00905	0.00833	0.00439	0.00210	0.00226	0.00344	0.00202
	18	0.01199	0.00153	0.00225	0.01488	0.02125	0.01871	0.02006	0.00505	0.00462	0.00234	0.00707	0.00380
	19	0.03684	0.00603	0.00498	0.00816	0.06456	0.03772	0.02313	0.01928	0.00531	0.00982	0.00715	0.01176
	20	0.01295	0.00109	0.00108	0.00321	0.02297	0.01688	0.00678	0.00344	0.00172	0.00268	0.00327	0.00181
	21	0.04916	0.00445	0.01647	0.00932	0.04302	0.02219	0.01247	0.01992	0.00286	0.00458	0.00495	0.00415
	22	0.04741	0.00312	0.00888	0.01649	0.08600	0.03839	0.04003	0.01869	0.00699	0.00765	0.00418	0.00720
	23	0.00460	0.00064	0.00144	0.00138	0.01045	0.00467	0.00235	0.00235	0.00053	0.00181	0.00164	0.00081

	INDUSTRY	13	14	15	16	17	18	19	20	21	22	23
UPPER LICKING	1	0.00003	0.00003	0.00003	0.00303	0.00005	0.00001	0.00011	0.00832	0.00237	0.00009	0.00066
	2	0.00365	0.00088	0.00062	0.00043	0.00890	0.00007	0.00066	0.00023	0.00035	0.00039	0.00214
	3	0.00005	0.00003	0.00003	0.00002	0.00004	0.00000	0.00025	0.00012	0.00038	0.00067	0.00023
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00000	0.00000	0.00000	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	6	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00002	0.00003	0.00002	0.00002	0.00004	0.00000	0.00003	0.00003	0.00007	0.00002	0.00075
	11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00002	0.00001	0.00001	0.00001	0.00002	0.00000	0.00001	0.00001	0.00001	0.00001	0.00016
	13	0.00000	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00008
	14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00088	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00004	0.00000	0.00000	0.00000	0.00000
	17	0.00000	0.00000	0.00001	0.00003	0.00014	0.00000	0.00001	0.00001	0.00000	0.00007	0.00000
	18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00006	0.00000	0.00000
	19	0.00003	0.00002	0.00002	0.00001	0.00003	0.00000	0.00009	0.00006	0.00004	0.00006	0.00006
	20	0.00044	0.00030	0.00036	0.00030	0.00046	0.00008	0.00047	0.00038	0.00058	0.00057	0.00147
	21	0.00001	0.00000	0.00001	0.00000	0.00001	0.00000	0.00002	0.00004	0.00007	0.00002	0.00002
	22	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00001	0.00001
	23	0.00003	0.00003	0.00005	0.00001	0.00003	0.00000	0.00025	0.00013	0.00069	0.00067	0.00005
REST OF APPALACHIA	1	0.00062	0.00060	0.00060	0.00052	0.00096	0.00023	0.00197	0.00593	0.03939	0.00186	0.01176
	2	0.46440	0.09852	0.05916	0.04096	0.88098	0.00678	0.10448	0.61841	0.03265	0.63053	0.23575
	3	0.00044	0.00025	0.00025	0.00016	0.00034	0.00004	0.00191	0.00096	0.00204	0.00059	0.00178
	4	0.00093	0.00072	0.00065	0.00067	0.00104	0.00013	0.00305	0.00457	0.00589	0.05339	0.00222
	5	0.00817	0.00009	0.00009	0.00009	0.00015	0.00009	0.00064	0.00263	0.00111	0.00031	0.00068
	6	0.00293	0.00319	0.00246	0.00396	0.30670	0.00166	0.00225	0.01033	0.00455	0.01281	0.00437
	7	0.01673	0.00913	0.00612	0.01082	0.81343	0.00347	0.00435	0.00987	0.00992	0.01720	0.04686
	8	0.00152	0.00085	0.00083	0.00044	0.00090	0.00018	0.00792	0.00357	0.00294	0.00188	0.00693
	9	0.00453	0.00408	0.00791	0.00893	0.02120	0.00149	0.00763	0.00741	0.00474	0.01347	0.01397
	10	0.00799	0.01335	0.00936	0.00698	0.81705	0.00096	0.01416	0.62149	0.03102	0.00730	0.35606
	11	0.00145	0.00258	0.00231	0.00506	0.00405	0.00100	0.00276	0.00445	0.00289	0.01573	0.01735
	12	0.04364	0.02337	0.02324	0.03193	0.04531	0.00663	0.01734	0.02713	0.03536	0.02449	0.40026
	13	1.24982	0.20351	0.11640	0.07294	0.14685	0.01052	0.01631	0.06924	0.01735	0.01963	0.16308
	14	0.01348	1.02215	0.01935	0.01605	0.03673	0.00274	0.00766	0.00628	0.00963	0.00723	0.10822
	15	0.07245	0.00878	1.02736	0.00529	0.01279	0.00123	0.00215	0.00246	0.00219	0.00782	0.01119
	16	0.00268	0.00228	0.00688	1.01514	0.00873	0.00162	0.00253	0.00207	0.00173	0.00645	0.01007
	17	0.00074	0.00127	0.00280	0.00095	1.03807	0.00050	0.00266	0.00186	0.00009	0.01772	0.00096
	18	0.00094	0.00243	0.00239	0.00560	0.00819	1.00615	0.00134	0.00267	0.00141	0.01265	0.00580
	19	0.01709	0.00997	0.01017	0.00830	0.01769	0.00179	1.05391	0.03294	0.02196	0.03452	0.03826
	20	0.01504	0.01026	0.01223	0.01060	0.01565	0.00261	0.01614	1.01992	0.02004	0.01972	0.06600
	21	0.00328	0.00221	0.00277	0.00236	0.00348	0.00054	0.00906	0.02197	1.03379	0.01210	0.00793
	22	0.00151	0.00115	0.00146	0.00170	0.00257	0.00040	0.00457	0.81638	0.00830	1.00741	0.08710
	23	0.00355	0.00295	0.00485	0.00133	0.00325	0.00026	0.02673	0.01394	0.07481	0.00098	1.00517
REST OF THE U.S.	1	0.00252	0.00211	0.00220	0.00222	0.00404	0.00076	0.00541	0.01457	0.03349	0.00819	0.01895
	2	0.00523	0.04085	0.03410	0.02483	0.05597	0.00453	0.02156	0.01706	0.02016	0.04909	0.08186
	3	0.02733	0.01611	0.01647	0.01053	0.02302	0.00246	0.11358	0.05634	0.04138	0.03734	0.10813
	4	0.01753	0.01333	0.01460	0.01554	0.02495	0.00338	0.05057	0.49156	0.00558	0.49872	0.05815
	5	0.00897	0.00063	0.00064	0.00070	0.00120	0.00036	0.06229	0.00839	0.00485	0.00210	0.00377
	6	0.01394	0.01353	0.01283	0.01765	0.03262	0.00626	0.81567	0.04189	0.02340	0.07261	0.04488
	7	0.03636	0.02280	0.02101	0.02843	0.04630	0.00785	0.02313	0.03189	0.83039	0.03388	0.10250
	8	0.02985	0.01764	0.01806	0.01153	0.02535	0.00269	0.12336	0.06485	0.05478	0.64048	0.11796
	9	0.04009	0.03367	0.00256	0.00762	0.16633	0.01179	0.85973	0.00087	0.04166	0.11113	0.11424
	10	0.01475	0.01677	0.01608	0.01367	0.03156	0.00269	0.02234	0.03062	0.04580	0.02425	0.27683
	11	0.08976	0.01246	0.01344	0.02336	0.02488	0.00468	0.01576	0.02585	0.01854	0.06765	0.07353
	12	0.03675	0.02173	0.02565	0.02777	0.85153	0.00564	0.02695	0.02683	0.03757	0.03439	0.20714
	13	0.15465	0.12318	0.09936	0.00626	0.15840	0.01102	0.02685	0.02284	0.02894	0.05792	0.17056
	14	0.06070	0.07160	0.07214	0.05831	0.15079	0.01046	0.03466	0.03114	0.04412	0.05149	0.31867
	15	0.19384	0.08437	0.19111	0.05419	0.13527	0.01211	0.02556	0.02486	0.02707	0.08177	0.12829
	16	0.03864	0.03056	0.08677	0.17642	0.11614	0.01979	0.03401	0.03045	0.02563	0.10864	0.12663
	17	0.01255	0.01394	0.02785	0.01196	0.29223	0.00495	0.02867	0.63057	0.01612	0.14637	0.02424
	18	0.01504	0.02876	0.03141	0.00471	0.10149	0.06376	0.02019	0.03778	0.02214	0.13943	0.07408
	19	0.02424	0.01425	0.01406	0.01198	0.32565	0.00259	0.07437	0.04661	0.03130	0.04892	0.05460
	20	0.00805	0.00567	0.00748	0.00627	0.01319	0.00140	0.00770	0.61026	0.01083	0.01345	0.02230
	21	0.01205	0.00814	0.01021	0.00871	0.01302	0.00197	0.03266	0.07832	0.11981	0.09368	0.02433
	22	0.01877	0.01422	0.01837	0.02079	0.03205	0.00483	0.05501	0.12361	0.07599	0.08721	0.08594
	23	0.00338	0.00237	0.00340	0.00176	0.00377	0.00038	0.01202	0.01056	0.03044	0.00714	0.00671

Table K-3 (Cont.)

REST OF THE U.S.

	INDUSTRY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
UPPER LICKING	1	0.00050	0.00001	0.00001	0.00003	0.00089	0.00021	8.00006	0.00002	0.00001	0.00006	0.00002	0.00001	0.00002	0.00001	0.00002	0.00001	0.00003	0.00000	0.00004	0.00009	0.00016	0.00006	0.00010
	2	0.00035	0.00078	0.00003	0.00006	0.00052	0.00050	0.00090	0.00019	0.00010	0.00006	0.00016	0.00070	0.00331	0.00083	0.00059	0.00042	0.00087	0.00007	0.00075	0.00023	0.00034	0.00038	0.00200
	3	0.00010	0.00001	0.00002	0.00001	0.00010	0.00005	0.00007	0.00070	0.00001	0.00001	0.00001	0.00001	0.00003	0.00002	0.00002	0.00001	0.00003	0.00000	0.00012	0.00007	0.00007	0.00005	0.00012
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00000	0.00000	0.00000	0.00000	0.00031	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	10	0.00002	0.00000	0.00000	0.00001	0.00003	0.00007	0.00001	0.00000	0.00000	0.00014	0.00004	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00000	0.00002	0.00002	0.00004	0.00002	0.00021
	11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00050	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	12	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00008	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00001
	13	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	14	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00008	0.00006	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	15	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00003	0.00000	0.00000	0.00000	0.00000	0.00002	0.00000
	18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	19	0.00003	0.00001	0.00001	0.00001	0.00037	0.00004	0.00003	0.00002	0.00001	0.00001	0.00001	0.00001	0.00003	0.00002	0.00002	0.00001	0.00003	0.00000	0.00009	0.00005	0.00004	0.00006	0.00006
	20	0.00018	0.00002	0.00001	0.00003	0.00026	0.00019	0.00008	0.00003	0.00002	0.00004	0.00005	0.00003	0.00012	0.00006	0.00004	0.00008	0.00014	0.00002	0.00013	0.00014	0.00018	0.00016	0.00036
	21	0.00003	0.00009	0.00001	0.00000	0.00002	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00001	0.00000	0.00003	0.00000	0.00002	0.00004	0.00006	0.00002	0.00002
	22	0.00000	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000
	23	0.00000	0.00000	0.00001	0.00001	0.00037	0.00003	0.00001	0.00001	0.00000	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00001	0.00002	0.00000	0.00011	0.00007	0.00027	0.00004	0.00009
REST OF APPALACHIA	1	0.03193	0.00012	0.00016	0.00068	0.03271	0.00751	0.00116	0.00040	0.00027	0.00306	0.00066	0.00026	0.00045	0.00036	0.00039	0.00037	0.00066	0.00012	0.00102	0.00243	0.00693	0.00158	0.00315
	2	0.01982	0.03347	0.00171	0.00356	0.03137	0.02702	0.04402	0.01309	0.00548	0.00380	0.00991	0.03176	0.16052	0.05159	0.03665	0.02561	0.05376	0.00437	0.04030	0.01474	0.02209	0.02352	0.10883
	3	0.00115	0.00010	0.00032	0.00008	0.00106	0.00055	0.00084	0.01037	0.00008	0.00015	0.00064	0.00013	0.00036	0.00021	0.00021	0.00014	0.00030	0.00003	0.00141	0.00075	0.00081	0.00064	0.00135
	4	0.00105	0.00009	0.00019	0.00372	0.00259	0.00149	0.00095	0.00039	0.00021	0.00027	0.00029	0.00021	0.00056	0.00042	0.00046	0.00048	0.00078	0.00011	0.00154	0.00276	0.00253	0.01328	0.03164
	5	0.00359	0.00002	0.00002	0.00007	0.01061	0.00287	0.00053	0.00036	0.00006	0.00015	0.00064	0.00004	0.00069	0.00006	0.00006	0.00006	0.00010	0.00003	0.00068	0.00054	0.00037	0.00017	0.00031
	6	0.00245	0.00032	0.00020	0.00011	0.00441	0.05653	0.00413	0.00079	0.00260	0.00643	0.00366	0.00182	0.00175	0.00165	0.00153	0.00200	0.00380	0.00074	0.00184	0.00491	0.00282	0.00063	0.00545
	7	0.01257	0.00127	0.00061	0.00294	0.01443	0.02447	0.03598	0.00431	0.00773	0.00218	0.00299	0.00322	0.00643	0.00395	0.00340	0.00441	0.00707	0.00122	0.00373	0.00492	0.00537	0.00745	0.01651
	8	0.00151	0.00015	0.00010	0.00015	0.00163	0.00086	0.00106	0.00105	0.00013	0.00022	0.00015	0.00021	0.00060	0.00035	0.00035	0.00024	0.00051	0.00005	0.00185	0.00104	0.00101	0.00077	0.00183
	9	0.00427	0.00049	0.00052	0.00069	0.00597	0.00793	0.00408	0.00095	0.00240	0.00114	0.00392	0.00139	0.00309	0.00252	0.00453	0.00467	0.01184	0.00085	0.00448	0.00449	0.00323	0.00806	0.00647
	10	0.00548	0.00067	0.00051	0.00164	0.00772	0.01631	0.00243	0.00104	0.00079	0.02438	0.06709	0.00149	0.00302	0.00287	0.00274	0.00206	0.00454	0.00040	0.00604	0.00603	0.01361	0.00470	0.03931
	11	0.00067	0.00010	0.00010	0.00058	0.00137	0.00380	0.00065	0.00075	0.00031	0.00041	0.00252	0.00030	0.00070	0.00082	0.00048	0.00144	8.00152	0.00029	0.00168	0.00172	0.00151	0.00415	0.00461
	12	0.00703	0.00259	0.00075	0.00115	0.01826	0.00728	0.00735	0.00219	0.00186	0.00216	0.00418	0.01594	0.01346	0.00801	0.00827	0.00872	0.01486	0.00176	0.00898	0.00959	0.01828	0.00965	0.07689
	13	0.00616	0.00282	0.00112	0.00143	0.01431	0.00674	0.00970	0.00305	0.00165	0.00185	0.00416	0.00218	0.07626	0.05127	0.04156	0.02700	0.05925	0.00423	0.00981	0.00748	0.01200	0.01643	0.08653
	14	0.00304	0.00045	0.00045	0.00054	0.00905	0.00305	0.00299	0.00179	0.00068	0.00049	0.00226	0.00081	0.00553	0.00622	0.00608	0.00403	0.01209	0.00086	0.00366	0.00307	0.00563	0.00434	0.02612
	15	0.00139	0.00069	0.00041	0.00031	0.00190	0.00130	0.00133	0.00062	0.00025	0.00030	0.00076	0.00035	0.01021	0.00569	0.00963	0.00289	0.00709	0.00063	0.00143	0.00158	0.00158	0.00414	0.00657
	16	0.00081	0.00021	0.00025	0.00023	0.00132	0.00073	0.00060	0.00040	0.00018	0.00019	0.00053	0.00027	0.00211	0.00167	0.00466	0.00445	0.00622	0.00106	0.00188	0.00170	0.00148	0.00583	0.00663
	17	0.00040	0.00007	0.00006	0.00011	0.00064	0.00030	0.00026	0.00014	0.00006	0.00007	0.00010	0.00007	0.00039	0.00038	0.00071	0.00033	0.00688	0.00013	0.00081	0.00087	0.00069	0.00354	0.00076
	18	0.00063	0.00008	0.00012	0.00075	0.00111	0.00097	0.00102	0.00026	0.00024	0.00012	0.00036	0.00020	0.00077	0.00145	0.00158	0.00323	0.00505	0.00317	0.00109	0.00192	0.00118	0.00698	0.00374
	19	0.02059	0.00407	0.00336	0.00544	0.04317	0.02513	0.01546	0.01287	0.00335	0.00659	0.00478	0.00793	0.01631	0.00456	0.00979	0.00794	0.01707	0.00172	0.05048	0.03116	0.02098	0.03277	0.03656
	20	0.00624	0.00065	0.00048	0.00115	0.00960	0.00547	0.00263	0.00114	0.00373	0.00131	0.00159	0.00099	0.00419	0.00285	0.00320	0.00261	0.03470	0.00060	0.00432	0.00488	0.00607	0.00527	0.01278
	21	0.01272	0.00115	0.00426	0.00241	0.01111	0.00573	0.00322	0.00510	0.00074	0.00114	0.00128	0.00108	0.00313	0.00211	0.00264	0.00225	0.00336	0.00051	0.00848	0.02027	0.03103	0.01134	0.00759
	22	0.00354	0.00024	0.00067	0.00124	0.00650	0.00291	0.00302	0.00141	0.00053	0.00057	0.00064	0.00055	0.00143	0.00108	0.00139	0.00157	0.00242	0.00036	0.00418	0.00932	0.00575	0.00657	0.00669
	23	0.00035	0.00040	0.00052	0.00085	0.00569	0.00788	0.00140	0.00143	0.00033	0.00135	0.00124	0.00054	0.00224	0.00169	0.00239	0.00105	0.00028	0.00022	0.01674	0.00735	0.02701	0.00458	0.00410
REST OF THE U.S.	1	[illegible]	0.03070	0.00130	0.00487	0.70464	0.07740	0.00499	0.00721	0.00198	0.03742	0.00551	0.00146	0.00271	0.00235	0.00243	0.00239	0.00437	0.00088	0.00692	0.01831	0.08678	0.00876	0.02816
	2	0.03618	1.07128	0.00227	0.00544	0.05150	0.05176	0.10048	0.02034	0.01055	0.00568	0.01547	0.00086	0.36945	0.07983	0.05664	0.04020	0.08322	0.00694	0.08582	0.02658	0.03075	0.03611	0.20889
	3	0.09246	0.00823	1.02738	0.00571	0.08300	0.04227	0.04806	0.93972	0.00636	0.01165	0.00706	0.01038	0.02743	0.01616	0.01652	0.01056	0.02307	0.00246	0.11401	0.05860	0.06242	0.03747	0.10847
	4	0.03311	0.00261	0.00592	1.15223	0.06930	0.05057	0.03181	0.01222	0.00698	0.00920	0.00987	0.00691	0.01740	0.01362	0.01479	0.01572	0.02521	0.00341	0.05208	0.04334	0.06849	0.53884	0.05853
	5	0.07230	0.00019	0.00018	0.00100	1.22772	0.01447	0.00991	0.00077	0.00084	0.00220	0.00141	0.00060	0.00105	0.00067	0.00068	0.00076	0.00125	0.00042	0.00275	0.01067	0.00559	0.00223	0.00414
	6	0.02215	0.00240	0.00178	0.00193	0.04087	1.57525	0.03424	0.00730	0.02592	0.00777	0.03433	0.01740	0.01913	0.01507	0.01378	0.01993	0.03558	0.00719	0.01628	0.04730	0.02513	0.07739	0.04881
	7	0.10552	0.01018	0.00482	8.02328	0.10934	0.20225	1.32997	0.03851	0.07116	0.01765	0.02373	0.02698	0.04666	0.02797	0.02373	0.03481	0.05266	0.01011	0.02582	0.03684	0.05494	0.06313	0.13285
	8	0.10438	0.00915	0.00508	0.00825	0.09342	0.04712	0.07395	1.08427	0.00679	0.01314	0.00787	0.01164	0.03077	0.01813	0.01854	0.01173	0.02582	0.00274	0.12946	0.06534	0.05876	0.04159	0.12303
	9	0.06650	0.01272	0.00737	0.01223	0.08129	0.11305	0.05829	0.01290	1.03580	0.01629	0.05855	0.01470	0.04153	0.03524	0.06594	0.07169	0.17569	0.01243	0.08308	0.06378	0.04318	0.11650	0.11974
	10	0.04116	0.00608	0.00282	0.01212	0.06014	0.18431	0.01952	0.00571	0.00665	1.39446	0.10243	0.01561	0.01973	0.02727	0.02266	0.01860	0.04409	0.00325	0.03040	0.04010	0.06324	0.03185	0.59451
	11	0.00915	0.00153	0.00128	0.00941	0.02027	9.06672	0.01014	0.00366	0.00552	0.00711	1.05073	0.00490	0.01051	0.01422	0.01488	0.02698	0.02736	0.00539	0.01788	0.02657	0.01993	0.07923	0.08827
	12	5.02660	0.01484	0.00253	0.00422	0.10169	0.03347	0.03943	0.00955	0.01071	0.01619	0.02345	1.11378	0.06494	0.03710	0.04063	0.05094	0.08200	0.01051	0.02932	0.04418	0.05488	0.04404	0.53084
	13	0.01971	0.01084	0.00348	0.00493	0.04945	0.02270	0.03658	0.01047	0.00589	0.00648	0.03759	0.00745	1.32822	0.26542	0.17421	0.11420	0.24600	0.01232	0.03254	0.02482	0.03428	0.06132	0.26710
	14	0.03422	0.00515	0.00561	0.00603	0.13862	0.03660	0.03993	0.02502	0.00914	0.01099	8.03219	0.01057	0.07066	1.08753	0.08539	0.06953	0.17743	0.01234	0.03864	0.03427	0.04832	0.05436	0.40077
	15	0.82698	0.01837	0.00670	0.00604	0.03460	0.02463	0.02514	0.01205	0.00486	0.00559	0.01401	0.00623	0.20588	0.08846	1.70384	0.05659	0.14096	0.01271	0.02628	0.03074	0.02771	0.08546	0.12490
	16	0.01460	0.00384	0.00467	0.00425	0.02374	0.01316	0.01096	0.00732	0.00336	0.00367	0.01001	0.00502	0.03920	0.03115	0.04900	1.18260	8.11665	0.02035	0.03488	0.03131	0.02607	0.11120	0.12487
	17	0.01364	0.00226	0.00215	0.00387	0.02014	0.00910	0.00837	0.00440	0.00217	0.00228	0.00355	0.00205	0.01240	0.01484	0.02995	0.01253	1.32354	0.00532	0.03053	0.03154	0.01631	0.16060	0.02444
	18	0.01203	0.00154	0.00227	0.01536	0.02132	0.01901	0.32052	0.00507	0.00474	0.00235	0.00723	0.00388	0.01521	0.02974	0.03222	0.04709	0.10462	1.00674	0.02049	0.03852	0.02237	0.14500	0.07612
	19	0.03174	0.00628	0.00517	0.00839	0.06665	0.03073	0.02385	0.01993	0.00516	0.01018	0.00735	0.01220	0.02503	0.01466	0.01504	0.01229	0.02627	0.00265	1.07821	0.04819	0.03228	0.05007	0.05630
	20	0.03468	0.00328	0.00276	0.00800	0.05143	0.03431	0.01317	0.00525	0.00395	0.00711	0.00901	0.00492	0.01922	0.01330	0.01677	0.01429	0.02446	0.00347	0.01988	1.02571	0.02520	0.02881	0.07411
	21	0.05005	0.00453	0.01685	0.00748	0.04350	0.02243	0.01361	0.02008	0.00299	0.00464	0.00502	0.00421	0.01220	0.00824	0.01034	0.00883	0.01313	0.00200	0.03324	0.08002	1.12258	0.04464	0.02967
	22	0.04768	0.00314	0.00894	0.01660	0.08652	0.01856	0.04029	0.01876	0.00703	0.00753	0.00923	0.00724	0.01888	0.01429	0.01844	0.02091	0.03220	0.00488	0.05542	0.12488	0.07855	1.08746	0.08655
	23	0.01515	0.00072	0.00150	0.00176	0.01436	0.00563	0.00275	0.00258	0.00062	0.00334	0.00318	0.00089	0.00471	0.00368	0.00589	0.00206	0.00475	0.00042	0.02845	0.01672	0.07667	0.00456	1.00780

Table K-4

Interregional Interindustry and Local Consumption Multipliers

UPPER LICKING

	INDUSTRY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
UPPER LICKING	1	1.04647	0.02526	0.02459	0.02483	0.05736	0.82920	0.02568	0.02763	0.02481	0.02689	0.02532	0.02910	0.02916	8.82663	8.02618	0.02546	0.02730	0.02469	0.02666	0.02623	0.02940	0.02658	0.03271
	2	0.00676	1.00513	0.00263	0.00317	0.00570	0.85565	0.00582	0.00651	0.00308	0.00339	0.00336	0.00646	0.01243	8.00459	0.80465	0.00418	0.80569	0.00298	0.00369	0.00411	0.00436	0.00533	0.00996
	3	0.00255	0.00185	1.00326	0.00179	8.20281	0.00231	0.00244	0.05159	0.00177	0.00143	0.00168	0.00192	0.88252	0.00211	0.00286	0.00199	0.00238	0.08175	0.00245	0.00217	0.00301	0.00226	0.00334
	4	0.01166	0.01627	0.01026	[illegible]	0.01055	0.01029	0.01028	0.01086	0.81025	0.01626	0.01026	0.01627	0.01036	0.01026	0.01026	0.01026	0.01027	0.01025	0.01028	0.01027	[illegible]	0.01044	0.01034
	5	0.14056	0.13803	0.13744	0.13774	1.14200	0.13530	0.13811	0.14540	0.13775	0.13611	0.13782	0.13000	0.13809	0.13790	0.13788	0.13763	0.13400	0.13775	0.13017	0.13746	0.12847	0.13743	0.13842
	6	0.04620	0.04734	0.04731	0.04724	0.04863	1.04742	8.04736	0.05204	0.04724	0.04737	0.04727	0.04733	0.04763	0.04729	0.04729	0.04727	0.04333	0.04724	0.04734	0.04731	0.04749	0.04730	0.84766
	7	0.01569	0.01541	0.01540	0.01538	0.01583	0.01544	1.01541	0.01629	0.81538	0.01542	0.01538	0.01540	0.01550	8.01539	0.81539	0.01539	0.01540	8.01537	0.01542	0.01540	0.01546	0.01540	0.01550
	8	0.02265	0.02166	0.02165	0.02162	0.02225	0.02178	0.87167	1.02289	0.02162	0.02167	0.02163	0.02166	0.02179	0.02164	0.02164	0.02163	0.82165	0.02161	0.02166	0.02165	0.02173	0.02164	0.02180
	9	0.00455	0.00447	0.00446	0.00446	0.00459	0.00447	0.00447	8.00472	1.00446	0.00447	0.00446	0.00447	0.00449	0.80446	0.00446	0.00446	0.00446	0.00446	0.00447	0.00446	0.00446	0.00446	0.00449
	10	0.00121	0.00097	0.00094	[illegible]	0.00115	0.00134	0.00109	0.00113	0.00096	1.00251	0.00124	[illegible]	0.00100	0.00111	0.00109	0.00106	0.00123	0.00098	0.00114	0.00114	0.00116	0.00111	0.00324
	11	0.01876	0.01842	0.01841	0.01838	0.01893	0.01846	0.01943	0.01947	0.01830	0.01843	1.01839	0.01842	0.01834	0.01840	0.01840	0.01840	0.01842	0.01838	0.01844	0.01841	0.01848	0.01841	0.01856
	12	0.00123	0.00118	0.00117	0.00117	0.00128	0.00120	8.00120	0.00125	0.00117	0.00118	0.00118	1.00124	0.00123	0.00120	0.00119	0.80120	0.08121	0.00112	0.00120	0.00119	0.00120	0.00120	0.00149
	13	0.00216	0.00712	0.00212	0.00211	0.85218	0.00213	0.00212	0.00224	0.00212	0.00212	0.00212	0.00212	1.00213	0.00214	0.80212	0.00212	0.00212	0.08212	0.00212	0.00212	0.00213	0.00212	0.08213
	14	0.00512	0.00502	0.00502	0.00501	0.00516	0.00503	0.00503	0.00531	8.00501	0.00503	0.00502	0.00502	0.00506	1.00502	0.10502	0.00502	0.00503	0.88501	0.00503	0.00502	0.00506	0.00502	0.00506
	15	0.03035	0.02481	0.02474	0.02475	0.03052	0.02996	8.02983	0.03151	0.02975	0.02983	0.02477	0.02980	0.03000	0.02978	1.02979	0.02477	0.02980	0.02975	0.02984	0.02979	0.02991	0.02979	0.03000
	16	0.02545	0.02490	0.02488	0.02485	0.02558	0.02494	0.07491	0.02632	0.02485	0.02491	0.02488	0.02489	0.02505	0.02487	0.02487	1.02488	0.02489	0.02484	0.02492	0.02488	0.02494	0.02488	0.02505
	17	0.06179	0.06069	0.06063	0.06055	0.06235	0.06000	0.06071	0.06416	0.06055	0.06071	0.06059	0.06067	0.06167	8.06064	0.86065	0.06060	1.06109	0.06055	0.06077	0.06066	0.06088	0.06065	0.06184
	18	0.00750	0.00737	0.00736	0.00735	0.00757	0.00738	0.00737	0.00779	0.00735	0.00737	0.00736	0.00737	0.00741	0.00736	0.00736	0.00736	8.08732	1.88735	0.00738	0.00736	0.00739	0.00736	0.00742
	19	0.07800	0.07657	0.07658	0.07642	0.07889	0.07696	0.07669	0.08101	0.07651	0.07664	0.07647	0.07656	0.07716	0.07658	0.07658	0.07651	0.07670	0.07639	1.07878	0.07664	0.07691	0.07670	0.07737
	20	0.18062	0.17565	0.17557	0.17550	0.18206	0.17764	0.17654	0.18626	0.17566	0.17617	0.17579	0.17596	0.17819	0.17627	0.17628	0.17603	0.17692	0.17539	0.17680	1.17858	0.17758	0.17666	0.18077
	21	0.14769	0.14460	0.14431	0.14412	0.14845	0.14474	0.14452	8.15268	0.14411	0.14450	0.14419	0.14438	0.14536	0.14429	0.14429	0.14422	8.14444	8.14409	0.14455	0.14439	1.14497	0.14439	0.14566
	22	0.07378	0.07247	0.07242	0.07232	0.07448	0.07260	0.07250	0.07660	0.07232	0.07251	0.07236	0.07245	0.07292	0.07240	0.07239	0.07236	0.07245	0.07231	0.07256	0.07245	0.07270	1.07242	0.07296
	23	0.15573	0.15286	0.15273	0.15256	0.15747	0.15341	0.15308	0.16172	0.15254	0.15302	0.15269	0.15286	0.15407	0.15286	0.15268	0.15274	0.15310	8.15251	0.15335	0.15301	0.15421	0.15306	1.15461
REST OF APPALACHIA	1	0.45550	0.09700	0.08352	0.09167	0.64866	0.18430	0.13342	0.13053	0.08941	0.12672	0.13109	0.10777	0.18461	0.13173	0.14379	0.11815	0.15412	0.08871	0.12859	0.12468	0.17788	0.14431	0.27288
	2	0.21703	0.26029	0.06299	0.10423	0.30092	0.24866	0.24078	0.18397	0.09969	0.12294	0.12406	0.20036	0.83025	0.23255	0.20557	0.17602	0.26284	0.09407	0.24497	0.18879	0.19336	0.24027	0.56045
	3	0.01135	0.00667	0.01090	0.03061	0.01338	0.01056	0.81029	0.19591	8.08632	0.00742	0.80706	0.00716	0.01101	0.00857	0.00848	0.00799	0.01844	0.00621	0.01083	0.00433	0.01107	0.01052	0.01732
	4	0.02050	0.00756	0.00508	0.01310	0.03143	0.02079	0.01590	0.01456	8.09636	0.01016	0.00884	0.00963	0.02554	0.81514	0.01385	0.01234	0.02876	0.00576	0.01588	0.01584	0.01073	[illegible]	0.04379
	5	0.02359	0.03634	0.01286	0.01689	0.21675	0.04810	0.07582	0.06173	0.02048	0.04596	0.03465	0.04942	0.15726	0.07842	0.06118	0.05031	0.30273	0.01694	0.06695	0.05367	0.07765	0.06501	0.24963
	6	0.06735	0.02417	0.01476	0.03269	0.10910	0.15559	0.05397	0.04571	0.02281	0.03229	0.03201	0.03416	8.08673	0.05826	0.84638	0.04006	0.03847	0.01807	0.04694	0.04647	0.05335	0.04377	0.14735
	7	0.09647	0.03465	0.02658	0.03632	0.12086	0.12267	0.17284	0.06480	8.05383	0.04363	0.04163	0.04574	0.09071	0.05879	8.05426	0.05417	8.08002	8.03036	0.05011	0.03642	0.08326	0.07499	8.10440
	8	0.03546	0.01249	0.00829	0.03442	0.04276	0.02489	0.07661	0.22816	0.03953	0.01451	0.01227	0.01921	0.03606	0.82187	0.01836	0.01578	8.02490	8.80873	0.03337	0.02220	0.02474	0.02219	0.06432
	9	0.03474	0.02478	0.02162	0.01499	0.04817	0.04285	0.02991	0.02506	0.01712	0.02482	0.02311	0.01787	0.83628	0.02591	0.02956	0.02462	0.05196	0.01343	0.03003	0.02912	0.02862	0.04390	0.06813
	10	0.12601	0.00670	0.04427	0.05738	0.17256	0.15585	0.09625	0.09155	0.05432	0.19162	0.04399	0.07275	0.14141	0.09837	0.89118	0.08259	0.12473	0.05152	0.10015	0.09545	0.12359	0.11062	0.33230
	11	0.02592	0.01013	0.00531	[illegible]	0.03329	0.03137	0.01978	0.01768	0.00844	0.01341	0.01845	0.01360	0.03436	0.02084	0.01841	0.01612	0.32718	0.00783	0.01900	0.01861	0.02138	0.01308	0.08584
	12	0.14551	0.11794	0.07473	0.13732	0.30146	0.19965	0.17764	0.16166	0.10762	0.12940	0.13090	0.20545	0.24998	0.17334	0.16879	8.16827	0.23350	0.10485	8.14684	0.17051	0.14332	0.20438	0.70342
	13	0.12603	0.00787	0.05404	0.06684	0.18306	0.13884	0.12009	0.15076	0.06165	0.07984	0.09413	0.07414	0.35976	0.21966	0.20175	0.15589	0.26829	0.06693	0.11401	0.10574	0.14156	0.15216	0.37194
	14	0.06300	0.03147	0.02637	0.03079	0.10634	0.06548	0.05542	0.85149	0.02984	0.05678	0.04017	0.03715	0.08134	0.06450	0.06086	0.05671	0.09270	0.02942	0.05374	0.05020	0.05976	0.08545	0.14198
	15	0.03365	0.01197	0.00659	0.00549	0.05124	0.03038	0.02476	0.02174	0.00806	0.01470	0.01264	0.01519	0.05679	0.02979	0.83227	0.02092	0.03963	0.00785	0.02305	0.02603	0.02593	0.02489	8.07998
	16	0.02651	0.00720	0.00488	0.00721	0.04328	0.02571	0.07050	8.01458	0.03669	0.02240	0.01662	0.01261	0.03676	0.02159	0.82178	0.02374	0.03277	0.00476	0.02021	0.01757	0.02425	0.02782	0.06618
	17	0.04981	0.01591	0.00027	[illegible]	0.07666	0.01963	0.01391	0.02866	0.00968	0.02001	0.01594	0.02263	0.07051	0.01666	0.03017	0.02604	0.37233	0.00841	0.03267	[illegible]	0.01351	[illegible]	0.11271
	18	0.01571	0.00076	[illegible]	0.00790	0.02299	0.01668	0.01372	0.01217	8.00630	0.00082	0.00819	0.00541	0.01946	0.01471	0.81391	0.01703	0.02593	8.01353	0.01295	0.01383	0.01392	0.01478	0.03762
	19	0.16920	0.06119	0.04402	0.03241	0.26659	0.14263	0.13261	0.13912	8.05349	0.08513	0.07300	0.05036	0.19642	0.12282	0.11740	8.10679	0.18136	0.04852	0.16515	0.13013	0.14369	0.15860	0.33686
	20	0.26079	0.04667	0.03733	0.04986	0.24722	0.15771	0.13345	0.11269	8.04975	0.06560	0.07412	0.09078	0.25371	0.13928	8.11883	0.10244	8.17818	0.84401	0.13631	0.11430	0.14864	0.13774	0.44219
	21	0.15249	0.04651	0.02642	0.03545	0.22627	0.13063	0.10301	0.09498	0.03721	0.06193	0.05657	0.06393	0.19367	0.10349	0.08883	0.07598	0.13621	0.02798	0.10073	0.07952	0.13731	8.21916	0.32412
	22	0.07665	0.02173	0.01658	0.01633	0.11044	0.06199	0.05077	0.04378	8.01507	0.02946	0.02481	0.03063	0.09381	0.04970	0.04222	0.03830	0.06544	0.01293	0.04810	0.04678	0.05574	0.05701	0.15971
	23	0.15733	0.03150	0.02666	0.03655	0.23123	0.12780	0.10535	0.09305	0.03579	0.06761	0.05598	0.06967	0.20393	0.10966	0.09345	0.07726	0.13557	0.03145	0.12151	0.09213	0.10803	0.10947	0.32711
REST OF THE U.S.	1	0.44026	0.07724	0.08540	0.15290	0.78026	0.48470	0.27958	0.31039	0.18973	0.19367	0.16279	0.12855	0.33054	0.23654	0.27162	0.24609	0.45587	0.18396	0.27585	0.30281	0.31850	0.50262	8.74368
	2	0.18322	0.07614	0.04506	0.08921	0.27456	0.26147	0.18390	8.17373	0.07122	0.10295	0.07994	0.09153	0.27590	8.17621	0.18187	0.15908	0.29426	0.80783	0.17358	0.17077	0.17666	0.28452	0.46923
	3	0.35509	0.12046	0.12015	0.14294	0.46982	0.36849	0.29780	0.75116	0.12869	0.17293	0.15467	0.14379	0.31305	0.22223	0.23741	0.21454	0.35971	0.11300	0.33603	0.28670	0.29630	0.38993	0.45413
	4	0.35399	0.13833	0.12588	0.31779	0.54059	0.49165	0.30766	0.31449	0.14632	0.20591	0.19029	0.16818	0.36273	0.26414	0.28530	0.26565	0.43909	0.13823	0.32493	0.37413	0.37752	0.46559	0.72476
	5	0.30755	0.07117	0.06383	0.13630	0.69291	0.47236	0.27426	0.31256	8.08979	0.16968	0.14530	0.10064	0.30822	0.22155	0.26847	0.24373	0.47537	0.08695	0.26980	0.30214	0.24963	0.53561	0.75084
	6	0.30159	0.10342	0.07139	0.21701	0.55450	0.91130	0.27941	0.27912	0.13297	0.17199	0.14176	0.14089	0.40869	0.22786	0.25328	0.23413	0.42126	0.11152	0.25714	0.24919	0.24622	0.49635	0.66662
	7	0.32600	0.10192	0.08714	0.14405	0.45483	0.48287	0.45271	0.76195	0.15224	0.15933	0.15229	0.13489	0.29488	8.20993	0.22677	0.21870	8.37088	0.10357	0.23031	0.24833	0.25605	0.40149	0.62720
	8	0.35280	0.12359	0.09329	0.13833	0.47498	0.37576	0.28844	0.31577	0.11134	0.16574	0.16750	0.13243	0.30396	0.21525	0.23459	0.21105	0.38585	0.10347	0.33486	0.28092	0.28513	0.40190	0.40331
	9	0.32136	0.12404	0.10374	0.15010	0.46627	0.43744	0.28735	0.24552	0.14816	0.17735	0.20319	0.15174	0.32494	0.24088	0.28490	0.27307	0.50824	0.12272	0.28430	0.29155	0.77946	0.46608	0.66249
	10	0.39003	0.15128	0.13564	0.23419	0.58266	8.62188	0.37408	0.35378	0.16136	0.51835	0.28192	0.16665	0.34085	0.30076	0.32839	0.30298	0.51936	0.15368	0.33480	8.38359	0.37544	0.54818	1.20370
	11	0.15032	0.05425	0.04809	0.08347	0.23127	0.24871	0.13177	0.13981	8.00133	0.09030	0.12175	0.06915	0.15932	0.12141	0.13459	8.13575	8.21616	8.05916	0.13769	0.15407	8.14756	0.27930	0.38603
	12	0.31261	0.10593	0.09015	0.14737	0.50880	0.62243	0.27519	0.29155	0.11441	0.17505	0.16898	0.16803	0.36117	0.26322	0.27680	0.25822	0.46268	0.11013	0.27256	0.29340	0.30602	0.49078	0.67601
	13	0.26739	0.10558	0.09077	0.13262	0.41616	0.34304	0.24184	0.24775	0.15813	0.15552	0.16079	0.12451	0.44368	0.33570	0.32237	0.26832	0.50359	0.11158	0.24616	0.24513	0.25514	0.41324	0.71785
	14	0.38810	0.13308	0.13053	0.19241	0.65946	0.49505	0.34315	0.36009	0.16151	0.22789	0.22793	0.18820	8.44518	0.35425	0.37800	0.34053	0.62384	0.15932	0.33984	0.34692	0.38880	0.54416	1.04058
	15	0.25732	0.10472	0.09708	0.12404	0.38513	8.32831	0.27539	0.73500	0.89842	0.14397	0.13792	0.11409	0.44939	0.26553	0.39911	0.23766	0.45277	0.18286	0.22526	0.23054	0.23873	0.42864	0.62667
	16	0.23587	0.08994	0.08078	0.11720	0.35591	8.27972	8.20162	0.21868	0.09375	0.13590	0.13081	0.10946	0.27468	8.20173	0.47699	0.39613	0.41440	0.18764	0.22393	0.22832	0.22665	0.42714	0.60514
	17	0.25429	0.07985	0.07092	0.12020	0.37528	0.14135	0.21427	0.24054	0.08834	0.13934	8.12711	0.10087	0.26245	0.19472	8.23517	0.20128	0.84290	0.88781	0.23672	0.25183	0.23874	0.52445	0.57473
	18	0.17680	0.06695	0.05961	0.09473	0.25659	0.21899	0.15634	0.15636	0.07195	0.09872	0.09519	0.08707	0.18542	0.15177	0.16682	0.14678	0.30832	0.12707	0.15521	0.17672	0.16547	0.35509	0.40081
	19	0.29534	0.03305	0.02324	0.12548	0.40528	0.39485	0.24281	0.27941	0.09221	0.15237	0.13519	0.11158	0.28694	0.20336	0.23367	0.21195	8.39420	0.08610	0.49462	0.24150	0.26667	8.65453	0.64375
	20	0.34302	0.05854	0.05305	0.14319	0.57376	0.53573	0.29286	0.36570	0.08320	0.16908	0.14726	8.09258	0.33299	0.23794	0.29863	0.26894	8.54834	0.07804	0.29728	0.33280	0.31972	0.62660	0.87054
	21	0.42119	0.10110	0.10420	0.16320	0.64036	0.56180	0.33357	0.39233	0.11983	0.20679	0.18338	0.13721	0.39058	0.28087	0.33244	0.30191	0.57011	0.11356	0.35512	0.42788	0.46326	0.66913	0.91736
	22	0.38774	0.12080	0.11263	0.18452	0.61303	0.50062	0.33513	8.35152	8.13456	0.20532	0.18822	0.15443	0.37765	0.27309	0.31879	0.28862	0.50904	0.12778	0.34901	0.43404	0.38427	0.60476	0.85096
	23	0.28022	0.04740	0.04354	0.11588	0.46723	0.43046	0.23741	0.28365	0.06689	0.13841	0.12164	0.07464	0.26964	0.19263	0.24229	0.21747	0.44355	0.86276	0.24981	0.27551	0.24417	0.50932	0.70355

Table K-4 (Cont.)

REST OF APPALACHIA

	INDUSTRY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
UPPER LICKING	1	0.02512	0.00628	0.00556	0.00593	0.03536	0.01869	0.00784	0.03726	0.00586	0.00848	0.00657	0.80672	0.01047	0.00785	0.00736	0.00699	0.00856	0.88571	0.00747	0.00730	0.01006	0.00784	0.01911
	2	0.00286	0.00207	0.00111	0.00145	0.30438	0.80346	0.00311	0.03256	0.00131	0.00164	0.00165	0.00215	0.00630	0.00285	0.00270	0.00237	0.00393	0.00124	0.00287	0.00236	0.00254	0.00354	0.00691
	3	0.00155	0.03695	0.00139	0.00091	0.00148	0.00147	0.00140	0.02252	0.00089	0.00111	0.00099	0.00103	0.00164	0.00124	0.00118	0.00111	0.00143	0.00086	0.00141	0.00123	0.00159	0.00137	0.00255
	4	0.00018	0.00001	0.00001	0.00000	0.00027	0.00004	0.00002	0.00022	0.00000	0.00002	0.00001	0.00001	0.00004	0.00001	0.00001	0.00001	0.00002	0.00000	0.00002	0.00002	0.00005	0.00001	0.00006
	5	0.00152	0.00016	0.00011	0.00006	0.00377	0.00052	0.00025	0.03302	0.00005	0.00031	0.00011	0.00016	0.00062	0.00021	0.00018	0.00014	0.00026	0.00804	0.00031	0.00024	0.00065	0.08022	0.00088
	6	0.00084	0.00005	0.00003	0.00001	0.00125	0.00017	0.00080	0.00103	0.00001	0.00010	0.00003	0.00005	0.00020	0.00006	0.00005	0.80006	0.00008	0.00001	0.00016	0.00007	0.00022	0.00067	0.00029
	7	0.00028	0.00002	0.00001	0.00000	0.00041	0.80005	0.00003	0.03033	0.00000	0.00003	0.00001	0.00002	0.00007	0.00002	0.00002	0.00001	0.00003	0.00000	0.00003	0.00002	0.00007	0.00002	0.00009
	8	0.00039	0.00002	0.00001	0.00001	0.03057	0.00008	0.00004	0.00047	0.00001	0.00004	0.00001	0.00002	0.00009	0.00003	0.00003	0.00002	0.00004	0.00000	0.00005	0.00003	[illegible]	0.00003	0.00013
	9	0.00008	0.00000	0.00000	0.00000	0.00012	0.00002	0.00001	0.00010	0.00000	0.00001	0.00003	0.00000	0.00002	0.00001	0.00001	0.00005	0.00001	0.00000	0.00001	0.00001	0.00002	0.00001	0.00003
	10	0.00044	0.00025	0.00122	0.00026	0.00059	0.00062	0.00037	0.00035	0.00024	0.00041	0.00040	0.00029	0.00067	0.00037	0.00035	0.00033	0.00047	0.00023	0.00017	0.00014	0.00042	0.00044	0.00144
	11	0.00033	0.00002	0.03001	0.00030	0.00049	0.00097	0.00003	0.00040	0.00000	0.00004	0.00001	0.00002	0.00008	0.00002	0.00002	0.00002	0.00003	0.00000	0.00884	0.00003	0.00008	0.00003	0.00011
	12	0.00009	0.00005	0.00005	0.00005	0.00014	0.00009	0.00008	0.00028	0.00025	0.00006	0.00006	0.00009	0.00011	0.00008	0.00007	0.00007	0.00009	0.00005	0.00007	0.00007	0.00008	0.00008	0.00029
	13	0.00004	0.00000	0.00000	0.00000	0.00006	0.00001	0.00000	0.00005	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00800	0.00001	0.00000	0.00001
	14	0.00009	0.00001	0.00000	0.00000	0.00013	0.00002	0.00001	0.00011	0.00000	0.00001	0.00000	0.00001	0.00002	0.00001	0.00001	0.00000	0.00001	0.00000	0.00001	0.00001	0.00002	0.00001	0.00003
	15	0.00053	0.00003	0.00002	0.00001	0.00079	0.00011	0.00005	0.00065	0.00001	0.00006	0.00002	0.00003	0.00013	0.00004	0.00003	0.00002	0.00005	0.00000	0.00006	0.00085	0.00014	0.00004	0.00018
	16	0.00044	0.00032	0.00002	0.00001	0.00066	0.00008	0.00004	0.00354	0.00001	0.00005	0.00002	0.00003	0.00011	0.00003	0.00003	0.00002	0.00004	0.00000	0.00005	0.00006	0.00011	0.00004	0.00015
	17	0.00112	0.00006	0.00006	0.00004	0.00165	0.00025	0.00013	0.00135	0.00304	0.00015	0.00007	0.00009	0.00030	0.00011	0.00011	0.00006	0.00828	0.00003	0.00017	0.00013	0.00031	0.00019	0.00043
	18	0.00013	0.00001	0.00000	0.00030	0.00019	0.00003	0.00001	0.00016	0.00000	0.00002	0.00000	0.00001	0.00003	0.00001	0.00001	0.00001	0.00001	0.00000	0.00002	0.00001	0.00003	0.00001	0.00004
	19	0.00158	0.00017	0.00014	0.00013	0.00236	0.00053	0.00031	0.00185	0.03012	0.00028	0.00017	0.00019	0.00055	0.00027	0.00026	0.00022	0.00038	0.00010	0.00040	0.00034	0.00055	0.00040	0.00087
	20	0.00578	0.00148	0.00146	0.00137	0.03813	0.00330	0.00222	0.00544	0.03129	0.00197	0.00165	0.00164	0.00337	0.00217	0.00216	0.00195	0.00276	0.00126	0.00266	0.00261	0.00305	0.00272	0.00631
	21	0.00270	0.00019	0.00005	0.00010	0.00397	0.00064	0.00033	0.00323	0.00038	0.00036	0.00015	0.00020	0.00073	0.00027	0.00026	0.00019	0.00037	0.00007	0.00040	0.00035	0.00041	0.00036	0.08108
	22	0.00131	0.00008	0.00006	0.03301	0.00196	0.00027	0.00013	0.00158	0.00003	0.00016	0.00006	0.00008	0.00032	0.00011	0.00009	0.00007	0.00016	0.00002	0.00016	0.00013	0.00044	0.00012	0.03047
	23	0.00331	0.00047	0.00016	0.00034	0.00476	0.00110	0.00068	0.03374	0.00073	0.00068	0.00044	0.05047	0.00121	0.08862	0.08062	0.00851	0.80082	0.00028	0.00097	0.00076	0.00160	0.00080	0.00182
REST OF APPALACHIA	1	1.45768	0.13406	0.11904	0.14923	0.64205	0.23061	0.17313	0.15466	[illegible]	0.17638	0.14218	0.14527	0.22816	0.17166	0.16320	0.15440	0.19500	0.12293	0.16698	0.18200	0.20892	0.18205	0.33407
	2	[illegible]	1.23626	0.10795	0.13008	0.32669	0.28141	0.29650	0.20617	[illegible]	0.15250	0.15140	0.23445	0.69695	0.26443	0.23512	0.20612	0.31855	0.11958	0.28198	0.19463	0.21840	0.26802	0.61767
	3	0.00949	0.00517	1.06696	0.00516	0.31176	0.00938	0.00340	0.09987	[illegible]	0.00621	0.00562	0.00569	0.00966	0.00715	0.00704	0.00656	0.08905	0.00473	0.00875	0.00785	0.00919	0.00905	0.81602
	4	0.03796	0.02557	0.02262	[illegible]	0.04996	0.04165	0.03471	0.03070	[illegible]	0.03031	0.02756	0.02800	0.04493	0.03380	0.03236	0.03068	0.03956	0.82357	0.03486	0.03316	0.03898	0.04958	0.04619
	5	0.10111	[illegible]	[illegible]	[illegible]	1.40857	0.28750	0.26085	0.22165	0.19456	0.24906	0.21971	0.23001	0.34967	0.24336	0.24526	0.23317	0.22941	0.19478	0.24577	[illegible]	0.45502	0.25158	0.47442
	6	0.13461	0.09360	0.06278	0.10966	0.18730	1.29189	0.12735	0.10774	0.09400	0.10942	0.10620	0.10499	0.16099	0.12210	0.11554	0.11110	0.14174	0.08695	0.11608	0.11885	0.12229	0.13822	[illegible]
	7	0.12915	0.06362	0.03671	0.06593	0.15020	0.16488	1.22375	0.89107	0.08667	0.07692	0.07196	0.07574	0.12346	0.08926	0.08406	0.08842	0.11108	0.05892	0.08470	0.08593	0.09159	0.11023	0.20746
	8	0.05586	0.03768	0.03320	0.03513	0.06653	0.05291	0.04971	1.04510	0.03494	0.04315	0.03867	0.04056	0.06295	0.04711	0.04423	0.04165	0.05125	0.03395	0.05135	0.04481	0.04799	0.04765	0.09173
	9	0.04360	0.02326	0.02016	0.02353	0.05658	0.05285	0.03835	0.03252	1.02576	0.02836	0.03215	0.02665	0.04548	0.03476	0.03852	0.03272	0.06152	0.02183	0.03867	0.03781	0.03701	0.05316	0.07927
	10	0.18637	0.11436	0.09978	0.11067	0.22906	0.25279	0.15291	0.13500	0.13710	1.37451	0.17719	0.12876	0.20066	0.15813	0.14030	0.13845	0.18626	0.10334	0.15351	0.15576	0.17614	0.16653	0.63753
	11	0.05196	[illegible]	[illegible]	[illegible]	0.36609	0.06431	0.06766	0.04155	0.03552	0.04306	1.04997	0.06066	0.06466	0.06923	0.06666	0.06681	0.05614	0.03672	0.04696	0.06665	0.06878	0.06377	0.10667
	12	0.21795	0.14555	0.12081	0.13511	0.32938	0.23619	0.23755	0.17856	0.13485	0.16607	0.14122	1.23550	0.26423	0.20388	0.19888	0.19776	0.26543	0.15151	0.19385	0.19855	0.21953	0.23534	0.76241
	13	0.14561	0.08878	0.07461	0.06745	0.20399	0.16280	0.14293	0.12556	0.08203	0.10358	0.11772	0.09486	1.48669	0.32892	0.23409	0.18356	0.30306	0.08787	0.13693	0.12665	0.16159	0.17656	0.61551
	14	0.08314	0.05156	0.04618	0.05126	0.13273	0.08968	0.07789	0.07108	0.05015	0.06252	0.06290	0.05777	0.10624	1.09025	0.08574	0.07822	0.12225	0.04973	0.07419	0.87108	0.07965	0.08742	0.24563
	15	0.07346	0.05347	0.04451	0.04963	0.09129	0.07552	0.06688	0.85813	0.04882	0.05979	0.05488	0.05608	0.10878	0.07391	1.08399	0.08326	0.08558	0.04829	0.06388	0.06160	0.06628	0.07497	0.13317
	16	0.06066	0.04313	0.03836	0.04127	0.07671	0.06316	0.05512	0.04905	0.04047	0.04984	0.04584	0.04470	0.07532	0.85692	0.85478	1.06433	0.07051	0.04091	0.05456	0.05184	0.05575	0.06576	0.11333
	17	0.12566	0.09468	0.08380	0.08841	0.15391	0.12670	0.11665	0.09868	0.08812	0.10768	0.09711	0.10152	0.15516	0.11766	0.11132	0.10605	1.14209	0.08639	0.11119	0.10651	0.11313	0.12957	0.21104
	18	0.02493	0.01633	0.01457	0.01724	0.03240	0.02718	0.02330	0.02062	0.01576	0.01931	0.01798	0.01798	0.02966	0.02400	0.02328	0.02534	0.03412	1.02119	0.02232	0.02299	0.02327	0.03674	0.04856
	19	0.27683	0.16590	0.14734	0.16756	0.37011	0.29669	0.23956	0.22574	0.15771	0.19974	0.18093	0.18547	0.30925	0.22921	0.22467	0.21067	0.28942	0.15222	1.26954	0.24306	0.24692	0.24853	0.48355
	20	0.42601	0.29738	0.26261	0.27474	0.52178	0.42291	0.36867	0.31476	0.22754	0.34181	0.31027	0.32055	0.49932	0.37511	0.35348	0.33462	0.40841	0.27069	0.35755	1.14355	0.37394	0.37569	0.73190
	21	[illegible]	0.21273	[illegible]	0.22252	0.40959	0.33538	0.29364	0.24209	0.21786	[illegible]	0.26246	0.25067	0.39179	0.29466	0.27916	0.26453	0.32909	0.21222	0.26585	0.28608	1.32116	0.31198	0.55404
	22	0.11077	0.11495	0.10263	0.10969	0.20224	0.16457	0.14625	0.12739	0.10792	0.13248	0.11990	0.12422	0.19313	0.14542	0.13752	0.13879	0.16203	0.18517	0.14078	0.14006	0.14765	1.15355	0.27499
	23	0.34807	0.26960	0.22146	0.23543	0.47570	0.34680	0.38826	0.26896	0.23285	0.28779	0.25988	0.26839	0.41551	0.31323	0.29606	0.27766	0.34184	0.22712	0.31817	0.29030	0.37508	0.31479	1.57665
REST OF THE U.S.	1	0.52042	[illegible]	0.10912	0.17263	0.84872	0.49134	0.29666	0.35392	0.13116	0.19420	0.17875	0.14692	0.34196	0.25315	0.28898	0.26666	0.67105	0.12648	0.29788	0.32340	0.34468	0.51819	0.73096
	2	0.19475	0.07107	0.06016	[illegible]	0.29912	0.25509	0.17782	0.18652	0.07488	0.09929	0.10115	0.08794	0.24095	0.17093	0.18109	0.16067	0.29188	0.07148	0.17136	0.17443	0.17933	0.24516	0.66296
	3	0.36653	0.14498	0.14796	0.16669	0.49449	0.38949	0.31677	1.11173	0.14470	0.19370	0.17796	0.16766	0.33529	0.24536	0.26068	0.23606	0.38258	0.13722	0.46892	0.31108	0.32263	0.41492	0.67168
	4	0.47501	0.15511	0.14639	0.32831	0.56062	0.46514	0.32580	0.34220	0.16606	0.21989	0.20832	0.18761	0.32910	0.28225	0.30372	0.28456	0.65678	0.15865	0.34389	0.39265	0.39549	0.95283	0.73225
	5	0.37364	0.07286	0.06902	0.13649	0.64197	0.44893	0.26943	0.34821	0.09713	0.14001	0.13981	0.10138	0.29468	0.21639	0.26442	0.24199	0.46804	0.08889	0.27278	0.30249	0.29464	0.52863	0.70050
	6	[illegible]	0.11239	0.10196	[illegible]	0.51021	0.46931	0.20322	0.30330	0.13989	0.16887	0.18667	0.16801	0.31021	0.23299	0.25926	0.24556	0.62663	0.12100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	7	0.33567	0.11350	0.10001	0.15477	0.46668	0.47809	0.44162	0.28144	0.16005	0.16327	0.16140	0.14530	0.30047	0.21916	0.23676	0.22853	0.37928	0.11581	0.24247	0.25927	0.26268	0.40917	0.61746
	8	0.37968	0.12693	0.11432	0.15593	0.49736	0.39029	0.31817	0.35312	0.13149	0.17963	0.16553	0.15251	0.32091	0.23388	0.25353	0.23026	0.38390	0.12401	0.36255	0.30973	0.30783	0.42068	0.67663
	9	0.34182	0.14521	0.12549	0.16903	0.48611	0.45223	0.30035	0.28573	0.16727	0.19243	0.22096	0.17873	0.34173	0.25810	0.30295	0.29141	0.52329	0.14223	0.30352	0.31047	0.29912	0.48550	0.67236
	10	0.37498	0.13531	0.12244	0.18823	0.56291	0.55820	0.30899	0.39571	0.14632	0.36725	0.24519	0.16815	0.36653	0.27738	0.30782	0.28361	0.49380	0.13990	0.31937	0.34146	0.36118	0.52827	0.98666
	11	0.15796	0.06024	0.05480	0.08566	0.24030	0.24645	0.13643	0.15258	0.06772	0.09095	0.12261	0.07470	0.16217	0.12548	0.13894	0.13961	0.22147	0.86535	0.14364	0.15891	0.15395	0.27885	0.37639
	12	0.32622	0.11663	0.10402	0.15757	0.52010	0.61958	0.28220	0.32075	0.12557	0.17187	0.17165	0.17614	0.36272	0.24967	0.28392	0.20636	0.66755	0.12217	0.24617	0.30356	0.31736	0.46666	0.84326
	13	0.28043	0.11571	0.10249	0.14315	0.42907	0.34669	0.24928	0.26843	0.11895	0.15889	0.16720	0.13479	0.42588	0.32453	0.32030	0.27125	0.49062	0.12209	0.25860	0.25551	0.26676	0.42069	0.99717
	14	0.40503	0.17085	0.15525	0.20978	0.66181	0.49479	0.35765	0.38747	0.17922	0.24275	0.26193	0.20336	0.45581	0.36528	0.39006	0.35385	0.63071	0.17732	0.45760	0.38366	0.38542	0.55866	1.06563
	15	0.27368	0.11817	0.09990	0.13576	0.39852	0.33321	0.73552	0.25746	0.11881	0.14874	0.14992	0.12602	0.44870	0.27349	0.39959	0.24750	0.45867	0.11535	0.23756	0.24999	0.25169	0.42741	0.61962
	16	0.25038	0.10238	0.09404	0.12928	0.36939	0.30615	0.21263	0.23992	0.10633	0.14198	0.14134	0.12158	0.28298	0.21197	0.28565	0.36147	0.42202	0.12005	0.23613	0.26029	0.23987	0.43461	0.60024
	17	0.26774	0.08926	0.08200	0.12891	0.40678	0.33899	0.72289	0.26663	0.09828	0.13623	0.13307	0.10983	0.26504	0.70066	0.24134	0.20894	0.64027	0.09825	0.26641	0.26058	0.24777	0.52663	0.55472
	18	0.18182	0.07899	0.07224	0.10866	0.26312	0.22822	0.16796	0.17120	0.05615	0.10780	0.10648	0.09603	0.19630	0.16355	0.17663	0.19974	0.31908	0.16115	0.16756	0.18909	0.17788	0.36908	0.61361
	19	0.29954	0.09243	0.08463	0.13743	0.47699	0.39013	0.24251	0.29947	0.15197	0.16682	0.14048	0.12030	0.28765	0.20882	0.23979	0.21937	0.39842	0.09680	0.30461	0.29051	0.27614	0.45877	0.62043
	20	0.35384	0.05807	0.05695	0.14048	0.58383	0.50163	0.28419	0.38979	0.05332	0.13419	0.13490	0.09040	0.31188	0.22795	0.29015	0.26358	0.53563	0.08030	0.29863	0.33110	0.32148	0.61203	0.79356
	21	0.43945	0.11276	0.11741	0.18833	0.65436	0.54637	0.33753	0.43703	0.13017	0.18977	0.18766	0.14585	0.38474	0.28273	0.33625	0.30805	0.57057	0.12555	0.36022	0.43059	0.47610	0.66470	0.86866
	22	0.41170	0.13787	0.13198	0.20072	0.61255	0.50337	0.34881	0.38822	0.15230	0.20748	0.20115	0.12093	0.38603	0.26622	0.32657	0.30390	0.52092	0.16615	0.46690	0.65073	0.60724	0.61671	0.83521
	23	0.28898	0.04682	0.04680	0.11373	0.47143	0.40315	0.23046	0.31995	0.06706	0.10932	0.11263	0.07299	0.25252	0.18461	0.23547	0.21290	0.43317	0.06670	0.25879	0.27433	0.28719	0.49915	0.64063

Table K-4 (Cont.)

REST OF THE U.S.

	INDUSTRY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
UPPER LICKING	1	0.00210	0.00070	0.00047	0.00064	0.00338	0.00224	0.00149	0.00159	0.00358	0.00066	0.00081	0.00085	0.00256	0.00152	0.00144	0.00123	0.00217	0.00052	0.00161	0.00152	0.00187	0.00200	0.00395
	2	0.00302	0.00214	0.00136	0.00161	0.00425	0.00363	0.00322	0.00269	0.00546	0.00183	0.00181	0.00225	0.00626	0.00299	0.00285	0.00253	0.00409	0.00140	0.00307	0.00256	0.00274	0.00370	0.00708
	3	0.00055	0.00022	0.00019	0.00024	0.00076	0.00060	0.00047	0.00107	0.00021	0.00028	0.00026	0.00026	0.00062	0.00041	0.00041	0.00036	0.00060	0.00019	0.00053	0.00047	0.00051	0.00061	0.00108
	4	0.00001	0.00001	0.00000	0.00000	0.00002	0.00001	0.00001	0.00001	0.00003	[illegible]	[illegible]	0.00001	0.00004	0.00001	0.00001	[illegible]	0.00001	0.00003	0.00001	[illegible]	0.00001	[illegible]	0.00004
	5	0.00018	0.00014	0.00007	0.00013	0.00030	0.00016	0.00014	0.00014	0.00022	0.00035	0.00005	0.00011	0.00050	0.00014	0.00011	0.00308	0.00017	0.00002	0.00019	0.00011	0.00017	0.00012	0.00042
	6	0.00008	0.00004	0.00000	0.00001	0.00077	0.00005	0.00005	0.00005	0.00001	0.00002	0.00001	0.00004	0.00017	0.00065	0.00004	0.00003	0.00006	0.00000	0.00006	0.00003	0.00006	0.00004	0.00014
	7	0.00002	0.00001	0.00000	0.00000	0.00001	0.00002	0.00002	0.00002	0.00000	0.00001	0.00000	0.00001	0.00005	0.00002	0.00001	0.00001	0.00002	0.00000	0.00002	0.00001	0.00002	0.00001	0.00005
	8	0.00003	0.00002	0.00000	0.00000	0.00006	0.00002	0.00002	0.00002	0.00000	0.00001	0.00001	0.00002	0.00006	0.00002	0.00002	0.00001	0.00003	0.00000	0.00003	0.00004	0.00003	0.00002	0.00006
	9	0.00001	0.00000	0.00000	0.00000	0.00001	0.00000	0.00001	0.00000	0.00000	0.00006	0.00000	0.00000	0.00002	0.00000	0.00002	0.00000	0.00001	0.00000	0.00001	0.00000	0.00001	0.00000	0.00001
	10	0.00025	0.00011	0.00010	[illegible]	0.00036	0.00034	0.00030	0.00029	0.00011	0.00026	[illegible]	0.00014	0.00024	0.00120	0.00021	[illegible]	0.00030	0.00011	0.00022	0.00022	0.00005	[illegible]	0.00047
	11	0.00002	0.00002	0.00010	0.00000	0.00034	0.00002	0.00002	0.00002	[illegible]	0.00001	0.00001	0.00000	0.00007	0.00002	0.00001	0.00001	0.00002	0.00000	0.00002	0.00001	0.00002	0.00001	0.00005
	12	0.00002	0.00001	0.00001	0.00001	0.00003	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00003	0.00002	0.00002	0.00031	0.00002	0.00001	0.00002	0.00002	0.00003	0.00002	0.00005
	13	0.00000	0.00000	0.00000	0.00000	0.00070	0.00000	0.00000	0.00000	[illegible]	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001
	14	0.00001	0.00000	0.00000	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00002	0.00000	0.00000	0.00000	0.00001	0.00000	0.00001	0.00000	0.00001	0.00000	0.00001
	15	0.00004	0.00002	0.00000	0.00000	0.00006	0.00003	0.00001	0.00003	[illegible]	0.00001	0.00001	0.00002	0.00011	0.00003	0.00002	0.00002	0.00004	0.00000	0.00004	0.00002	0.00003	0.00002	0.00009
	16	0.00001	0.00002	0.00000	[illegible]	0.00005	0.00003	0.00003	0.00002	0.00000	[illegible]	[illegible]	0.00002	0.00004	0.00002	0.00003	0.00001	0.00003	0.00003	0.00003	[illegible]	[illegible]	[illegible]	0.00002
	17	0.00004	0.00006	0.00001	0.00002	0.00014	0.00008	0.00009	0.00007	0.00002	0.00005	0.00003	0.00006	0.00023	0.00007	0.00005	0.00006	0.00012	0.00001	0.00004	0.00006	0.00009	0.00007	0.00021
	18	0.00001	0.00002	0.00000	0.00000	0.00001	0.00001	0.00001	0.00001	0.00003	0.00000	0.00000	0.00001	0.00003	0.00001	0.00001	0.00005	0.00001	0.00000	0.00001	0.00001	0.00001	0.00001	0.00002
	19	0.00047	0.00017	0.00011	0.00013	0.00049	0.00075	0.00019	0.00074	0.00012	0.00016	0.00015	0.00018	0.00051	0.00025	0.00024	0.00021	0.00035	0.00019	0.00036	0.00027	0.00030	0.00016	0.00065
	20	0.00127	0.00039	0.00037	0.00052	0.00188	0.00143	0.00105	0.00075	0.00046	0.00064	0.00031	0.00066	0.00180	0.00099	0.00097	0.00366	0.00143	0.00043	0.00114	0.00103	0.00021	0.00136	0.00267
	21	0.00011	0.00017	0.00007	0.00006	0.00045	0.00029	0.00076	[illegible]	0.00027	0.00012	0.00011	0.00017	0.00063	0.00023	0.00021	0.00016	0.00030	0.00096	0.00036	0.00023	0.00032	0.00016	0.00064
	22	0.00010	0.00026	0.00021	0.00002	0.00015	0.00009	0.00009	[illegible]	0.00001	0.00001	0.00003	0.00006	0.00027	0.00008	0.00006	0.00005	0.00009	0.00001	0.00010	0.00007	0.00004	0.00007	0.00023
	23	[illegible]	0.00129	0.00017	0.00022	0.00035	0.08059	0.00049	[illegible]	0.00019	0.00028	0.00026	0.00032	0.00096	0.00045	0.00042	0.00036	0.00061	0.00018	0.00061	0.00047	0.00076	0.00058	0.00114
REST OF APPALACHIA	1	0.08661	0.02547	0.02017	0.02734	0.13466	0.07500	0.04976	[illegible]	0.32357	0.03458	0.03686	0.03640	0.07466	0.04893	0.04818	0.04306	0.37135	0.02216	0.05161	0.05102	0.06106	0.06455	0.11318
	2	0.17555	0.11403	0.07260	0.09334	0.25555	0.21447	0.18251	0.15554	0.09465	0.16711	0.16646	0.12531	0.33655	0.18193	0.17177	0.15116	0.24733	0.08128	0.17769	0.15268	0.16744	0.22046	0.41414
	3	0.00362	0.00231	0.00243	0.00253	0.00764	0.00588	0.00476	0.01433	0.00223	0.01029	0.00275	0.00268	0.00561	0.00394	0.00403	0.00366	0.00581	0.00211	0.00534	0.00465	0.00648	0.00663	0.01030
	4	0.00420	0.00032	0.00127	0.01342	0.02111	0.01768	0.01757	0.01171	0.00598	0.00812	0.00775	0.00754	0.01741	0.01160	0.01183	0.01376	0.31739	0.00571	0.01347	0.01434	0.01532	0.02952	0.02765
	5	[illegible]	0.02242	[illegible]	[illegible]	0.06727	0.04745	[illegible]	0.01751	0.00419	0.02444	[illegible]	0.01714	0.06477	0.03569	0.03203	0.02628	0.04821	0.09776	[illegible]	0.03272	0.05166	[illegible]	0.09495
	6	0.04603	0.01307	0.01410	0.32682	0.06536	8.10375	0.03015	0.33097	0.01891	0.02293	0.02463	0.02292	0.05350	0.03561	0.03497	0.03146	0.35301	0.01420	0.03734	0.03872	0.04108	0.05535	0.06932
	7	0.03362	0.02227	0.01846	0.02379	0.07606	0.07614	0.07318	0.04154	0.02797	0.02896	0.02822	0.02756	0.05462	0.04032	0.04036	0.03422	0.06055	0.02071	0.04197	0.04260	0.04669	0.06126	0.10422
	8	0.00671	0.00403	0.00272	0.00391	0.01531	0.01259	0.00938	0.00714	0.00338	0.00485	0.00472	0.00503	0.01503	0.00905	0.00856	0.00724	0.01286	0.00303	0.01087	0.00433	0.01040	0.01101	0.02403
	9	0.02629	0.01290	0.01106	0.01430	0.03991	0.03643	0.02705	0.02264	0.01421	0.01659	0.01839	0.01517	0.03056	0.02236	0.02500	0.02302	0.04124	0.01230	0.02541	0.02340	0.02555	0.03782	0.05574
	10	0.00468	0.02683	0.02363	0.03197	0.09413	0.08818	0.05471	0.05004	0.02734	0.05784	0.04680	0.03453	0.07546	0.05399	0.05394	0.04834	0.37917	0.02579	0.05985	0.05813	0.07102	0.07783	0.16404
	11	0.01340	0.00570	0.00450	0.00355	0.02068	0.01972	0.01213	0.00991	0.00552	0.00755	0.00941	0.00727	0.01881	0.01241	0.01216	0.01140	0.01826	0.00519	0.01424	0.01316	0.01600	0.01995	0.03350
	12	0.10428	0.07664	0.04107	0.05520	0.15613	0.12397	0.07273	0.08635	0.04757	0.05260	0.06115	0.07098	0.13092	0.09014	0.09170	0.08507	0.13563	0.04578	0.09536	0.09468	0.11025	0.13625	0.27497
	13	0.10477	0.05125	0.06373	0.05556	0.15101	0.12121	0.09399	0.09954	0.06934	0.06626	0.06752	0.05706	0.18582	0.14086	0.12382	0.10326	0.17729	0.05050	0.09380	0.09150	0.10064	0.13634	0.25594
	14	0.03663	0.01876	0.01626	0.02091	0.06426	0.04847	0.03624	0.03473	0.01857	0.02453	0.02453	0.02228	0.05162	0.03915	0.03857	0.03480	0.05908	0.01911	0.03725	0.03621	0.04137	0.05127	0.10303
	15	0.01949	0.00767	0.00663	0.00978	0.02938	0.02378	0.01749	0.01627	0.00761	0.01058	0.01044	0.01018	0.03564	0.02699	0.02549	0.01692	0.03058	0.00755	0.01844	0.01769	0.01947	0.02640	0.04719
	16	0.01777	0.00500	0.00614	0.00841	0.02655	0.02164	0.01569	0.01360	0.00731	0.03967	0.00962	0.00956	0.02521	0.01674	0.01945	0.02264	0.02802	0.00780	0.01762	0.01674	0.01867	0.03172	0.04413
	17	0.01730	[illegible]	0.00354	[illegible]	0.02833	0.02260	0.01513	0.00732	0.00459	0.00761	0.00362	0.00851	0.03666	0.01734	0.01609	0.01319	0.03056	0.00433	[illegible]	[illegible]	[illegible]	[illegible]	0.04529
	18	[illegible]	0.00524	0.00447	0.00634	0.01650	0.01380	0.01039	0.00737	0.00519	0.00668	0.00646	0.00821	0.01354	0.01551	0.01074	0.01159	0.01814	0.00793	0.01057	0.01126	0.01133	0.02011	0.02566
	19	0.14985	0.08757	0.05783	0.07533	0.22815	0.17980	0.12879	0.12610	0.05491	0.08775	0.08115	0.08137	0.16991	0.11609	0.12052	0.10906	0.17751	0.06113	0.14065	0.14415	0.14246	0.14306	0.29740
	20	0.07332	0.02629	0.01650	0.02525	0.12931	0.08806	0.06014	0.03994	0.02132	0.05150	0.03131	0.03346	0.10853	0.06406	0.05987	0.05068	0.09090	0.01910	0.06701	0.06215	0.07564	0.08213	0.17072
	21	0.07036	0.03621	0.03094	0.03851	0.12863	0.10301	0.07309	0.06328	0.03209	0.06425	0.04233	0.04334	0.11447	0.07203	0.07120	0.06275	0.10509	0.02992	0.08218	0.08949	0.11096	0.10137	0.18425
	22	0.01914	0.01576	0.01220	0.01722	0.06946	0.04743	0.03490	0.02716	0.01438	0.02476	0.01933	0.01963	0.05522	0.03361	0.03270	0.02903	0.04905	0.01328	0.01803	0.04108	0.04256	0.05020	0.08819
	23	0.06404	0.02728	0.02318	0.02726	0.19471	0.03343	0.05871	0.04395	0.07303	0.03352	0.05293	0.05306	0.10056	0.06129	0.05868	0.04962	0.08701	2.02106	0.07254	0.06435	0.09474	0.08144	0.15594
REST OF THE U.S.	1	0.47616	0.22332	0.25458	0.32771	1.46368	0.71570	0.48349	0.52465	0.28725	0.40566	0.34764	0.32156	0.57545	0.43977	0.46393	0.42655	0.65960	0.27978	0.48476	0.49072	0.55479	0.64064	1.05113
	2	0.30407	1.27453	0.12845	0.18325	0.42337	0.38451	0.33247	0.27574	0.14998	0.18591	0.18279	0.25734	0.65075	0.24427	0.28271	0.25277	0.40451	0.14322	0.31290	0.25196	0.28905	0.36776	0.71071
	3	0.41071	0.17602	1.17994	0.13036	0.44127	0.42719	0.35296	1.24820	0.17465	0.22996	0.21013	0.20118	0.38019	0.25119	0.29427	0.27003	8.41877	0.16662	0.37435	0.34276	0.35781	0.44595	0.73197
	4	0.44367	0.21319	0.19036	1.39159	0.84441	0.53181	0.38217	0.39339	0.21923	0.25248	0.26499	0.26591	0.65728	0.34469	0.38218	0.34127	0.51980	0.20956	0.40236	0.44881	0.45772	1.05669	0.83636
	5	0.70791	0.35123	0.30593	0.38016	2.10954	0.75675	0.56134	0.61473	0.33521	0.43475	0.40230	0.37426	0.65967	0.50812	0.53787	0.50733	0.76266	0.32869	0.54055	0.56075	0.56403	0.79697	1.18751
	6	0.49312	0.22603	0.20716	0.33065	0.60126	2.08515	0.65762	0.62337	0.25279	0.40124	0.38000	0.27256	0.67649	0.36682	0.38233	0.36595	0.55917	0.22901	0.38602	0.42652	0.41385	0.62116	0.86742
	7	0.45031	0.16766	0.16616	0.22596	0.56936	0.60575	1.47901	0.36559	0.24958	0.24870	0.23642	0.22816	0.41229	0.30509	0.31520	0.30842	0.46714	0.18446	0.31915	0.33516	0.34305	0.49269	0.78262
	8	0.46305	0.19373	0.17321	0.21626	0.53373	0.46759	0.38567	1.42413	0.19247	0.25331	0.23112	0.22093	0.41287	0.30709	0.32219	0.29659	0.45782	0.18383	0.45528	0.37811	0.37806	0.48887	0.80110
	9	0.37454	0.18365	0.16217	0.20059	0.54732	8.58454	0.34814	0.32739	1.20739	0.23872	0.26566	0.21398	0.39956	0.30466	0.34858	0.33640	0.57809	0.17984	0.34811	0.35268	0.34291	0.53224	0.75295
	10	0.35122	0.20909	0.24256	0.32211	0.73876	0.78016	0.46139	0.49119	0.27167	1.73718	0.42088	0.31336	0.55695	0.43603	0.45328	0.42329	0.65594	0.26223	0.46321	0.48084	0.51756	0.66709	1.55186
	11	0.27063	0.13657	0.10038	8.13348	0.31398	0.31366	0.19572	0.20463	0.11512	0.14398	1.18242	0.12812	0.23366	0.18370	0.19331	0.19459	8.28096	0.11246	0.19679	0.21118	0.20833	0.34234	0.46334
	12	[illegible]	0.28066	0.22097	0.28687	0.78250	0.54932	0.45177	0.46322	0.25868	1.33068	[illegible]	1.39192	0.50659	0.41817	0.46245	0.42686	0.65267	0.25290	0.61288	0.65568	[illegible]	[illegible]	1.42220
	13	0.37051	0.19127	0.16764	0.21039	0.53761	0.43303	0.34067	0.34295	0.18735	0.24135	0.25585	0.21196	1.70020	0.54725	0.47060	0.39040	0.66750	0.19456	0.33666	0.32793	0.34765	0.44610	0.92801
	14	0.30419	0.24635	0.22429	0.28031	0.79342	0.58583	0.44749	0.46836	0.25136	0.32672	0.32308	0.28818	0.57172	1.46584	0.48267	0.44205	0.74282	0.24875	0.45896	0.44077	0.48966	0.63935	1.28897
	15	0.30577	0.19273	0.14729	0.23466	0.50586	0.42079	0.31578	0.33349	0.19031	0.23263	0.22495	0.20379	0.56452	0.36048	1.49006	0.32531	0.54788	0.18400	0.31423	0.32363	0.33014	0.50733	0.76256
	16	0.32949	0.16532	0.15160	0.16835	0.46177	0.33093	0.28350	0.30523	0.25596	0.21394	0.20559	0.15827	0.37260	0.28377	0.35464	1.43192	0.49644	0.17914	0.30205	0.30315	0.30696	0.50271	0.72231
	17	0.44223	0.21346	0.17312	0.24506	0.58698	0.46590	0.36215	0.39472	0.21579	0.27764	0.25912	0.24086	0.44605	0.34157	0.37469	0.33666	1.81298	0.21369	0.37656	0.38443	0.37935	0.66900	0.78853
	18	0.22086	0.10853	0.09927	0.15708	0.31244	0.26361	0.20166	0.20202	0.11221	0.16160	0.14673	0.12560	0.23835	0.19798	0.20880	0.23260	0.35600	1.17162	0.19851	0.21914	0.20951	0.40657	0.67131
	19	0.40333	0.23558	0.21894	0.27543	0.69272	0.56544	0.41476	0.45209	0.24115	0.31497	0.27016	0.27636	0.49645	0.37540	0.39594	0.37043	0.56686	0.23344	1.44034	0.43813	0.43305	0.61332	0.89941
	20	0.79723	0.39793	0.36760	0.48211	1.19513	0.92120	0.67235	0.74182	0.40636	0.52578	0.48456	0.45233	0.86301	0.61904	0.65888	0.62037	0.93396	0.39753	0.66196	1.48329	0.49754	0.97947	1.49009
	21	0.76792	0.37659	0.35809	0.43535	1.03746	0.85889	0.63372	0.70929	0.37931	0.49045	0.45556	0.42449	0.75756	0.50058	0.61548	0.57499	0.87137	0.37029	0.61966	0.69960	1.75823	0.93923	1.36577
	22	0.59647	0.28629	0.20725	0.33972	0.84863	0.67947	0.51564	0.54165	0.29250	0.37659	0.35190	0.32771	0.59563	0.45382	0.48170	0.65640	0.69025	0.28386	0.52049	0.59543	0.56503	1.77139	1.11538
	23	0.64349	0.32757	0.30258	0.37686	0.88224	0.73640	0.54589	0.60956	0.33224	0.44074	0.39916	0.36452	0.65044	0.50277	0.53497	0.50145	8.75413	0.32516	0.55732	0.55856	0.63047	0.79290	2.17033

APPENDIX L

Regional System C

Table L-1

1963 TRADE COEFFICIENTS

Youghiogheny River Basin, Appalachia, and the Rest of the U.S.

Industry	From \ To	Region I	Region II	Region III
1) Agriculture, Forestry and Fishing	Region I	.15775	.01684	.00115
	II	.63042	.69135	.05072
	III	.21183	.29181	.94812
2) Products of Mines	I	.16294	.06928	.01477
	II	.82795	.89363	.23091
	III	.00911	.03709	.75432
3) Petroleum and Natural Gas	I	.00180	.00102	.00048
	II	.04105	.15213	.01100
	III	.95715	.84685	.98852
4) Publishing and Printing	I	.06333	.03142	.00526
	II	.08618	.06616	.01782
	III	.85049	.90242	.97692
5) Tobacco, Food and Kindred Products	I	.08584	.03039	.00607
	II	.27249	.28326	.03348
	III	.64168	.68635	.96045
6) Textiles, Apparel and Paper Products	I	.02151	.00825	.00196
	II	.35709	.30705	.07905
	III	.62139	.68472	.91900
7) Chemicals and Allied Products	I	.03039	.00879	.00380
	II	.37383	.45511	.08212
	III	.59580	.53610	.91408
8) Petroleum and Coal Products	I	.00091	.00024	.00011
	II	.01920	.07884	.01077
	III	.97989	.92092	.98912
9) Rubber and Plastics	I	.01395	.00762	.00270
	II	.13205	.13110	.05833
	III	.85400	.86128	.93897
10) Lumber and Wood Products	I	.03469	.00452	.00243
	II	.55069	.66310	.04432
	III	.41462	.33239	.95324
11) Furniture, Fixtures and Miscellaneous Manufactures	I	.05374	.02412	.00360
	II	.26859	.19105	.04180
	III	.67767	.78483	.95460
12) Stone, Clay, and Glass Products	I	.13428	.02233	.01340
	II	.66919	.68340	.09692
	III	.19652	.29427	.88967

Table L-1 (Cont.)

Industry	From \ To	Region I	Region II	Region III
13) Primary Metals	Region I	.29157	.18026	.03921
	II	.54050	.51551	.11653
	III	.16794	.30422	.84425
14) Fabricated Metals	I	.11831	.05122	.01249
	II	.23915	.21579	.04432
	III	.64254	.73299	.94319
15) Machinery not Electrical	I	.06808	.02273	.00916
	II	.13935	.08838	.03309
	III	.79257	.88890	.95774
16) Electrical Machinery	I	.02300	.01087	.00712
	II	.09997	.06853	.04162
	III	.87703	.92061	.95126
17) Transportation Equipment	I	.02990	.01604	.00294
	II	.17056	.11663	.01698
	III	.79954	.86733	.98007
18) Instruments, Watches and Clocks	I	.00781	.01080	.00818
	II	.08602	.08114	.03695
	III	.90616	.90806	.95487
19) Transportation, Communication, and Public Utilities	I	.08411	.08135	.07488
	II	.34274	.34238	.31596
	III	.57315	.57628	.60916
20) Wholesale and Retail Trade	I	.19718	.19152	.02542
	II	.69891	.70284	.08885
	III	.10391	.10564	.88583
21) Finance, Insurance, and Real Estate	I	.00658	.00635	.00567
	II	.21869	.21698	.19585
	III	.77473	.77667	.79849
22) Services	I	.00511	.00493	.00432
	II	.07423	.07402	.06495
	III	.92065	.92106	.93073
23) Construction	I	.07663	.07382	.02516
	II	.69665	.69727	.21912
	III	.22672	.22891	.75572

Table L-2

Interregional Interindustry Requirements Matrix

YOUGHIOGHENY

Region	Industry	1	2	3	4	5	6	7	8
YOUGHIOGHENY	1	0.04660	0.00000	0.00000	0.00000	0.06721	0.00465	0.00018	0.00000
	2	0.00224	0.01707	0.00000	0.00000	0.00115	0.00317	0.01251	0.00229
	3	0.00000	0.00000	0.00004	0.00000	0.00000	0.00000	0.00008	0.00154
	4	0.00006	0.00001	0.00001	0.00744	0.00068	0.00086	0.00033	0.00001
	5	0.00362	0.00000	0.00000	0.00000	0.01418	0.00039	0.03049	0.00001
	6	0.00007	0.00002	0.00000	0.03101	0.00069	0.00415	0.00034	0.00034
	7	0.00148	0.00017	0.00007	0.00023	0.00070	0.00278	0.00779	0.00073
	8	0.00005	0.00000	0.00000	0.00000	0.00001	0.00001	0.00004	0.00006
	9	0.00138	0.00012	0.00006	0.00003	0.00031	0.00074	0.00046	0.00001
	10	0.00041	0.00010	0.00002	0.00000	0.00044	0.00274	0.00018	0.00031
	11	0.00002	0.00003	0.00000	0.00020	0.00019	0.00197	0.00014	0.00004
	12	0.00040	0.00156	0.00005	0.00000	0.00833	0.00137	0.00301	0.00051
	13	0.00002	0.00154	0.00010	0.00015	0.00044	0.00038	0.00399	0.00003
	14	0.00070	0.00021	0.00036	0.00014	0.01045	0.00125	0.00252	0.00183
	15	0.00056	0.00084	0.00039	0.00012	0.00005	0.00038	0.00047	0.00001
	16	0.00003	0.00003	0.00065	0.00002	0.00004	0.00003	0.00002	0.00001
	17	0.00066	0.00002	0.00001	0.00001	0.00000	0.00000	0.00008	[illegible]
	18	0.00508	0.00000	0.00000	0.00008	0.00000	0.00004	0.00007	0.00000
	19	0.00181	0.00055	0.00046	0.00052	0.00415	0.00204	0.00151	0.00154
	20	0.00413	0.00048	0.00029	0.00363	0.00514	0.00367	0.00143	0.00038
	21	0.00020	0.00002	0.00011	0.00304	0.00005	0.00005	0.00003	0.00002
	22	0.00010	0.00000	0.00003	0.00005	0.00020	0.00006	0.00012	0.00003
	23	0.00068	0.00001	0.00000	0.00005	0.00026	0.00008	0.00004	0.00003
REST OF APPALACHIA	1	0.13624	0.00000	0.00000	0.00000	0.26860	0.01858	0.00042	0.00000
	2	0.01137	0.06673	0.00000	0.00000	0.00565	0.01611	0.06356	0.01162
	3	0.00000	0.00000	0.00042	0.00000	0.00000	0.00000	0.00009	0.03515
	4	0.00008	0.00001	0.00001	0.01088	0.00343	0.00116	0.00044	0.00001
	5	0.01150	0.00000	0.00000	0.00000	0.04500	0.00124	0.00156	0.00004
	6	0.00114	0.00028	0.00006	0.01676	0.01144	0.13534	0.00557	0.00070
	7	0.01617	0.00204	0.00083	0.00281	0.00858	0.03426	0.09586	0.00892
	8	0.00103	0.00010	0.00004	0.00001	0.00031	0.00020	0.00085	0.00133
	9	0.00361	0.00115	0.00080	0.00029	0.00296	0.00722	0.00438	0.00013
	10	0.00844	0.00161	0.00037	0.00006	0.00694	0.04343	0.00279	0.00312
	11	0.00010	0.00013	0.00000	0.00099	0.00046	0.03956	0.00078	0.00018
	12	0.00198	0.00777	0.00027	0.00008	0.04152	0.00682	0.01500	0.00257
	13	0.00004	0.00286	0.00018	0.00026	0.00081	0.00055	0.00740	0.00006
	14	0.00141	0.00042	0.00073	0.00028	0.02111	0.00253	0.00909	0.00369
	15	0.00115	0.00171	0.00080	0.00324	0.00009	0.00077	0.00096	0.00032
	16	0.00014	0.00011	0.00022	0.00037	0.00016	0.00014	0.00011	0.00003
	17	0.00035	0.00012	0.00004	0.00008	0.00030	0.00001	0.00000	0.00000
	18	0.00000	0.00000	0.00002	0.00008	0.00030	0.00039	0.00074	0.00002
	19	0.00055	0.00224	0.00164	0.00212	0.01491	0.00833	0.00614	0.00027
	20	0.01462	0.00169	0.00101	0.00222	0.01823	0.01302	0.00588	0.00136
	21	0.00662	0.00073	0.00372	0.00144	0.00162	0.00164	0.00107	0.00062
	22	0.00142	0.00007	0.00048	0.00374	0.00294	0.00087	0.00176	0.80951
	23	0.00614	0.00008	0.00004	0.00044	0.00234	0.00070	0.00035	0.00025
REST OF THE U.S.	1	0.04258	0.00000	0.00000	0.00000	0.04025	0.00624	0.00014	0.00000
	2	0.00613	0.00095	0.00000	0.00000	0.00006	0.00018	0.00078	0.00013
	3	0.00000	0.00009	0.02134	0.00000	0.00000	0.00000	0.00212	0.01947
	4	0.00081	0.00013	0.00007	0.10734	0.00414	0.01149	0.00437	0.00007
	5	0.02707	0.00000	0.00000	0.00000	0.10546	0.00292	0.00367	0.00010
	6	0.00199	0.00049	0.00010	0.02416	0.01991	0.23551	0.00969	0.00123
	7	0.02898	0.00326	0.00132	0.00446	0.01367	0.05460	0.15279	0.01422
	8	0.05271	0.00534	0.00283	0.00060	0.01563	0.01029	0.04323	0.06768
	9	0.02335	0.00745	0.00385	0.00166	0.01913	0.04670	0.02332	0.00087
	10	0.00465	0.00121	0.00024	0.00005	0.00522	0.03270	0.08210	0.00309
	11	0.00026	0.00033	0.00000	0.00240	0.00242	0.02488	0.00177	0.00046
	12	0.00058	0.00728	0.00008	0.00000	0.01219	0.00200	0.00440	0.00074
	13	0.00001	0.00059	0.00006	0.00009	0.00025	0.00017	0.00230	0.00002
	14	0.00378	0.00113	0.00195	0.00076	0.05673	0.00680	0.01366	0.00942
	15	0.00652	0.00475	0.00456	0.00136	0.00054	0.00437	0.00548	0.80013
	16	0.00123	0.00099	0.00189	0.03058	0.00144	0.00119	0.00095	0.00329
	17	0.00162	0.00058	0.00018	0.00038	0.00000	0.00006	0.00002	0.00000
	18	0.00000	0.00000	0.00017	0.00901	0.00030	0.00416	0.00780	0.00017
	19	0.01075	0.00375	0.00316	0.00355	0.02828	0.01392	0.01027	0.01048
	20	0.00217	0.00025	0.00015	0.00033	0.00271	0.00194	0.00075	0.00020
	21	0.02348	0.00260	0.01319	0.00512	0.00573	0.00582	0.00380	0.00221
	22	0.01756	0.00086	0.00592	0.03966	0.03649	0.01079	0.02182	0.00627
	23	0.00201	0.00002	0.00001	0.03016	0.00076	0.00023	0.00013	0.00008

Region	Industry	9	10	11	12	13	14	15	16
YOUGHIOGHENY	1	0.00000	0.00249	0.00003	0.00601	0.00000	0.00000	0.00001	0.00003
	2	0.00352	0.00604	0.00007	0.01349	0.05349	0.00819	0.00039	0.00033
	3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	4	0.80011	0.00217	0.00016	0.00069	0.00019	0.00016	0.00009	0.00010
	5	0.03808	0.00000	0.00004	0.00001	0.00001	0.00000	0.00000	0.00303
	6	0.00072	0.00045	0.00041	0.00019	0.00006	0.00010	0.00006	0.00014
	7	0.00168	0.00020	0.00026	0.00047	0.00057	0.00826	0.00012	0.00041
	8	0.00880	0.00000	0.00000	0.00000	0.00001	0.00001	0.00001	0.00000
	9	0.03042	0.00011	0.00068	0.00017	0.00016	0.00023	0.00055	0.00068
	10	0.03804	0.01013	0.00234	0.00026	0.00013	0.00042	0.00023	0.00018
	11	0.03017	0.00026	0.00251	0.00013	0.00015	0.00045	0.00036	0.00049
	12	0.03093	0.00059	0.00211	0.01487	0.00475	0.00226	0.00242	0.00443
	13	0.03027	0.00026	0.00453	0.00050	0.07340	0.06057	0.03108	0.01899
	14	0.02059	0.00054	0.00278	0.00073	0.00414	0.00747	0.00826	0.00546
	15	[illegible]	0.00009	0.00022	0.00008	0.00830	0.00214	0.00992	0.06156
	16	[illegible]	0.00001	0.00011	0.00005	0.00027	0.00831	0.00133	0.00350
	17	[illegible]	0.00001	0.00002	0.00000	0.00065	0.00019	0.00047	0.00012
	18	[illegible]	0.00000	0.00002	0.00001	0.00002	0.00015	0.00012	0.00038
	19	0.00011	0.00068	0.00038	0.00108	0.00144	0.00072	0.00075	0.00083
	20	0.03049	0.00060	0.00126	0.00067	0.00215	0.00148	0.00202	0.00181
	21	0.00001	0.00001	0.00002	0.00001	0.00002	0.00002	0.00003	0.00003
	22	0.00002	0.00003	0.00002	0.00002	0.00003	0.00003	0.00004	0.00006
	23	0.00001	0.00017	0.00020	0.00000	0.00015	0.00015	0.00033	0.00002
REST OF APPALACHIA	1	0.00000	0.01193	0.00012	0.00005	0.00000	0.00000	0.00004	0.00000
	2	0.00765	0.00022	0.00033	0.06853	0.27179	0.00099	0.00199	0.00166
	3	0.00800	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	4	0.00014	0.00022	0.00021	0.00012	0.00026	0.00021	0.00012	0.00013
	5	0.00000	0.00000	0.00014	0.00002	0.00003	0.00000	0.00000	0.00300
	6	0.03531	0.00382	0.00081	0.00321	0.00106	0.00173	0.00099	0.06226
	7	0.01967	0.00245	0.00323	0.00578	0.00764	0.00324	0.00149	0.00500
	8	0.00002	0.00068	0.00003	0.00010	0.00020	0.00011	0.00012	0.00004
	9	0.00398	0.00104	0.00065	0.08165	0.00152	0.00215	0.00524	0.00647
	10	0.00068	0.10059	0.03717	0.00420	0.00204	0.00063	0.00365	0.00241
	11	0.03086	0.00101	0.01256	0.00067	0.00073	0.00223	0.00179	0.00443
	12	0.09464	0.00293	0.01650	0.07411	0.02360	0.01125	0.01207	0.02209
	13	0.03050	0.00051	0.01210	0.00094	0.13699	0.11229	0.05761	0.03521
	14	0.00128	0.00110	0.00584	0.06148	0.00837	0.01510	0.01265	0.01104
	15	0.00019	0.00018	0.00046	0.00017	0.01699	0.00439	0.02030	0.00319
	16	0.00012	0.00006	0.00048	0.00021	0.00118	0.00134	0.00577	0.01520
	17	0.00008	0.00003	0.00012	0.00001	0.00031	0.00109	0.00267	0.00070
	18	0.00018	0.00000	0.00026	0.00012	0.00020	0.00169	0.00137	0.00423
	19	0.00127	0.00276	0.00153	0.00440	0.00567	0.00293	0.00305	0.00246
	20	0.00175	0.00285	0.00448	0.00236	0.00763	0.00526	0.00718	0.00641
	21	0.00027	0.00028	0.00051	0.00643	0.00082	0.00088	0.00101	0.00087
	22	0.02973	0.00018	0.00031	0.00025	0.00042	0.00039	0.00057	0.00004
	23	0.03207	0.00151	0.00181	0.00004	0.00133	0.00141	0.00302	0.00019
REST OF THE U.S.	1	0.00009	0.00401	0.00004	0.00002	0.00000	0.00000	0.00001	0.00003
	2	0.00003	0.00000	0.00000	0.00075	0.00299	0.00001	0.00002	0.00002
	3	0.00030	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	4	0.00141	0.00222	0.00208	0.00121	0.00255	0.00208	0.00121	0.00128
	5	0.00031	0.00000	0.00033	0.00065	0.00007	0.00000	0.00001	0.00000
	6	0.00924	0.00143	0.01186	0.00559	0.00184	0.00302	0.00173	0.00393
	7	0.03136	0.00390	0.00515	0.00922	0.01123	0.00517	0.00237	0.00797
	8	0.03093	0.00430	0.00167	0.00561	0.01024	0.00550	0.00594	0.00180
	9	0.02571	0.00671	0.04173	0.01088	0.00981	0.01391	0.03391	0.04186
	10	0.00051	0.12113	0.02799	0.00316	0.00154	0.00499	0.00275	0.00219
	11	0.00216	0.00258	0.03143	0.00170	0.00183	0.00563	0.00452	0.01244
	12	0.00136	0.00084	0.00308	0.02174	0.00695	0.00330	0.00354	0.00049
	13	0.00015	0.00016	0.00376	0.00029	0.04257	0.03689	0.01790	0.01094
	14	0.00321	0.00296	0.01508	0.00397	0.02248	0.04058	0.03400	0.02968
	15	0.00108	0.00104	0.00260	0.00095	0.04664	0.02695	0.11548	0.01814
	16	0.00107	0.00045	0.00420	0.00181	0.01033	0.01173	0.05063	0.13336
	17	0.00838	0.00016	0.00056	0.00006	0.00146	0.00510	0.01251	0.00328
	18	0.00191	0.00006	0.00277	0.00121	0.00208	0.01785	0.01430	0.04453
	19	0.00212	0.00462	0.00256	0.00736	0.00981	0.00489	0.00509	0.00411
	20	0.00026	0.00042	0.00067	0.00035	0.00113	0.00078	0.00107	0.00045
	21	0.00097	0.00101	0.00182	0.00152	0.00240	0.00242	0.00358	0.00309
	22	0.00299	0.00222	0.00382	0.00310	0.00516	0.00408	0.00704	0.01044
	23	0.00002	0.00049	0.00059	0.00001	0.00043	0.00046	0.00098	0.00006

Region	Industry	17	18	19	20	21	22	23
YOUGHIOGHENY	1	0.00600	0.00001	0.00011	0.00040	0.00030	0.00004	0.00071
	2	0.08043	0.00007	0.01255	0.00017	0.00076	0.00087	0.01642
	3	0.00000	0.00000	0.00000	0.00000	0.00002	0.00000	0.00000
	4	0.00012	0.00001	0.00100	0.00118	0.00228	0.02750	0.00005
	5	0.00000	0.00001	0.00012	0.00004	0.00008	0.00002	0.00002
	6	0.00021	0.00007	0.00006	0.00043	0.00011	0.00033	0.00018
	7	0.00034	0.00015	0.00022	0.00030	0.00016	0.00061	0.00185
	8	0.00000	0.00000	0.00004	0.00004	0.00002	0.00002	0.00007
	9	0.00155	0.00011	0.00055	0.00048	0.00028	0.00069	0.00076
	10	0.00049	0.00002	0.00061	0.00059	0.00010	0.00062	0.01443
	11	0.00062	0.00019	0.00037	0.00071	0.00021	0.00321	0.00337
	12	0.00546	0.00094	0.00045	0.00369	0.00036	0.00263	0.00567
	13	0.03501	0.00255	0.00176	0.00023	0.00031	0.00040	0.03604
	14	0.01279	0.00091	0.00128	0.00123	0.00014	0.00164	0.04117
	15	0.00380	0.00044	0.00042	0.00066	0.00036	0.00244	0.00264
	16	0.00146	0.00034	0.00036	0.00020	0.00008	0.00158	0.00191
	17	0.30721	0.00008	0.00042	0.00022	0.00004	0.00327	0.00060
	18	0.80049	0.00049	0.00004	0.00012	0.00002	0.00082	0.00031
	19	0.00124	0.00013	0.00045	0.00428	0.00232	0.00422	0.00310
	20	0.30240	0.00048	0.00271	0.00368	0.00274	0.00351	0.01313
	21	0.00002	0.00001	0.00018	0.00045	0.00080	0.00022	0.00005
	22	0.00007	0.00001	0.00020	0.00054	0.00026	0.00032	0.00027
	23	0.00011	0.00000	0.00232	0.00068	0.00066	0.00032	0.00001
REST OF APPALACHIA	1	0.00000	0.00005	0.00044	0.00183	0.02540	0.00017	0.00283
	2	0.00221	0.00033	0.06376	0.00068	0.00388	0.00441	0.08342
	3	0.00000	0.00003	0.00000	0.00000	0.00046	0.00000	0.00000
	4	0.00016	0.00001	0.00136	0.00160	0.00367	0.03743	0.00006
	5	0.00000	0.00005	0.00038	0.00204	0.00025	0.00067	0.00067
	6	0.00348	0.00139	0.00096	0.00708	0.00188	0.05948	0.00307
	7	0.30424	0.00188	0.00152	0.00371	0.00201	0.00755	0.02279
	8	0.00010	0.00001	0.00196	0.00076	0.00044	0.00032	0.00145
	9	0.01471	0.00100	0.00324	0.00455	0.00188	0.00841	0.00724
	10	0.00781	0.00025	0.00180	0.00429	0.00181	0.00031	0.22410
	11	0.00311	0.00096	0.00187	0.00350	0.00104	0.01604	0.01064
	12	0.02720	0.00470	0.00225	0.01541	0.00177	0.01309	0.12727
	13	0.06490	0.00473	0.00326	0.00042	0.00057	0.00073	0.00640
	14	0.02588	0.00184	0.00255	0.00288	0.00028	0.00211	0.00323
	15	0.00778	0.00090	0.00088	0.00135	0.00082	0.00861	0.00539
	16	0.00636	0.00149	0.00155	0.00088	0.00024	0.00088	0.00830
	17	0.04111	0.00048	0.00234	0.00123	0.00620	0.01847	0.00004
	18	0.00541	0.00539	0.00043	0.00126	0.00421	0.00903	0.00340
	19	0.00504	0.00034	0.03446	0.01740	0.00869	0.01721	0.01284
	20	0.00849	0.00170	0.00402	0.01247	0.00471	0.01244	0.04653
	21	0.30075	0.00021	0.00541	0.01039	0.02000	0.00718	0.00180
	22	0.00695	0.00828	0.00288	0.00790	0.00363	0.00462	0.00388
	23	0.00046	0.00002	0.02112	0.00774	0.00052	0.00292	0.00008
REST OF THE U.S.	1	0.00000	0.00002	0.00015	0.00061	0.00073	0.00006	0.00045
	2	0.00002	0.00000	0.00076	0.00001	0.00004	0.00005	0.00092
	3	0.00000	0.00000	0.00006	0.00600	0.01067	0.00009	0.00000
	4	0.00181	0.00013	0.01344	0.01580	0.03031	0.36935	0.00080
	5	0.00000	0.00011	0.00000	0.00481	0.00059	0.00015	0.00015
	6	0.00406	0.00208	0.00166	0.01232	0.00328	0.00953	0.00534
	7	0.00675	0.00299	0.00242	0.00591	0.00321	0.01264	0.01824
	8	0.00512	0.00049	0.04047	0.03456	0.02488	0.01644	0.07410
	9	0.09514	0.00846	0.04378	0.02444	0.01205	0.05440	0.04084
	10	0.00588	0.00019	0.00135	0.06700	0.00121	0.00023	0.17249
	11	0.00780	0.00242	0.00471	0.00847	0.00262	0.04047	0.04250
	12	0.00799	0.00138	0.00066	0.00453	0.00052	0.00364	0.09611
	13	0.32017	0.00147	0.00101	0.00013	0.00018	0.00023	0.02079
	14	0.06948	0.00494	0.00888	0.00667	0.00076	0.00567	0.22361
	15	0.04424	0.00510	0.00491	0.00764	0.00355	0.03420	0.03068
	16	0.05582	0.01309	0.01362	0.00774	0.00210	0.00638	0.07277
	17	0.19270	0.00220	0.01124	0.00578	0.00096	0.08753	0.00008
	18	0.05700	0.05683	0.00450	0.01351	0.06225	0.09512	0.03588
	19	0.30842	0.00091	0.05757	0.02920	0.01448	0.02874	0.02113
	20	0.00126	0.00025	0.00145	0.00193	0.00144	0.00185	0.00692
	21	0.00267	0.00073	0.01917	0.05808	0.09468	0.02542	0.00639
	22	0.01175	0.00252	0.03551	0.04743	0.06751	0.05734	0.09412
	23	0.00031	0.00001	0.00087	0.00254	0.01984	0.00095	0.00003

Table L-2 (Cont.)

REST OF APPALACHIA

Region	Industry	1	2	3	4	5	6	7	8	9	10	11
YOUGHIOGHENY	1	0.00497	0.00000	0.00000	0.00000	0.00717	0.00058	0.00881	0.00000	0.00088	0.00032	0.00000
	2	0.00695	0.00726	0.00000	0.00000	0.00049	0.08135	0.00532	0.00097	0.00022	0.00002	0.00003
	3	0.00000	0.00000	0.00002	0.00000	0.00038	0.00008	0.00880	0.06057	0.00900	0.00000	0.00000
	4	0.00003	0.00000	0.00000	0.00047	0.00034	0.00842	0.00016	0.00078	0.00094	0.00008	0.00004
	5	0.00114	0.00000	0.00000	0.00000	0.00183	0.00014	0.00017	0.00450	0.00088	0.00000	0.00002
	6	0.00003	0.00001	0.00008	0.00039	0.00026	0.00313	0.00013	0.00002	0.00012	0.00002	0.00016
	7	0.00043	0.00005	0.00002	0.00007	0.00020	0.00081	0.00225	0.00071	0.00356	0.00006	0.00008
	8	0.00001	0.00000	0.00060	0.00000	0.00030	0.00000	0.00001	0.00002	0.00000	0.00000	0.00000
	9	0.00021	0.00007	0.00003	0.00302	0.00017	0.00042	0.00025	0.00001	0.00023	0.00000	0.00037
	10	0.00005	0.00001	0.00000	0.00000	0.00036	0.00036	0.00002	0.00050	0.00001	0.00132	0.00831
	11	0.00001	0.00801	0.00008	0.00009	0.00859	0.00369	0.00396	0.00002	0.00268	0.00009	0.00113
	12	0.00007	0.00826	0.00001	0.00000	0.00139	0.00023	0.00050	0.00009	0.00015	0.00010	0.00035
	13	0.00001	0.00045	0.00006	0.00084	0.00027	0.00018	0.00247	0.00002	0.00017	0.00047	0.00403
	14	0.00030	0.00007	[illegible]	0.00006	0.00452	0.00054	0.00189	0.00079	0.00026	0.00026	0.00120
	15	0.00019	0.00026	0.00813	0.00004	0.00002	0.00813	0.00016	0.00020	[illegible]	0.00003	0.00007
	16	0.00002	0.00001	0.00002	0.00001	0.00002	0.00801	0.00001	0.00070	[illegible]	0.00001	0.00005
	17	0.00003	0.00001	0.00030	0.00001	0.00000	0.00080	0.00008	0.00000	[illegible]	0.00030	0.00001
	18	0.00000	0.00000	0.00000	0.00011	0.00000	0.00005	0.00809	0.00000	[illegible]	0.00000	0.00003
	19	0.00155	0.00051	0.00045	0.00053	0.00431	0.00198	0.00146	0.00147	[illegible]	0.00006	0.00036
	20	0.00401	0.00046	0.00026	0.00001	0.00500	0.00357	0.00139	0.00037	[illegible]	0.00078	0.00123
	21	0.00019	0.00082	0.00011	0.00004	0.00005	0.00005	0.00803	0.00002	0.00121	0.00001	0.00001
	22	0.00009	0.00000	0.00003	0.00005	0.00320	0.00096	0.00012	0.00003	0.00032	0.00001	0.00082
	23	0.00065	0.00001	0.00000	0.00005	0.00025	0.00807	0.00004	0.00003	0.00031	0.00016	0.00019
REST OF APPALACHIA	1	0.20424	0.00000	0.00000	0.00000	0.24456	0.02837	0.00846	0.00000	0.00000	0.81304	0.00013
	2	0.01227	0.03161	0.00000	0.00000	0.00631	0.01739	0.06860	0.01254	0.00786	0.00024	0.00036
	3	0.00000	0.00001	0.00334	0.03300	0.00030	0.00808	0.00034	0.13025	0.00000	0.00000	0.08000
	4	0.00006	0.00001	0.00001	0.00035	0.00071	0.08889	0.00834	0.00001	0.00011	0.00017	0.00016
	5	0.01195	0.00000	0.00000	0.00000	0.04678	0.00129	0.00162	0.00004	0.00000	0.00000	0.00015
	6	0.00048	0.00024	0.00005	0.01441	0.00944	0.11637	0.00479	0.00061	0.00456	0.00071	0.00588
	7	0.02212	0.00249	0.00101	0.00342	0.01044	0.04171	0.11671	0.01086	0.07395	0.00298	0.00393
	8	0.00426	0.00043	0.00023	0.00095	0.00126	0.00053	0.00348	0.00545	0.00807	0.00835	0.00012
	9	0.00356	0.00114	0.00059	0.00029	0.00234	0.00717	0.00435	0.00013	0.00395	0.00103	0.00641
	10	0.00776	0.00144	0.00045	0.00007	0.00036	0.05229	0.00336	0.00015	0.00362	0.14371	0.04476
	11	0.00007	0.00004	0.00050	0.00070	0.00068	0.00702	0.00858	0.00813	0.00061	0.00072	0.00492
	12	0.00202	0.00794	0.00025	0.00000	0.04248	0.00696	0.01532	0.00254	0.22473	0.00294	0.01072
	13	0.00004	0.00073	0.00017	0.00026	0.00077	0.00057	0.00706	0.00095	0.00047	0.00049	0.01154
	14	0.00127	0.00034	0.00066	0.00025	0.01495	0.00224	0.00459	0.00133	0.06188	0.00099	0.00506
	15	0.00073	0.00069	0.00051	0.00015	0.08006	0.00049	0.00061	0.00001	0.00012	0.00012	0.00029
	16	0.00010	0.00008	0.00015	0.00005	0.00011	0.00009	0.00097	0.00002	0.00808	0.00006	0.00833
	17	0.00004	0.00008	0.00003	0.00006	0.00000	0.00001	0.00090	0.00070	0.00006	0.00002	0.00006
	18	0.00000	0.00000	0.00002	0.00081	0.00000	0.00037	0.00070	0.00002	0.00017	0.00000	0.00025
	19	0.00456	0.00224	0.00169	0.00212	0.01698	0.00832	0.00613	0.00626	0.00126	0.00276	0.00153
	20	0.01471	0.00170	0.00102	0.00223	0.01834	0.01310	0.00511	0.00136	0.00176	0.00266	0.00451
	21	0.00057	0.00073	0.00349	0.00143	0.00161	0.00163	0.00187	0.00062	0.00027	0.00028	0.08051
	22	0.00141	0.00007	0.00048	0.00079	0.00293	0.00087	0.00175	0.00850	0.00823	0.00018	0.00031
	23	0.00017	0.00006	0.00004	0.00044	0.00234	0.00070	0.00035	0.00025	0.00037	0.00151	0.00181
REST OF THE U.S.	1	0.08021	0.00000	0.00000	0.00008	0.12433	0.00460	0.03819	0.00000	0.00000	0.00552	0.00006
	2	0.00051	0.00389	0.00000	0.00000	0.00826	0.00072	0.00285	0.00052	0.00012	0.00001	0.00001
	3	0.00050	0.00038	0.01858	0.00000	0.00000	0.00000	0.08180	0.72504	0.00000	0.00000	0.08000
	4	0.03036	0.08016	0.00007	0.11390	0.08970	0.01228	0.00464	0.00007	0.00159	0.00235	0.00221
	5	0.02896	0.00300	0.00300	0.00000	0.11334	0.00313	0.00393	0.00011	0.00001	0.00000	0.00036
	6	0.00219	0.00854	0.00011	0.03213	0.02194	0.25952	0.01069	0.00135	0.01810	0.00158	0.01306
	7	0.02006	0.00293	0.00116	0.00403	0.01230	0.04913	0.13748	0.01279	0.02921	0.00351	0.00463
	8	0.04453	0.00501	0.00266	0.00058	0.01469	0.00967	0.04063	0.06361	0.00087	0.00404	0.00138
	9	0.02355	0.00752	0.00388	0.00188	0.01929	0.04710	0.02856	0.00088	0.02373	0.00676	0.04209
	10	0.00369	0.00097	0.00022	0.00394	0.00419	0.02621	0.00168	0.00097	0.03041	0.09711	0.02244
	11	0.00030	0.00038	0.00600	0.00268	0.00281	0.02882	0.00285	0.00853	0.00250	0.00296	0.03663
	12	0.00067	0.00342	0.00012	0.00000	0.01826	0.00300	0.00660	0.03111	0.00704	0.00129	0.08462
	13	0.00032	0.00161	0.00010	0.00015	0.00045	0.00031	0.00417	0.00003	0.00028	0.00029	0.00461
	14	0.00431	0.00129	0.00223	0.00066	0.06472	0.08776	0.01559	0.01131	0.00366	0.00338	0.01720
	15	0.00732	0.01896	0.00511	0.03153	0.00860	0.03490	0.00614	0.00014	0.00121	0.00117	0.00291
	16	0.00130	0.00184	0.00199	0.03060	0.00151	0.00125	0.00099	0.00030	0.00112	0.00052	0.00461
	17	0.00176	0.00063	0.00020	0.00041	0.00800	0.00807	0.00082	0.00008	0.00041	0.00017	0.00061
	18	0.00000	0.00008	0.00017	0.00903	0.00000	0.00417	0.00781	0.00017	0.00191	0.00000	0.00278
	19	0.01101	0.00377	0.00316	0.00357	0.02844	0.01400	0.01032	0.01054	0.00219	0.00465	0.00258
	20	0.00221	0.00024	0.00015	0.00033	0.00276	0.00197	0.00077	0.00021	0.00926	0.00063	0.00068
	21	0.02352	0.00261	0.01322	0.00513	0.03575	0.00583	0.00381	0.08221	0.00098	0.00181	0.00183
	22	0.01756	0.00086	0.00593	0.00486	0.03658	0.81879	0.02183	0.00620	0.03289	0.00222	0.08384
	23	0.00203	0.00002	0.00004	0.00015	0.00077	0.00023	0.00812	0.00098	0.00002	0.00050	0.88859

Region	Industry	12	13	14	15	16	17	18	19	20	21	22	23
YOUGHIOGHENY	1	0.00000	0.00000	0.00000	0.00880	0.00068	0.00880	0.00008	0.00001	0.00005	0.00069	0.00000	0.00000
	2	0.00573	0.02274	0.00008	0.00017	0.00814	0.00818	0.00003	0.00934	0.00007	0.00032	0.00037	0.00548
	3	0.00006	0.00000	0.00000	0.00000	0.00000	0.00088	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000
	4	0.00004	0.00004	0.00008	0.00004	0.00009	0.00008	0.00008	0.00000	0.00048	0.00112	[illegible]	0.00007
	5	0.00000	0.00000	0.00000	0.00008	0.00003	0.00000	0.00801	0.00004	0.00023	0.00003	0.00001	0.00001
	6	0.00007	0.00002	0.00004	0.00002	0.00005	0.00008	0.00003	0.00082	0.00016	0.00004	0.00013	0.00007
	7	0.00014	0.00017	0.00008	0.00003	0.00812	0.00010	0.00004	0.00004	0.00004	0.00005	0.00018	0.00053
	8	0.00000	0.00000	0.00000	0.00000	0.00050	0.00000	0.00000	0.00002	0.00001	0.00001	0.00000	0.00002
	9	0.00010	0.00009	0.00012	0.00030	0.00037	0.00085	0.00006	0.00030	0.00026	0.00011	0.00049	0.00042
	10	0.00003	0.00002	0.00085	0.00003	0.00002	0.00006	0.00000	0.00001	0.00006	0.00001	0.00000	0.00146
	11	0.00006	0.00007	0.00020	0.00016	0.00044	0.00028	0.00009	0.00017	0.00032	0.00009	0.00144	0.00151
	12	0.00247	0.00079	0.00038	0.00040	0.00074	0.00091	0.00814	0.00004	0.00051	0.00006	0.00044	0.01092
	13	0.00031	0.04569	0.03749	0.01921	0.01176	0.02165	0.00158	0.00104	0.00016	0.00014	0.00026	0.02431
	14	0.00032	0.00179	0.00323	0.00271	0.00236	0.00556	0.00030	0.00055	0.00053	0.00006	0.00045	0.01763
	15	0.00003	0.00277	0.00072	0.00331	0.00052	0.00127	0.00015	0.00014	0.00022	0.00010	0.00046	0.00046
	16	0.00002	0.00013	0.00015	0.00063	0.00165	0.00069	0.00016	0.00017	0.00010	0.00003	0.00075	0.00090
	17	0.00000	0.00003	0.00010	0.00825	0.00007	0.00387	0.00005	0.00022	0.00012	0.00002	0.00176	0.00000
	18	0.00001	0.00082	0.00021	0.00012	0.00053	0.00068	0.00068	0.00005	0.00016	0.00003	0.00143	0.00043
	19	0.00104	0.00139	0.00069	0.00872	0.00058	0.00120	0.00013	0.00017	0.00616	0.00205	0.00469	0.00300
	20	0.00005	0.06209	0.00144	0.00197	0.00176	0.00233	0.00047	0.00264	0.00355	0.00266	0.00340	0.01275
	21	0.00001	0.00802	0.00002	0.00003	0.00003	0.00082	0.00301	0.00016	0.00046	0.00017	0.00021	0.00005
	22	0.00302	0.00003	0.00003	0.00004	0.00006	0.00806	0.00801	0.00019	0.00652	0.00025	0.00031	0.00026
	23	0.00008	0.00014	0.00015	0.00032	0.00002	0.00016	0.00008	0.00224	0.00683	0.00041	0.00031	0.00081
REST OF APPALACHIA	1	0.00005	0.00000	0.00000	0.00004	0.00000	0.00808	0.00085	0.00844	0.00201	0.02445	0.00019	0.00311
	2	0.07346	0.29335	0.00102	0.00214	0.00179	0.08238	0.00036	0.04488	0.00095	0.00417	0.00476	0.04004
	3	0.00000	0.00008	0.00000	0.00000	0.00000	0.00008	0.00008	0.00000	0.00000	0.00176	0.00001	0.00000
	4	0.00069	0.00020	0.00016	0.00009	0.00013	0.00013	0.08081	0.00105	0.00123	0.00236	0.02673	0.00005
	5	0.00002	0.00003	0.00800	0.00000	0.00008	0.00008	0.00005	0.00040	0.00212	0.00026	0.00007	0.00007
	6	0.00276	0.00091	0.00149	0.00085	0.00194	0.00300	0.00103	0.00042	0.00069	0.00162	0.00471	0.00264
	7	0.00704	0.00858	0.00395	0.00181	0.03609	0.00516	0.08229	0.00185	0.00452	0.00245	0.00940	0.02768
	8	0.00040	0.00083	0.00044	0.00048	0.00014	0.00041	0.00004	0.00768	0.08318	0.00266	0.00132	0.00546
	9	0.00164	0.08151	0.00214	0.00521	0.00863	0.01468	0.00099	0.00519	0.00452	0.00185	0.00835	0.00719
	10	0.00505	0.08246	0.00798	0.08440	0.00351	0.00960	0.00038	0.00216	0.01119	0.00194	0.00037	0.27566
	11	0.00048	0.00052	0.00159	0.00127	0.00351	0.00222	0.00968	0.00133	0.00253	0.00074	0.01141	0.01148
	12	0.07569	0.02416	0.01149	0.01232	0.02256	0.32278	0.00588	0.00288	0.01574	0.00181	0.01337	0.33421
	13	0.00089	0.13664	0.10710	0.05495	0.03358	0.86190	0.00451	0.00311	0.00040	0.00054	0.00070	0.06181
	14	0.00133	0.08755	0.01363	0.01142	0.00996	0.82333	0.00146	0.00250	0.00224	0.00025	0.00190	0.07510
	15	0.00011	0.01078	0.00278	0.01288	0.08292	0.38493	0.00057	0.00055	0.00086	0.00090	0.00361	0.00342
	16	0.00014	0.00081	0.08092	0.08396	0.01042	0.00436	0.80182	0.00106	0.00060	0.00016	0.50472	0.05069
	17	0.00001	0.00021	0.00074	0.00183	0.00048	0.02811	0.00033	0.00164	0.00084	0.00014	0.01277	0.00081
	18	0.00011	0.00019	0.00160	0.00129	0.00399	0.00518	0.00509	0.00840	0.08121	0.00020	0.00852	0.08321
	19	0.00440	0.00586	0.00292	0.00304	0.00266	0.88583	0.00056	0.03459	0.01746	0.00064	0.01720	0.01262
	20	0.00238	0.08767	0.00529	0.00722	0.00649	0.08894	0.00171	0.00967	0.01304	0.00477	0.01251	0.04674
	21	0.00043	0.00061	0.00068	0.00100	0.00087	0.00875	0.88028	0.00537	0.01027	0.02665	0.00712	0.00179
	22	0.00025	0.00041	0.00039	0.00057	0.00084	0.08094	0.00025	0.00285	0.00287	0.00362	0.00061	0.00387
	23	0.00064	0.00133	0.08141	0.00302	0.00019	0.08896	0.08882	0.02119	0.00780	0.00057	0.00242	0.00008
REST OF THE U.S.	1	0.00002	0.00000	0.80000	0.00082	0.88800	0.00008	0.88032	0.00020	0.00605	0.01202	0.00006	0.00131
	2	0.00307	0.01218	0.00004	0.00089	0.00002	0.00810	0.00081	0.08288	0.00006	0.00017	0.00028	0.00374
	3	0.00000	0.00000	0.00000	0.00008	0.00008	0.00088	0.00008	0.00000	0.08300	0.00444	0.00008	0.00000
	4	0.00128	0.00271	0.00221	0.00128	0.00136	0.08171	0.00016	0.01426	0.01676	0.03217	0.39241	0.00064
	5	0.00006	0.00008	0.00000	0.00001	0.00000	0.00080	0.08812	0.00097	0.00516	0.00063	0.00016	0.00016
	6	0.00616	0.00203	0.00333	0.00198	0.00434	0.00668	0.00229	0.00183	0.01358	0.00361	0.01051	0.03589
	7	0.00829	0.01010	0.00465	0.00213	0.00717	0.00687	0.00269	0.00218	0.00532	0.00284	0.01083	0.03281
	8	0.00471	0.00967	0.00517	0.00558	0.08169	0.00481	0.00846	0.09114	0.03720	0.02338	0.01545	0.00964
	9	0.01077	0.00990	0.01403	0.03428	0.84221	0.04595	0.08651	0.03407	0.02469	0.01215	0.05466	0.04722
	10	0.00253	0.08123	0.00408	0.00221	0.00174	0.00471	0.00815	0.00108	0.00561	0.00097	0.00019	0.13828
	11	0.00197	0.00212	0.00652	0.00523	0.01441	0.00910	0.00281	0.00546	0.01859	0.00303	0.04687	0.04922
	12	0.03259	0.01640	0.00495	0.08531	0.00971	0.01196	0.00207	0.00049	0.00078	0.00078	0.00576	0.14391
	13	0.00053	0.07711	0.06320	0.03243	0.01982	0.03653	0.08266	0.00184	0.00024	0.00032	0.00041	0.03766
	14	0.00452	0.02564	0.04629	0.03879	0.03383	0.07926	0.08586	0.00783	0.00761	0.00066	0.00466	0.25509
	15	0.00107	0.10839	0.02748	0.12952	0.02035	0.04981	0.08572	0.00550	0.00863	0.00398	0.03835	0.03441
	16	0.00190	0.01004	0.01231	0.05314	0.13999	0.09859	0.01374	0.01436	0.00812	0.00221	0.00558	0.07639
	17	0.00007	0.00158	0.00553	0.01357	0.00356	0.28984	0.08245	0.01216	0.00627	0.00104	0.04495	0.00009
	18	0.00121	0.00208	0.01788	0.01641	0.04462	0.05312	0.05695	0.00451	0.01354	0.00226	0.09532	0.03596
	19	0.00740	0.00987	0.00692	0.00512	0.00413	0.08867	0.00091	0.05789	0.02936	0.01654	0.02496	0.02125
	20	0.00036	0.00115	0.00080	0.00188	0.00847	0.00128	0.00026	0.00145	0.00196	0.00147	0.00188	0.00703
	21	0.00153	0.00291	0.00242	0.00359	0.00318	0.00268	0.00073	0.01922	0.05823	0.04969	0.02548	0.00640
	22	0.00310	0.00516	0.00488	0.00704	0.01844	0.01175	0.00252	0.03553	0.04796	0.04753	0.05737	0.00864
	23	0.00001	0.08044	0.00846	0.00099	0.00006	0.00831	0.00081	0.00694	0.00256	0.01988	0.00096	0.00083

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Table L-2 (Cont.)

REST OF THE U.S.

INDUSTRY		1	2	3	4	5	6	7	8
YOUGHIOGHENY	1	0.00014	0.00000	0.00000	0.00080	0.00099	0.00088	0.00000	0.00000
	2	0.00020	0.00155	0.00000	0.00000	0.00010	0.00029	0.00113	0.00021
	3	0.00000	0.00000	0.00001	0.00000	0.00030	0.00000	0.00003	0.00041
	4	0.00000	0.00000	0.00000	0.00006	0.00006	0.00007	0.00003	0.00000
	5	0.00026	0.00000	0.00000	0.00000	0.00100	0.00003	0.00003	0.00000
	6	0.00001	0.00000	0.00000	0.00009	0.00036	0.00074	0.00003	0.00050
	7	0.00118	0.00004	0.00001	0.00007	0.00009	0.00035	0.00097	0.00009
	8	0.00001	0.00000	0.00000	0.00000	0.00050	0.00030	0.00090	0.00031
	9	0.00007	0.00002	0.00001	0.00001	0.00006	0.00015	0.00089	0.00000
	10	0.00003	0.00001	0.00000	0.00000	0.00003	0.00019	0.00001	0.00000
	11	0.00000	0.00000	0.00000	0.00001	0.00031	0.00013	0.00001	0.00000
	12	0.00004	0.00016	0.00001	0.00003	0.00083	0.00014	0.00030	0.00005
	13	0.00000	0.00021	0.00001	0.00002	0.00036	0.00004	0.00054	0.00000
	14	0.00007	0.00002	0.00004	0.00001	0.00110	0.00013	0.00027	0.00019
	15	0.00008	0.00011	0.00005	0.00002	0.00031	0.00005	0.00006	0.00000
	16	0.00001	0.00001	0.00002	0.00030	0.00001	0.00001	0.00001	0.00000
	17	0.00001	0.00000	0.00000	0.00300	0.00000	0.00080	0.00000	0.00000
	18	0.00000	0.00000	0.00000	0.00004	0.00000	0.00004	0.00007	0.00000
	19	0.00143	0.00049	0.00041	0.00046	0.00370	0.00182	0.00134	0.00137
	20	0.00053	0.00106	0.00004	0.00008	0.00046	0.00047	0.00018	0.00009
	21	0.00017	0.00002	0.00010	0.00004	0.00004	0.00004	0.00003	0.00002
	22	0.00008	0.00000	0.00003	0.00005	0.00017	0.00005	0.00010	0.00003
	23	0.00022	0.00000	0.00000	0.00002	0.00008	0.00003	0.00001	0.00001
REST OF APPALACHIA	1	0.01498	0.00000	0.00000	0.00000	0.02161	0.00149	0.00053	0.00000
	2	0.00317	0.02419	0.00000	0.00000	0.00163	0.00449	0.81773	0.00324
	3	0.00000	0.00000	0.00025	0.00000	0.00000	0.00000	0.00002	0.80942
	4	0.00002	0.00000	0.00000	0.00225	0.00019	0.00024	0.00009	0.00000
	5	0.00141	0.00000	0.00000	0.00000	0.00553	0.00015	0.00019	0.00001
	6	0.00025	0.00036	0.00001	0.00371	0.00253	0.02995	0.03123	0.03016
	7	0.00399	0.00045	0.00018	0.00082	0.00188	0.00753	0.02106	0.00196
	8	0.00058	0.00006	0.00003	0.00001	0.00017	0.00011	0.00048	0.88874
	9	0.00159	0.00041	0.00026	0.00013	0.00131	0.00319	0.00193	0.00006
	10	0.00052	0.00013	0.00093	0.00000	0.00056	0.00350	0.00022	0.00001
	11	0.00092	0.00002	0.00006	0.00015	0.00015	0.00153	0.00011	0.00003
	12	0.00029	0.00113	0.00004	0.00000	0.00631	0.03099	0.00217	0.00037
	13	0.00101	0.00062	0.00004	0.00006	0.00017	0.03012	0.03169	0.80001
	14	0.00026	0.00003	0.00013	0.00005	0.02391	0.00047	0.00094	0.03060
	15	0.00027	0.00041	0.00019	0.00006	0.00002	0.00018	0.00023	0.00001
	16	0.00006	0.00005	0.00009	0.00003	0.00037	0.00006	0.00004	0.00001
	17	0.00003	0.00001	0.00000	0.00001	0.00030	0.00000	0.00800	0.00000
	18	0.00000	0.00000	0.00001	0.00037	0.00030	0.00017	0.70032	0.00001
	19	0.00026	0.00207	0.00174	0.00196	0.01559	0.00768	0.00466	0.00578
	20	0.03186	0.00061	0.00013	0.00028	0.00232	0.00166	0.00065	0.00017
	21	0.00593	0.00066	0.00133	0.00129	0.00145	0.00147	0.00096	0.00056
	22	0.00124	0.00006	0.00042	0.00676	0.00257	0.00076	0.00154	0.00044
	23	0.00194	0.00002	0.00301	0.00014	0.00074	0.00022	0.00011	0.00008
REST OF THE U.S.	1	0.28009	0.00000	0.00000	0.00003	0.40396	0.02794	0.00063	0.00000
	2	0.01176	0.07902	0.00000	0.00000	0.00533	0.01469	0.05791	0.01059
	3	0.00000	0.00009	0.02204	0.00030	0.00030	0.00003	0.00219	0.84633
	4	0.00003	0.00015	0.00009	0.12330	0.01050	0.01320	0.00502	0.00309
	5	0.04052	0.00000	0.00000	0.00000	0.15860	0.00438	0.00550	0.00015
	6	0.00294	0.00073	0.00015	0.04312	0.02944	0.34531	0.01433	0.03181
	7	0.04444	0.00493	0.00202	0.70087	0.02097	0.08377	0.25440	0.02181
	8	0.05320	0.00539	0.00246	0.00080	0.01977	0.01039	0.04364	0.05832
	9	0.02567	0.00819	0.00473	0.00205	0.02103	0.05135	0.83114	0.07096
	10	0.01115	0.00479	0.00064	0.00311	0.01201	0.07517	0.00453	0.03021
	11	0.00037	0.00046	0.00000	0.00351	0.00141	0.03505	0.00249	0.30065
	12	0.00263	0.01033	0.00036	0.00000	0.05520	0.00906	0.01994	0.00335
	13	0.00006	0.00447	0.00029	0.00343	0.00126	0.09006	0.01157	0.00009
	14	0.00555	0.00166	0.00287	0.00111	0.00327	0.00998	0.02006	0.01456
	15	0.00788	0.01178	0.00551	0.00165	0.00065	0.00528	0.00662	0.00015
	16	0.00134	0.00107	0.00205	0.00062	0.00156	0.00129	0.03103	0.80031
	17	0.00198	0.00071	0.00022	0.03347	0.00000	0.00007	0.03032	0.00000
	18	0.00000	0.00000	0.00018	0.03749	0.00000	0.00430	0.00822	0.00219
	19	0.01164	0.00399	0.00336	0.00377	0.03036	0.01480	0.81091	0.01114
	20	0.01654	0.00714	0.00128	0.00281	0.02711	0.01451	0.00644	0.00172
	21	0.02418	0.02088	0.01359	0.03927	0.00391	0.03600	0.00392	0.00728
	22	0.01775	0.00087	0.00599	0.03996	0.03689	0.01091	0.02206	0.33634
	23	0.00669	0.00007	0.00004	0.00348	0.00254	0.00076	0.00238	0.00027

INDUSTRY		9	10	11	12	13	14	15	16
YOUGHIOGHENY	1	0.00000	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	2	0.00005	0.00000	0.00001	0.00122	0.00485	0.00002	0.00004	0.00003
	3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	4	0.00001	0.00001	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001
	5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00080
	6	0.00005	0.00000	0.00004	0.00002	0.00001	0.00001	0.00001	0.00001
	7	0.00020	0.00002	0.00003	0.00004	0.00007	0.00003	0.00002	0.00005
	8	0.00300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	9	0.00208	0.00002	0.00013	0.00003	0.00005	0.00004	0.00011	0.00013
	10	0.00000	0.00071	0.00016	0.00002	0.00001	0.00003	0.00002	0.00001
	11	0.00001	0.00001	0.00017	0.00001	0.00001	0.00003	0.00802	0.00007
	12	0.00004	0.00006	0.00021	0.00145	0.00047	0.00023	0.00824	0.00044
	13	0.00004	0.00004	0.00068	0.00007	0.00994	0.00815	0.00418	0.00255
	14	0.00036	0.00006	0.00029	0.00018	0.00044	0.00079	0.00066	0.00058
	15	0.00001	0.00001	0.00003	0.00002	0.00112	0.00029	0.00133	0.00021
	16	0.00001	0.00001	0.00003	0.00001	0.00008	0.00010	0.00041	0.00108
	17	0.00008	0.00000	0.00000	0.00000	0.00001	0.00002	0.00005	0.00001
	18	0.00002	0.00000	0.00003	0.00001	0.00002	0.00016	0.00013	0.00040
	19	0.00028	0.00000	0.00034	0.00096	0.00128	0.00064	0.00067	0.00054
	20	0.00006	0.00010	0.00016	0.00009	0.00028	0.00019	0.00826	0.00328
	21	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00003	0.00002
	22	0.00001	0.00001	0.00002	0.00001	0.00002	0.00002	0.00003	0.00005
	23	0.00000	0.00005	0.00007	0.00000	0.00005	0.00005	0.00011	0.00001
REST OF APPALACHIA	1	0.00100	0.00046	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000
	2	0.00076	0.00006	0.00669	0.01911	0.07580	0.00028	0.00055	0.00046
	3	0.00300	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	4	0.83003	0.00005	0.00004	0.00003	0.00005	0.00004	0.00003	0.00003
	5	0.00000	0.00000	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
	6	0.03118	0.00016	0.00151	0.00071	0.00023	0.00038	0.00022	0.00050
	7	0.00432	0.00056	0.00071	0.00127	0.00155	0.00071	0.00033	0.00110
	8	0.00001	0.00005	0.00092	0.00006	0.00011	0.00006	0.00007	0.00002
	9	0.00176	0.00046	0.00295	0.00075	0.00067	0.00095	0.00232	0.00286
	10	0.00005	0.01249	0.00299	0.00034	0.00016	0.00053	0.00029	0.00023
	11	0.00013	0.00016	0.00175	0.00011	0.00011	0.00035	0.00028	0.00077
	12	0.00767	0.00042	0.00152	0.01073	0.00343	0.00163	0.00175	0.00320
	13	0.00011	0.00011	0.00261	0.00028	0.07954	0.02421	0.01242	0.00759
	14	0.00022	0.00020	0.00104	0.00027	0.00155	0.00280	0.00235	0.00205
	15	0.00004	0.00004	0.00011	0.00004	0.00403	0.00104	0.00482	0.00076
	16	0.00005	0.00002	0.00020	0.00009	0.00049	0.00056	0.00240	0.00635
	17	0.00001	0.00000	0.00001	0.00000	0.00003	0.00012	0.00027	0.00007
	18	0.00003	0.00000	0.00011	0.00005	0.00008	0.00073	0.00059	0.00182
	19	0.00117	0.00255	0.00141	0.00406	0.00541	0.00270	0.00281	0.00227
	20	0.00022	0.00036	0.00057	0.00030	0.00097	0.00067	0.00091	0.00081
	21	0.00025	0.00025	0.00046	0.00039	0.00073	0.00061	0.00071	0.00078
	22	0.00320	0.00016	0.00027	0.00022	0.00036	0.00034	0.00050	0.00374
	23	0.00002	0.02047	0.00057	0.00001	0.00042	0.00044	0.00045	0.00086
REST OF THE U.S.	1	0.00000	0.01796	0.00018	0.00007	0.00000	0.00000	0.00005	0.00000
	2	0.00241	0.00020	0.00010	[illegible]	0.24762	0.00090	0.00181	0.00151
	3	0.00020	0.00300	[illegible]	[illegible]	0.00000	0.00000	0.00000	0.00360
	4	0.00162	0.00255	[illegible]	[illegible]	0.00293	0.00239	0.00139	0.00147
	5	0.00031	0.00060	0.00050	[illegible]	0.00011	0.00000	0.00001	0.00000
	6	0.01366	0.00212	0.01753	0.05826	0.00273	0.00446	0.00256	0.00582
	7	0.04311	0.00599	0.00790	0.01414	0.01722	0.00793	0.00364	0.01225
	8	0.00993	0.03434	0.00148	0.00586	0.01039	0.00555	0.00599	0.00181
	9	0.02827	0.00737	0.04588	0.01174	0.01079	0.01529	0.03728	0.04002
	10	0.00118	0.27850	0.06434	0.00726	0.00354	0.02147	0.00633	0.00504
	11	0.00334	0.00360	0.04455	0.00240	0.00258	0.00793	0.00636	0.01753
	12	0.03616	0.00390	0.01396	0.09853	0.03145	0.01496	0.01604	0.02937
	13	0.00077	0.00086	0.01490	0.00146	0.21398	0.17539	0.08999	0.05500
	14	0.03471	0.00434	0.02214	0.00562	0.03300	0.05957	0.04991	0.04353
	15	0.00138	0.00126	0.00314	0.00115	0.11670	0.03015	0.13955	0.02193
	16	0.00116	0.00054	0.00455	0.00196	0.01121	0.01272	0.05491	0.14465
	17	0.03047	0.00020	0.00069	0.00007	0.00179	0.00625	0.01534	0.00402
	18	0.00201	0.00000	0.00292	0.00128	0.00219	0.01881	0.01515	0.04692
	19	0.00725	0.00491	0.00273	0.00782	0.01043	0.00520	0.00541	0.00437
	20	0.00221	0.00361	0.00540	0.00299	0.00967	0.00667	0.00915	0.00812
	21	0.00155	0.00264	0.00188	0.00157	0.00299	0.00249	0.00369	0.00319
	22	0.00292	0.00425	0.00386	0.00314	0.00522	0.00493	0.00711	0.01055
	23	0.00008	0.00164	0.00196	0.00064	0.00144	0.00153	0.00327	0.00021

INDUSTRY		17	18	19	20	21	22	23
YOUGHIOGHENY	1	0.00000	0.00000	0.00000	0.00000	0.00009	0.00000	0.00001
	2	0.00004	0.00001	0.00119	0.00002	0.00007	0.00006	0.00149
	3	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000
	4	0.00001	0.00000	0.00008	0.00010	0.00019	0.00228	0.00000
	5	0.00000	0.00000	0.00001	0.00005	0.00001	0.00000	0.00000
	6	0.00002	0.00001	0.00001	0.00004	0.00001	0.00003	0.00002
	7	0.00004	0.00002	0.00002	0.00004	0.00002	0.00008	0.00023
	8	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00001
	9	0.00030	0.00002	0.00011	0.00009	0.00004	0.00017	0.00015
	10	0.00003	[illegible]	0.00001	0.00004	0.00001	0.00060	0.00101
	11	0.00004	0.00001	0.00003	0.00005	0.00001	0.00021	0.00023
	12	0.00054	0.00009	0.00005	0.00831	0.00004	0.00026	0.00655
	13	0.00471	0.00034	0.00024	0.00003	0.00004	0.00005	0.00485
	14	0.00135	0.00010	0.00013	0.00013	0.00001	0.00011	0.00435
	15	0.00051	0.00006	0.00066	0.00069	0.00034	0.00040	0.00035
	16	0.00045	0.00011	0.00011	0.00006	0.00002	0.00049	0.00059
	17	0.00071	0.00001	0.00004	0.00002	0.00000	0.00032	0.00000
	18	0.00051	0.00051	0.00004	0.00012	0.00002	0.00066	0.00032
	19	0.00110	0.00012	0.00752	0.00381	0.00189	0.00376	0.00276
	20	0.00031	0.00006	0.00035	0.00047	0.00035	0.00045	0.00169
	21	0.00002	0.00001	0.00014	0.00043	0.00069	0.00019	0.00005
	22	0.00006	0.00001	0.00017	0.00046	0.00022	0.00027	0.00023
	23	0.00003	0.00000	0.00076	0.00028	0.00219	0.00011	0.00000
REST OF APPALACHIA	1	0.00000	0.00000	0.00004	0.00015	0.00209	0.00001	0.00023
	2	0.00062	0.00009	0.01775	0.00025	0.00108	0.00123	0.02327
	3	0.00006	0.00000	0.00000	0.00000	0.00012	0.00000	0.00000
	4	0.80803	0.00000	0.00028	0.00033	0.00064	0.00774	0.00001
	5	0.00000	0.00001	0.00005	0.00025	0.00063	0.00001	0.00501
	6	0.00077	0.00026	0.00021	0.00157	0.00042	0.00121	0.00068
	7	0.00093	0.00041	0.00034	0.00081	0.00044	0.00166	0.00499
	8	0.00006	0.00001	0.00107	0.00044	0.00027	0.00028	0.00081
	9	0.80650	0.00044	0.00241	0.00201	0.00062	0.00372	0.00320
	10	0.30863	0.00007	0.00034	0.00075	0.00013	0.00002	0.01449
	11	0.80048	0.00015	0.00029	0.00055	0.00016	0.00256	0.00262
	12	0.00394	0.00068	0.00033	0.00223	0.00026	0.00170	0.04740
	13	0.01399	0.00102	0.00070	0.00069	0.00012	0.00016	0.01442
	14	0.00479	0.00034	0.00047	0.00066	0.00005	0.00039	0.01542
	15	0.00185	0.00021	0.00026	0.00032	0.00015	0.00143	0.00128
	16	0.80265	0.00062	0.00065	0.00037	0.00010	0.00267	0.00345
	17	0.00409	0.00005	0.00024	0.00042	0.00002	0.00186	0.00030
	18	0.00232	0.00232	0.00018	0.00055	0.00009	0.01348	0.00146
	19	0.00466	0.00050	0.03174	0.01610	0.00747	0.01587	0.01165
	20	0.00108	0.00022	0.00122	0.00165	0.00124	0.00158	0.00541
	21	0.00060	0.00018	0.00485	0.01468	0.02388	0.00643	0.00161
	22	0.00083	0.00018	0.00251	0.00641	0.00395	0.00405	0.00339
	23	0.00030	0.00001	0.00604	0.00245	0.01901	0.00092	0.00003
REST OF THE U.S.	1	0.00000	0.00007	0.00067	0.00275	0.03907	0.00026	0.00426
	2	0.00201	0.00030	0.05811	0.00000	0.00352	0.00402	0.07601
	3	0.00080	0.00000	0.00000	0.00000	0.01102	0.00069	0.00000
	4	0.00185	0.00015	0.01564	0.01814	0.03402	0.42426	0.00069
	5	0.00000	0.00016	0.00135	0.00720	0.00088	0.00023	0.00023
	6	0.00097	0.00307	0.00246	0.01022	0.00485	0.01410	0.00790
	7	0.01036	0.00459	0.00371	0.00407	0.00492	0.01847	0.03580
	8	0.00517	0.00049	0.09780	0.03496	0.02512	0.01660	0.07480
	9	0.10460	0.00710	0.03734	0.03238	0.01325	0.05981	0.05144
	10	0.01351	0.00043	0.00311	0.01409	0.00274	0.00054	0.39657
	11	0.01107	0.00341	0.00864	0.01264	0.00309	0.05700	0.05986
	12	0.03617	0.00625	0.00299	0.02049	0.00236	0.01740	0.43509
	13	0.10130	0.00739	0.00510	0.00066	0.00089	0.00114	0.10450
	14	0.10199	0.00726	0.01007	0.00980	0.00111	0.00832	0.32825
	15	0.05345	0.00616	0.00593	0.00930	0.00429	0.04132	0.03708
	16	0.06054	0.01420	0.01478	0.00839	0.00228	0.06549	0.07893
	17	0.23621	0.00277	0.01375	0.00708	0.00118	0.10729	0.00010
	18	0.06007	0.05988	0.00475	0.01424	0.00437	0.10023	0.03779
	19	0.00895	0.00096	0.06119	0.03103	0.01537	0.03159	0.02246
	20	0.01076	0.00216	0.01219	0.01644	0.01231	0.01576	0.05497
	21	0.00275	0.00075	0.01976	0.05966	0.09735	0.02620	0.00650
	22	0.01188	0.00255	0.03540	0.04900	0.04803	0.05747	0.04765
	23	0.00104	0.00002	0.02291	0.00845	0.08565	0.00316	0.00009

Table L-3

Interregional Interindustry Multiplier Matrix

YOUGHIOGHENY

INDUSTRY		1	2	3	4	5	6	7	8	9	10	11
YOUGHIOGHENY	1	1.05079	0.00001	0.00001	0.00003	0.07431	0.00534	0.00021	0.00802	0.00081	0.00338	0.00009
	2	0.00408	1.01859	0.00016	0.00032	0.00453	0.00546	0.01584	0.00298	0.05106	0.00465	0.00154
	3	0.00065	0.00000	1.00004	0.00000	0.00004	0.00002	0.00004	0.08159	0.00003	0.00001	0.00000
	4	0.00236	0.00004	0.00005	1.00024	0.00122	0.00126	0.00057	0.00011	0.00016	0.00124	0.00024
	5	0.00440	0.00000	0.00000	0.03301	1.01572	0.00057	0.00056	0.00002	0.00001	0.00005	0.00008
	6	0.00015	0.00003	0.00001	0.00117	0.00091	1.00915	0.00044	0.08036	0.03037	0.00007	0.00048
	7	0.00195	0.00021	0.00008	0.00033	0.00138	0.00354	1.00844	0.00383	0.00175	0.00028	0.00037
	8	0.00008	0.00001	0.00000	0.00000	0.03033	0.00002	0.00005	1.00006	0.00002	0.00001	0.00050
	9	0.00057	0.00015	0.00008	0.00007	0.00063	0.00104	0.00059	0.00005	1.00045	0.00018	0.00074
	10	0.00057	0.00012	0.00001	0.00005	0.00064	0.00319	0.00024	0.00003	0.00007	1.01064	0.00252
	11	0.00011	0.00004	0.00001	0.00025	0.00036	0.00230	0.00021	0.00006	0.00020	0.00025	1.00258
	12	0.00169	0.00173	0.00011	0.00010	0.00972	0.00195	0.00357	0.00067	0.00105	0.00037	0.00242
	13	0.00206	0.00245	0.00046	0.00058	0.00570	0.00249	0.00715	0.00109	0.00084	0.00044	0.04933
	14	0.00161	0.00032	0.00043	0.00027	0.01217	0.00197	0.00309	0.00206	0.00071	0.00077	0.00312
	15	0.00568	0.00094	0.00044	0.00018	0.00061	0.00067	0.00080	0.00016	0.00015	0.00016	0.00046
	16	0.00015	0.00005	0.00037	0.00005	0.00023	0.00013	0.00011	0.00807	0.00035	0.00044	0.00018
	17	0.00013	0.00003	0.00002	0.00003	0.00011	0.00305	0.00004	0.00092	0.00022	0.00024	0.00004
	18	0.00011	0.00001	0.00002	0.00013	0.00019	0.00017	0.00018	0.00005	0.00004	0.00002	0.00006
	19	0.00419	0.00085	0.00069	0.00111	0.00885	0.00509	0.00316	0.00264	0.00368	0.00136	0.00097
	20	0.00622	0.00063	0.00037	0.00089	0.00857	0.00537	0.00210	0.08064	0.00066	0.00125	0.00163
	21	0.00039	0.00004	0.00014	0.00007	0.00033	0.00017	0.00010	0.00015	0.00002	0.00004	0.00004
	22	0.00025	0.00002	0.00005	0.00009	0.00045	0.00019	0.00021	0.00009	0.00004	0.00004	0.00002
	23	0.00125	0.00005	0.00009	0.00512	0.00157	0.00039	0.00019	0.00017	0.00004	0.00028	0.00028
REST OF APPALACHIA	1	0.05944	0.00017	0.00028	0.03109	0.39259	0.03420	0.00263	0.00046	0.00044	0.02925	0.00175
	2	0.03285	0.10267	0.00180	0.00391	0.04459	0.04371	0.10126	0.01965	0.00901	0.00469	0.01524
	3	0.00143	0.00011	0.00101	0.03009	0.00136	0.00066	0.00109	0.03652	0.00011	0.00018	0.00011
	4	0.00088	0.00008	0.00015	0.01161	0.00238	0.00216	0.00110	0.00030	0.00028	0.00041	0.00041
	5	0.01685	0.00002	0.00002	0.00910	0.05540	0.00250	0.00207	0.00011	0.00010	0.00037	0.00025
	6	0.00404	0.00063	0.00027	0.02255	0.01935	0.17193	0.00936	0.00145	0.00722	0.00172	0.00945
	7	0.03394	0.00334	0.00134	0.00595	0.03089	0.05916	0.11802	0.01204	0.02483	0.00530	0.00054
	8	0.00301	0.00024	0.00013	0.03017	0.00330	0.00133	0.00176	0.08167	0.00021	0.00041	0.00024
	9	0.00687	0.00159	0.00084	0.00110	0.00848	0.01242	0.00670	0.00104	0.03461	0.00147	0.00753
	10	0.01775	0.00284	0.00099	0.00264	0.02261	0.07411	0.00687	0.00145	0.00207	0.20668	0.05679
	11	0.00088	0.00023	0.00002	0.00196	0.00238	0.01267	0.00131	0.00041	0.00106	0.00145	0.01312
	12	0.01737	0.01042	0.00104	0.00162	0.36081	0.01568	0.02315	0.00675	0.00545	0.00592	0.01302
	13	0.00559	0.00520	0.00116	0.00146	0.01479	0.00452	0.01571	0.00799	0.00202	0.00228	0.01924
	14	0.00469	0.00080	0.00098	0.03074	0.32712	0.00515	0.00713	0.00454	0.83154	0.00193	0.00680
	15	0.00221	0.00215	0.00094	0.00045	0.00191	0.00176	0.00204	0.00055	0.03035	0.00043	0.00117
	16	0.00082	0.00026	0.00034	0.00026	0.00129	0.00073	0.00060	0.00037	0.00023	0.00021	0.00076
	17	0.00076	0.00019	0.00010	0.00019	0.00070	0.00031	0.03028	0.00013	0.00013	0.00011	0.00022
	18	0.00057	0.00007	0.00011	0.00112	0.00099	0.00109	0.00132	0.00024	0.00031	0.00061	0.00067
	19	0.01741	0.00350	0.00288	0.03459	0.03666	0.02117	0.01309	0.01093	0.00283	0.00562	0.00403
	20	0.02239	0.00225	0.00132	0.00316	0.03103	0.01717	0.00748	0.00227	0.00734	0.00447	0.00582
	21	0.01310	0.00121	0.00454	0.00251	0.01133	0.00583	0.00320	0.00504	0.03076	0.00121	0.00132
	22	0.00363	0.00024	0.00069	0.00127	0.00660	0.00289	0.00309	0.00139	0.00053	0.00057	0.00070
	23	0.01139	0.00095	0.00080	0.00113	0.00961	0.00352	0.00171	0.00151	0.00038	0.00259	0.00251
REST OF THE U.S.	1	0.16140	0.00064	0.00127	0.03445	0.29135	0.04558	0.00025	0.00215	0.02181	0.01473	0.00437
	2	0.01923	0.00479	0.00204	0.00477	0.03428	0.03012	0.02829	0.00901	0.00687	0.00426	0.00876
	3	0.07224	0.00621	0.02707	0.00570	0.05275	0.04218	0.06785	0.91260	0.00636	0.01162	0.00704
	4	0.03242	0.00258	0.00591	0.13605	0.06778	0.04867	0.03110	0.01221	0.00675	0.00882	0.00952
	5	0.05463	0.00018	0.00018	0.04096	0.16721	0.01228	0.00780	0.00070	0.00079	0.00193	0.00119
	6	0.02042	0.00256	0.00171	0.06632	0.06902	0.45080	0.03359	0.00659	0.02093	0.00681	0.02786
	7	0.08221	0.00791	0.00401	0.01994	0.09119	0.16402	0.23890	0.02996	0.85231	0.01624	0.01982
	8	0.10282	0.00406	0.00564	0.00621	0.09171	0.04063	0.07320	0.05358	0.00691	0.01494	0.00778
	9	0.05734	0.01187	0.00698	0.01194	0.07805	0.10752	0.05507	0.01275	0.03314	0.01541	0.05920
	10	0.02814	0.00379	0.00231	0.01087	0.04459	0.12339	0.01454	0.00528	0.00530	0.20164	0.85624
	11	0.00844	0.00137	0.00127	0.00826	0.01890	0.05554	0.00926	0.00344	0.00457	0.00588	0.03755
	12	0.02616	0.00527	0.00213	0.00486	0.04963	0.02318	0.02007	0.00533	0.00507	0.00565	0.01018
	13	0.01822	0.00601	0.00335	0.00433	0.04327	0.02044	0.02362	0.00954	0.00468	0.00514	0.01818
	14	0.01696	0.00440	0.00465	0.03556	0.10218	0.03253	0.03271	0.02021	0.00746	0.00918	0.02453
	15	0.02529	0.01614	0.00772	0.00572	0.03391	0.02350	0.02365	0.01196	0.00459	0.00529	0.01314
	16	0.01494	0.00374	0.00450	0.00420	0.02353	0.01303	0.01005	0.00729	0.00327	0.00341	0.00962
	17	0.01316	0.00211	0.00210	0.00377	0.01997	0.00904	0.03233	0.00439	0.00208	0.00723	0.00340
	18	0.01199	0.00153	0.00225	0.01686	0.02126	0.01872	0.02005	0.00535	0.00462	0.00266	0.00706
	19	0.03077	0.00601	0.00496	0.00814	0.06438	0.03764	0.02309	0.01925	0.00501	0.00981	0.00718
	20	0.01244	0.00106	0.00107	0.00314	0.02201	0.01643	0.00630	0.08353	0.00171	0.00274	0.00319
	21	0.04909	0.00444	0.01644	0.00931	0.04298	0.02217	0.01246	0.01979	0.00285	0.00458	0.00495
	22	0.04740	0.00312	0.00888	0.01649	0.08598	0.03832	0.04202	0.01869	0.03699	0.00749	0.00918
	23	0.00891	0.00064	0.00144	0.00137	0.01023	0.00464	0.00235	0.00235	0.00053	0.00183	0.00163

INDUSTRY		12	13	14	15	16	17	18	19	20	21	22	23
YOUGHIOGHENY	1	0.00083	0.00002	0.00002	0.00003	0.00862	0.00003	0.00002	0.00017	0.00084	0.00712	0.00010	0.00101
	2	0.01568	0.06840	0.00956	0.00613	0.00418	0.00809	0.00060	0.01513	0.00137	0.00304	0.03294	0.02451
	3	0.00001	0.00001	0.00001	0.00001	0.00001	0.00081	0.00000	0.00006	0.00003	0.00005	0.00102	0.00005
	4	0.00615	0.00036	0.00028	0.00022	0.00023	0.00034	0.00004	0.00144	0.00190	0.00274	0.02861	0.00062
	5	0.00002	0.00003	0.00001	0.00001	0.00001	0.00002	0.00002	0.00015	0.00070	0.00019	0.00005	0.00010
	6	0.00024	0.00012	0.00015	0.00011	0.00019	0.00031	0.00009	0.09011	0.00054	0.00019	0.00056	0.00034
	7	0.00057	0.00083	0.00044	0.00027	0.00058	0.00062	0.00019	0.00826	0.00047	0.00038	0.00048	0.00742
	8	0.00001	0.00001	0.00001	0.00081	0.00000	0.00001	0.00000	0.00010	0.00006	0.00003	0.00002	0.00008
	9	0.00072	0.00033	0.00033	0.00068	0.00079	0.00185	0.00013	0.00061	0.00061	0.00034	0.00112	0.00111
	10	0.00011	0.00022	0.00050	0.00031	0.00025	0.00063	0.00003	0.00027	0.00024	0.00067	0.00015	0.01539
	11	0.00017	0.00024	0.00052	0.00045	0.00167	0.00077	0.00021	0.00056	0.00085	0.00062	0.00340	0.00308
	12	1.01567	0.00615	0.00318	0.00325	0.00511	0.00680	0.00107	0.00132	0.00378	0.00216	0.00342	0.00920
	13	0.00129	1.09451	0.07714	0.04317	0.02683	0.05306	0.00381	0.00508	0.00262	0.00474	0.00572	0.05862
	14	0.05089	0.00560	1.00860	0.00738	0.00621	0.01462	0.00105	0.00226	0.00194	0.00213	0.00214	0.04359
	15	0.00018	0.01044	0.00362	1.01120	0.00226	0.00542	0.00056	0.00076	0.00098	0.00089	0.00355	0.00442
	16	0.00008	0.00054	0.00048	0.00163	1.00382	0.00196	0.00040	0.00054	0.00040	0.00028	0.00192	0.00238
	17	0.00001	0.00013	0.00924	0.00055	0.00017	1.00769	0.00010	0.00051	0.00033	0.00011	0.00375	0.00014
	18	0.00003	0.00014	0.00025	0.00028	0.00056	0.00089	1.00055	0.00018	0.00633	0.00020	0.00122	0.00065
	19	0.00166	0.00334	0.00195	0.00198	0.08162	0.00345	0.00035	1.01084	0.00641	0.00429	0.00677	0.00747
	20	0.00093	0.00349	0.00239	0.00283	0.00239	0.00363	0.00060	0.00365	1.00452	0.00453	0.00451	0.01547
	21	0.00003	0.00009	0.00006	0.00008	0.00007	0.00015	0.00002	0.00028	0.00064	1.00099	0.00035	0.00023
	22	0.00004	0.00010	0.00007	0.00009	0.00011	0.00016	0.00003	0.00025	0.00067	0.00050	1.00046	0.00045
	23	0.00006	0.00036	0.00030	0.00049	0.00014	0.00033	0.00003	0.00268	0.00135	0.00730	0.00070	1.00052
REST OF APPALACHIA	1	0.00052	0.05063	0.00060	0.00065	0.80553	0.00097	0.00024	0.00198	0.00590	0.03809	0.00190	0.01112
	2	0.09011	0.41653	0.08924	0.05793	0.03792	0.07498	0.00656	0.09226	0.01719	0.03609	0.02854	0.21893
	3	0.00016	0.00044	0.00026	0.00025	0.00017	0.00035	0.00004	0.00164	0.00068	0.00130	0.00057	0.00161
	4	0.00027	0.00068	0.00052	0.00047	0.00048	0.00075	0.00009	0.00225	0.00335	0.00437	0.00427	0.00156
	5	0.00008	0.00015	0.00008	0.00008	0.00008	0.00013	0.00008	0.00055	0.00245	0.00102	0.00027	0.00080
	6	0.00480	0.00309	0.00343	0.00262	0.00425	0.08721	0.00180	0.00265	0.01115	0.00475	0.01362	0.00982
	7	0.00900	0.01498	0.00835	0.00576	0.00957	0.01237	0.00299	0.06565	0.00885	0.06927	0.01524	0.04102
	8	0.00034	0.00097	0.00055	0.00051	0.00034	0.00071	0.00008	0.00284	0.00150	0.00165	0.00102	0.00304
	9	0.00242	0.00437	0.00392	0.00756	0.00650	0.02023	0.00142	0.00742	0.00703	0.00450	0.01275	0.01332
	10	0.00716	0.08769	0.01197	0.00868	0.00647	0.81556	0.00096	0.01165	0.01941	0.03851	0.00758	0.30368
	11	0.00092	0.00150	0.00244	0.00254	0.00582	0.00439	0.00111	0.00288	0.00477	0.00278	0.01702	0.01933
	12	0.00368	0.04232	0.02297	0.02457	0.03056	0.04369	0.08632	0.01651	0.02706	0.03361	0.02338	0.37441
	13	0.00301	0.18830	0.15346	0.08838	0.05527	0.11170	0.00798	0.01238	0.00492	0.01258	0.01533	0.12455
	14	0.00209	0.01312	0.01879	0.01639	0.01356	0.03276	0.08231	0.00615	0.00508	0.00765	0.00601	0.09134
	15	0.00050	0.02342	0.00876	0.02423	0.00534	0.01268	0.00128	0.00199	0.00238	0.00192	0.00864	0.01098
	16	0.00037	0.00268	0.00233	0.00749	0.01706	0.00924	0.00179	0.00258	0.00201	0.00194	0.00410	0.01090
	17	0.00099	0.00076	0.00142	0.00319	0.00098	0.04416	0.00057	0.00295	0.00191	0.00065	0.02094	0.00033
	18	0.00024	0.00083	0.00222	0.00216	0.00514	0.00745	0.00570	0.00147	0.00236	0.00121	0.01103	0.00524
	19	0.00682	0.01386	0.00608	0.00325	0.00673	0.01434	0.00145	0.04303	0.02666	0.01778	0.02795	0.03099
	20	0.00331	0.01247	0.00852	0.01008	0.00851	0.01294	0.00212	0.01302	0.01607	0.01620	0.06603	0.05503
	21	0.00111	0.00320	0.00216	0.00271	0.00231	0.00340	0.00052	0.00669	0.02149	0.03307	0.01163	0.00776
	22	0.00055	0.00142	0.00109	0.00140	0.00159	0.00242	0.00037	0.00426	0.00715	0.00592	0.08676	0.00668
	23	0.00057	0.00330	0.00273	0.00446	0.00123	0.00301	0.00024	0.02437	0.01226	0.06639	0.00659	0.00473
REST OF THE U.S.	1	0.00163	0.00252	0.00212	0.00220	0.00222	0.00405	0.00074	0.00536	0.01422	0.03004	0.00814	0.01926
	2	0.00773	0.04835	0.03345	0.02983	0.02212	0.05079	0.00416	0.01951	0.01683	0.02005	0.02852	0.07130
	3	0.01035	0.02736	0.01613	0.01649	0.01054	0.02303	0.00246	0.11385	0.05852	0.00246	0.03742	0.10847
	4	0.00671	0.01742	0.01324	0.01456	0.81549	0.02498	0.00338	0.05008	0.09188	0.08436	0.48323	0.85819
	5	0.00054	0.00096	0.00063	0.00064	0.00070	0.00119	0.08035	0.00223	0.00806	0.00475	0.00208	0.00376
	6	0.01438	0.01366	0.01316	0.01258	0.01717	0.03185	0.00603	0.01524	0.04034	0.02301	0.07126	0.04406
	7	0.02063	0.03729	0.02313	0.02110	0.02909	0.04673	0.00816	0.02840	0.03244	0.03066	0.05996	0.10592
	8	0.01151	0.03038	0.01792	0.01846	0.01163	0.82561	0.00271	0.12838	0.00689	0.05604	0.04132	0.12175
	9	0.01845	0.03992	0.03351	0.06222	0.06727	0.16546	0.01174	0.05947	0.06603	0.04157	0.11063	0.11378
	10	0.00962	0.01485	0.01768	0.01647	0.01395	0.03246	0.00269	0.02253	0.03202	0.04591	0.02863	0.31497
	11	0.00411	0.00946	0.01167	0.01279	0.02168	0.32376	0.00436	0.01545	0.02467	0.01824	0.06229	0.06787
	12	0.03056	0.02994	0.01906	0.02308	0.02605	0.06636	0.00488	0.02068	0.02641	0.03218	0.03209	0.15893
	13	0.00531	0.12159	0.09618	0.08421	0.05710	0.14049	0.00975	0.02511	0.02256	0.02696	0.05670	0.15046
	14	0.00945	0.05747	0.06641	0.06770	0.05459	0.14196	0.00984	0.04385	0.03034	0.04417	0.05056	0.29196
	15	0.00589	0.18223	0.08076	0.17804	0.05189	0.12975	0.01150	0.02498	0.02900	0.02665	0.07745	0.11814
	16	0.00485	0.03811	0.03000	0.08453	0.17116	0.11366	0.01922	0.03343	0.03061	0.02574	0.10602	0.12344
	17	0.00202	0.01240	0.01356	0.02692	0.01171	0.27868	0.00478	0.02788	0.03018	0.01605	0.14016	0.82419
	18	0.00380	0.01502	0.02872	0.03136	0.06662	0.10133	0.06366	0.02018	0.03775	0.02213	0.11976	0.07396
	19	0.01172	0.82416	0.01420	0.01461	0.01195	0.02550	0.00258	0.07450	0.04028	0.03123	0.04877	0.05447
	20	0.00176	0.00758	0.00533	0.00715	0.00601	0.01273	0.08136	0.00764	0.01015	0.01072	0.01370	0.02176
	21	0.00414	0.01204	0.80813	0.01020	0.00870	0.31301	0.00197	0.03262	0.07620	0.11961	0.04382	0.02931
	22	0.00120	0.01876	0.01421	0.01836	0.02078	0.03284	0.00483	0.05500	0.12358	0.01598	0.08718	0.08592
	23	0.00081	0.00330	0.00232	0.00336	0.08173	0.00371	0.00037	0.01204	0.01053	0.03025	0.00709	0.00666

Table L-3 (Cont.)

REST OF APPALACHIA

Industry		1	2	3	4	5	6	7	8	9	10	11	12
YOUGHIOGHENY	1	0.00783	0.00001	0.00001	0.00003	0.01078	0.00093	0.00008	0.00001	0.00001	0.00056	0.00005	0.00002
	2	0.00268	0.00860	0.00015	0.00031	0.00358	0.00152	0.00847	0.08164	0.00374	0.00041	0.00131	0.00746
	3	0.00005	0.00800	0.00003	0.00000	0.00036	0.00002	0.00004	0.00092	0.00000	0.00001	0.00000	0.00001
	4	0.00037	0.00003	0.00005	0.00522	0.00057	0.00079	0.00040	0.00011	0.00310	0.00014	0.00015	0.00010
	5	0.00140	0.00000	0.00000	0.00001	0.00825	0.03029	0.00074	0.00001	0.00081	0.00004	0.00004	0.00001
	6	0.00019	0.00002	0.00001	0.00053	0.00057	0.02403	0.03723	0.00004	0.00017	0.00014	0.00022	0.00011
	7	0.00054	0.00009	0.00024	0.00016	0.02279	0.00152	0.03289	0.02331	0.02051	0.00014	0.00018	0.00022
	8	0.00002	0.00009	0.00000	0.00000	0.00052	0.00001	0.00002	0.00002	0.00000	0.00000	0.00000	0.00000
	9	0.00029	0.00009	0.00005	0.00006	0.00046	0.00068	0.00038	0.00036	0.00026	0.00011	0.00043	0.00014
	10	0.00020	0.00003	0.00001	0.00004	0.00027	0.00077	0.00078	0.00032	0.00023	0.00180	0.00040	0.00007
	11	0.00010	0.00002	0.00001	0.00014	0.00024	0.00118	0.00013	0.00004	0.00010	0.00014	0.00019	0.00009
	12	0.00071	0.00040	0.00036	0.00010	0.00258	0.00080	0.00099	0.08024	0.00026	0.00047	0.00062	0.00289
	13	0.00196	0.00179	0.00019	0.00051	0.00504	0.00778	0.00540	0.00101	0.00070	0.00049	0.00064	0.00103
	14	0.00119	0.00010	0.00027	0.00018	0.00404	0.00172	0.00144	0.00193	0.00037	0.00049	0.00151	0.00049
	15	0.00158	0.00080	0.00017	0.00010	0.00073	0.00058	0.00086	0.00016	0.00244	0.00039	0.00028	0.00012
	16	0.00013	0.00004	0.00095	0.00004	0.00021	0.01012	0.00014	0.00006	0.00093	0.00004	0.00010	0.00005
	17	0.00039	0.00012	0.00001	0.00002	0.00011	0.00005	0.00004	0.00002	0.01002	0.00001	0.00003	0.00001
	18	0.00001	0.03031	0.00002	0.00016	0.00019	0.03010	0.00020	0.00005	0.00005	0.00002	0.00007	0.00004
	19	0.00013	0.00083	0.00065	0.00109	0.00849	0.00567	0.00311	0.00260	0.00067	0.00134	0.00096	0.00162
	20	0.00602	0.00061	0.00036	0.00085	0.00828	0.00517	0.00206	0.00065	0.00064	0.00124	0.00158	0.00090
	21	0.00039	0.00004	0.00013	0.00007	0.00033	0.00017	0.00010	0.00815	0.00002	0.00004	0.00004	0.00003
	22	0.00024	0.00002	0.00005	0.00008	0.00044	0.00019	0.00021	0.00009	0.00004	0.00004	0.00005	0.00004
	23	0.00121	0.00005	0.00009	0.00012	0.00104	0.00035	0.00019	0.00017	0.00004	0.00024	0.00027	0.00006
REST OF APPALACHIA	1	1.27165	0.00219	0.00029	0.00101	0.40057	0.03485	0.00257	0.00044	0.00042	0.02153	0.00181	0.00032
	2	0.03353	1.10912	0.00178	0.03355	0.84378	0.04467	0.10540	0.02767	0.00931	0.03440	0.01426	0.00474
	3	0.02103	0.00118	1.00351	0.00307	0.00148	0.00074	0.00167	0.13242	0.00912	0.03922	0.00012	0.00020
	4	0.00066	0.00408	0.00014	1.03403	0.80215	0.00186	0.00079	0.00329	0.00724	0.00036	0.01036	0.00024
	5	0.01691	0.00002	0.00002	0.00009	1.05637	0.00247	0.00215	0.00011	0.00310	0.00035	0.00025	0.00009
	6	0.00310	0.00054	0.00024	0.01461	0.81736	1.15044	0.00950	0.00134	0.00639	0.00160	0.00833	0.00426
	7	0.03776	0.00380	0.00193	0.00547	0.03199	0.86620	1.14055	0.01426	0.07742	0.00594	0.09720	0.01028
	8	0.00626	0.00157	0.00031	0.00021	0.00428	0.00197	0.00447	1.00583	0.00028	0.00069	0.00033	0.00065
	9	0.00677	0.00157	0.00083	0.00169	0.00832	0.01225	0.00570	0.00107	1.00458	0.00187	0.00746	0.00239
	10	0.01897	0.00328	0.00107	0.00263	0.02351	0.08273	0.00749	0.00151	0.00217	1.24511	0.05932	0.00807
	11	0.00083	0.00019	0.00009	0.00115	0.01205	0.00753	0.03110	0.00035	0.00081	0.00110	1.00945	0.00071
	12	0.01219	0.01045	0.00103	0.00139	0.06061	0.01546	0.02344	0.00481	0.00652	0.00603	0.01497	1.00448
	13	0.00546	0.00488	0.00108	0.00140	0.01350	0.00030	0.01498	0.00277	0.00194	0.00221	0.01796	0.00284
	14	0.00465	0.00074	0.00070	0.00370	0.02471	0.00482	0.00464	0.00422	0.00152	0.00183	0.00617	0.00187
	15	0.00174	0.00149	0.00085	0.00036	0.00184	0.00145	0.00164	0.00056	0.00030	0.00035	0.00095	0.00042
	16	0.00077	0.00022	0.00027	0.00022	0.00123	0.00068	0.00056	0.00036	0.00019	0.00019	0.00061	0.00030
	17	0.00063	0.00014	0.00009	0.00015	0.00068	0.00030	0.00025	0.00013	0.00011	0.00010	0.00018	0.00008
	18	0.00656	0.00007	0.00011	0.00107	0.00078	0.03106	0.00128	0.00024	0.00030	0.00051	0.00045	0.00023
	19	0.01738	0.00350	0.00286	0.00458	0.03660	0.02114	0.01309	0.01094	0.00283	0.00562	0.00403	0.00461
	20	0.00202	0.00224	0.00132	0.00312	0.03026	0.01888	0.00753	0.00237	0.00234	0.00453	0.00578	0.00328
	21	0.01343	0.00121	0.00452	0.00269	0.01128	0.00581	0.00327	0.00507	0.00975	0.00141	0.00131	0.00111
	22	0.00362	0.00024	0.00059	0.00127	0.00654	0.00288	0.00309	0.00140	0.00053	[illegible]	0.00070	0.00055
	23	0.01125	0.00044	0.00080	0.00112	0.02957	0.00349	0.00171	0.00131	0.00078	0.00261	0.00250	0.00057
REST OF THE U.S.	1	0.19295	0.00064	0.00127	0.89454	0.33889	0.04931	0.00843	0.00715	0.02183	0.01826	0.00434	0.00166
	2	0.01994	0.00833	0.90207	0.00454	0.03604	0.03108	0.03044	0.00838	0.03509	0.00427	0.04998	0.01111
	3	0.09184	0.09816	0.02454	0.00569	0.08263	0.04210	0.06727	0.81744	0.03633	0.01159	0.00703	0.01031
	4	0.03298	0.00259	0.00592	0.14270	0.38837	0.04942	0.03137	0.81221	0.03694	0.00895	0.00960	0.00679
	5	0.05709	0.00018	0.00018	0.00046	0.17572	0.01258	0.00805	0.00070	0.00079	0.00175	0.00122	0.00055
	6	0.02070	0.00262	0.00173	0.00470	0.07144	0.47730	0.03463	0.00672	0.02196	0.00494	0.02923	0.01504
	7	0.07449	0.00757	0.00386	0.01959	0.59068	0.15900	0.22191	0.02826	0.04896	0.01375	0.01935	0.01970
	8	0.07960	0.00873	0.00547	0.00618	0.09075	0.04600	0.07052	0.07947	0.00684	0.01266	0.00769	0.01120
	9	0.05762	0.01195	0.00701	0.01198	0.07438	0.10805	0.05529	0.01272	0.03336	0.01540	0.05459	0.01856
	10	0.02749	0.00352	0.00225	0.01108	0.94411	0.11719	0.01438	0.03522	0.03525	0.17203	0.04978	0.00897
	11	0.00990	0.00142	0.00127	0.00469	0.21935	0.05971	0.00956	0.00352	0.00492	0.00628	0.04262	0.00439
	12	0.02071	0.00658	0.00219	0.00358	0.05679	0.02448	0.02236	0.00670	0.00579	0.00685	0.01204	0.04235
	13	0.01643	0.00702	0.00350	0.00468	0.04492	0.02037	0.02589	0.09976	0.00490	0.00536	0.02230	0.00573
	14	0.03165	0.00466	0.00493	0.82568	0.11770	0.03360	0.03464	0.02155	0.00792	0.00959	0.02677	0.00905
	15	0.02616	0.01738	0.00829	0.00589	0.03412	0.02408	0.02437	0.01195	0.09473	0.00543	0.01354	0.00603
	16	0.01451	0.00379	0.00460	0.00423	0.02362	0.01310	0.01090	0.00738	0.00332	0.00344	0.00984	0.00495
	17	0.01332	0.00216	0.00212	0.00381	0.02000	0.00908	0.00834	0.00439	0.00211	0.01225	0.00365	0.00203
	18	0.01194	0.00151	0.00225	0.01484	0.02125	0.01873	0.02004	0.00505	0.00462	0.01234	0.00707	0.00380
	19	0.03045	0.03604	0.00498	0.00817	0.06460	0.03774	0.02314	0.81928	0.00302	0.00963	0.00715	0.01177
	20	0.01307	0.00110	0.00108	0.00322	0.02317	0.01692	0.00628	0.00342	0.00172	0.00468	0.00329	0.08182
	21	0.04918	0.00445	0.01649	0.80933	0.04303	0.02219	0.01247	0.01976	0.00286	0.00458	0.00495	0.00415
	22	0.04761	0.03212	0.00888	0.01649	0.05601	0.03839	0.84003	0.01569	0.00597	0.00749	0.00918	0.00720
	23	0.00910	0.03064	0.00144	0.00138	0.81051	0.00468	0.00236	0.00235	0.08053	0.00181	0.00164	0.00081

Industry		13	14	15	16	17	18	19	20	21	22	23
YOUGHIOGHENY	1	0.00002	0.00002	0.00002	0.00002	0.00003	0.00001	0.00006	0.00018	0.00103	0.00006	0.00032
	2	0.03542	0.00793	0.00506	0.00345	0.00042	0.00056	0.00777	0.00142	0.00256	0.00235	0.01823
	3	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000	0.00006	0.00003	0.00004	0.00002	0.00006
	4	0.00025	0.00020	0.00017	0.00018	0.00021	0.00003	0.00084	0.00120	0.00158	0.01442	0.00054
	5	0.00002	0.00001	0.00001	0.00001	0.00002	0.00001	0.00007	0.00029	0.00012	0.00094	0.00008
	6	0.00005	0.00009	0.00007	0.00010	0.00018	0.00004	0.00007	0.00027	0.00012	0.00034	0.00025
	7	0.00040	0.00023	0.00017	0.00026	0.00036	0.00009	0.00017	0.00025	0.00026	0.00043	0.00106
	8	0.00001	0.00000	0.00000	0.00000	0.00001	0.00000	0.00003	0.00001	0.00001	0.00001	0.00003
	9	0.00024	0.00022	0.00042	0.00048	0.00112	0.00008	0.00042	0.00039	0.00025	0.00070	0.00074
	10	0.00010	0.00013	0.00011	0.00008	0.00019	0.00001	0.00012	0.00022	0.00038	0.00013	0.00271
	11	0.00015	0.00027	0.00024	0.00052	0.00041	0.00010	0.00029	0.00045	0.00030	0.00161	0.00174
	12	0.00193	0.00114	0.00111	0.00130	0.00206	0.00024	0.00094	0.00116	0.00184	0.00147	0.01355
	13	0.06340	0.05165	0.02962	0.01857	0.03744	0.00768	0.00424	0.00742	0.00458	0.00914	0.04179
	14	0.00104	0.00420	0.00367	0.00392	0.00711	0.00092	0.00184	0.00122	0.00403	0.00148	0.01702
	15	0.04558	0.00167	0.00059	0.00113	0.00270	0.00025	0.00056	0.00031	0.00048	0.00155	0.00244
	16	0.00038	0.00011	0.00091	0.00148	0.00117	0.00021	0.00044	0.00029	0.00025	0.00112	0.00136
	17	0.00009	0.00015	0.00032	0.00011	0.00420	0.00006	0.00031	0.00022	0.00009	0.00200	0.00013
	18	0.00014	0.00031	0.00032	0.00071	0.00107	0.00074	0.00026	0.00019	0.00021	0.00153	0.00377
	19	0.00329	0.00192	0.00196	0.00160	0.00340	0.00034	0.01030	0.00033	0.00422	0.00063	0.00735
	20	0.00330	0.00225	0.00269	0.00229	0.00344	0.00058	0.00350	0.00440	0.00442	0.00435	0.01498
	21	0.00004	0.00006	0.00008	0.00007	0.00010	0.00002	0.00026	0.00062	0.00096	0.03034	0.00023
	22	0.00049	0.00007	0.00009	0.00011	0.00016	0.00002	0.00029	0.00065	0.00019	0.00045	0.00194
	23	0.00035	0.00024	0.00047	0.00013	0.00032	0.00003	0.00359	0.00132	0.00706	0.00069	0.00351
REST OF APPALACHIA	1	0.00062	0.00060	0.00060	0.03052	0.00097	0.00023	0.00198	0.00346	0.03985	0.00180	0.01192
	2	0.42788	0.00141	0.05359	0.03722	0.07366	0.02619	0.04693	0.01704	0.03027	0.02839	0.21701
	3	0.00052	0.00029	0.00030	0.00018	0.00039	0.00004	0.00238	0.00117	0.00272	0.00070	0.00216
	4	0.00060	0.00044	0.00043	0.00045	0.00070	0.00009	0.00193	0.00297	0.00304	0.03140	0.00153
	5	0.00015	0.00009	0.00008	0.00004	0.00013	0.00008	0.00056	0.00254	0.00098	0.00027	0.00080
	6	0.00265	0.00309	0.00241	0.00343	0.00655	0.00101	0.00267	0.01000	0.00442	0.01237	0.00910
	7	0.01625	0.00080	0.00588	0.01055	0.01299	0.00340	0.00622	0.00905	0.00980	0.01678	0.04590
	8	0.00159	0.00087	0.00066	0.00045	0.00101	0.00011	0.00877	0.00392	0.00317	0.00202	0.00756
	9	0.00425	0.00383	0.00743	0.00839	0.01990	0.00140	0.00736	0.00697	0.00447	0.01237	0.01313
	10	0.00786	0.01327	0.00927	0.00690	0.01609	0.00094	0.01396	0.02143	0.03075	0.00710	0.35746
	11	0.00123	0.00215	0.00194	0.00418	0.00339	0.00083	0.00242	0.00372	0.00247	0.01295	0.01531
	12	0.04125	0.02199	0.02109	0.03027	0.04272	0.00629	0.01640	0.02576	0.03453	0.02308	0.38403
	13	1.17653	0.14377	0.08241	0.05108	0.10413	0.00766	0.01107	0.00668	0.01247	0.01432	0.11552
	14	0.01182	1.01690	0.01478	0.01225	0.02953	0.00289	0.00585	0.00476	0.00759	0.00553	0.08253
	15	0.01652	0.00669	1.01639	0.00399	0.00961	0.00092	0.00164	0.00185	0.00166	0.00578	0.00650
	16	0.00224	0.00187	0.00561	1.01222	0.30716	0.00132	0.00204	0.00172	0.00146	0.00689	0.00821
	17	0.00062	0.00104	0.00227	0.00074	1.03968	0.00040	0.00217	0.00152	0.00058	0.01430	0.00082
	18	0.00079	0.00211	0.00295	0.00487	0.00707	1.00539	0.00114	0.00224	0.00119	0.01047	0.00500
	19	0.01382	0.00806	0.00823	0.06671	0.01431	0.00145	1.04359	0.02064	0.01776	0.02792	0.03095
	20	0.01206	0.00822	0.00983	0.00837	0.01256	0.00210	0.01304	1.01609	0.01617	0.01569	0.05487
	21	0.00319	0.00215	0.00270	0.00230	0.00338	0.00052	0.00896	0.02136	1.03206	0.01177	0.00772
	22	0.00142	0.00108	0.00134	0.00159	0.00241	0.00037	0.00428	0.00973	0.00591	1.00676	0.00686
	23	0.00322	0.00268	0.00441	0.00128	0.80295	0.00076	0.02438	0.01225	0.06641	0.00835	1.00469
REST OF THE U.S.	1	0.00253	0.00212	0.00221	0.00223	0.00406	0.00074	0.00544	0.01469	0.03436	0.00822	0.01914
	2	0.06997	0.04290	0.83526	0.02555	0.05737	0.00463	0.02221	0.01714	0.02634	0.02926	0.08450
	3	0.02729	0.01609	0.01645	0.01852	0.02300	0.00245	0.11313	0.05822	0.06104	0.03728	0.10792
	4	0.01760	0.01339	0.81464	0.81558	0.82501	0.00339	0.05088	0.09198	0.08629	0.50609	0.03825
	5	0.00097	0.00063	0.00064	0.00070	0.00120	0.00036	0.00229	0.00842	0.00488	0.00216	0.00377
	6	0.01345	0.01356	0.01286	0.01767	0.03265	0.00627	0.01567	0.06195	0.02341	0.07271	0.05491
	7	0.03645	0.02289	0.02108	0.02641	0.04638	0.00784	0.02317	0.03186	0.03039	0.05536	0.10240
	8	0.02977	0.01761	0.01802	0.01152	0.02532	0.00268	0.12251	0.06249	0.05453	0.04033	0.11725
	9	0.04012	0.03370	0.06262	0.06769	0.16631	0.01180	0.05976	0.00091	0.04169	0.11123	0.11434
	10	0.01481	0.01676	0.01609	0.01369	0.03157	0.00270	0.02231	0.03052	0.04576	0.02934	0.27347
	11	0.00982	0.01262	0.01358	0.02372	0.07512	0.00475	0.01591	0.02612	0.01087	0.06882	0.07479
	12	0.03522	0.02199	0.02589	0.04816	0.05207	0.00571	0.02099	0.02666	0.03758	0.03464	0.21196
	13	0.16456	0.13127	0.10374	0.08895	0.16368	0.01139	0.02665	0.02496	0.02923	0.05828	0.17636
	14	0.06132	0.07266	0.07303	0.05909	0.15268	0.01059	0.03685	0.03134	0.04432	0.05172	0.32444
	15	0.19499	0.08449	0.19268	0.05437	0.13575	0.01217	0.82561	0.02497	0.02711	0.88226	0.12094
	16	0.03878	0.03063	0.08713	0.17787	0.11654	0.01988	0.03482	0.03101	0.02545	0.10907	0.12715
	17	0.01258	0.01403	0.02807	0.01201	0.29549	0.00498	0.02887	0.03067	0.01619	0.14785	0.02425
	18	0.01505	0.02877	0.03142	0.06676	0.10152	0.06378	0.02080	0.03778	0.02416	0.13998	0.07609
	19	0.02425	0.01426	0.01466	0.01199	0.02566	0.00259	0.07482	0.04669	0.03131	0.04895	0.05463
	20	0.00817	0.00576	0.00755	0.00632	0.01330	0.00140	0.00771	0.01025	0.01085	0.01400	0.02242
	21	0.01206	0.00814	0.01021	0.00872	0.01302	0.00197	0.03266	0.07854	0.11985	0.04389	0.02934
	22	0.01877	0.01422	0.01837	0.02079	0.03205	0.00683	0.05502	0.12362	0.07600	0.08721	0.05594
	23	0.00339	0.00238	0.00342	0.00176	0.00379	0.00038	0.01209	0.01857	0.03068	0.00715	0.00673

Table L-3 (Cont.)

REST OF THE U.S.

INDUSTRY		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
YOUGHIOGHENY	1	0.00080	0.00000	0.00001	0.00002	0.00136	0.00020	0.00004	0.00001	0.00001	0.00008	0.00002	0.00001	0.00001	0.00001	0.00001	0.00801	0.00002	0.00000	0.00003	0.00007	0.00017	0.00004	0.00009
	2	0.00140	0.00220	0.00013	0.00026	0.00232	0.00190	0.00299	0.00071	0.00039	0.00029	0.00678	0.00209	0.01111	0.00401	0.00284	0.00197	0.00416	0.00033	0.00262	0.00113	0.00167	0.00179	0.00790
	3	0.00005	0.00000	0.00001	0.00000	0.00034	0.00002	0.00003	0.00346	0.00000	0.00001	0.00000	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000	0.00006	0.00003	0.00003	0.00002	0.00005
	4	0.00028	0.00002	0.00005	0.00006	0.00032	0.00037	0.00023	0.00010	0.00005	0.00032	0.00007	0.00005	0.00014	0.00011	0.00012	0.00012	0.00020	0.00003	0.00018	0.00044	0.00061	0.00368	0.00346
	5	0.00052	0.00000	0.00010	0.00031	0.00157	0.00012	0.00008	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000	0.00002	0.00006	0.00005	0.00002	0.00004
	6	0.00006	0.00001	0.00001	0.00020	0.08021	0.03139	0.00010	0.00002	0.00006	0.00002	0.00009	0.00005	0.00005	0.00004	0.00004	0.00005	0.00010	0.00002	0.00005	0.00012	0.00007	0.00020	0.00014
	7	0.00049	0.00005	0.01002	0.00011	0.00053	0.00094	0.00145	0.00017	0.00031	0.00008	0.00011	0.00013	0.00024	0.00015	0.00012	0.00017	0.00026	0.00005	0.00013	0.00018	0.00019	0.00030	0.00064
	8	0.00031	0.00000	0.00008	0.00000	0.00301	0.00001	0.00001	0.00001	[illegible]	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00002	0.00001	0.00001	0.00001	0.00002
	9	0.00020	0.00004	0.00002	0.00004	0.00027	0.03036	0.00019	0.00005	0.00011	0.00005	0.00018	0.00006	0.00015	0.00012	0.00021	0.00022	0.00054	0.00004	0.00021	0.00021	0.00015	0.00037	0.00039
	10	0.00004	0.00012	0.00021	0.00304	0.00070	0.00353	0.00006	0.00002	0.00092	0.00105	0.00028	0.00205	0.00047	0.00009	0.00007	0.00006	0.00014	0.00001	0.00012	0.00035	0.00028	0.00011	0.00160
	11	0.00006	0.00001	0.00001	0.00005	0.00013	0.00032	0.00006	0.00002	0.00003	0.00004	0.00020	0.00003	0.00007	0.00007	0.00004	0.00012	0.00014	0.00002	0.00011	0.00015	0.00014	0.00035	0.00039
	12	0.00056	0.00026	0.00006	0.00009	0.00179	0.00063	0.00070	0.00019	0.00018	0.00015	0.00041	0.00177	0.00126	0.00075	0.00078	0.00069	0.00148	0.00018	0.00068	0.00085	0.00132	0.00091	0.00853
	13	0.00162	0.00073	0.00027	0.00038	0.00376	0.03176	0.00253	0.00080	0.00043	0.00049	0.00238	0.00056	0.01976	0.01587	0.01079	0.00701	0.01540	0.00110	0.00257	0.00198	0.00316	0.00429	0.01734
	14	0.00066	0.00007	0.00010	0.00012	0.00215	0.00066	0.00065	0.00039	0.00015	0.00019	0.00050	0.00018	0.00123	0.00138	0.00136	0.00107	0.00267	0.00019	0.00075	0.00066	0.00126	0.00095	0.00575
	15	0.00031	0.00020	0.00009	0.00007	0.00043	0.00029	0.00035	0.00014	0.00006	0.00007	0.00017	0.00008	0.00230	0.00108	0.00214	0.00066	0.00160	0.00014	0.00032	0.00035	0.00035	0.00092	0.00150
	16	0.00012	0.00003	0.00004	[illegible]	0.00019	0.00011	0.00009	0.00006	0.00003	0.00002	0.00008	0.00004	0.00031	0.00025	0.00068	0.00138	0.00091	0.00015	0.00028	0.00025	0.00022	0.00085	0.00100
	17	0.00006	0.00001	0.00001	[illegible]	0.00009	0.00004	0.00004	0.00002	0.00001	0.00001	0.00001	0.00001	0.00005	0.00005	0.00010	0.00005	0.00101	0.00002	0.00012	0.00012	0.00007	0.00052	0.00011
	18	0.00011	0.00001	0.00002	0.00013	0.00219	0.00017	0.00018	0.00004	0.00384	0.00002	0.00006	0.00003	0.00013	0.00026	0.00028	0.00058	0.00090	0.00037	0.00018	0.00034	0.00020	0.00145	0.00586
	19	0.00392	0.00078	0.00064	0.00104	0.00879	0.00453	0.00297	0.00247	0.00064	0.00127	0.00092	0.00152	0.00313	0.00184	0.00188	0.00154	0.00328	0.00033	0.00969	0.00598	0.00463	0.00829	0.00702
	20	0.00141	0.00015	0.00011	0.00020	0.00217	0.00146	0.00040	0.03826	0.00017	0.00030	0.00036	0.00022	0.00095	0.00064	0.00072	0.00059	0.00106	0.00014	0.00098	0.00110	0.00137	0.00128	0.00291
	21	0.00036	0.00003	0.00012	0.00007	0.00031	0.00016	0.00009	0.00014	0.00002	0.00003	0.00004	0.00003	0.00009	0.00006	0.00007	0.00008	0.00009	0.00001	0.00049	0.00057	0.00088	0.00032	0.00021
	22	0.00022	0.00001	0.00004	0.00008	0.00041	0.00018	0.00019	0.00009	[illegible]	0.00004	0.00004	0.00003	0.00009	0.00007	0.00009	0.00010	0.00015	0.00002	0.00028	0.00038	0.00036	0.00041	0.00041
	23	0.00065	0.00004	0.00358	0.00009	0.00068	0.00029	0.00015	0.00014	[illegible]	0.00014	0.00013	0.00005	0.00023	0.00017	0.00024	0.00011	0.00023	0.00002	0.00110	0.00075	0.00274	0.00046	0.00041
REST OF APPALACHIA	1	0.00347	0.00012	0.00026	0.00008	0.05250	0.00745	0.00115	0.00040	[illegible]	0.00302	0.00066	0.00026	0.00045	0.00046	0.00039	0.00037	0.00065	0.00012	0.00102	0.00242	0.00627	0.00138	0.00313
	2	0.01854	0.03255	0.00160	0.00330	0.02955	0.02558	0.04193	0.00956	[illegible]	0.00357	0.00431	0.03058	0.15271	0.04643	0.03441	0.02408	0.35848	0.00411	0.03824	0.01367	0.02012	0.02209	0.18293
	3	0.00124	0.00011	0.00033	0.00008	0.00115	0.03059	0.00091	0.01063	[illegible]	0.00016	0.00010	0.00014	0.00039	0.00023	0.00023	0.00015	0.00033	0.00004	0.00151	0.00081	0.00088	0.00053	0.00145
	4	0.00075	0.00006	0.00014	0.00285	0.00152	0.00109	0.00069	0.00028	0.00015	0.00020	0.00021	0.00015	0.00041	0.00031	0.00033	0.00035	0.00057	0.00008	0.00144	0.00261	0.00186	0.01014	0.00132
	5	0.00362	0.00301	0.00051	0.00038	0.00904	0.00025	0.00045	0.08005	0.00005	0.00013	0.00007	0.00006	0.00006	0.00005	0.00005	0.00005	0.00009	0.00002	0.00015	0.00048	0.00032	0.00015	0.00027
	6	0.00240	0.00032	0.00000	0.00790	0.50821	0.05511	0.00402	0.00078	0.00754	0.00081	0.00337	0.00177	0.00171	0.00141	0.00149	0.00203	0.00371	0.00072	0.00175	0.00474	0.00275	0.00704	0.00532
	7	0.01409	0.00122	0.00059	0.00283	0.01360	0.02354	0.03373	0.00414	0.00741	0.00269	0.00288	0.00309	0.00618	0.00374	0.00326	0.00424	0.00829	0.00112	0.00359	0.00473	0.00517	0.00704	0.01586
	8	0.00151	0.00015	0.00010	0.00013	0.00163	0.00086	0.00106	0.00104	0.00013	0.00022	0.00015	0.00021	0.00059	0.00035	0.00034	0.00026	0.00051	0.00005	0.00183	0.00103	0.00101	0.00077	0.00161
	9	0.00407	0.00065	0.00049	0.00085	0.00557	0.00756	0.00389	0.00871	0.00229	0.00109	0.00324	0.00132	0.00294	0.00240	0.00432	0.00465	0.01131	0.00081	0.00427	0.00428	0.00307	0.00763	0.00808
	10	0.03537	0.00065	0.00050	0.00160	0.00755	0.01588	0.00237	0.00132	0.00077	0.02345	0.00685	0.00145	0.00298	0.00280	0.00273	0.00201	0.00442	0.00039	0.00599	0.00541	0.01339	0.00466	0.03794
	11	0.00080	0.00009	0.00003	0.00050	0.00123	0.00343	0.00050	0.00023	0.00029	0.00037	0.00231	0.00027	0.00063	0.00075	0.00080	0.00132	0.00143	0.00026	0.00109	0.00158	0.00135	0.00379	0.00421
	12	0.00048	0.00234	0.00070	0.00108	0.01458	0.03564	0.00666	0.00201	0.03168	0.00197	0.00377	0.01415	0.01226	0.00731	0.00753	0.00786	0.01343	0.00158	0.00832	0.00878	0.01699	0.00898	[illegible]
	13	0.00451	0.00208	0.00082	0.00105	0.01051	0.00494	0.00715	0.00224	0.00121	0.00134	0.00978	0.00158	0.05652	0.04542	0.03077	0.01998	0.04385	0.00313	0.00726	0.00547	0.00876	0.01211	0.04917
	14	0.00237	0.00039	0.00035	0.00042	0.00788	0.00237	0.00733	0.00139	0.00053	0.00065	0.00176	0.00083	0.00432	0.00485	0.00474	0.00377	0.00443	0.00067	0.00285	0.00239	0.00432	0.00336	0.02037
	15	0.00109	0.00070	0.00032	0.00026	0.00149	0.00102	0.03105	0.00048	0.00520	0.00023	0.00060	0.00028	0.00805	0.00371	0.00757	0.00228	0.00559	0.00049	0.00112	0.00124	0.00122	0.00325	0.00519
	16	0.00069	0.00018	0.00021	0.00020	0.00113	0.00062	0.00052	0.00034	0.00015	0.00016	0.00046	0.00023	0.00161	0.00143	0.00398	0.00807	0.00531	0.00090	0.00161	0.00145	0.00126	0.00498	0.00584
	17	0.00034	0.00006	0.00003	0.00010	0.00055	0.00026	0.00023	0.00012	0.00005	0.00008	0.00009	0.00008	0.00034	0.00034	0.00061	0.00028	0.00589	0.00011	0.00028	0.00075	0.00042	0.00303	0.00065
	18	0.00052	0.00007	0.00010	0.00041	0.00092	0.00080	0.00084	0.00022	0.00019	0.00012	0.00030	0.00016	0.00064	0.00119	0.00130	0.00266	0.00415	0.00260	0.00087	0.00159	0.00098	0.00573	0.00308
	19	0.01667	0.00330	0.00271	0.00440	0.03495	0.02035	0.01252	0.01042	0.00771	0.00534	0.00387	0.00642	0.01320	0.00774	0.00792	0.00847	0.01342	0.00140	0.00407	0.02523	0.01699	0.02653	0.02980
	20	0.00501	0.00052	0.00039	0.00092	0.00771	0.00520	0.00212	0.00092	0.00059	0.00105	0.00128	0.00060	0.00337	0.00224	0.00257	0.00209	0.00376	0.00048	0.00367	0.00392	0.00488	0.00424	0.01026
	21	0.01238	0.00112	0.00415	0.00239	0.01082	0.00558	0.00314	0.00494	0.00072	0.00115	0.00125	0.00105	0.00305	0.00206	0.00257	0.00219	0.00327	0.00050	0.00624	0.01974	0.03022	0.01104	0.00739
	22	0.00337	0.00022	0.00063	0.00117	0.00610	0.00272	0.00284	0.00132	0.00050	0.00053	0.00065	0.00051	0.00134	0.00101	0.00130	0.00147	0.00222	0.00034	0.00391	0.00474	0.00548	0.00617	0.00609
	23	0.00578	0.00037	0.00074	0.00078	0.00697	0.00262	0.00135	0.00130	0.00935	0.00124	0.00113	0.00049	0.00263	0.00150	0.00217	0.00095	0.00207	0.00020	0.00971	0.00867	0.02449	0.00416	0.00372
REST OF THE U.S.	1	1.43935	0.00070	0.00130	0.00488	0.70488	0.07746	0.00990	0.00771	0.00199	0.03724	0.00352	0.00141	0.00271	0.00236	0.00243	0.00239	0.00438	0.00088	0.00643	0.01433	0.00881	0.00872	0.02817
	2	0.03821	1.09130	0.00227	0.00545	0.05153	0.05179	0.10051	0.02037	0.01056	0.00568	0.01548	0.05087	0.36946	0.07981	0.05883	0.04020	0.08321	0.00694	0.08584	0.02080	0.03079	0.03812	0.20892
	3	0.09243	0.00823	1.02778	0.00570	0.08296	0.04225	0.06903	0.93970	0.03636	0.01165	0.00706	0.01032	0.02242	0.01615	0.01652	0.02055	0.02306	0.00246	0.11398	0.05858	0.08289	0.03745	0.10863
	4	0.03315	0.00261	0.00593	1.15224	0.06935	0.05061	0.03183	0.01223	0.00699	0.00420	0.00982	0.00092	0.01791	0.01361	0.01440	0.01524	0.02523	0.00341	0.05232	0.09347	0.08900	0.53890	0.05858
	5	0.07230	0.00019	0.03018	0.00100	1.72772	0.01498	0.03971	0.00077	0.00084	0.00240	0.00141	0.00060	0.00105	0.00067	0.00088	0.00074	0.00125	0.00042	0.00275	0.01087	0.00559	0.00223	0.00414
	6	0.02214	0.00290	0.03178	0.00819	0.08087	1.57527	0.03924	0.00730	0.02592	0.00722	0.03433	0.01760	0.01512	0.01506	0.01578	0.01953	0.03557	0.00718	0.01628	0.14730	0.02512	0.02738	0.04871
	7	0.10552	0.01018	0.00482	0.02328	0.10734	0.20224	1.32997	0.03851	0.07116	0.01765	0.02373	0.02698	0.04668	0.02798	0.02374	0.03482	0.05268	0.01011	0.02583	0.03684	0.03495	0.06313	0.13287
	8	0.10436	0.00715	0.00588	0.00425	0.09340	0.04711	0.07394	1.08477	0.00698	0.01313	0.00787	0.02164	0.03077	0.01813	0.01854	0.01173	0.02582	0.00274	0.12946	0.08339	0.05069	0.04159	0.12303
	9	0.06051	0.01272	0.00737	0.01223	0.03129	0.11305	0.05029	0.01270	1.03580	0.01829	0.05855	0.01971	0.04153	0.03526	0.06594	0.07169	0.17569	0.01243	0.08308	0.06378	0.04316	0.11650	0.11976
	10	0.04115	0.00608	0.00282	0.01211	0.06013	0.18428	0.01951	0.00571	0.00665	1.39443	0.10243	0.01560	0.01973	0.02727	0.02766	0.01460	0.04409	0.00325	0.03040	0.04610	0.06323	0.03185	0.59448
	11	0.00918	0.00153	0.00128	0.00992	0.02028	0.06676	0.01014	0.00166	0.00552	0.00711	1.05073	0.00490	0.01051	0.01622	0.01688	0.02698	0.02736	0.00539	0.01737	0.02059	0.01995	0.07424	0.08628
	12	0.02859	0.00483	0.00251	0.00421	0.10167	0.01367	0.03943	0.00955	0.01071	0.01019	0.02344	1.11327	0.06489	0.03705	0.04059	0.05096	0.08195	0.01051	0.02931	0.06417	0.05463	0.06962	0.53057
	13	0.01974	0.01089	0.00388	0.02494	0.04949	0.02273	0.03660	0.01048	0.00590	0.00645	0.03780	0.00748	1.32920	0.26539	0.17420	0.11221	0.24600	0.01732	0.03259	0.02468	0.03437	0.06135	0.26712
	14	0.03429	0.00518	0.00561	0.00603	0.13884	0.03663	0.03994	0.02503	0.00914	0.01099	0.03420	0.01057	0.07004	1.08752	0.08538	0.06953	0.17742	0.01234	0.03868	0.03429	0.06038	0.05439	0.40077
	15	0.02497	0.01837	0.00470	0.03603	0.03458	0.02462	0.02512	0.01205	0.00486	0.00558	0.01400	0.00622	0.20575	0.08835	1.20376	0.05655	0.14035	0.01270	0.02628	0.03073	0.02704	0.05942	0.12478
	16	0.01460	0.00364	0.00667	0.03425	0.02374	0.01316	0.01096	0.00732	0.00336	0.00342	0.01601	0.00502	0.03920	0.03114	0.08899	1.18260	0.11465	0.02035	0.03900	0.03131	0.02608	0.11126	0.12987
	17	0.01365	0.00226	0.00215	0.00387	0.02015	0.00910	0.00937	0.00440	0.00717	0.00224	0.00355	0.00205	0.01290	0.01484	0.02995	0.01253	1.32354	0.00532	0.03053	0.03155	0.01832	0.16061	0.02445
	18	0.01201	0.00154	0.08227	0.01538	0.02132	0.01901	0.02052	0.00503	0.00476	0.00245	0.00724	0.00388	0.01521	0.02476	0.03222	0.00709	0.10462	1.06676	0.02065	0.03452	0.02287	0.14500	0.07612
	19	0.03474	0.00628	0.00517	0.00839	0.08655	0.03973	0.02385	0.01993	0.00916	0.01018	0.00735	0.01226	0.02503	0.01466	0.01504	0.01229	0.02627	0.00265	1.07821	0.04819	0.03228	0.05067	0.05630
	20	0.03468	0.00328	0.00226	0.00800	0.05183	0.03431	0.01317	0.08525	0.00395	0.00712	0.00901	0.00497	0.01922	0.01330	0.01872	0.01429	0.02446	0.00367	0.01982	1.02571	0.04520	0.02881	0.07911
	21	0.05005	0.00453	0.01685	0.00948	0.04351	0.07243	0.01741	0.07038	0.00289	0.00464	0.00502	0.00421	0.01220	0.00824	0.01034	0.00865	0.01313	0.00200	0.03324	0.08002	1.12258	0.04404	0.02987
	22	0.04768	0.00314	0.00894	0.01680	0.08652	0.03856	0.04029	0.01876	0.00703	0.00753	0.00923	0.00726	0.01886	0.01429	0.01866	0.02091	0.03220	0.00456	0.05562	0.12468	0.07655	1.08784	0.08655
	23	0.01515	0.00072	0.00150	0.00178	0.01436	0.00563	0.00275	0.00258	0.00062	0.00534	0.00316	0.00089	0.00471	0.00368	0.00589	0.00204	0.00475	0.00042	0.02825	0.01672	0.07887	0.00958	1.00780

Table L-4

Interregional Interindustry and Local Consumption Multipliers

YOUGHIOGHENY

Industry		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
YOUGHIOGHENY	1	1.00897	0.03471	0.03366	0.03426	0.11522	0.04223	0.03637	0.03468	0.05397	0.03850	0.03497	0.03534	0.04212	0.03822	0.03716	0.03618	0.03884	0.03398	0.03617	0.03685	0.04516	0.03740	0.04714
	2	0.02346	1.03116	0.01168	0.01338	0.02972	0.02468	0.03314	0.02017	0.01331	0.01506	0.01538	0.02914	0.09027	0.02666	0.02325	0.02036	0.02493	0.01273	0.03214	0.01842	0.02008	0.02455	0.06274
	3	0.00035	0.00021	1.00026	0.00022	0.00041	0.00034	0.03031	0.00187	0.00021	0.00024	0.00023	0.00023	0.00034	0.00028	0.00028	0.00037	0.00036	0.00020	0.00033	0.00034	0.00033	0.00039	0.00046
	4	0.01700	0.01887	0.01524	1.04404	0.02078	0.01855	0.01685	0.01530	0.01466	0.02568	0.01847	0.01584	[illegible]	0.01226	0.01480	[illegible]	0.01846	0.01498	0.01708	[illegible]	[illegible]	[illegible]	0.02363
	5	0.11618	0.14865	0.19918	0.19871	0.18316	0.14349	0.14246	0.14726	0.14581	0.14623	0.14894	0.14947	0.17418	0.10173	0.14763	0.13338	0.14145	0.14622	0.15223	0.11559	0.15177	0.15620	0.18454
	6	0.03432	0.05105	0.04783	0.05162	0.05871	1.06192	0.05282	0.05074	0.05049	0.05498	0.05162	0.05190	0.06004	0.05457	0.05411	0.05292	0.05687	0.05027	0.05262	0.05211	0.05234	0.05440	0.06098
	7	0.02134	0.01794	0.01734	0.01799	0.02249	0.02267	1.02707	0.01995	0.01917	0.01816	0.01827	0.01860	0.02247	0.02002	0.01941	0.01921	0.02079	0.01761	0.01605	0.01801	0.01897	0.02044	0.02616
	8	0.02425	0.02245	0.02242	0.02267	0.02572	0.02352	0.02358	1.02273	0.02254	0.02204	0.02246	0.02321	0.02675	0.02463	0.02618	0.02362	0.02487	0.02257	0.02351	0.02312	0.02335	0.02481	0.02876
	9	0.00712	0.00594	0.00557	0.00575	0.00630	0.00762	0.00450	0.00412	1.00403	0.00601	0.00655	0.00605	0.00760	0.00680	0.00704	0.00694	0.00876	0.00570	0.00685	0.00671	0.00656	0.00784	0.00969
	10	0.00563	0.00400	0.00437	0.00398	0.00641	0.00823	0.00427	0.00452	[illegible]	1.01480	0.00457	0.00413	0.00560	0.00513	0.00490	0.00462	0.00584	0.00382	0.00477	0.00514	0.00506	0.00542	0.02233
	11	0.02103	0.02110	0.02050	0.02107	0.02489	0.02455	0.02208	0.02116	0.02086	0.02139	1.02375	0.02196	0.02548	0.02301	0.02294	0.02300	0.02422	0.02888	0.02231	0.02233	0.02221	0.02602	0.03112
	12	0.02326	0.01881	0.01837	0.02795	0.03035	0.02528	0.02411	0.02116	0.01704	0.01918	0.02042	1.03334	0.03008	0.02401	0.02398	0.02502	0.03109	0.01776	0.04171	0.02402	0.02292	0.02742	0.10195
	13	0.04126	0.02697	0.02268	0.02809	0.05739	0.04573	0.04186	0.03362	0.02465	0.02943	0.03657	0.04017	1.13962	0.11130	0.07736	0.03406	0.09737	0.02718	0.03409	0.03636	0.04018	0.04444	0.12770
	14	0.02532	0.01842	0.01740	0.01843	0.04089	0.02664	0.02484	0.02297	0.01829	0.02041	0.02216	0.01997	0.03257	1.03086	0.02922	0.02711	0.04033	0.01848	0.02365	0.02302	0.02405	0.02685	0.07970
	15	0.03626	0.03510	0.03305	0.03607	0.04124	0.03749	0.03665	0.03502	0.03367	0.03457	0.03496	0.03489	0.05173	0.04130	1.04803	0.03614	0.04424	0.03409	0.03653	0.03626	0.03647	0.04119	0.05013
	16	0.02997	0.02756	0.02669	0.02736	0.03269	0.02946	0.02882	0.02890	0.02709	0.02769	0.02788	0.02802	0.03348	0.03070	0.03117	1.03262	0.03292	0.02744	0.02926	0.02869	0.02892	0.03358	0.03538
	17	0.06521	0.06517	0.06362	0.06441	0.07377	0.06730	0.06685	0.06463	0.06399	0.06455	0.06531	0.06595	0.07657	0.07095	0.06963	0.06744	1.07876	0.06416	0.06723	0.06609	0.06662	0.07714	0.08176
	18	0.00967	0.00839	0.00815	0.00833	0.01087	0.08978	0.00928	0.00731	0.03928	0.00880	0.00881	0.00860	0.01067	0.00972	0.00960	0.00961	0.01100	1.00479	0.00928	0.00932	0.00532	0.01111	0.01293
	19	0.10623	0.09023	0.08732	0.09114	0.12642	0.11062	0.10191	0.10049	0.08876	0.09354	0.09273	0.09338	0.11764	0.10413	0.10286	0.09946	0.11442	0.08529	1.10514	0.10411	0.10341	0.11574	0.14402
	20	0.21389	0.19362	0.18799	0.19144	0.23257	0.20846	0.20200	0.19351	0.15975	0.19464	0.19533	0.19069	0.23416	0.21354	0.20845	0.20287	0.21774	0.18979	0.20295	1.20085	0.20367	0.21093	0.26562
	21	0.16257	0.15315	0.14977	0.15147	0.17272	0.15760	0.15691	0.15198	0.15047	0.15260	0.15362	0.15495	0.17910	0.16603	0.16181	0.15807	0.16676	0.15069	0.15692	0.15510	1.15709	0.16151	0.18456
	22	0.08212	0.07713	0.07539	0.07639	0.08779	0.07999	0.07941	0.07656	0.07582	0.07442	0.07737	0.07810	0.09058	0.08382	0.08176	0.07946	0.08451	0.07591	0.07946	0.08163	0.07926	1.08156	0.09668
	23	0.17557	0.16376	0.15499	0.16206	0.18751	0.17046	0.16867	0.16325	0.16084	0.16366	0.16449	0.16569	0.19323	0.17842	0.17410	0.16966	0.17999	0.16102	0.17091	0.16721	0.17568	0.17424	1.20647
REST OF APPALACHIA	1	0.46375	0.09131	0.07656	0.08730	0.28948	0.18837	0.12808	0.10465	0.05355	0.12990	0.09554	0.10290	0.18498	0.12954	0.12186	0.11289	0.15404	0.08076	0.12105	0.11899	0.16519	0.14056	0.27016
	2	0.20772	0.19544	0.08316	0.10405	0.28799	0.24630	0.25230	0.17262	0.09921	0.12367	0.12413	0.19566	0.01446	0.23350	0.20409	0.17660	0.28351	0.09421	0.23960	0.18410	0.18566	0.23332	0.55506
	3	0.00777	0.00306	0.00325	0.00303	0.01065	0.00765	0.00631	0.04116	0.00275	0.00425	0.00358	0.00366	0.00526	0.00532	0.00518	0.00464	0.00747	0.00253	0.00658	0.00584	0.00665	0.00731	0.01532
	4	0.01619	0.00644	0.00630	0.01442	0.02765	0.02114	0.01518	0.01148	0.00753	0.01169	0.00797	0.01039	0.02316	0.01465	0.01367	0.01238	0.01925	0.00692	0.01536	0.01544	0.01865	0.01666	0.03454
	5	0.11541	0.03499	0.01346	0.02265	0.21328	0.10646	0.07400	0.03229	0.02219	0.05568	0.04835	0.04900	0.15114	0.07625	0.06260	0.05236	0.09610	0.01815	0.06173	0.05338	0.07247	0.08433	0.26631
	6	0.07684	0.03116	0.02134	0.05012	0.11863	0.24470	0.06276	0.04167	0.03782	0.04504	0.06453	0.04268	0.09218	0.05727	0.05214	0.04844	0.07767	0.02558	0.05197	0.05059	0.05878	0.07547	0.16196
	7	0.09549	0.03505	0.02693	0.03757	0.11836	0.12768	0.16961	0.05796	0.05390	0.04897	0.04296	0.04611	0.09050	0.05916	0.05500	0.05472	0.38057	0.03084	0.05498	0.05019	0.06190	0.07959	0.16760
	8	0.02215	0.00499	0.00309	0.00511	0.03379	0.02204	0.01599	0.00946	0.00480	0.01160	0.00822	0.00982	0.02915	0.01523	0.01304	0.01098	0.01980	0.00395	0.01522	0.01219	0.01594	0.01607	0.05307
	9	0.03342	0.01470	0.01164	0.01507	0.04834	0.04294	0.02920	0.02305	0.01710	0.01932	0.02344	0.01772	0.03527	0.02542	0.02918	0.02845	0.05104	0.01344	0.02918	0.02850	0.02778	0.04314	0.06705
	10	0.15240	0.08604	0.07276	0.08421	0.20260	0.21729	0.12313	0.10237	0.07993	0.30736	0.14176	0.10106	0.17329	0.13032	0.12160	0.11155	0.15883	0.07662	0.12605	0.12608	0.14779	0.14021	0.55529
	11	0.02626	0.01257	0.00879	0.01240	0.01955	0.03993	0.02169	0.01519	0.01141	0.01857	0.02695	0.01599	0.03567	0.02368	0.02166	0.02263	0.03061	0.01078	0.02158	0.02195	0.02124	0.04030	0.07615
	12	0.18641	0.11616	0.09460	0.10830	0.29324	0.20325	0.17439	0.14203	0.10771	0.15493	0.13265	0.20355	0.25121	0.17495	0.17000	0.16820	0.23288	0.10500	0.16225	0.16698	0.18085	0.20252	0.76054
	13	0.09771	0.05628	0.04595	0.05344	0.14154	0.11065	0.09550	0.05157	0.05130	0.06627	0.07803	0.06068	0.29395	0.23064	0.16603	0.12768	0.21768	0.05593	0.08591	0.08389	0.09453	0.12026	0.29942
	14	0.05743	0.03419	0.02747	0.03207	0.09854	0.06260	0.05267	0.04609	0.03110	0.04021	0.04154	0.03727	0.07640	0.06424	0.06062	0.05472	0.09060	0.03094	0.05004	0.04761	0.05396	0.06098	0.19045
	15	0.03164	0.01491	0.00761	0.01026	0.06732	0.03378	0.02472	0.01531	0.00969	0.01827	0.01459	0.01609	0.06473	0.03188	0.04474	0.02321	0.04307	0.00943	0.02230	0.02036	0.02476	0.03327	0.08300
	16	0.02660	0.01047	0.00635	0.00696	0.04134	0.02909	0.02056	0.01405	0.00821	0.01606	0.01265	0.01380	0.03030	0.02245	0.02559	0.03286	0.03615	0.00895	0.02657	0.01631	0.02172	0.03203	0.07371
	17	0.04595	0.01698	0.00763	0.01124	0.07231	0.04808	0.03365	0.01630	0.01130	0.02765	0.01918	0.02363	0.06897	0.03664	0.03249	0.02574	0.08768	0.00997	0.04186	0.02617	0.03384	0.05314	0.11934
	18	0.01314	0.00560	0.00408	0.00645	0.01972	0.01522	0.01148	0.00864	0.00512	0.00807	0.00704	0.00769	0.01693	0.01219	0.01166	0.01305	0.02127	0.01019	0.01685	0.01134	0.01156	0.02372	0.03350
	19	0.14137	0.05426	0.03657	0.05353	0.22540	0.16418	0.11247	0.09656	0.04537	0.08623	0.08442	0.06913	0.17017	0.10341	0.10052	0.08922	0.15458	0.04079	0.11605	0.11563	0.12663	0.15955	0.31706
	20	0.17261	0.06153	0.03146	0.04715	0.24630	0.17797	0.12017	0.06326	0.04655	0.09769	0.07326	0.08306	0.23246	0.12645	0.11032	0.09441	0.15942	0.03888	0.11143	0.10047	0.12853	0.12944	0.43486
	21	0.14654	0.04533	0.02556	0.03772	0.21343	0.14662	0.09910	0.06509	0.03742	0.07588	0.05507	0.06268	0.18431	0.09865	0.08795	0.07538	0.13493	0.02765	0.09306	0.09679	0.12987	0.12096	0.33467
	22	0.08373	0.02091	0.00986	0.01764	0.10267	0.06911	0.04812	0.02808	0.01482	0.03585	0.02565	0.02961	0.08455	0.04685	0.04121	0.03550	0.06396	0.01263	0.04381	0.04443	0.05149	0.05803	0.10364
	23	0.14116	0.04492	0.02436	0.03767	0.21410	0.14334	0.09916	0.05663	0.03465	0.08159	0.05904	0.06697	0.19274	0.10343	0.09097	0.07522	0.13247	0.02976	0.10471	0.08650	0.10399	0.10973	0.33734
REST OF THE U.S.	1	0.47837	0.09662	0.08882	0.15084	0.77898	0.46393	0.27712	0.34572	0.11070	0.38053	0.15895	0.12403	0.30839	0.22402	0.26085	0.24125	0.44605	0.10515	0.27652	0.30151	0.31561	0.49084	0.04684
	2	0.18184	0.05730	0.04972	0.08147	0.28197	0.24201	0.16632	0.19117	0.06443	0.09048	0.08904	0.07381	0.20738	0.14897	0.16275	0.14506	0.27127	0.06021	0.15833	0.16316	0.16623	0.27089	0.41520
	3	0.36231	0.12755	0.13367	0.14987	0.47361	0.37114	0.30004	1.17411	0.12826	0.17758	0.16084	0.15020	0.31311	0.22560	0.24154	0.21978	0.36223	0.12961	0.34400	0.29406	0.30633	0.39394	0.64794
	4	0.35045	0.13521	0.12624	0.30096	0.53260	0.44050	0.30316	0.32423	0.14374	0.19867	0.18521	0.16403	0.34955	0.25545	0.27774	0.25979	0.42939	0.13586	0.34025	0.30889	0.37124	0.91182	0.70166
	5	0.35736	0.06381	0.06169	0.12876	0.65036	0.43453	0.26346	0.35905	0.08459	0.13820	0.13019	0.09023	0.26420	0.19691	0.24598	0.22705	0.64531	0.08008	0.26413	0.24246	0.28554	0.51160	0.87343
	6	0.24998	0.09563	0.08627	0.19835	0.68301	0.80471	0.25667	0.29565	0.12309	0.15536	0.16619	0.12960	0.28170	0.21015	0.23736	0.22533	0.39991	0.10638	0.24931	0.24034	0.27255	0.47404	0.61764
	7	0.32350	0.10111	0.08816	0.14231	0.44912	0.46828	0.44552	0.27615	0.15113	0.35301	0.14895	0.13274	0.28265	0.20293	0.22091	0.21452	0.36214	0.10363	0.22989	0.24695	0.25103	0.34462	0.60047
	8	0.30553	0.11482	0.10085	0.16155	0.47852	0.37456	0.29862	0.34770	0.11777	0.16704	0.15103	0.13766	0.30053	0.21599	0.23632	0.21403	0.36588	0.10974	0.35291	0.29719	0.25441	0.40448	0.65591
	9	0.32163	0.12469	0.10767	0.15062	0.46328	0.43703	0.28180	0.27093	0.14916	0.17510	0.20205	0.15164	0.31761	0.23640	0.28171	0.27113	0.50031	0.12403	0.28448	0.29159	0.28028	0.40433	0.64649
	10	0.36150	0.12514	0.11317	0.17738	0.54349	0.55031	0.30031	0.35515	0.13695	0.30788	0.23046	0.15715	0.34624	0.26166	0.29254	0.27019	0.47640	0.12978	0.30910	0.33209	0.35054	0.51261	1.00279
	11	0.14692	0.05036	0.04543	0.07362	0.22667	0.23241	0.12692	0.14675	0.05759	0.08451	0.10651	0.06427	0.14779	0.11226	0.12626	0.12675	0.20732	0.05533	0.13249	0.14766	0.14360	0.26172	0.35611
	12	0.30017	0.09120	0.07945	0.14318	0.47271	0.39130	0.25735	0.30695	0.10173	0.15125	0.14550	0.13996	0.30234	0.21561	0.25120	0.23475	0.42451	0.09750	0.25538	0.27600	0.29256	0.45482	0.75792
	13	0.25649	0.09407	0.08276	0.12266	0.40271	0.32493	0.22811	0.25391	0.09913	0.14080	0.14384	0.11386	0.30619	0.27322	0.28158	0.23963	0.45575	0.10072	0.22962	0.23495	0.24802	0.39638	0.65003
	14	0.37626	0.14163	0.12608	0.18961	0.61952	0.46327	0.32769	0.36372	0.15055	0.21078	0.21086	0.17301	0.41519	0.32606	0.35250	0.31866	0.58698	0.14798	0.32731	0.33338	0.35027	0.52516	1.00022
	15	0.25498	0.10136	0.08447	0.11985	0.37732	0.31513	0.21973	0.24768	0.09581	0.13561	0.13380	0.30944	0.41450	0.25006	0.36737	0.22737	0.63213	0.09929	0.22103	0.23325	0.23331	0.40972	0.59149
	16	0.23607	0.08782	0.08012	0.11470	0.34991	0.29002	0.19859	0.73061	0.09234	0.12947	0.12847	0.10631	0.26189	0.19331	0.26592	0.33939	0.40062	0.10520	0.22089	0.22530	0.22508	0.61460	0.57531
	17	0.25236	0.07602	0.07044	0.11602	0.38033	0.32384	0.21174	0.26385	0.08631	0.12718	0.12016	0.09617	0.24319	0.18203	0.22287	0.19303	0.60685	0.08569	0.23311	0.24746	0.23505	0.50342	0.53183
	18	0.17219	0.06030	0.06498	0.09818	0.25569	0.21664	0.15736	0.15313	0.07375	0.09796	0.09569	0.08297	0.18201	0.15078	0.16425	0.14801	0.30577	0.13056	0.15007	0.17026	0.16059	0.35073	0.39416
	19	0.28543	0.08150	0.07481	0.12617	0.45675	0.37603	0.23957	0.30008	0.09201	0.14003	0.12921	0.10818	0.26624	0.19138	0.22312	0.20467	0.37908	0.08611	0.29356	0.27931	0.26506	0.46255	0.59761
	20	0.34181	0.05287	0.05386	0.13417	0.55871	0.48947	0.28349	0.41070	0.07999	0.13657	0.13293	0.08258	0.28571	0.20925	0.27264	0.25865	0.51237	0.07529	0.29393	0.32586	0.31036	0.54575	0.76563
	21	0.42121	0.04991	0.10634	0.17461	0.62576	0.52814	0.32790	0.44070	0.11892	0.18431	0.17424	0.13045	0.35437	0.25886	0.31355	0.28904	0.54336	0.11301	0.35370	0.42341	0.40301	0.64290	0.83629
	22	0.37063	0.12026	0.11566	0.16265	0.60497	0.46261	0.33274	0.38249	0.13577	0.19396	0.18319	0.15197	0.35674	0.26150	0.30081	0.28247	0.49427	0.12888	0.34924	0.43288	0.38941	0.59353	0.80402
	23	0.27464	0.09288	0.09458	0.10895	0.45159	0.39377	0.23819	0.33748	0.06464	0.11323	0.10808	0.06690	0.23157	0.16974	0.22157	0.20277	0.41478	0.08091	0.29740	0.27021	0.28316	0.48619	0.61833

Table L-4 (Cont.)

REST OF APPALACHIA

INDUSTRY		1	2	3	4	5	6	7	8	9	10	11	12
YOUGHIOGHENY	1	0.01200	0.00322	0.00258	0.00301	0.01766	0.00606	0.00458	0.00357	0.03280	0.00408	0.00350	0.00354
	2	0.01828	0.01761	0.00817	0.00982	0.02473	0.02110	0.07222	0.01559	0.08948	0.01154	0.01158	0.01749
	3	0.00022	0.00009	0.00011	0.00010	0.00028	0.00022	0.00019	0.00105	0.00009	0.00012	0.00011	0.00011
	4	0.00525	0.00303	0.00262	0.03722	0.00757	0.00615	0.00478	0.00422	0.00282	0.00309	0.00448	0.00341
	5	0.00654	0.00340	0.00170	0.00277	0.01745	0.00703	0.00623	0.00334	0.00215	0.00298	0.00395	0.00387
	6	0.00266	0.00131	0.00071	0.00161	0.00471	0.00668	0.00252	0.00145	0.00103	0.00122	0.00172	0.00158
	7	0.00249	0.00120	0.00069	0.00129	0.00430	0.00391	0.00479	0.00195	0.00159	0.00141	0.00150	0.00149
	8	0.00074	0.00032	0.00008	0.00022	0.00136	0.00073	0.00067	0.00027	0.00013	0.00021	0.00039	0.00032
	9	0.00191	0.00094	0.00077	0.00094	0.00261	0.00239	0.00173	0.00135	0.00105	0.00113	0.00141	0.00109
	10	0.00209	0.00105	0.00090	0.00114	0.00291	0.00293	0.00174	0.00169	0.00151	0.00302	0.00166	0.00122
	11	0.00230	0.00132	0.00099	0.00135	0.00346	0.00350	0.00210	0.00162	0.00119	0.00156	0.00263	0.00153
	12	0.01069	0.00574	0.08474	0.00540	0.01450	0.01276	0.00972	0.00918	0.00546	0.00698	0.00691	0.00692
	13	0.03656	0.02290	0.01844	0.02174	0.05162	0.04105	0.03598	0.03182	0.07032	0.02573	0.02443	0.02353
	14	0.01457	0.00846	0.00751	0.00657	0.02193	0.01589	0.01355	0.01260	0.00824	0.01635	0.01067	0.00958
	15	0.00466	0.00259	0.00184	0.00210	0.03676	0.00594	0.00415	0.00340	0.00198	0.00259	0.00285	0.00259
	16	0.00221	0.00132	0.00095	0.00132	0.00422	0.00301	0.00239	0.00199	0.00109	0.00144	0.00164	0.00151
	17	0.00326	0.00165	0.00089	0.00136	0.00538	0.00331	0.00290	0.00172	0.00110	0.00148	0.00191	0.00186
	18	0.00188	0.00088	0.00073	0.00111	0.00279	0.00223	0.00174	0.00157	0.00086	0.00105	0.00113	0.00103
	19	0.02067	0.01164	0.00769	0.01316	0.04178	0.03142	0.07270	0.02243	0.01092	0.01406	0.01431	0.01406
	20	0.02553	0.01223	0.00906	0.31460	0.03675	0.02559	0.01957	0.01441	0.01333	0.01368	0.01444	0.01378
	21	0.00821	0.00266	0.00110	0.00213	0.01071	0.00616	0.00533	0.00250	0.00141	0.00269	0.00322	0.00307
	22	0.00377	0.00181	0.00080	0.00168	0.00650	0.00392	0.00336	0.00199	0.00106	0.00146	0.00201	0.00191
	23	0.01169	0.00489	0.00296	0.00441	0.01639	0.01035	0.00767	0.00588	[illegible]	0.00495	0.00592	0.00556
REST OF APPALACHIA	1	1.46600	0.13400	0.11954	0.12914	0.64432	0.22985	0.17255	0.15734	[illegible]	0.17716	0.14187	0.14509
	2	0.22462	1.21826	0.09955	0.12909	0.30260	0.26106	0.27449	0.19355	[illegible]	0.14085	0.13538	0.21654
	3	0.01190	0.80676	1.00952	0.00687	0.01442	0.01157	0.01066	0.14117	[illegible]	0.00811	0.00726	0.00741
	4	0.03107	0.02123	0.01905	1.02946	0.04011	0.03339	0.02819	0.02573	0.02026	0.02515	0.02263	0.02314
	5	0.29215	0.20959	0.18760	0.19520	1.38925	0.27832	0.25273	0.22435	0.19635	0.24033	0.21397	0.22449
	6	0.13174	0.09169	0.08169	0.10716	0.17698	1.28300	0.12394	0.10896	0.09242	0.10778	0.10381	0.10261
	7	0.12608	0.06614	0.05371	0.06936	0.14564	0.16078	1.21950	0.09026	0.09511	0.07581	0.07608	0.07395
	8	0.05612	0.03765	0.03348	0.03511	0.06525	0.05256	0.04972	1.04689	0.03512	0.04343	0.03846	0.04647
	9	0.04081	0.02210	0.01923	0.02238	0.05357	0.05006	0.03680	0.03131	1.02447	0.02702	0.03045	0.02510
	10	0.17695	0.11350	0.09936	0.10967	0.22631	0.25063	0.15131	0.13632	0.10659	1.37448	0.17613	0.12772
	11	0.04575	0.03992	0.03112	0.03918	0.06140	0.05585	0.05445	0.04015	0.03352	0.04137	1.04553	0.03813
	12	0.20457	0.13771	0.11968	0.12729	0.30955	0.22107	0.19550	0.16947	0.12762	0.15711	0.15200	1.22334
	13	0.10515	0.06376	0.05375	0.06303	0.14743	0.11782	0.10295	0.09171	0.05959	0.07472	0.08449	0.06819
	14	0.05565	0.04084	0.03640	0.04057	0.10383	0.07852	0.06131	0.05685	0.03976	0.04460	0.04952	0.04568
	15	0.06646	0.05021	0.04423	0.04658	0.08412	0.06975	0.06204	0.05559	0.04610	0.05078	0.05143	0.05288
	16	0.05780	0.04131	0.03703	0.03944	0.07197	0.05965	0.05210	0.04793	0.03596	0.04796	0.04340	0.04460
	17	0.12178	0.09201	0.08222	0.08588	0.14749	0.12197	0.11048	0.09899	0.08618	0.10561	0.09401	0.09848
	18	0.02298	0.01533	0.01377	0.01802	0.02942	0.02478	0.02140	0.01936	0.01482	0.01814	0.01671	0.01682
	19	0.24412	0.15343	0.13726	0.15351	0.32784	0.26409	0.21576	0.20658	0.14619	0.18442	0.16560	0.17042
	20	0.39723	0.29482	0.29377	0.25721	0.48655	0.39715	0.34459	0.30940	0.26712	0.32883	0.29500	0.30603
	21	0.32643	0.22878	0.20820	0.21894	0.39818	0.32729	0.29660	0.26559	0.21532	0.26527	0.23756	0.24622
	22	0.15702	0.11268	0.10131	0.10780	0.19535	0.15967	0.14202	0.12953	0.10641	0.13072	0.11703	0.12151
	23	0.33779	0.24331	0.21802	0.22967	0.40595	0.33473	0.29805	0.27028	0.22894	0.28254	0.25238	0.26139
REST OF THE U.S.	1	0.33760	0.12005	0.11077	0.17466	0.86236	0.49458	0.29843	0.35341	0.13293	0.20056	0.18083	0.14902
	2	0.19630	0.07270	0.06091	0.09361	0.30129	0.25640	0.17937	0.18626	0.07573	0.10017	0.10232	0.08955
	3	0.37678	0.14305	0.14830	0.16543	0.49237	0.38739	0.31467	1.09116	0.14345	0.19212	0.17646	0.16012
	4	0.37598	0.15559	0.19694	0.33101	0.50190	0.46590	0.32621	0.34222	0.16664	0.22053	0.20686	0.18819
	5	0.37521	0.07309	0.06495	0.13902	0.68563	0.44940	0.26944	0.34367	0.09218	0.13688	0.14630	0.10170
	6	0.31391	0.11215	0.10170	0.21854	0.51068	0.85013	0.28268	0.30110	0.13971	0.16842	0.18438	0.16782
	7	0.33527	0.11303	0.09759	0.15442	0.46669	0.47706	0.43968	0.27976	0.15938	0.16266	0.16095	0.14677
	8	0.37770	0.12793	0.11347	0.15512	0.47826	0.38879	0.30836	0.35070	0.13060	0.17622	0.16456	0.15143
	9	0.34145	0.14274	0.12516	0.16866	0.48456	0.45148	0.29956	0.29489	0.16673	0.19191	0.22051	0.17021
	10	0.37362	0.13422	0.12138	0.16741	0.56168	0.55628	0.30742	0.35177	0.14577	0.36366	0.23378	0.16702
	11	0.15672	0.08066	0.05919	0.08692	0.24137	0.24790	0.13684	0.15227	0.06769	0.09244	0.12397	0.07529
	12	0.32785	0.11768	0.10307	0.15861	0.52249	0.42066	0.28309	0.31945	0.12653	0.17277	0.17280	0.17822
	13	0.26325	0.11805	0.10430	0.14509	0.43279	0.34910	0.25196	0.26949	0.12087	0.16110	0.17011	0.13695
	14	0.41601	0.17219	0.15553	0.21108	0.66541	0.49633	0.35909	0.35837	0.13057	0.23925	0.24356	0.20476
	15	0.27364	0.11817	0.09988	0.13572	0.39876	0.33288	0.23512	0.25612	0.11072	0.14850	0.14978	0.12589
	16	0.25049	0.10227	0.09397	0.14927	0.36960	0.30557	0.21226	0.23309	0.10626	0.14175	0.14126	0.12145
	17	0.26863	0.03953	0.08225	0.12932	0.40824	0.33931	0.22296	0.26481	0.09930	0.13630	0.13343	0.11016
	18	0.18357	0.07867	0.07201	0.10862	0.26451	0.22770	0.15740	0.17058	0.08359	0.10799	0.10615	0.09368
	19	0.29937	0.09229	0.08436	0.11748	0.47811	0.38995	0.24839	0.29676	0.13177	0.14635	0.14064	0.12029
	20	0.35580	0.05845	0.05885	0.14114	0.58790	0.50241	0.25431	0.38377	0.08359	0.13377	0.13963	0.09399
	21	0.44045	0.11267	0.11708	0.18957	0.65670	0.54635	0.33707	0.43220	0.12993	0.18907	0.18781	0.14589
	22	0.41181	0.13745	0.13155	0.20852	0.63317	0.50294	0.34798	0.35518	0.17198	0.20665	0.20082	0.17053
	23	0.29099	0.04709	0.04668	0.11429	0.47463	0.40373	0.23052	0.31495	0.05708	0.10892	0.11818	0.07343

INDUSTRY		13	14	15	16	17	18	19	20	21	22	23
YOUGHIOGHENY	1	0.00846	0.00590	0.00508	0.00641	0.00645	0.00279	0.00462	0.00427	0.01566	0.00540	0.01127
	2	0.05328	0.02123	0.01843	0.01596	0.32482	0.00908	0.02822	0.01472	0.01665	0.02022	0.04725
	3	0.00021	0.00016	0.00016	0.00015	0.00022	0.00009	0.00021	0.00018	0.00020	0.00023	0.00040
	4	0.00647	0.00499	0.00467	0.00427	0.00616	0.00277	0.00516	0.00536	0.00666	0.02062	0.01031
	5	0.01953	0.01755	0.00942	0.00704	0.01294	0.00235	0.00707	0.00566	0.00695	0.00912	0.02298
	6	0.00766	0.00460	0.00353	0.00273	0.00496	0.00097	0.00271	0.00257	0.00271	0.00382	0.00654
	7	0.00415	0.00280	0.00242	0.00217	0.00350	0.00105	0.00216	0.00207	0.00236	0.00317	0.00628
	8	0.00260	0.00168	0.00120	0.00089	0.00169	0.00017	0.00085	0.00059	0.00079	0.00111	0.00300
	9	0.00235	0.00173	0.00184	0.00174	0.00306	0.00086	0.00177	0.00169	0.00165	0.00252	0.00491
	10	0.00263	0.00181	0.00179	0.00162	0.00251	0.00097	0.00182	0.00186	0.00216	0.00261	0.00566
	11	0.00431	0.00311	0.00263	0.00252	0.00357	0.00120	0.00238	0.00228	0.00240	0.00420	0.00717
	12	0.01392	0.00793	0.00785	0.00937	0.01428	0.00533	0.00958	0.00973	0.01081	0.01327	0.03317
	13	0.10260	0.04107	0.05914	0.04627	0.07689	0.02181	0.03400	0.03103	0.03575	0.04526	0.10547
	14	0.01924	0.01620	0.01535	0.01390	0.02248	0.00821	0.01399	0.01252	0.01415	0.01665	0.04475
	15	0.01186	0.00696	0.00877	0.00403	0.00878	0.00215	0.00433	0.00404	0.00444	0.00665	0.01256
	16	0.00540	0.00369	0.00379	0.00433	0.00526	0.00124	0.00286	0.00269	0.00275	0.00452	0.01016
	17	0.00892	0.00585	0.00466	0.00340	0.01025	0.00122	0.00360	0.00261	0.00432	0.00629	0.01052
	18	0.00266	0.08210	0.00201	0.00220	0.00749	0.00154	0.00178	0.00190	0.00165	0.00182	0.00470
	19	0.03409	0.02377	0.02306	0.02033	0.03395	0.01047	0.03038	0.02581	0.02505	0.03013	0.05652
	20	0.04075	0.02773	0.02400	0.02012	0.03153	0.01035	0.02192	0.02052	0.02102	0.02714	0.06291
	21	0.01895	0.01203	0.00891	0.00648	0.01255	0.00164	0.00659	0.00537	0.00709	0.00847	0.02199
	22	0.01021	0.00658	0.00503	0.00383	0.00715	0.00122	0.00498	0.00358	0.00450	0.00555	0.01433
	23	0.02409	0.01580	0.01263	0.00957	0.01713	0.00369	0.01214	0.00915	0.01652	0.01338	0.02940
REST OF APPALACHIA	1	0.22245	0.16004	0.16068	0.15301	0.19109	0.12310	0.16403	0.16143	0.26051	0.17928	0.33010
	2	0.64076	0.24081	0.21556	0.16950	0.29289	0.11008	0.26092	0.18023	0.20236	0.24835	0.56916
	3	0.01190	0.00893	0.00880	0.00826	0.01104	0.00619	0.01100	0.00960	0.01175	0.01101	0.01965
	4	0.03551	0.02688	0.02594	0.02480	0.03129	0.01960	0.02766	0.02798	0.03067	0.06029	0.05248
	5	0.32266	0.24566	0.23169	0.22303	0.26078	0.19120	0.23638	0.22716	0.26617	0.23745	0.46143
	6	0.15096	0.11534	0.11034	0.10705	0.13448	0.08540	0.11247	0.11365	0.11880	0.13248	0.22293
	7	0.11732	0.08503	0.08058	0.08152	0.10612	0.05765	0.08209	0.08348	0.08884	0.10652	0.19917
	8	0.05961	0.04499	0.04282	0.04075	0.04912	0.03404	0.05154	0.04478	0.04766	0.06461	0.08881
	9	0.04238	0.03268	0.03021	0.03557	0.05776	0.02078	0.03838	0.03502	0.03306	0.05069	0.07442
	10	0.19530	0.15449	0.14536	0.13619	0.18192	0.10263	0.15162	0.15415	0.17416	0.16787	0.63186
	11	0.05707	0.04449	0.04260	0.04291	0.05073	0.03262	0.04487	0.04317	0.04530	0.05762	0.09378
	12	0.26475	0.19002	0.18567	0.18534	0.24672	0.12434	0.18196	0.18645	0.20823	0.21852	0.71839
	13	1.28870	0.22782	0.16702	0.13133	0.21667	0.06315	0.09726	0.09141	0.10219	0.12618	0.29728
	14	0.08250	1.07006	0.06677	0.06151	0.09471	0.03934	0.05851	0.05597	0.06253	0.06827	0.14976
	15	0.09398	0.06551	1.07259	0.05788	0.07497	0.04560	0.05888	0.05670	0.06126	0.06654	0.11837
	16	0.06820	0.05194	0.05364	1.05823	0.06358	0.03908	0.05404	0.04872	0.05241	0.05967	0.10574
	17	0.14242	0.10896	0.10424	0.09886	1.14582	0.08422	0.10812	0.10641	0.10881	0.11548	0.19624
	18	0.02844	0.02152	0.02076	0.02290	0.03019	1.01953	0.02637	0.02093	0.02126	0.03257	0.04325
	19	0.27080	0.20223	0.19917	0.18852	0.25216	0.14105	1.23795	0.21623	0.22606	0.25791	0.42212
	20	0.45087	0.34197	0.32561	0.31209	0.37156	0.25998	0.33301	1.32288	0.35088	0.34494	0.66299
	21	0.36530	0.27727	0.26619	0.25502	0.31092	0.20947	0.27738	0.27911	1.31252	0.29862	0.52393
	22	0.17914	0.13617	0.13043	0.12545	0.15204	0.10348	0.13584	0.13578	0.14269	1.14579	0.25635
	23	0.38353	0.29185	0.27928	0.26523	0.31812	0.22264	0.30951	0.27982	0.35779	0.29702	1.53688
REST OF THE U.S.	1	0.34519	0.25576	0.29145	0.26915	0.47408	0.12825	0.29596	0.32532	0.34744	0.52127	0.73534
	2	0.24698	0.17405	0.18327	0.10236	0.29452	0.07238	0.17289	0.17528	0.18031	0.28663	0.44727
	3	0.33197	0.24303	0.25807	0.23629	0.38015	0.13598	0.35873	0.30924	0.32039	0.41093	0.60723
	4	0.32855	0.28211	0.30384	0.28485	0.45679	0.15898	0.34429	0.39334	0.39646	0.46055	0.73193
	5	0.29784	0.21866	0.26614	0.24317	0.47065	0.08908	0.27277	0.30260	0.29483	0.53098	0.70559
	6	0.30989	0.24208	0.25915	0.24544	0.42665	0.12083	0.26563	0.30439	0.28932	0.49087	0.64368
	7	0.30007	0.21565	0.23633	0.22808	0.37876	0.11541	0.24167	0.25659	0.26196	0.40885	0.61012
	8	0.31894	0.23253	0.25234	0.22916	0.38256	0.12316	0.36028	0.30817	0.30626	0.41974	0.67137
	9	0.33988	0.25688	0.30204	0.29070	0.52223	0.14185	0.30263	0.30978	0.29836	0.48477	0.67014
	10	0.36575	0.27678	0.30716	0.28282	0.49328	0.13895	0.31786	0.33993	0.35965	0.57798	0.98225
	11	0.16265	0.12605	0.13952	0.14041	0.22222	0.06583	0.14385	0.15951	0.15462	0.28063	0.37824
	12	0.34615	0.25098	0.28516	0.26770	0.46924	0.12316	0.28983	0.30996	0.31799	0.48829	0.84930
	13	0.43776	0.33430	0.32652	0.27582	0.50591	0.12426	0.25272	0.25746	0.26897	0.42322	0.70594
	14	0.45658	0.36680	0.39173	0.35558	0.63325	0.17866	0.35840	0.30454	0.38657	0.55995	1.07205
	15	0.44915	0.27322	0.40888	0.24745	0.45858	0.11532	0.23764	0.24970	0.25127	0.42777	0.61888
	16	0.28237	0.21167	0.28576	0.36223	0.42211	0.12007	0.23576	0.24604	0.23952	0.43498	0.59989
	17	0.26603	0.20153	0.24223	0.20952	0.64449	0.09853	0.24600	0.26678	0.24792	0.52412	0.55570
	18	0.19526	0.16286	0.17609	0.15937	0.31842	0.14091	0.16692	0.18862	0.17734	0.18868	0.41212
	19	0.28847	0.20945	0.24023	0.21961	0.39922	0.09666	0.30421	0.29621	0.27582	0.45960	0.62106
	20	0.31665	0.23147	0.29278	0.26539	0.53962	0.08057	0.29861	0.33155	0.32391	0.61546	0.79852
	21	0.38713	0.28445	0.33750	0.30883	0.57261	0.12565	0.36577	0.45630	0.47589	0.66660	0.87078
	22	0.38569	0.28616	0.32447	0.30370	0.52101	0.14579	0.36603	0.45006	0.40652	0.61760	0.83459
	23	0.25651	0.18743	0.23759	0.21440	0.43636	0.06488	0.25092	0.27499	0.26753	0.50191	0.64460

Table L-4 (Cont.)

REST OF THE U.S.

INDUSTRY		1	2	3	4	5	6	7	8	9	10	11	12
YOUGHIOGHENY	1	0.00258	0.00078	0.00058	0.00082	0.00419	0.00236	0.00166	0.00130	0.00069	0.00101	0.00099	0.00098
	2	0.01317	0.00812	0.00535	0.00689	0.01596	0.01582	0.01326	0.01144	0.00623	0.00792	0.00790	0.00687
	3	0.00021	0.00004	0.00008	0.00009	0.00027	0.00021	0.00017	0.00061	0.00008	0.00012	0.00010	0.00011
	4	0.00316	0.00163	0.00125	0.00262	0.00426	0.00382	0.00278	0.00263	0.00141	0.00162	0.00179	0.00170
	5	0.00368	0.00124	0.00075	0.00120	0.00719	0.00390	0.00306	0.00192	0.00075	0.00138	0.00166	0.00167
	6	0.00168	0.00061	0.00043	0.00081	0.00261	0.00308	0.00142	0.00100	0.00056	0.00071	0.00087	0.00082
	7	0.00217	0.00066	0.00371	0.00100	0.00302	0.00297	0.00299	0.00181	0.00108	0.00110	0.00111	0.00104
	8	0.00037	0.00013	0.00006	0.00011	0.00069	0.00043	0.00035	0.00019	0.00098	0.00014	0.00014	0.00018
	9	0.00035	0.00061	0.00051	0.00067	0.00193	0.00172	0.00120	0.00107	0.00366	0.00478	0.00087	0.00072
	10	0.00174	0.00083	0.00072	0.00096	0.00248	0.00262	0.00146	0.00168	0.00232	0.00209	0.00126	0.00097
	11	0.00117	0.00051	0.00040	0.00058	0.00186	0.00164	0.00106	0.00087	0.00543	0.00645	0.00682	0.00064
	12	0.00934	0.00468	0.00399	0.00506	0.01421	0.01097	0.00835	0.00824	0.03456	0.01590	0.00526	0.00665
	13	0.02673	0.01333	0.01140	0.01448	0.03928	0.03148	0.02443	0.02362	0.01795	0.01673	0.01758	0.01500
	14	0.00569	0.00406	0.00351	0.00452	0.01366	0.01022	0.00769	0.00750	0.00401	0.00527	0.00529	0.00476
	15	0.00351	0.00176	0.00140	0.00178	0.00521	0.00410	0.59315	0.00291	0.00155	0.00403	0.00704	0.00191
	16	0.00144	[illegible]	0.00090	0.00116	0.00340	0.00263	0.00199	0.00158	0.00105	0.00142	0.00145	0.00125
	17	0.00168	0.00567	0.00345	0.00058	0.00208	0.00197	0.00155	0.00108	0.00756	0.00076	0.00093	0.00087
	18	0.00152	0.00056	0.00077	0.00104	0.00264	0.00218	0.00167	0.00158	0.00058	0.00111	0.00110	0.00131
	19	0.02705	0.01239	0.01313	0.01410	0.04119	0.03195	0.02315	0.02359	0.01211	0.01422	0.01504	0.01485
	20	0.01060	0.00425	0.00321	0.03455	0.01572	0.01257	0.00292	0.00717	0.00381	0.00526	0.00550	0.00526
	21	0.00386	0.00145	0.00105	0.00148	0.00640	0.00432	0.00336	0.00241	0.00116	0.00164	0.00193	0.00190
	22	0.00262	0.00105	0.00070	0.00116	0.00437	0.00302	0.00239	0.00183	0.00293	0.00127	0.00139	0.00136
	23	0.00632	0.00252	0.00171	0.00267	0.00792	0.00763	0.00533	0.00629	0.00719	0.00309	0.00330	0.00315
REST OF APPALACHIA	1	0.04540	0.02503	0.21988	0.02691	0.13182	0.87382	0.04907	0.04281	0.02317	0.03407	0.03032	0.02990
	2	0.06784	0.10786	0.06948	0.08787	0.23997	0.20202	0.17199	0.14619	0.07973	0.12081	0.10013	0.11644
	3	0.00613	0.00251	0.00238	0.00272	0.02015	0.00646	0.00522	0.00343	0.00241	0.00363	0.00248	0.00292
	4	0.01065	0.00474	0.00393	0.00785	0.01559	0.01318	0.00945	0.00334	0.00453	0.00868	0.00578	0.00565
	5	0.03361	0.01161	0.00536	0.00865	0.06002	0.05101	0.02936	0.01552	0.02815	0.01294	0.01408	0.01534
	6	0.03423	0.01745	0.01374	0.02595	0.04265	0.10042	0.03669	0.02976	0.01532	0.02217	0.02368	0.02206
	7	0.05327	0.02136	0.01772	0.02992	0.87271	0.07301	0.07098	0.03196	0.02657	0.02276	0.02702	0.04742
	8	0.01033	0.00391	0.00265	0.00379	0.01516	0.01214	0.00702	0.00695	0.00339	0.03472	0.08452	0.00464
	9	0.02658	0.01277	0.01052	0.01360	0.03786	0.03561	0.02377	0.02154	0.01352	0.01574	0.01749	0.01441
	10	0.06296	0.02606	0.02297	0.03107	0.09151	0.08583	0.05322	0.04868	0.02659	0.05798	0.03959	0.03359
	11	0.01210	0.00513	0.00405	0.00590	0.01851	0.01785	0.01091	0.00906	0.00609	0.00643	0.00850	0.00655
	12	0.09470	0.04531	0.03710	0.04610	0.14346	0.11263	0.09415	0.07809	0.04299	0.05665	0.05531	0.06402
	13	0.07594	0.03769	0.03220	0.04690	0.11079	0.08696	0.06953	0.06471	0.03632	0.04718	0.04969	0.04237
	14	0.03189	0.01976	0.01266	0.01628	0.05034	0.03776	0.02823	0.02205	0.01447	0.01910	0.01569	0.01736
	15	0.01692	0.00738	0.00528	0.00706	0.02390	0.02971	0.01440	0.01145	0.00612	0.00841	0.00645	0.00832
	16	0.01543	0.00693	0.00543	0.00723	0.02279	0.01588	0.01363	0.01170	0.00629	0.00653	0.00844	0.00828
	17	0.01543	0.00635	0.00512	0.00511	0.02476	0.02035	0.01411	0.00820	0.00431	0.00658	0.00664	0.00755
	18	0.00959	0.00438	0.00370	0.00528	0.01381	0.01159	0.02869	0.00778	0.00429	0.00556	0.00544	0.00517
	19	0.12272	0.05521	0.04694	0.06138	0.16884	0.14767	0.10553	0.10259	0.05281	0.07155	0.06605	0.06649
	20	0.05425	0.02241	0.01358	0.02102	0.09304	0.07608	0.05159	0.03335	0.01782	0.02665	0.02639	0.02865
	21	0.08870	0.03475	0.02457	0.03893	0.12174	0.09824	0.06944	0.06036	0.03088	0.04256	0.04924	0.04133
	22	0.03634	0.01468	0.01138	0.01601	0.05572	0.04415	0.03235	0.02530	0.01341	0.01844	0.01785	0.01421
	23	0.06327	0.02487	0.01714	0.02459	0.09440	0.07619	0.05327	0.03976	0.02099	0.03051	0.02960	0.03066
REST OF THE U.S.	1	1.98651	0.28332	0.25956	0.34789	1.46363	0.71579	0.43346	0.52463	0.28724	0.40581	0.34757	0.32155
	2	0.33402	0.22953	0.12843	0.16323	0.42329	0.36450	0.33244	0.27571	0.15997	0.18568	0.18276	0.23728
	3	0.42011	0.17599	1.17939	0.19611	0.54027	0.42645	0.35240	1.24783	0.17496	0.22563	0.28484	0.20087
	4	0.44274	0.21315	0.19655	1.39146	0.64177	0.53165	0.39909	0.39934	0.21821	0.24292	0.26441	0.24582
	5	0.70941	0.31107	0.30430	0.36319	2.10996	0.75637	0.56193	0.61645	0.33885	0.43454	0.40218	0.37407
	6	0.65832	0.22792	0.20702	0.13368	0.65658	2.04671	0.41703	0.42279	0.25275	0.30115	1.36061	0.27227
	7	0.45074	0.18754	0.15608	0.22528	0.58083	0.60536	1.62872	0.36540	0.24958	0.24856	0.23826	0.22794
	8	0.46321	0.17356	0.17310	0.21611	0.59299	0.45105	0.36506	1.42387	0.19232	0.25310	0.23070	0.22070
	9	0.39416	0.16371	0.16207	0.20643	0.54663	0.50407	0.34777	0.32716	1.20726	0.23856	0.26525	0.21379
	10	0.55072	0.26887	0.24242	0.31189	0.76735	0.77951	0.45092	0.49094	0.27149	1.73687	0.42042	0.31307
	11	0.22035	0.11013	0.10035	0.13344	0.31380	0.31359	0.19312	0.20437	0.11508	0.14883	1.18235	0.12811
	12	0.50427	0.26045	0.22050	0.26463	0.76182	0.58981	0.45134	0.46336	0.25849	0.34294	0.32068	1.39165
	13	0.37054	0.17127	0.16703	0.21036	0.53757	0.43309	0.34067	0.34294	0.19736	0.24136	0.25582	0.21193
	14	0.50387	0.24625	0.22420	0.28018	0.79286	0.58453	0.44721	0.45857	0.25124	0.32958	0.32371	0.26406
	15	0.36530	0.14253	0.14713	0.20444	0.50537	0.42022	0.31832	0.33314	0.18912	0.23236	0.22467	0.20351
	16	0.32870	0.16541	0.15151	0.18822	0.44076	0.36857	0.27322	0.30904	0.16555	0.21379	0.22593	0.18811
	17	0.42201	0.21329	0.17504	0.24494	0.58058	0.48582	0.36191	0.39454	0.21570	0.27752	0.25497	0.24071
	18	0.22061	0.10554	0.09721	0.13698	0.31293	0.25332	0.20144	0.20188	0.11213	0.14145	0.13660	0.12528
	19	0.44303	0.21974	0.21603	0.27528	0.69222	0.56506	0.41446	0.45186	0.24103	0.31405	0.24994	0.27618
	20	0.79695	0.34576	0.36745	0.49092	1.10672	0.92075	0.67204	0.74151	0.40619	0.52556	0.48936	0.45213
	21	0.76751	0.37639	0.35793	0.43513	1.03651	0.85438	0.63331	0.70895	0.37913	0.49020	0.45531	0.42424
	22	0.59603	0.28610	0.26711	0.33951	0.84758	0.67372	0.51521	0.54134	0.29233	0.37635	0.35164	0.32745
	23	0.64325	0.32743	0.30245	0.37664	0.88190	0.73610	0.54564	0.60931	0.33210	0.43055	0.39499	0.36936

INDUSTRY		13	14	15	16	17	18	19	20	21	22	23
YOUGHIOGHENY	1	0.00305	0.00202	0.00188	0.00158	0.00279	0.00067	0.00192	0.00176	0.00209	0.00247	0.00475
	2	0.02442	0.01373	0.01249	0.01129	0.01857	0.08600	0.01305	0.01134	0.01247	0.01644	0.03095
	3	0.00019	0.00015	0.00015	0.00014	0.00021	0.00008	0.00020	0.00017	0.00018	0.00023	0.00037
	4	0.00340	0.00270	0.00272	0.00247	0.00397	0.00135	0.00303	0.00320	0.00338	0.00474	0.00852
	5	0.00732	0.00485	0.00424	0.00312	0.00636	0.00101	0.00407	0.00343	0.00390	0.00498	0.01062
	6	0.00292	0.00197	0.00178	0.00145	0.00269	0.00054	0.00173	0.00158	0.00169	0.00232	0.00454
	7	0.00252	0.00177	0.00172	0.00159	0.00258	0.00081	0.00172	0.00170	0.00182	0.00250	0.00438
	8	0.00097	0.00064	0.08054	0.00041	0.00082	0.00010	0.00054	0.00061	0.00068	0.00061	0.00139
	9	0.00156	0.00114	0.00124	0.00115	0.00202	0.00058	0.00145	0.00123	0.00123	0.00183	0.00277
	10	0.00192	0.00166	0.00160	0.00136	0.00216	0.00079	0.00154	0.00155	0.00174	0.00212	0.00474
	11	0.00187	0.00130	0.00123	0.00110	0.00184	0.00047	0.00126	0.00120	0.00130	0.00186	0.00319
	12	0.01122	0.00808	0.00835	0.00790	0.01233	0.00445	0.00839	0.00851	0.00936	0.01191	0.02579
	13	0.04821	0.03659	0.03220	0.02686	0.04611	0.01316	0.02446	0.02381	0.02623	0.03550	0.06655
	14	0.01079	0.00821	0.00830	0.00744	0.01271	0.00393	0.00791	0.00770	0.00872	0.01099	0.02200
	15	0.00666	0.00420	0.00521	0.00339	0.00606	0.08161	0.00338	0.00328	0.00369	0.00515	0.00968
	16	0.00332	0.00234	0.00277	0.00422	0.00395	0.00112	0.00235	0.00221	[illegible]	0.00370	0.00549
	17	0.00351	0.00236	0.00215	0.08169	0.00408	0.00858	0.00210	0.00179	0.00197	0.00299	0.00520
	18	0.00217	0.00176	0.00180	0.08197	0.00309	0.00139	0.00171	0.00185	0.00179	0.00343	0.00416
	19	0.03008	0.02173	0.02226	0.02027	0.03250	0.01156	0.03015	0.02630	0.02533	0.03558	0.05337
	20	0.01643	0.01112	0.01050	0.00886	0.01551	0.08377	0.01070	0.00987	0.01114	0.01388	0.02682
	21	0.00717	0.00523	0.00463	0.00368	0.00691	0.00122	0.00466	0.00423	0.00503	0.00575	0.01147
	22	0.00464	0.00318	0.00293	0.00263	0.00435	0.00095	0.00400	0.00297	0.00402	0.00546	0.00729
	23	0.01065	0.00727	0.00674	0.00548	0.00986	0.00222	0.00743	0.00613	0.00400	0.00964	0.01422
REST OF APPALACHIA	1	0.07276	0.04758	0.04693	0.04225	0.06915	0.02177	0.85066	0.05000	0.05989	0.06744	0.12021
	2	0.31933	0.17057	0.16117	0.14174	0.23200	0.07653	0.16731	0.14353	0.15708	0.20749	0.39276
	3	0.00619	0.00430	0.00439	0.00397	0.00634	0.00228	0.00382	0.08504	0.00598	0.00658	0.01129
	4	0.01309	0.00577	0.00878	0.00800	0.01293	0.00426	0.01007	0.01069	0.01151	0.02224	0.02218
	5	0.05659	0.03029	0.02713	0.02240	0.04735	0.00863	0.03244	0.02837	0.01698	0.03060	0.08476
	6	0.05046	0.03335	0.03294	0.03031	0.04974	0.01362	0.03529	0.03715	0.03915	0.05231	0.08430
	7	0.05550	0.03824	0.03834	0.03443	0.05756	0.01984	0.04000	0.04068	0.04403	0.05845	0.09921
	8	0.01393	0.00830	0.00789	0.00681	0.01189	0.00292	0.01027	0.00886	0.01037	0.01130	0.02244
	9	0.02880	0.02113	0.02367	0.02260	0.01909	0.01170	0.02407	0.02410	0.02405	0.03588	0.05275
	10	0.07615	0.05223	0.05224	0.04686	0.07666	0.02504	0.05795	0.05848	0.06918	0.07550	0.15887
	11	0.01665	0.03091	0.01073	0.01015	0.01616	0.00466	0.01175	0.01178	0.01406	0.01706	0.02781
	12	0.11913	0.08174	0.08308	0.07698	0.12287	0.04132	0.08870	0.08592	0.10055	0.11960	0.24835
	13	0.13665	0.10372	0.09108	0.07593	0.13036	0.03719	0.08827	0.08714	0.07369	0.10015	0.18784
	14	0.03968	0.02962	0.02996	0.02690	0.04592	0.01409	0.02847	0.02417	0.03219	0.03966	0.05014
	15	0.02905	0.01684	0.02033	0.01359	0.02456	0.00599	0.01509	0.01442	0.01467	0.02125	0.03852
	16	0.02171	0.01421	0.01655	0.01932	0.02387	0.00666	0.01516	0.01442	0.01601	0.02286	0.03791
	17	0.02651	0.01667	0.01363	0.01118	0.02606	0.00370	0.01595	0.01612	0.01708	0.02064	0.03932
	18	0.01159	0.00869	0.00889	0.00959	0.01518	0.00653	0.00881	0.00939	0.00650	0.01669	0.02139
	19	0.13930	0.09591	0.09788	0.08915	0.14394	0.04957	0.13430	0.11764	0.11686	0.15706	0.24313
	20	0.09203	0.05272	0.04928	0.04193	0.07520	0.01559	0.05701	0.05246	0.06468	0.06840	0.14382
	21	0.10555	0.06687	0.06592	0.05860	0.07719	0.02862	0.07705	0.08522	0.10544	0.10090	0.17121
	22	0.04813	0.03004	0.02943	0.02635	0.04419	0.01228	0.03475	0.03785	0.03926	0.04588	0.08010
	23	0.08927	0.05343	0.05145	0.04381	0.07637	0.01386	0.06485	0.05777	0.08562	0.07287	0.13850
REST OF THE U.S.	1	0.57510	0.43945	0.46365	0.43638	0.45923	0.27973	0.46457	0.69066	0.55479	0.68988	1.05966
	2	0.65052	0.29404	0.28252	0.25265	0.48486	0.14319	0.31281	0.25192	0.26902	0.38959	0.71840
	3	0.33906	0.28043	0.29359	0.27008	0.41775	0.16642	0.39367	0.34215	0.35712	0.44510	0.73023
	4	0.45662	0.34421	0.36177	0.34100	0.51921	0.20951	0.40208	0.44865	0.45701	1.04976	0.83546
	5	0.65928	0.50767	0.53747	0.50700	0.76207	0.32852	0.56021	0.56046	0.56873	0.79648	1.18660
	6	0.47360	0.35420	0.38178	0.36552	0.55836	0.22885	0.38614	0.42411	0.41338	0.62050	0.86630
	7	0.41163	0.30463	0.31479	0.30811	0.46654	0.18435	0.31878	0.33480	0.34270	0.49221	0.78164
	8	0.41200	0.30650	0.32166	0.29617	0.45703	0.18368	0.43477	0.37568	0.37754	0.48823	0.79977
	9	0.39881	0.30405	0.34796	0.33598	0.57728	0.17971	0.34761	0.35245	0.34244	0.53161	0.75166
	10	0.55599	0.43541	0.45272	0.42285	0.65512	0.26295	0.46267	0.49634	0.51701	0.66690	1.55023
	11	0.23330	0.18347	0.19311	0.19444	0.28068	0.11242	0.19664	0.21108	0.20822	0.34215	0.48292
	12	0.56356	0.41738	0.44135	0.42831	0.65165	0.25269	0.44216	0.45499	0.47200	[illegible]	1.42071
	13	1.69989	0.54694	0.47035	0.39826	0.66717	0.19450	0.43078	0.32789	0.34769	0.49794	0.92763
	14	0.57082	1.46516	0.48208	0.44163	0.74196	0.24862	0.43852	0.44042	0.46875	0.63874	1.28769
	15	0.56350	0.35974	1.48937	0.32479	0.54691	0.18387	0.31368	0.32315	0.32960	0.50657	0.76104
	16	0.37202	0.28329	0.35421	1.43160	0.49553	0.17903	0.30167	0.30284	0.30662	0.50223	0.72131
	17	0.44011	0.34116	0.37432	0.33658	1.81245	0.21358	0.37628	0.35419	0.37909	0.66920	0.78772
	18	0.23782	0.19762	0.20868	0.23235	0.35552	1.17154	0.19821	0.21876	0.20921	0.40456	0.47053
	19	0.49582	0.37495	0.39553	0.37051	0.56626	0.23330	1.45998	0.43782	0.43271	0.61283	0.89846
	20	0.80251	0.61564	0.65850	0.62005	0.93342	0.39735	0.60170	1.64103	0.69733	0.97903	1.48932
	21	0.75677	0.57998	0.61493	0.57856	0.87058	0.37009	0.63915	0.69919	1.75780	0.93859	1.36452
	22	0.59487	0.45314	0.48310	0.45593	0.68937	0.28368	0.52820	0.59812	0.56451	1.77867	1.11392
	23	0.65003	0.50245	0.53466	0.50120	0.75370	0.32501	0.55709	0.55834	0.63646	0.79254	2.10969

APPENDIX M

Outputs of Computerized Location Model

Table M-1

S.I.C. 20

K	PRICE	OLD A	ADJ. A	OLD B	ADJ. B
1	64.04	40572000	25391236	37800	23656
2	58.82	13746000	8602680	5490	3436
3	54.57	12131000	7591962	15310	9581
4	52.94	8412000	5264495	9730	6089
5	52.59	15231000	9532040	15640	9788
6	53.00	41070000	25702900	44780	28025
7	53.43	21940000	13730743	24091	15077
8	52.73	21116000	13215058	22110	13837
9	58.73	13039000	8160217	20380	12754
10	51.87	18857000	11801305	26620	16660
11	46.93	16917000	10587191	22290	13950
12	58.35	19728000	12346404	18350	11484
13	58.89	6615000	4139875	5560	3480
14	53.07	24299000	15207080	23900	14957
15	48.28	9325000	5835879	9270	5801
16	52.34	18472000	11560359	18960	11866
17	35.23	25839000	16170860	32130	20108
18	32.26	18575000	11624820	22180	13881
19	65.43	12265000	7675823	12330	7717
20	45.73	13981000	8749750	13080	8186

Table M-1 (Cont.)

S.I.C. 20

LOC. 1 IS YOUGHIOGHENY

L	CRIT	JDISP	KCAP	QMIN	QMAX	SLOPE
1	4.48	4	12	0	11676351	11484
2	3.27	10	7	11690267	24615383	26561
3	3.19	7	9	24617707	32028818	39315
4	1.18	10	8	32107599	44593073	53152
5	-1.50	8	13	44735636	48670582	56632
6	-2.11	10	5	48704896	57722160	6642[illegible]
7	-3.24	10	6	57797342	82015044	94445
8	-4.43	10	2	82127900	90528488	97881
9	-4.63	10	4	90547540	95489638	103970
10	-4.72	10	3	95499035	102568123	113551
11	-5.99	4	14	102712841	117126139	1285[illegible]9
12	-9.42	7	10	117566194	128503287	145168
13	-15.96	4	15	129452786	135008546	15[illegible]97[illegible]
14	-18.28	4	16	135358732	146298090	162836
15	-19.10	4	11	146432196	156364754	176786
16	-40.14	4	19	160083218	167254188	184502
17	-41.17	4	17	167444926	182907464	20461[illegible]
18	-41.92	4	20	183060678	191436126	212796
19	-49.19	4	18	192983112	204160136	226677
20	-50.35	4	1	204423600	228299810	25[illegible]333

Table M-1 (Cont.)

S.I.C. 20

LOC. 1 IS YOUGHIOGHENY

OUTPUT AT LOC. 1 2081708
COST AT LOC. 1 4.48

K	G
1	23876211
2	8400589
3	7069088
4	4942099
5	9017265
6	24217703
7	12925115
8	12485474
9	7411112
10	10937094
11	9932560
12	11676351
13	3934946
14	14413298
15	5555762
16	10939359
17	15462540
18	11177025
19	7170970
20	8375449

J	QP
1	2081708
2	0
3	0
4	116497815
5	0
6	0
7	18348205
8	3934946
9	0
10	79057331
11	0
12	0
13	0

Table M-1 (Cont.)

S.I.C. 20

LOC. 1 IS YOUGHIOGHENY

OUTPUT AT LOC. 1   2081708
COST AT LOC. 1   4.48

MARKET 1 SERVED BY LOC. 4
MARKET 2 SERVED BY LOC. 10
MARKET 3 SERVED BY LOC. 10
MARKET 4 SERVED BY LOC. 10
MARKET 5 SERVED BY LOC. 10
MARKET 6 SERVED BY LOC. 10
MARKET 7 SERVED BY LOC. 10
MARKET 8 SERVED BY LOC. 10
MARKET 9 SERVED BY LOC. 7
MARKET 10 SERVED BY LOC. 7
MARKET 11 SERVED BY LOC. 4
MARKET 12 SHARED BY LOCS. 1 AND 4
SHARES ARE 2,081,708 AND 9594643
MARKET 13 SERVED BY LOC. 8
MARKET 14 SERVED BY LOC. 4
MARKET 15 SERVED BY LOC. 4
MARKET 16 SERVED BY LOC. 4
MARKET 17 SERVED BY LOC. 4
MARKET 18 SERVED BY LOC. 4
MARKET 19 SERVED BY LOC. 4
MARKET 20 SERVED BY LOC. 4

SC 219919994   U.S. CONTROL TOTAL IS 219,920,000

SV 11,522,1·2,656

ST 7,907,477,184

Table M-1 (Cont.)

S.I.C. 20

LOC. 1 IS YOUGHIOGHENY

OUTPUT AT LOC. 1 2144575
COST AT LOC. 1 4.48

K	Q
1	23876211
2	8400589
3	7069088
4	4942099
5	9017265
6	24217703
7	12925115
8	12485474
9	7411112
10	10937094
11	9932560
12	11676351
13	3934946
14	14413298
15	5555762
16	10939359
17	15462540
18	11177025
19	7170970
20	8375449

J	QP
1	2144575
2	0
3	0
4	116434948
5	0
6	0
7	18348205
8	3934946
9	0
10	79057331
11	0
12	0
13	0

Table M-1 (Cont.)

S.I.C. 2?

LOC. 1 IS YOUGHIOGHENY

CUTPUT AT LOC. 1 2144575
COST AT LOC. 1 4.48

MARKET 1 SERVED BY LOC. 4
MARKET 2 SERVED BY LOC. 10
MARKET 3 SERVED BY LOC. 10
MARKET 4 SERVED BY LOC. 10
MARKET 5 SERVED BY LOC. 10
MARKET 6 SERVED BY LOC. 10
MARKET 7 SERVED BY LOC. 10
MARKET 8 SERVED BY LOC. 10
MARKET 9 SERVED BY LOC. 7
MARKET 10 SERVED BY LOC. 7
MARKET 11 SERVED BY LOC. 4
MARKET 12 SHARED BY LOCS. 1 AND 4
SHARES ARE 2144575 AND 9531776
MARKET 13 SERVED BY LOC. 8
MARKET 14 SERVED BY LOC. 4
MARKET 15 SERVED BY LOC. 4
MARKET 16 SERVED BY LOC. 4
MARKET 17 SERVED BY LOC. 4
MARKET 18 SERVED BY LOC. 4
MARKET 19 SERVED BY LOC. 4
MARKET 20 SERVED BY LOC. 4

SG 219919994 U.S. CONTROL TOTAL IS 219,920,000

SV 11,522,102,656

ST 7,907,549,376

Table M-1 (Cont.)

S.I.C. 20

LOC. 1 IS UPPER LICKING

L	CRIT	JDISP	KCAP	QMIN	QMAX	SLOPE
1	.18	4	12	0	11676351	11484
2	-1.08	7	9	11690831	19101942	24238
3	-5.67	4	14	19213285	33626583	39196
4	-6.84	8	13	33672583	37607529	42675
5	-7.09	7	10	37618149	48555242	59335
6	-9.21	10	7	48680973	61606088	74412
7	-11.19	10	8	61753386	74238859	88249
8	-13.87	10	5	74475272	83492536	98037
9	-14.41	4	15	83545125	89100886	103839
10	-14.72	4	11	89133787	99066346	117788
11	-15.61	10	6	99170733	123388435	145813
12	-16.93	10	2	123581532	131982120	149249
13	-17.02	10	4	131994829	136936926	155338
14	-17.20	10	3	136964734	144033822	164920
15	-19.96	4	16	144489450	155428808	176785
16	-37.73	4	17	158569714	174032252	196893
17	-40.35	4	19	174547730	181718700	204610
18	-40.73	4	20	181797844	190173292	212796
19	-45.95	4	18	191284422	202461446	226677
20	-48.36	4	1	203005680	226881890	250333

Table M-1 (Cont.)

S.I.C. 20

LOC. 1 IS UPPER LICKING

OUTPUT AT LOC. 1   162120
COST AT LOC. 1   .18

K	Q
1	23876211
2	8400589
3	7069088
4	4942099
5	9017265
6	24217703
7	12925115
8	12485474
9	7411112
10	10937094
11	9932560
12	11676351
13	3934946
14	14413298
15	5555762
16	10939359
17	15462540
18	11177025
19	7170970
20	8375449

J	QP
1	162120
2	0
3	0
4	118417403
5	0
6	0
7	18348205
8	3934946
9	0
10	79057331
11	0
12	0
13	0

Table M-1 (Cont.)

S.I.C. 20

LOC. 1 IS UPPER LICKING

OUTPUT AT LOC. 1 162120
COST AT LOC. 1 .18

MARKET 1 SERVED BY LOC. 4
MARKET 2 SERVED BY LOC. 10
MARKET 3 SERVED BY LOC. 10
MARKET 4 SERVED BY LOC. 10
MARKET 5 SERVED BY LOC. 10
MARKET 6 SERVED BY LOC. 10
MARKET 7 SERVED BY LOC. 10
MARKET 8 SERVED BY LOC. 10
MARKET 9 SERVED BY LOC. 7
MARKET 10 SERVED BY LOC. 7
MARKET 11 SERVED BY LOC. 4
MARKET 12 SHARED BY LOCS. 1 AND 4
SHARES ARE 162120 AND 11514231
MARKET 13 SERVED BY LOC. 8
MARKET 14 SERVED BY LOC. 4
MARKET 15 SERVED BY LOC. 4
MARKET 16 SERVED BY LOC. 4
MARKET 17 SERVED BY LOC. 4
MARKET 18 SERVED BY LOC. 4
MARKET 19 SERVED BY LOC. 4
MARKET 20 SERVED BY LOC. 4

SQ 219919994 U.S. CONTROL TOTAL IS 219920000

SV 11522102656

ST 7905845952

Table M-1 (Cont.)

S.I.C. 20

LOC. 1 IS UPPER LICKING

OUTPUT AT LOC. 1 167016
COST AT LOC. 1 .18

K	Q
1	23876211
2	8400589
3	7069088
4	4942099
5	9017265
6	24217703
7	12925115
8	12485474
9	7411112
10	10937094
11	9932560
12	11676351
13	3934946
14	14413298
15	5555762
16	10939359
17	15462540
18	11177025
19	7170970
20	8375449

J	QP
1	167016
2	0
3	0
4	118412507
5	0
6	0
7	18348205
8	3934946
9	0
10	79057331
11	0
12	0
13	0

Table M-1 (Cont.)

```
S.I.C. 20

LOC. 1 IS UPPER LICKING


OUTPUT AT LOC. 1     167016
COST AT LOC. 1          .18


MARKET  1 SERVED BY LOC.  4
MARKET  2 SERVED BY LOC. 10
MARKET  3 SERVED BY LOC. 10
MARKET  4 SERVED BY LOC. 10
MARKET  5 SERVED BY LOC. 10
MARKET  6 SERVED BY LOC. 10
MARKET  7 SERVED BY LOC. 10
MARKET  8 SERVED BY LOC. 10
MARKET  9 SERVED BY LOC.  7
MARKET 10 SERVED BY LOC.  7
MARKET 11 SERVED BY LOC.  4
MARKET 12 SHARED BY LOCS. 1 AND  4
   SHARES ARE     167016 AND   11509335
MARKET 13 SERVED BY LOC.  8
MARKET 14 SERVED BY LOC.  4
MARKET 15 SERVED BY LOC.  4
MARKET 16 SERVED BY LOC.  4
MARKET 17 SERVED BY LOC.  4
MARKET 18 SERVED BY LOC.  4
MARKET 19 SERVED BY LOC.  4
MARKET 20 SERVED BY LOC.  4


       SQ      219919994              U.S. CONTROL TOTAL IS      219920000

       SV    11522102656

       ST     7905868800
```

Table M-2

S.I.C. 26

K	PRICE	OLD A	ADJ. A	OLD B	ADJ. B
1	17.82	3067000	3505708	790	903
2	20.87	9980000	11407553	1605	1835
3	18.33	6156000	7036563	1324	1513
4	17.40	1940000	2217500	409	468
5	22.09	2542000	2905611	981	1121
6	20.74	4796000	5482026	1360	1555
7	20.08	3176000	3630299	593	678
8	17.85	1212000	1385366	679	776
9	19.45	4973000	5684345	975	1114
10	24.63	4095000	4680754	845	966
11	23.65	2445000	2794736	563	644
12	32.32	2895000	3309105	666	761
13	30.65	749000	856138	147	168
14	32.66	1175000	1343074	249	285
15	26.07	6522000	7454916	1236	1413
16	27.21	1907000	2179780	391	447

Table M-2 (Cont.)

S.I.C. 26

LOC. 1 IS YOUGHIOGHENY

L	CRIT	JDISP	KCAP	QMIN	QMAX	SLOPE
1	7.22	7	3	0	7008818	1513
2	7.[illegible]	10	4	7009150	9218517	1981
3	5.22	5	7	9222043	12838733	2659
4	3.67	6	5	12842853	15723690	3780
5	-1.08	9	2	15741643	27110906	5615
6	-3.34	5	8	27123614	28495128	6391
7	-3.46	5	9	28495887	34158556	7505
8	-4.93	6	6	34169556	39619341	9060
9	-6.95	3	10	39637664	44294627	10026
10	-8.74	9	1	44312579	47802192	10929
11	-12.36	4	11	47841696	50621216	11572
12	-14.08	3	12	50641170	53925670	12333
13	-14.56	3	14	53931580	55265358	12618
14	-31.18	2	13	55475125	56326113	12786
15	-39.32	2	16	56430105	58597723	13233
16	-49.32	2	15	58730036	66148114	14646

Table M-2 (Cont.)

S.I.C. 26

LOC. 1 IS YOUGHIOGHENY

OUTPUT AT LOC. 1 287886
COST AT LOC. 1 7.22

K	Q
1	3489613
2	11369263
3	7008818
4	2209368
5	2880836
6	5449785
7	3616689
8	1371514
9	5662669
10	4656964
11	2779520
12	3284500
13	850988
14	1333778
15	7418078
16	2167618

J	QP
1	287886
2	10436684
3	9275242
4	2779520
5	10650873
6	8330621
7	6720932
8	0
9	14858876
10	2209368

Table M-2 (Cont.)

S.I.C. 26

LOC. 1 IS YOUGHIOGHENY

OUTPUT AT LOC. 1 287886
COST AT LOC. 1 7.22

MARKET 1 SERVED BY LOC. 9
MARKET 2 SERVED BY LOC. 9
MARKET 3 SHARED BY LOCS. 1 AND 7
SHARES ARE 287886 AND 6720932
MARKET 4 SERVED BY LOC. 10
MARKET 5 SERVED BY LOC. 6
MARKET 6 SERVED BY LOC. 6
MARKET 7 SERVED BY LOC. 5
MARKET 8 SERVED BY LOC. 5
MARKET 9 SERVED BY LOC. 5
MARKET 10 SERVED BY LOC. 3
MARKET 11 SERVED BY LOC. 4
MARKET 12 SERVED BY LOC. 3
MARKET 13 SERVED BY LOC. 2
MARKET 14 SERVED BY LOC. 3
MARKET 15 SERVED BY LOC. 2
MARKET 16 SERVED BY LOC. 2

SQ 6555 [illegible] U.S. CONTROL TOTAL IS 65,550,000

SV 1,458,961,856

ST 1,[illegible]6221[illegible]448

Table M-2 (Cont.)

S.I.C. 26

LOC. 1 IS YOUGHIOGHENY

OUTPUT AT LOC. 1 293988
COST AT LOC. 1 7.22

K	Q
1	3489613
2	11369263
3	7008818
4	2209368
5	2880836
6	5449785
7	3616689
8	1371514
9	5662669
10	4656964
11	2779520
12	3284500
13	850988
14	1333778
15	7418078
16	2167618

J	QP
1	293988
2	10436684
3	9275242
4	2779520
5	10650873
6	8330621
7	6714830
8	0
9	14858876
10	2209368

Table M-2 (Cont.)

```
S.I.C. 26

LOC. 1 IS YOUGHIOGHENY


OUTPUT AT LOC. 1       293988
COST AT LOC. 1           7.22


MARKET  1 SERVED BY LOC.  9
MARKET  2 SERVED BY LOC.  9
MARKET  3 SHARED BY LOCS. 1 AND  7
   SHARES ARE      293988 AND    671483[illegible]
MARKET  4 SERVED BY LOC. 1[illegible]
MARKET  5 SERVED BY LOC.  6
MARKET  6 SERVED BY LOC.  6
MARKET  7 SERVED BY LOC.  5
MARKET  8 SERVED BY LOC.  5
MARKET  9 SERVED BY LOC.  5
MARKET 10 SERVED BY LOC.  3
MARKET 11 SERVED BY LOC.  4
MARKET 12 SERVED BY LOC.  3
MARKET 13 SERVED BY LOC.  2
MARKET 14 SERVED BY LOC.  3
MARKET 15 SERVED BY LOC.  2
MARKET 16 SERVED BY LOC.  2


      SQ        6555[illegible]            U.S. CONTROL TOTAL IS      65550000

      SV       1458961856

      ST       10622014.8
```

Table M-2 (Cont.)

S.I.C. 26

LOC. 1 IS UPPER LICKING

L	CRIT	JDISP	KCAP	QMIN	QMAX	SLOPE
1	11.10	6	5	0	2880836	1121
2	4.86	5	7	2887833	6504522	1799
3	2.62	6	6	6508540	11958325	3354
4	1.41	5	9	11962410	17625[illegible]8[illegible]	4468
5	-.79	10	4	17634914	19844281	4936
6	-1.34	7	3	19846961	26855779	6449
7	-4.67	3	10	26877271	31534235	7415
8	-4.73	4	11	31534686	34314206	8058
9	-4.84	5	8	34315069	35686583	8835
10	-6.50	3	12	35701268	38985768	9596
11	-9.16	9	2	39011259	50380521	11430
12	-10.23	3	14	50392770	51726548	11715
13	-17.28	9	1	51809179	55298792	12618
14	-25.38	2	13	55400926	56251914	12786
15	-35.56	2	16	56382129	58549747	13233
16	-43.35	2	15	58652859	66070937	14646

Table M-2 (Cont.)

S.I.C. 26

LOC. 1 IS UPPER LICKING

CUTPUT AT LCC. 1 15800
COST AT LOC. 1 11.10

K	Q
1	3489613
2	11369263
3	7008818
4	2209368
5	2880836
6	5449785
7	3616689
8	1371514
9	5662669
10	4656964
11	2779520
12	3284500
13	850988
14	1333778
15	7418078
16	2167618

J	QP
1	15800
2	10436684
3	9275242
4	2779520
5	10650873
6	8314821
7	7008818
8	0
9	14858876
10	2209368

Table M-2 (Cont.)

S.I.C. 26

LOC. 1 IS UPPER LICKING

OUTPUT AT LOC. 1 15800
COST AT LOC. 1 11.10

MARKET 1 SERVED BY LOC. 9
MARKET 2 SERVED BY LOC. 9
MARKET 3 SERVED BY LOC. 7
MARKET 4 SERVED BY LOC. 10
MARKET 5 SHARED BY LOCS. 1 AND 6
SHARES ARE 15800 AND 2865036
MARKET 6 SERVED BY LOC. 6
MARKET 7 SERVED BY LOC. 5
MARKET 8 SERVED BY LOC. 5
MARKET 9 SERVED BY LOC. 5
MARKET 10 SERVED BY LOC. 3
MARKET 11 SERVED BY LOC. 4
MARKET 12 SERVED BY LOC. 3
MARKET 13 SERVED BY LOC. 2
MARKET 14 SERVED BY LOC. 3
MARKET 15 SERVED BY LOC. 2
MARKET 16 SERVED BY LOC. 2

SQ 65550000 U.S. CONTROL TOTAL IS 65,550,000

SV 1,458,961,856

ST 1,062,554,808

Table M-2 (Cont.)

S.I.C. 26

LOC. 1 IS UPPER LICKING

OUTPUT AT LOC. 1 16135
COST AT LOC. 1 11.10

K	Q
1	3489613
2	11369263
3	7008818
4	2209368
5	2880836
6	5449785
7	3616689
8	1371514
9	5662669
10	4656964
11	2779520
12	3284500
13	850988
14	1333778
15	7418078
16	2167618

J	QP
1	16135
2	10436684
3	9275242
4	2779520
5	10650873
6	8314486
7	7008818
8	0
9	14858876
10	2209368

Table M-2 (Cont.)

```
S.I.C. 26

LOC. 1 IS UPPER LICKING


OUTPUT AT LOC. 1       16135
COST AT LOC. 1         11.10


MARKET  1 SERVED BY LOC.  9
MARKET  2 SERVED BY LOC.  9
MARKET  3 SERVED BY LOC.  7
MARKET  4 SERVED BY LOC. 10
MARKET  5 SHARED BY LOCS. 1 AND  6
   SHARES ARE       16135 AND    2864701
MARKET  6 SERVED BY LOC.  6
MARKET  7 SERVED BY LOC.  5
MARKET  8 SERVED BY LOC.  5
MARKET  9 SERVED BY LOC.  5
MARKET 10 SERVED BY LOC.  3
MARKET 11 SERVED BY LOC.  4
MARKET 12 SERVED BY LOC.  3
MARKET 13 SERVED BY LOC.  2
MARKET 14 SERVED BY LOC.  3
MARKET 15 SERVED BY LOC.  2
MARKET 16 SERVED BY LOC.  2


       SO      6555.000               U.S. CONTROL TOTAL IS      65,550,000

       SV     1,458,961,856

       ST     1,062,553,064
```

Table M-3

S.I.C. 28

K	PRICE	CLC A	ACJ. A	CLC B	ACJ. B
1	24.87	4007000	3558210	11170	9919
2	26.88	24017000	21327060	50850	45155
3	27.53	19957000	17721786	45200	40138
4	25.37	7222000	6413125	17000	15096
5	27.12	12854000	11414333	38200	33922
6	22.69	12733000	11306885	40390	35866
7	22.75	10524000	9345296	21970	19509
8	30.41	8092000	7185684	15290	13577
9	23.30	19654000	17452722	42390	37642
10	31.41	10057000	8930601	22850	20291
11	25.14	10338000	9180128	26630	23647
12	30.[illegible]0	11527000	10235959	26960	23940
13	28.93	4490000	3987113	9870	8765
14	26.82	3955000	3512034	9370	8321
15	33.00	5897000	5236527	42290	37553
16	32.06	6313000	5605934	14470	12849

Table M-3 (Cont.)

S.I.C. 28

LOC. 1 IS YOUGHIOGHENY

L	CRIT	JDISP	KCAP	QMIN	QMAX	SLOPE
1	11.42	7	3	.0	16616980	40138
2	9.99	7	4	16674543	22704628	55234
3	4.22	6	8	23022850	29795690	68811
4	3.70	7	5	29831732	40326225	102733
5	2.90	6	7	40408077	49309443	122242
6	-.06	9	2	49672120	69785432	167397
7	-4.61	4	9	70545972	87121758	205039
8	-5.17	4	10	87236810	95530173	225330
9	-6.68	9	1	95871989	99183505	235249
10	-7.97	5	6	99486064	109979190	271115
11	-15.85	3	11	112115046	120700596	294762
12	-21.39	3	12	122335131	131852921	318703
13	-25.39	10	14	133126813	136415702	327023
14	-37.89	2	13	140503584	144237110	335788
15	-39.46	2	16	144762482	149956422	348637
16	-47.39	2	15	152721036	156718472	3P6191

Table M-3 (Cont.)

S.I.C. 28

LCC. 1 IS YCLGHICGHENY

CLTPLT AT LCC. 1 1227641
CCST AT LCC. 1 11.42

K	C
1	3311516
2	20113313
3	16616980
4	6030084
5	10494493
6	10493127
7	8901366
8	6772841
9	16575786
10	8293363
11	8585551
12	9517790
13	3733526
14	3288891
15	3997437
16	5193941

J	CP
1	1227641
2	12924904
3	18103341
4	24869150
5	10493127
6	15674207
7	31913917
8	0
9	23424829
10	3288891

Table M-3 (Cont.)

```
S.I.C. 28

LOC. 1 IS YOUGHIOGHENY



OUTPUT AT LOC. 1    1227641
COST AT LOC. 1        11.42


MARKET  1 SERVED BY LOC.  9
MARKET  2 SERVED BY LOC.  9
MARKET  3 SHARED BY LOCS. 1 AND  7
   SHARES ARE    1227641 AND   15389339
MARKET  4 SERVED BY LOC.  7
MARKET  5 SERVED BY LOC.  7
MARKET  6 SERVED BY LOC.  5
MARKET  7 SERVED BY LOC.  6
MARKET  8 SERVED BY LOC.  6
MARKET  9 SERVED BY LOC.  4
MARKET 10 SERVED BY LOC.  4
MARKET 11 SERVED BY LOC.  3
MARKET 12 SERVED BY LOC.  3
MARKET 13 SERVED BY LOC.  2
MARKET 14 SERVED BY LOC. 10
MARKET 15 SERVED BY LOC.  2
MARKET 16 SERVED BY LOC.  2


      SO      141919998            U.S. CONTROL TOTAL IS      141,920,000

      SV      3,807,193,216

      ST      2,740,289,504
```

Table M-3 (Cont.)

S.I.C. 28

LCC. 1 IS YCLGHICGHENY

CLTPLT AT LCC. 1   1252807
CCST AT LOC. 1   11.42

K	C
1	3311516
2	20113313
3	16616980
4	6030084
5	10494493
6	10493127
7	8901366
8	6772841
9	16575786
10	8293363
11	8585551
12	9517790
13	3733526
14	3288891
15	3997437
16	5193941

J	CP
1	1252807
2	12924904
3	18103341
4	24869150
5	10493127
6	15674207
7	31888751
8	0
9	23424829
10	3288891

Table M-3 (Cont.)

```
S.I.C. 28

LCC. 1 IS YCLGHICGFENY



CLTPLT AT LCC. 1    12528C7
CCST AT LCC. 1        11.42


MARKET  1 SERVEC BY LCC.  9
MARKET  2 SERVEC BY LCC.  9
MARKET  3 SHAREC BY LCCS. 1 ANC  7
   SHARES ARE    12528C7 ANC   15364173
MARKET  4 SERVEC BY LCC.  7
MARKET  5 SERVEC BY LCC.  7
MARKET  6 SERVEC BY LCC.  5
MARKET  7 SERVEC BY LCC.  6
MARKET  8 SERVEC BY LCC.  6
MARKET  9 SERVEC BY LCC.  4
MARKET 10 SERVEC BY LCC.  4
MARKET 11 SERVEC BY LCC.  3
MARKET 12 SERVEC BY LCC.  3
MARKET 13 SERVEC BY LCC.  2
MARKET 14 SERVEC BY LCC. 10
MARKET 15 SERVEC BY LCC.  2
MARKET 16 SERVEC BY LCC.  2


      SC      141919998               L.S. CCNTRCL TCTAL IS      14192C,CCC

      SV     38C7193216

      ST     274C16L512
```

Table M-4

S.I.C. 29

K	PRICE	OLD A	ADJ. A	OLD B	ADJ. B
1	78.62	32911000	25067292	1960	1493
2	73.[illegible]	75709000	57665207	3740	2849
3	68.53	58458000	44525653	2850	2171
4	67.89	19739000	15034587	950	724
5	62.[illegible]1	39166000	29831533	2270	1729
6	6[illegible].[illegible]1	43964000	33486021	2850	2171
7	63.65	31841000	24252306	1360	1036
8	64.24	26733000	20361700	1030	785
9	58.49	24239000	18462098	1040	792
10	59.64	28914000	22022901	1360	1036
11	49.[illegible]4	31822000	24237835	1680	1280
12	45.11	66729000	50825418	3510	2673
13	59.57	10198000	7767502	460	350
14	57.36	11816000	8999882	570	434
15	67.44	55987000	42643569	2390	1820
16	68.35	4585000	3492253	310	236

Table M-4 (Cont.)

S.I.C. 29

LOC. 1 IS YOUGHIOGHENY

L	CRIT	JDISP	KCAP	QMIN	QMAX	SLOPE
1	-32.21	4	3	0	44376900	2171
2	-32.38	4	4	44377249	59362714	2694
3	-32.42	4	1	59362845	84312768	4387
4	-34.[illegible]7	4	2	84319985	141774678	7236
5	-39.58	4	7	141814596	1660[illegible]964	8272
6	-43.22	4	8	166031024	186342324	9[illegible]56
7	-43.6[illegible]	4	5	186345808	21607012[illegible]	1[illegible]785
8	-50.11	4	9	216140370	234556134	11577
9	-5[illegible].43	4	6	234559782	267915528	13748
10	-54.74	4	10	267974786	2899359[illegible]	14784
11	-67.45	4	14	290123776	299098752	15218
12	-68.29	4	11	299111592	323286672	16498
13	-69.33	4	16	323303848	326779960	16734
14	-74.99	4	13	326874544	334621172	17084
15	-76.15	4	15	334641052	377161848	18905
16	-79.16	4	12	377218688	427923504	21578

Table M-4 (Cont.)

S.I.C. 29

LOC. 1 IS YOUGHIOGHENY

OUTPUT AT LOC. 1 34702
COST AT LOC. 1 -32.21

K	Q
1	24949923
2	57454693
3	44376900
4	14985465
5	29724313
6	33355747
7	24186368
8	20311392
9	18415765
10	21961116
11	24175083
12	50704820
13	7746631
14	8974979
15	42520798
16	3476114

J	QP
1	34702
2	0
3	0
4	427285288
5	0
6	0
7	0
8	0
9	0
10	0

Table M-4 (Cont.)

```
S.I.C. 29

LOC. 1 IS YOUGHIOGHENY


OUTPUT AT LOC. 1       34702
COST AT LOC. 1        -32.21


MARKET  1 SERVED BY LOC.  4
MARKET  2 SERVED BY LOC.  4
MARKET  3 SHARED BY LOCS. 1 AND  4
   SHARES ARE        34702 AND   44342198
MARKET  4 SERVED BY LOC.  4
MARKET  5 SERVED BY LOC.  4
MARKET  6 SERVED BY LOC.  4
MARKET  7 SERVED BY LOC.  4
MARKET  8 SERVED BY LOC.  4
MARKET  9 SERVED BY LOC.  4
MARKET 10 SERVED BY LOC.  4
MARKET 11 SERVED BY LOC.  4
MARKET 12 SERVED BY LOC.  4
MARKET 13 SERVED BY LOC.  4
MARKET 14 SERVED BY LOC.  4
MARKET 15 SERVED BY LOC.  4
MARKET 16 SERVED BY LOC.  4


     SQ     427,319,992          U.S. CONTROL TOTAL IS      427,320,000

     SV    26,896,515,328

     ST    11,709,475,456
```

Table M-4 (Cont.)

S.I.C. 29

LOC. 1 IS YOUGHIOGHENY

OUTPUT AT LOC. 1   35563
COST AT LOC. 1   -32.21

K	Q
1	24949923
2	57454693
3	44376900
4	14985465
5	29724313
6	33355747
7	24186368
8	20311302
9	18415765
10	21961116
11	24175083
12	50704820
13	7746631
14	8974979
15	42520798
16	3476114

J	QP
1	35563
2	0
3	0
4	427284428
5	0
6	0
7	0
8	0
9	0
10	0

Table M-4 (Cont.)

S.I.C. 29

LOC. 1 IS YOUGHIOGHENY

```
OUTPUT AT LOC. 1      35563
COST AT LOC. 1       -32.21

MARKET  1 SERVED BY LOC.  4
MARKET  2 SERVED BY LOC.  4
MARKET  3 SHARED BY LOCS. 1 AND  4
   SHARES ARE       35563 AND   44341337
MARKET  4 SERVED BY LOC.  4
MARKET  5 SERVED BY LOC.  4
MARKET  6 SERVED BY LOC.  4
MARKET  7 SERVED BY LOC.  4
MARKET  8 SERVED BY LOC.  4
MARKET  9 SERVED BY LOC.  4
MARKET 10 SERVED BY LOC.  4
MARKET 11 SERVED BY LOC.  4
MARKET 12 SERVED BY LOC.  4
MARKET 13 SERVED BY LOC.  4
MARKET 14 SERVED BY LOC.  4
MARKET 15 SERVED BY LOC.  4
MARKET 16 SERVED BY LOC.  4

      SQ      427319992            U.S. CONTROL TOTAL IS      427320000

      SV    26896515328

      ST    11709513600
```

Table M-4 (Cont.)

S.I.C. 29

LOC. 1 IS UPPER LICKING

L	CRIT	JDISP	KCAP	QMIN	QMAX	SLOPE
1	-26.39	4	4	0	14985465	724
2	-26.74	4	3	14985716	59362616	2894
3	-26.93	4	1	59363183	84313105	4387
4	-27.47	4	5	84315453	114039766	6116
5	-28.27	4	2	114044662	171499354	8965
6	-28.64	4	7	171502702	195689070	1[illegible]1
7	-33.[illegible]3	4	8	195732968	216044268	10785
8	-34.21	4	6	216057014	249412760	12956
9	-35.69	4	9	249431858	267847622	13748
10	-42.[illegible]4	4	10	267934938	289896052	14784
11	-52.[illegible]3	4	11	290043728	314218808	16064
12	-53.38	4	14	314240532	323215508	16498
13	-55.65	4	16	323252908	326729020	16734
14	-59.93	4	13	326800732	334547360	17084
15	-60.99	4	15	334565468	377086264	18905
16	-62.92	4	12	377122724	427827540	21578

Table M-4 (Cont.)

S.I.C. 29

LOC. 1 IS UPPER LICKING

OUTPUT AT LOC. 1 6610
COST AT LOC. 1 -26.39

K	C
1	24949923
2	57454693
3	44376900
4	14985465
5	29724313
6	33355747
7	24186368
8	2[illegible]3113[illegible]2
9	18415765
10	21961116
11	24175083
12	5670482[illegible]
13	7746631
14	8974979
15	42520798
16	3476114

J	CP
1	6610
2	0
3	0
4	427313380
5	0
6	0
7	0
8	0
9	0
10	0

Table M-4 (Cont.)

S.I.C. 29

LOC. 1 IS UPPER LICKING

OUTPUT AT LOC. 1 6610
COST AT LOC. 1 -26.39

MARKET 1 SERVED BY LOC. 4
MARKET 2 SERVED BY LOC. 4
MARKET 3 SERVED BY LOC. 4
MARKET 4 SHARED BY LOCS. 1 AND 4
SHARES ARE 6610 AND 14978855
MARKET 5 SERVED BY LOC. 4
MARKET 6 SERVED BY LOC. 4
MARKET 7 SERVED BY LOC. 4
MARKET 8 SERVED BY LOC. 4
MARKET 9 SERVED BY LOC. 4
MARKET 10 SERVED BY LOC. 4
MARKET 11 SERVED BY LOC. 4
MARKET 12 SERVED BY LOC. 4
MARKET 13 SERVED BY LOC. 4
MARKET 14 SERVED BY LOC. 4
MARKET 15 SERVED BY LOC. 4
MARKET 16 SERVED BY LOC. 4

SQ 427319992 U.S. CONTROL TOTAL IS 427,320,000

SV 26,896,515[illegible]72

ST 11,70[illegible],192,[illegible]

Table M-4 (Cont.)

S.I.C. 29

LOC. 1 IS UPPER LICKING

OUTPUT AT LOC. 1 6825
CCST AT LOC. 1 -26.39

K	Q
1	24949923
2	57454693
3	44376900
4	14985465
5	29724313
6	33355747
7	24186368
8	20311302
9	18415765
10	21961116
11	24175083
12	50704820
13	7746631
14	8974979
15	42520798
16	3476114

J	QP
1	6825
2	0
3	0
4	427313168
5	0
6	0
7	0
8	0
9	0
10	0

Table M-4 (Cont.)

S.I.C. 29

LOC. 1 IS UPPER LICKING

```
OUTPUT AT LOC. 1        6825
COST AT LOC. 1        -26.39

MARKET  1 SERVED BY LOC.  4
MARKET  2 SERVED BY LOC.  4
MARKET  3 SERVED BY LOC.  4
MARKET  4 SHARED BY LOCS. 1 AND  4
   SHARES ARE         6825 AND   14978640
MARKET  5 SERVED BY LOC.  4
MARKET  6 SERVED BY LOC.  4
MARKET  7 SERVED BY LOC.  4
MARKET  8 SERVED BY LOC.  4
MARKET  9 SERVED BY LOC.  4
MARKET 10 SERVED BY LOC.  4
MARKET 11 SERVED BY LOC.  4
MARKET 12 SERVED BY LOC.  4
MARKET 13 SERVED BY LOC.  4
MARKET 14 SERVED BY LOC.  4
MARKET 15 SERVED BY LOC.  4
MARKET 16 SERVED BY LOC.  4

      SQ      427319992                 U.S. CONTROL TOTAL IS      427320000

      SV     26806515.72

      ST     117[illegible]82[illegible]192
```

Table M-5

S.I.C. 33

K	PRICE	OLD A	ADJ. A	OLD B	ADJ. B
1	109.46	6823000	7749558	227	258
2	104.55	1787000	2029673	483	549
3	99.81	18489000	20999790	504	572
4	99.56	5828000	6619437	156	177
5	96.15	7446000	8457160	256	291
6	98.55	5772000	6555833	209	237
7	94.71	9493000	10782141	226	257
8	95.21	11072000	12575568	239	271
9	89.26	6479000	7358843	162	184
10	95.47	8651000	9825798	228	259
11	97.10	4820000	5474552	142	161
12	103.61	4864000	5524527	143	162
13	113.26	936000	1063108	23	26
14	104.03	1691000	1920636	45	51
15	122.28	9968000	11321646	237	269
16	117.26	2330000	2646412	60	68

Table M-5 (Cont.)

S.I.C. 33

LOC. 1 IS YOUGHIOGHENY

L	CRIT	JCISP	KCAP	QMIN	QMAX	SLOPE
1	-52.64	4	4	0	6601797	177
2	-52.86	4	3	6601837	27544491	750
3	-53.51	4	1	27544976	35266310	1007
4	-55.35	4	2	35268166	37240486	1556
5	-60.46	4	7	37248431	48006260	1813
6	-61.40	4	5	48007972	56437176	2103
7	-63.83	4	6	56442285	62974725	2341
8	-64.18	4	8	62975539	75525260	2612
9	-70.85	4	10	75542695	85343771	2871
10	-71.28	4	9	85344996	92687414	3055
11	-72.16	4	11	92690112	98149002	3217
12	-72.36	4	16	98149621	100788341	3285
13	-72.59	4	12	100788797	106296495	3447
14	-72.71	4	14	106296934	108212253	3498
15	-73.23	4	13	108214056	109274205	3524
16	-73.24	4	15	109274253	120562982	3794

Table M-5 (Cont.)

S.I.C. 33

LCC. 1 IS YCUGHICGHENY

CLTPLT AT LCC. 1 8C6C885
CCST AT LCC. 1 -52.86

K	C
1	7721335
2	1972320
3	20942654
4	6601837
5	8429205
6	653244C
7	1C757829
8	12549722
9	7342419
10	9801C76
11	5458891
12	5507698
13	106C149
14	1915319
15	11288729
16	2638421

J	CP
1	8060885
2	C
3	C
4	112459153
5	C
6	C
7	C
8	C
9	C
10	C
11	C
12	C

Table M-5 (Cont.)

```
S.I.C. 33

LOC. 1 IS YOUGHIOGHENY


OUTPUT AT LOC. 1    8060885
COST AT LOC. 1        -52.86


MARKET  1 SERVED BY LOC.  4
MARKET  2 SERVED BY LOC.  4
MARKET  3 SHARED BY LOCS. 1 AND  4
   SHARES ARE    1459048 AND   19483636
MARKET  4 SERVED BY LOC.  1
MARKET  5 SERVED BY LOC.  4
MARKET  6 SERVED BY LOC.  4
MARKET  7 SERVED BY LOC.  4
MARKET  8 SERVED BY LOC.  4
MARKET  9 SERVED BY LOC.  4
MARKET 10 SERVED BY LOC.  4
MARKET 11 SERVED BY LOC.  4
MARKET 12 SERVED BY LOC.  4
MARKET 13 SERVED BY LOC.  4
MARKET 14 SERVED BY LOC.  4
MARKET 15 SERVED BY LOC.  4
MARKET 16 SERVED BY LOC.  4


      SO       12052038              U.S. CONTROL TOTAL IS      120520000

      SV    12166393472

      ST     6930228096
```

Table M-5 (Cont.)

S.I.C. 33

LCC. 1 IS YCUGHICGHENY

CUTPUT AT LCC. 1   8323669
CCST AT LCC. 1   -52.86

MARKET 1 SERVEC BY LCC. 4
MARKET 2 SERVEC BY LCC. 4
MARKET 3 SHAREC BY LCCS. 1 ANC 4
SHARES ARE 1721832 AND 19220822
MARKET 4 SERVEC BY LCC. 1
MARKET 5 SERVEC BY LCC. 4
MARKET 6 SERVEC BY LCC. 4
MARKET 7 SERVEC BY LCC. 4
MARKET 8 SERVEC BY LCC. 4
MARKET 9 SERVEC BY LCC. 4
MARKET 1C SERVEC BY LCC. 4
MARKET 11 SERVEC BY LCC. 4
MARKET 12 SERVEC BY LCC. 4
MARKET 13 SERVEC BY LCC. 4
MARKET 14 SERVEC BY LCC. 4
MARKET 15 SERVEC BY LCC. 4
MARKET 16 SERVEC BY LCC. 4

SC   120520C38   U.S. CONTRCL TCTAL IS   120,520,CCC

SV   12,166,393,472

ST   6,945,985,216

Table M-5 (Cont.)

S.I.C. 33

LOC. 1 IS YOUGHIOGHENY

OUTPUT AT LOC. 1   8323669
COST AT LOC. 1   -52.86

K	O
1	7721335
2	1972320
3	20942654
4	6601837
5	8429205
6	6532440
7	10757829
8	12549722
9	7342419
10	9801076
11	5458891
12	5507698
13	1060149
14	1915319
15	11288729
16	2638421

J	OP
1	8323669
2	0
3	0
4	112196369
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0

APPENDIX N

Users of Youghiogheny Recreation Facilities

by State and County of Residence*

*Figures are given on county basis moving out from the Youghiogheny recreation site.

Table N-1

State	County	No. of Annual Users
Maryland	Garrett	105,484
Pennsylvania	Fayette	321,884
Pennsylvania	Somerset	28,342
West Virginia	Preston	5,013
West Virginia	Mineral	1,954
West Virginia	Monongalia	4,057
Maryland	Allegany	4,776
Pennsylvania	Westmoreland	13,762
West Virginia	Grant	324
West Virginia	Tucker	302
West Virginia	Taylor	511
West Virginia	Marion	2,030
Pennsylvania	Greene	923
West Virginia	Barbour	362
West Virginia	Pendleton	189
Pennsylvania	Bedford	886
West Virginia	Hamshire	244
Pennsylvania	Cambria	3,605
Pennsylvania	Indiana	1,337
West Virginia	Hardy	165
Pennsylvania	Allegheny	20,398
Pennsylvania	Washington	2,721
West Virginia	Morgan	105
West Virginia	Harrison	931
Pennsylvania	Armstrong	869
West Virginia	Marshall	365
West Virginia	Wetzel	178
West Virginia	Ohio	604
West Virginia	Randolph	223
West Virginia	Upshur	155

State	County	No. of Annual Users
Pennsylvania	Fulton	86
Virginia	Franklin	178
Pennsylvania	Blair	1,073
West Virginia	Brooke	226
West Virginia	Berkeley	235
West Virginia	Lewis	132
Virginia	Russell	146
West Virginia	Doddridge	43
Pennsylvania	Butler	688
West Virginia	Hancock	238
Pennsylvania	Huntingdon	206
West Virginia	Tyler	52
Ohio	Belmont	423
Ohio	Jefferson	500
Pennsylvania	Beaver	1,009
Virginia	Clarke	39
Virginia	Sussex	69
Ohio	Monroe	67
West Virginia	Jefferson	80
Pennsylvania	Franklin	354
Pennsylvania	Jefferson	188
Virginia	Roanoke	163
Pennsylvania	Clearfield	318
Virginia	Nottoway	59
Pennsylvania	Lawrence	414
West Virginia	Gilmer	30
West Virginia	Ritchie	40
Pennsylvania	Clarion	133
Ohio	Harrison	60
West Virginia	Braxton	49

Table N-1 (Cont.)

State	County	No. of Annual Users
West Virginia	Pleasants	23
West Virginia	Webster	45
Virginia	Princess Anne	17
Ohio	Columbiana	339
West Virginia	Pocahontas	30
Virginia	Henrico	9
Virginia	Lancaster	69
Ohio	Carroll	57
Maryland	Washington	245
West Virginia	Calhoun	21
Ohio	Noble	28
West Virginia	Wirt	11
Virginia	Fairfax Town	58
Pennsylvania	Mifflin	102
Pennsylvania	Venango	150
Virginia	Louisa	19
Ohio	Guernsey	88
Pennsylvania	Centre	175
Ohio	Washington	115
Pennsylvania	Mercer	278
Virginia	Augusta	81
Virginia	Goochland	10
Ohio	Mahoning	654
Pennsylvania	Cumberland	265
Pennsylvania	Juniata	34
Virginia	Culpepper	32
Ohio	Tuscarawas	163
Pennsylvania	Adams	105
Pennsylvania	Forest	9
Pennsylvania	Elk	72

State	County	No. of Annual Users
West Virginia	Wood	144
Virginia	Prince Edward	90
Pennsylvania	Perry	47
Virginia	Bath	9
West Virginia	Clay	20
West Virginia	Nicholas	44
West Virginia	Roane	26
Ohio	Stark	557
Virginia	Fairfax	440
Ohio	Morgan	20
Ohio	Trumbull	319
Virginia	Northumberland	19
Pennsylvania	Cameron	11
Maryland	Frederick	101
Ohio	Muskingum	111
West Virginia	Greenbrier	46
Virginia	Southampton	23
Ohio	Coshocton	42
Pennsylvania	Crawford	101
Pennsylvania	Warren	56
West Virginia	Jackson	23
Virginia	Richmond	30
Ohio	Athens	57
Virginia	Alleghany	14
Pennsylvania	Clinton	44
Ohio	Meigs	26
Virginia	Smyth	16
Pennsylvania	Snyder	30
Ohio	Holmes	25
Ohio	Summit	575

Table N-1 (Cont.)

State	County	No. of Annual Users	State	County	No. of Annual Users
Pennsylvania	York	262	Virginia	Giles	8
Virginia	Lee	14	Ohio	Licking	74
Pennsylvania	McKean	58	Maryland	Howard	29
Virginia	Floyd	8	Pennsylvania	Erie	201
Ohio	Perry	29	Pennsylvania	Potter	13
Maryland	Montgomery	346	Pennsylvania	Lancaster	219
Pennsylvania	Dauphin	224	Pennsylvania	Northampton	159
West Virginia	Fayette	62	Ohio	Gallia	21
Ohio	Wayne	75	Ohio	Knox	31
West Virginia	Kanawha	247	Ohio	Vinton	8
Maryland	Carroll	51	Pennsylvania	Lebanon	70
Pennsylvania	Union	25	West Virginia	Summers	12
Virginia	Amherst	22	Ohio	Lake	115
Ohio	Ashtabula	89	West Virginia	Raleigh	59
Virginia	Buckingham	10	Pennsylvania	Lycoming	82
Ohio	Geauga	44	Virginia	Craig	3
West Virginia	Mason	22	Ohio	Ashland	29
Virginia	Botetourt	15	Ohio	Cuyahoga	1,232
Virginia	James City	6	Ohio	Fairfield	47
Ohio	Medina	56	West Virginia	Boone	20
West Virginia	Putnam	20	Virginia	Cumberland	4
Virginia	Appomattox	8	Virginia	Greensville	19
Ohio	Hocking	17	Maryland	Baltimore	332
West Virginia	Monroe	9	Pennsylvania	Montour	11
Virginia	Caroline	10	New York	Chautauqua	98

Table N-1 (Cont.)

State	County	No. of Annual Users	State	County	No. of Annual Users
Maryland	Prince Georges	238	Virginia	Chesterfield	37
Virginia	Bedford	21	Ohio	Franklin	359
Virginia	Patrick	4	Maryland	Hartford	40
Ohio	Jackson	19	Ohio	Delaware	18
Maryland	Anne Arundel	133	Ohio	Huron	24
Maryland	Charles	20	Ohio	Ross	31
Pennsylvania	Tioga	23	New York	Allegany	22
Ohio	Lorain	136	Virginia	Pulaski	3
Ohio	Richland	73	West Virginia	Logan	31
Virginia	Warren	7	Virginia	Mecklenburg	17
West Virginia	Cabell	65	Maryland	Calvert	8
West Virginia	Lincoln	12	Virginia	Montgomery	6
Virginia	Campbell	20	Pennsylvania	Berks	134
Ohio	Lawrence	33	Virginia	Isle of Wight	3
New York	Cattaraugus	48	Virginia	Charlotte	6
Virginia	Rappahannock	37	Virginia	Northampton	7
Virginia	Essex	4	Ohio	Pike	9
Virginia	Albermarle	18	West Virginia	Wayne	18
Pennsylvania	Schuylkill	98	Ohio	Crawford	22
West Virginia	Mercer	39	Ohio	Scioto	39
Virginia	Amelia	4	Pennsylvania	Sullivan	3
Virginia	King and Queen	4	Ohio	Erie	31
Ohio	Morrow	11	Pennsylvania	Chester	94
West Virginia	Wyoming	19	Virginia	Nansemond	2
Virginia	Pittsylvania	8			
Virginia	Fluvanna	14		TOTAL	543,310
Ohio	Portage	50			
Pennsylvania	Columbia	29			
Virginia	Franklin Town	9			
Ohio	Pickaway	19			

APPENDIX O

Programming Statement for Pilot Area Impact Solutions

This is the main program. The subroutines called are those of the scientific subroutine Package II for the IBM-360.

```
      DIMENSION TBAR (3,3,23), TBIG (69,69), ET (69,69)
      DIMENSION A(69,69), E (69,69)
      DIMENSION Y (69,1)
      DIMENSION ABIG (69,69)
      DO400 I=1,69
      DO400 J=1,69
  200 E (1,J)=0.0
  300 ABIG (I,J)=0.0
  400 TBIG (I,J)=0.0
      DO100N=1,23
      DO100 I=1,3
  100 READ (5,110)(TBAR(I,J,N), J=1,3)
  110 FORMAT (3F10.5)
      DO120 N=1,23
      N3M1=3*(N-1)
      DO120 I=1,3
      II=I+N3M1
      DO120 J=1,3
      JJ=J+N3M1
  120 TBIG(II,JJ)=TBAR(I,J,N)
      DO121 I=1,23
      E(I,3*I-2)=1.0
      E(I+46,3*I)=1.0
  121 E(I+46,3*I)=1.0
      DO500I=1,69
      DO500J=1,69
  500 ET(I,J)=E(J,I)
      CALL GMPRD(E,TBIG,E,69,69,69)
      CALL GMPRD (E,ET,E,69,69,69)
      READ(5,130)(A(I,J),I=1,69),J=1,69
  130 FORMAT(8F10.5)
      CALL GMPRD(A,E,A,69,69,69)
      READ(5,150)Y
  150 FORMAT (8F10.0)
      CALL GMPRD(A,Y,Y,69,69,1)
      WRITE (6,160)(Y(I,1),I=1,69)
  160 FORMAT (1F20.5)
      END
```

Statement No.

0001 TBAR, TBIG, ET

TBAR - A three dimension array consisting of 23 3X3 matricies. Each of the twenty-three matricies refers to the inter-regional shipments of a commodity. The diagonal elements of each 3X3 give intra-regional trade coefficients: the off diagonal elements give interregional trade coefficients. This is the information contained in Table 2 of my dissertation and Tables 1 of Appendicies E and F.

TBIG and ET are created by the program (see below)

0002 A (69, 69) is the matrix of interregion multipliers. This matrix contains both the interindustry and local consumption sector elements of the multipliers.

E is created by the program.

0003 Y (69, 1) is the vector of changes in final demands.

0004 ABIG (69,69) is created by the program.

0007-0009 program statements, 200, 300, 400	These statements simply clear storage for the E, ABIG and TBIG matricies - to insure that in the calculations, zeros in these matricies will not be read as the garbage that is in storage.
0012 (100)	Reads in the 23 3X3 matricies.
0014-0020 program statement 120	Converts the 23 3X3 matricies into a single 69X69.
0021-0024 program statement 121	Develops the permutation matrix - (Moses & Fei appendix to Moses, AEA, December 1955)
0027 program statement 500	Forms the transpose of the permutation matrix
0028-0029	Pic multiplies TBIG by the permutation matrix, the post multiplies the result of the premultiplication by the transpose of the permutation matrix. The result is a "scattered trade coefficient matrix (same as T* in Moses & Fei).

Statement No.	
0030	Reads in the (interindustry and local consumption sector) multiplier matrix, A.
0032	Multiplies the multiplier matrix A by the "scattered" trade coefficient matrix E. This converts output multipliers (i.e. A) into shipments on final demand account (sale) multipliers.
0033	Read in the changes in final demand
0035	Multiplies the changes in the final demands Y by the final demand multiplier matrix, A.
0036	Writes out the vector of changes in output by industry by region due to the original changes in final demand.

APPENDIX P

Testing for Constancy Over Time of the Elasticities

The coefficients derived are tested to determine whether or not they are constant over time. Briefly, the coefficients estimated on the basis of n-1 observations are employed to predict the value of total tax receipts in year n, the last year for which we have actual data. The test is designed to give a rule for deciding whether the coefficients are constant over time by determining whether the difference between actual and predicted values of total receipts is statistically significant. The null hypothesis is that the values are the same. When the hypothesis cannot be rejected, time constancy of the coefficients is assumed. For the interested reader the details of the test is presented in this appendix.

There is a simple statistical method for testing the hypothesis that the coefficients of a linear model are constant over time.[1] The test used in this paper relies on the assumption that the first n-1 observations are generated by the same model

(1) $R_1 = X_1\beta_1 + \varepsilon_1$.

Where R_1 is an (n-1) x 1 vector of tax receipts, X_1 is an (n-1) x k matrix of tax rates, per capita income and population, β_1 is a k x 1 vector of elasticities, and ε_1 is the random error which is distributed normally with zero expected value and convariance matrix $\sigma^2 I$. The last (nth) observation is generated by

(2) $R_2 = x_2\beta_2 + \varepsilon_2$,

---

[1] Gregory C. Chow, "Test of Equality Between Sets of Coefficients of Two Linear Regressions," Econometrica, Vol. 28, 3 (July, 1960), pp. 592-3.

where x_2 is a 1 x k vector of tax rates, per capita income and population, R_2, a scalar, is the total tax receipts in year n, β_2 is a k x 1 vector of elasticities and ε_2 is the random variable which is distributed normally with zero expected value and variance σ^2. The two random variables, ε_1 and ε_2, are independent.

The difference between the observed R_2 and the value predicted based on the estimated value b_1 (the least squares estimate) of β_1 is

(3) $d = y_2 - x_2b_1 = x_2\beta_2 - x_2\beta_1 + \varepsilon_2 - x_2\ (X_1'X_1)^{-1}X_1'\varepsilon_1$.

the expected value of d is

(4) $E(d) = X_2(\beta_2 - \beta_1)$.

If the coefficients are constant over time β_2 equals β_1, and the null hypothesis is

(5) H_o: $E(d) = 0$.

Due to the independence of ε_1 and ε_2, the variance of d is

(6) $V(d) = \sigma^2(1 + x_2(X_1'X_1)^{-1}x_2')$.

Let

(7) $s^2 = (\sum_{i=1}^{n-1} q_i^2/n-1-k)$,

where the q_i variables are the residuals of the first n-1 observations from the fitted regression line. The variable s^2 is an unbiased estimate of σ^2 and (s^2/σ^2) is distributed Chi-square with n-1-k degrees of freedom. Further,

(8) $d^2/\sigma^2\ (1 + x_2(X_1'X_1)^{-1}x_2')$

is Chi-square with one degree of freedom. Therefore,

(9) $d^2/(1 + x_2(X_1'X_1)^{-1}x_2')s^2$

is distributed $F(1, n-1-k)$. Thus, (9) is a statistic for testing the null hypothesis.

APPENDIX Q

Method of Progressive Refinement
and Narrowing of the Field of Choice

The following description is taken from the paper given by Harry Schwarz and Kenneth Ristau at the Fort Belvoir Seminar on River Basin Planning.* Included in the article but not reviewed here are examples of the implementation of these various approaches to securing objectives.

Steps Common to all Procedures.

Screening of alternatives is the process of preliminary selection and evaluation of a single project or a system of projects to fulfill given needs under specified conditions, criteria and objectives. Therefore any method for screening requires data on: requirements for the goods and services provided by water resources development; the criteria and objectives towards which planning is directed; the conditions and restraints applicable to this planning, and the various possible alternative solutions or projects.

The principles, methods and techniques of establishing the needs in measurable units have been discussed previously. For efficient screening of alternatives the requirements must be tabulated concisely. Three dimensions are needed for each requirement. These are scalar quantity, location, and place in, or variation with, time.

Prior to the screening of alternatives the general objectives of basin planning must be translated into specific criteria or planning policies. Risk levels must be established for flood control, low flow augmentation, water supply, power production and recreation. Minimum levels acceptable must be set for flood control. Judgment values must be developed for social, esthetical or political effects to include their

*Harry Schwarz and Kenneth Ristau, "Screening of Alternatives," Seminar on River Basin Planning Ft. Belvoir, Virginia (Mimeo.) U. S. Army Corps of Engineers, 1963, pp. 368-400.

consideration and a site development policy must be agreed upon. It is the opinion of the authors that underdevelopment at any site, regardless of the outcome of monetary calculations is a tenable solution only in rare cases, that normally the lowest level of development considered for a site should be that obtained by optimization and that every means should be taken to obtain full development.

The adoption of constraints on the free choice of alternatives based on the realities of the basin under study will preclude the expenditure of time and money on completely impractical alternatives and provides a means for reducing the mass of possibilities to more manageable proportions. Constraints adopted at this time, however, should be only those that are very certain. Concessions at this early stage to restraints that may not be as unyielding as we may first anticipate may lead to erroneous conclusions. We have reference to a basin in which flood control was the primary objective and the principal benefit values were in a city at the very mouth of the stream. The choice appeared to be between a system of reservoirs, or major channel work within that city. The latter involved intricate and costly relocation of railroads and streets through a congested industrial area. As a result the early conclusion of the planners -- such as we might use in our initial screening -- was to reject the channel plan on the basis that it would be too costly and -- even if it might be found to be economically feasible -- that it would never be accepted by the railroads. What proved to be the case? Further studies were made, the channel plan was recommended and authorized, the opposition of the railroads melted away, and the channel was built. What is disturbing is -- if we had maintained our original position based on a preliminary evaluation (such as we of necessity are doing in our screening) we would have rejected once and for all the channel plan. In a basin offering many more alternatives of choice we might use a "second-best" choice and yet proceed confidently to develop what purports to be the most desirable plan. This risk will be ever present when we must screen on the basis of fragmentary data and limited judgment or allow restraints -- either real or probable -- to influence our decision making. We have no "cure-all" to offer except that if at all times we are aware of the potential problem and take a second look before making the selection we may hope to minimize errors in the screening process.

The final set of data needed for the screening of alternatives is an inventory of projects and significant cost-output relationships for each project. The appraisal of solutions and the principles involved in cost and benefit analyses of alternatives have been treated in previous papers.

From the full array of possible alternative solutions -- and this array should include even the most far-fetched ones -- a preliminary elimination can be made of those methods of solutions that are:

1. Technically not applicable
2. Not sufficiently developed to be used
3. Obviously too expensive

This elimination of types of solutions can be made on the basis of literature research, of experience in similar or neighboring basins, of local conditions or of just common sense.

For those solutions that survive this screening, cost-output relationships for the various purposes singly and in groups must be developed. In the ideal case the same amount of definition should be developed for each purpose and each project and at survey report accuracy. This is far beyond the capability of any organization. Shortcuts must be employed to give preliminary data both in cost and the output area. In reservoir design this might take the form of standardized tabulated design data that can provide a quick estimate on the basis of very meager field and office data.

Order of Merit Approach

The following is abstracted largely from Appendix Q, Formulation of the Plan of Development, Volume IX, of the Delaware River Basin Report, December 1960. The general procedures adopted for that study involved the following steps.

1. Appraisal of basin needs. From detailed studies, including economic base studies, prepare an inventory of basin needs in terms of acre-feet of storage for flood control, kilowatts of power, etc., preferably subdivided to portray area requirements.

2. Inventory of potential projects. Prepare an inventory of major impoundment and development potentials in the basin. Then reduce the number of units in the inventory by elimination of alternatives in the immediate vicinity.

3. Order of Merit. As a practical means of limiting the number of possible combinations to be considered in detail, an "order of merit" for the major impounding sites is then established as a guide in establishing the combinations for detailed study. Its objective is to provide initial groupings of major impounding units to meet future water control needs with some assurance that the groupings would result in balanced water resource development with thrifty investments in productive resources. Also, an order of merit for the sites will identify those sites with such low relative merit that there would be little or no likelihood of their eventual justification. These latter sites are to be avoided in the initial groupings of units into basic plans for further appraisal. (The validity of this assumption is discussed later.)

4. Criteria. A number of criteria, assumptions and details of procedure must be established with the objective of attaining realistic appraisals of the relative order of merit of the impounding potentials. In order that the relative merit of a particular site will be truly relative to all other sites the appraisal of the site in question has to be on an individual basis and in accordance with a set of fixed standards and procedures. Therefore, the first two criteria provide that (1) all sites be appraised, as nearly as practicable, by the same procedures and that (2) each site should be appraised individually and as a solitary unit. Under these criteria any monetary appraisals of the cost of storage and of the worth of storage for various uses would be merely indices of the relative merit of the sites and would have no relation to benefit-cost ratios as normally used.

5. Establish relative order of merit. In view of the nature of the estimates of cost and worth and the limitations imposed by the assumptions and procedures utilized, it is advisable to reduce this order of merit to its simplest form. This may be done by expressing the worth/cost of each project as a fraction of the highest worth/cost ratio identified with any project under consideration. The worth of each site is based on the estimated values of the products and effects to be attained from full use of the storage provided and without adjustments to tailor the products and effects to the needs of the area. Although it is hoped that the relative values for the various sites will be consistent and in proper relation to each other within the concepts of this appraisal, they should not be confused with final appraisals.

6. Select a number of plans. With the order of merit study and appraisals of basin needs as guides, separate plans of basic storage and hydropower projects are formulated. (Assuming these are the principal objectives; if not, the other dominant objectives should be substituted.) The elements included in these plans are selected in accordance with their relative merit and with the geographic distribution necessary to meet estimated water supply, recreation, and flood control requirements in various tributaries and reaches of the river.

7. Evaluate the products of each plan. To arrive at the best balanced plan for water resources development to ensure optimum availability of surface water for every use of water, the next step is the evaluation of the goods and services produced by the several plans under consideration.

8. Select a basic plan. The monetary values of the products and the costs of their production serve as the basis for selecting from the several plans a single basic plan to produce, in a balanced manner, the needed goods and services with the least investment of water resources and funds. (This basic plan is not the final plan. In fact, where there are conflicting objectives we may require three or more basic plans be studied and presented for final selection involving consideration and rigid restraints.) The definition of the basic plan constitutes one of the series of discreet screenings leading to a balanced plan. Further steps are confined to these elements and to additions to, or specific alternatives for, these elements and to additions to, or delections from, the basic plan. The next step is to determine the scale of development for each major impounding project.

9. Dimensions of components. Each of the affected sites is individually analyzed to identify the area of its optimum scale of development in terms of net benefit maximization with consideration given to all water resources products that could be produced by a project at that site. Modifications are then made at each project's optimum level of development so that the scale of development at each site will produce only the resource products for which foreseeable markets exist and where the system net benefits would be a maximum.

10. System Maximization. Before it is possible to choose the final dimensions of any one site to be included within a system it is necessary to re-evaluate each site with respect to its contribution in the attainment of a balanced program of development which could not be fully evaluated within the constraints of the individual site maximization studies.

11. Selection of plan. With the information now available we are ready to proceed to selection of phased plans, establishing of desired planning of construction, etc.

Factors to Watch

1. A selection of values (cost and benefits) that do not distort the formulation. In the Delaware study (discussed later) the benefits for water supply utilized in establishing the order of merit were based upon the average cost of obtaining surface water at other points in the basin even though the final analysis considered the cost of obtaining water from alternate sources such as the ground water aquifer in and adjacent to the basin. If the cost from these alternate sources would be considerably less than from surface impoundments, the water supply benefits attributed to storage would have been overstated in the preliminary screening and we would have injected a bias favoring those reservoirs where water supply was a dominant consideration.

2. Failure of individual components to reflect proportionately in a system. The order of merit is established on the basis of one individual project operating alone. There is no assurance that when this project is incorporated into a system that it will function as efficiently when operated under a system plan as another project that may have been eliminated earlier through the screening process.

3. Influence of scale. In our early screening we may discard a project that would be worthy of retention if the scale had been modified.

Sub-basin Approach.

1. Determine the functional requirements and list (quantitatively - i.e., acre-feet of water supply required, etc.)

2. Identify requirements as to location in basin. This will give a breakdown of 1 by sub-basins.

3. Assign preliminary weights to functions in order to prepare a list of order of importance (this should recognize conflicting functions) or establish preliminary and generalized benefit values. Judgment will usually be the important factor as the conventional approach would require detailed value analysis including intangible and secondary values.

4. By inspection of each sub-basin make a site analysis to determine which sites are alternates, i.e., one site could be replaced by three, the three by six, etc. Using general cost data make a rough analysis of cost by tabulating system cost and output. Choose those sites in the sub-basin system with least cost and which meet, or more nearly meet, functional requirements.

5. Repeat for each sub-basin until you have determined all sites for the basin system which, theoretically, meet functional requirements at least cost.

6. Initiate detailed study of each site with objective of maximizing output from each one that meets functional requirements as determined in 3 above. (Some sites may not be able to meet some of the functional requirements.)

7. Tabulate costs for development of each site.

8. At this point, attention should be turned to a basin system composed of sub-basin plans. As a trial, select an operating plan (by trial and error) to determine system output for maximum outputs in order of priorities previously selected.

9. Vary the priorities where a fine line exists between functions and then test various combinations of sub-basin outputs.

10. Evaluate functional benefits.

11. Evaluate costs.

12. Compare 10 - 11 and select the two or three most promising combinations.

13. Refine design, costs, benefits, and operation plan and if necessary prepare alternates that reflect political and legal restraints.

Comments

This plan differs from "order of merit" primarily in that only small groups are analyzed at one time. Step 4 is generally comparable to the "order of merit" and might be considered as a variation. Inclusion of Step 3 overlaps to some extent the concept of the "functional approach" described in the next section. There are, however, instances where this may become a paramount consideration as, for example, in one reach of a stream where there may have to be a choice between reservoir development of any kind as contrasted to preserving a scenic attraction of national importance in its undisturbed state. In such a case we would want to ensure that we have alternatives for our basic plan that did not require development of that reach.

Functional Approach.

This is of value primarily when either of the following conditions exist;

1. Analysis of needs indicates that a definite priority for development of several of the functions is logical.

2. There is a great disparity in values that can be attributed to use of water for different functions. For example, the value of an acre-foot of storage for irrigation may be ten times the value for flood control. This would mean that in any approach directed toward maximization of benefits, irrigation considerations would govern and therefore the initial screening could be simplified.

Method

1. By generalized methods determine approximate costs of storage at each site.

2. Determine storage requirements to meet the primary need.

3. Select sites to meet aggregate storage.

4. Modify system to maximize benefits.

5. By "trial and error" add in projects or increase size of units to meet subordinate functions.

6. Proceed as in Step 13 of "Sub-basin Approach".