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A CRITIQUE OF FEDERAL RESERVE--FEDERAL OPEN MARKET COMMITTEE

ACTIVITIES IN THE POST-ACCORD PERIOD: 1953-1969

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CHAPTER I

INTRODUCTION

The March 5, 1951 Accord between the Federal Reserve and the Treasury officially freed the Federal Reserve from the "obligation" to support the price level of United States Government security issues. This allowed the Federal Reserve to return to the administration of monetary matters. Since that time, a tremendous volume of written material and speculation has appeared concerning the process the "Fed" has employed in analyzing the current state of the economy. Also under scrutiny has been the method the Fed employs to determine how its policy efforts affect, or will affect, the various factors and sectors within the economy.

A significant portion of this discussion has centered on the Federal Open Market Committee's choice of the variables which it uses as indicators of the current economic situation and of the impact of monetary policy on this situation. These indicators have been subdivided into many different categories depending upon such factors as their position in the economic framework, how long a time span must elapse

before they reflect a policy action, how well they reflect this action, and how effectively the Fed can control their movements. Many different economic variables have been proposed as being: (1) the "best" indicator of the current effect of a given policy action; (2) the "most appropriate" target toward which the Fed should direct its actions and from which the Fed could judge the effectiveness of its actions; or (3) the "primary" economic objective which the Fed attempts to correct or to maintain within some suitable range.

The primary purpose of this dissertation is to examine various aspects of this indicator problem. Initially the contrasting theories which have led to this confusion are discussed and a general justification for the alternative proposals is observed. Then the problem is analyzed in terms of finding the "best" indicator, the "most appropriate" target, and the "primary" economic objective for the analysis of the effects that monetary policy have on the economy as a whole. Finally, several of these "optimal" variables are used to establish a system which is designed to evaluate the potential effects of any given level of policy action.

This study is divided into two major topic areas. Thus, it seemed appropriate that the two areas should be segmented into separate, though not totally independent, sections. The first section attempts to compare and contrast various problem areas in the analysis and implementation of monetary policy with reference to the selection of the appropriate indicators. The second seeks to establish an empirical basis for the analysis of the potential effects of a policy action. The latter would enable the Federal Reserve to include this evidence as

part of the justification for the decision regarding the correctness of a proposed policy position.

The first chapter in the opening section discusses: the organization and operations of the Federal Reserve and the Federal Open Market Committee; the historical development of the policy "tools" which these two bodies utilize to effect a change in, or a continuation of, the current level of policy action; and the problems implicit in defining and quantifying the length of the policy lag—from the origin of the need to the recognition of the effects of a policy action.

The next chapter begins with a rather in-depth comparison of the neo-Keynesian versus the monetarist approaches to stabilization policy. It explains the theoretical background behind each viewpoint and gives explicit examples of how followers of the two approaches are led to quite contradictory conclusions and actions. Then, based on these differing frameworks, the analysis accounts for the selection of dissimilar indicators and targets of policy activity. Finally, a rather laconic look at the development of the several "ultimate objectives," from the inception of the Federal Reserve through the period presently under consideration, is presented.

The second section seeks to evaluate monetary policy action from a different perspective. In the first chapter of this section, a brief discussion of the evolution of econometric models and of their relevance is followed by the development of an econometric model which specifically emphasizes the financial (monetary) sector. The intent of this model is more than simply to specify a functional relationship for a group of endogenous variables. Its purpose is to evaluate the importance and contribution of

movements in several of the key economic variables toward determining the expected level of reaction of the policy indicators and targets, the primary tools of policy action, and the levels of the proxies for the "ultimate" objectives. The policy indicators and targets employed in this model include changes in the demand for free reserves, for the components of the money supply, and for commercial bank loans. The primary tools of policy action are open market operations and the discount rate. Changes in the level of required reserves against deposits and selective credit controls are used too infrequently to be included endogenously; and moral suasion is far too qualitative a factor to be measured adequately in any form. The levels of the proxies for the ultimate objectives which are endogenously determined within this model are income and its components, and the annual rate of change in prices; other proxies are included exogenously. In many respects, this model parallels that of Teigen (1969).

The next chapter amplifies upon the results of the preceding chapter. Using the structural parameter estimates of the equations, an analysis is made of the demand and income elasticities for the endogenous variables with respect to a given level of change in some predetermined variables which are of particular interest to the monetary policy-maker. The balance of the chapter contains a fairly-detailed multiplier analysis of the effects on the endogenous variables of a unit change in the level of several of the exogenous variables. These multipliers reflect the long-run effects of a sustained unit change in the predetermined variable. If the series converges (as one would a priori expect), the system is assumed to be stable; if not, the system is assumed to be

unstable. These long-term effects are also of particular interest to the policy-maker. An analysis of these should play a key role in the determination of the most appropriate monetary (and fiscal) policy combination to put into affect at any point in time.

The final chapter primarily synthesizes the conclusions which are drawn from the empirical analysis of the second section. Based on the results from the estimation of the model and from the calculations of the elasticities and multipliers, several inferences are made concerning the principal determinants of the level of demand for money and bank loans. Then various elements of Federal Reserve activity are analyzed. Conclusions regarding the choice of indicators, targets, and objectives are drawn, and the general trend of open market and discount rate activities of the Fed are observed. These trends indicate, among other things, that the discount rate, not open market operations, might be the primary tool used to effect "dynamic" changes in policies activities over the quarter (three months).

SECTION ONE

QUALITATIVE POLICY EVALUATION

CHAPTER II

BACKGROUND TO THE ANALYSIS OF POST-WAR MONETARY POLICY ACTIVITIES

Monetary policy in the last twenty years has, again, assumed a large part of the responsibility for short-term economic stabilization. This has resulted primarily because of the lengthy initial lag and general inflexibility of fiscal policy and the addition of new national economic goals since World War II (reasonably stable but sufficient economic growth, and an international balance of payments). With this responsibility has come the question of how effectively monetary policy can guide the economy along these desired policy roads. The basic argument in favor of its use has been its flexibility. The real issues, however, are whether monetary actions are appropriate at the time they are taken, and whether, when the resulting effects work themselves out, the consequences stabilize the economy or simply serve to reinforce instability.

If the economy contains forces which tend to make its fluctuations self-correcting, then unless the correcting mechanism requires an extensive time lag before its effects are felt there is no real need for any form of stabilization activities. The fact that the economy on its own will bring about this correction precludes the need for any type of policy action. If, instead, the economy appears to be subject to a

considerable amount of under- or unemployment disequilibrium forces, as is assumed in the body of Keynesian economics, more or less continuous stabilization actions may be required to promote the desired economic goals. And if a long lag exists between the initiation of a policy action and the first evidence of its effects, any actions taken toward stabilization are questionable. In this case, the question relating to the appropriateness of policy actions which are "leaning against the wind" may be complicated by the inability to forecast such factors as: when the action needs to be taken; when the action will be, or begin to be, effective; what type of action to take; what magnitude of action is called for; what differential effects to expect; etc.

The primary functions of stabilization policy are to maintain a high level of resource utilization, especially full employment, and to keep the price level stable. Price level stability implies the necessity of keeping the value of money constant. Economic growth is an essential part of achieving these goals. Given the appropriate policy tools full employment and price stability can be compatible with a whole spectrum of growth rates; the types of policy instruments to be employed serve to determine, to a large degree, the appropriate rate of growth. The proper role of public policy must be to supplement the economy at times when it fails to achieve full employment and/or price stability; also when the rate of growth is less than optimal.

To determine the significance of the effect that a change in the short-run target or some non-controlled variable will have on the overall economic picture, the Federal Reserve must, explicitly or implicitly, specify its view of the transmission mechanism through which these short-run

changes are thought to ultimately affect long-run developments. Money creation is a relatively short-run phenomenon, resulting generally from open market purchases by the Federal Reserve or loans by commercial banks. However, the effects of its creation are felt or observed on the ultimate economic objectives only after filtering down through a lengthy economic framework (which describes the linkage of short-run occurrences to long-run effects). That there are lags in this framework, between the initial policy action and the final effects of this action on the ultimate goals, is well-recognized.

The Organization and Operations of the Federal Open Market Committee

The manager of the System Open Market Account is the agent through whom all system open market operations are carried out. He also maintains the "Trading Desk" for the Federal Open Market Committee (FOMC)[1] at the Federal Reserve Bank of New York. The FOMC, through its periodic directives[2] to the Account manager, attempts to direct the conduct of monetary

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[1]The Federal Open Market Committee is composed of the seven members of the Federal Reserve Board of Governors, plus five of the twelve presidents of the district Federal Reserve Banks. These five are the president of the Federal Reserve Bank of New York, who is a permanent member, and four other presidents who are selected on a rotating basis. All of the presidents are eligible to attend the FOMC meetings and participate in the discussions; only the five presidents and the seven Board members are allowed to vote on policy matters, including the content of the directive.

[2]The directives, either implicitly or explicitly, establish the policy guidelines to be followed. These guidelines reflect the desired levels of such short-term, operational variables as specific levels of free reserves, member bank borrowing from the Federal Reserve, and money market prices (interest rates). Prior to June 22, 1955, there were two directives issued: one from the full FOMC to its Executive Committee (EC); the other from the Executive Committee to the manager of the System's Account. Both directives were, except for the operating statement,

policy toward sometimes divergent ends. It seeks to maintain, over the current policy period (usually three to four weeks), specified conditions in the money market while also seeking to accommodate a general expansion in aggregate bank reserves. Except when policy is in a state of change, the FOMC takes such actions as it deems necessary to maintain stabilized conditions in the money market. The daily operations for the System Account are usually conducted with the intent of maintaining a desired degree of ease or restraint on both bank reserve positions and the general money market condition. At the same time it would seek to provide additional, or absorb excess, reserves in the short-run as required by the daily demand for cash and by other factors which affect reserve levels (e.g., float, and the Treasury's balances at the Federal Reserve Banks). Therefore, most open market operations are undertaken simply to maintain some desired net reserve position by allowing for these short-term

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couched in very general terms. At the June 22 meeting, it was felt that consolidation into a single, two-paragraph, general summary of the considerations implicit in the chosen course of action and the specific operating directive would provide a better indication of FOMC thinking. This should serve as a guide in conducting Account operations while allowing the Account manager a wide latitude within which he could use his discretion to determine the appropriate actions to take toward assuring the desired policy position. This admixture of general and specific statements constituted the form of the directives until 1962.

Since the almost complete revision of the directive format in early 1962, the first paragraph has been used to state the ultimate goals and intermediate objectives of the System. It has also outlined the major economic conditions currently faced by the nation. The second contains the specific operating instructions (generally mentioning desired money market tone, interest rates, growth of the money supply and/or bank credit and reserves, etc.). Since 1966, a "proviso clause" has also been included in the second paragraph; this is intended to provide the Account manager with more latitude in directing policy operations. Through this action they hoped that he could alter money market pressure in either direction to accommodate changes in the growth of bank credit or changes in the intermediate guides which were not expected or desired before the next regular FOMC meeting.

and seasonal changes, many of which are fully expected before they occur. This is the basis of the FOMC's "defensive" aspect of policy operations.

In addition to this day-to-day function of maintaining an orderly and smoothly-operating money market mechanism (the defensive aspect), the FOMC also seeks to contribute toward achieving the nation's longer-run economic goals (the "dynamic" aspect of its actions). These concepts of "defensive" and "dynamic" policy actions, introduced by Robert Roosa (1956) to delimit the contrasting operations, were defined as:

> . . . the defensive side of the Federal Reserve System's duties—defending against those seasonal, regional, or perhaps accidental causes of sudden stringency that arise in the process of issuing currency, or clearing checks, or meeting net flows of funds among regions (or vis-a-vis other countries), for example, and which might by unhappy coincidence aggravate, or even ignite, a financial and economic crisis. . . . A more sensitive monetary control mechanism was wanted, to make greater use of the latent potential of a fractional reserve banking system in resisting inflation and deflation and facilitating economic growth. That shift-over from a purely defensive to what might be called a dynamic conception of Federal Reserve responsibility . . . found full legislative expression in the Banking Act of 1935.
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> The System's defensive aim is to help keep the machinery of the money market working smoothly in distributing and allocating the market's stock in trade within any given period; its dynamic aim is to exert through the money market whatever degree of pressure upon bank reserves, liquidity, and the general availability of credit is required for stability without inhibiting sustainable economic growth.

Although the pursuit of defensive operations accounts for most of the policy open market operations, Roosa points out that ". . . there has in fact been a fusion of both types of responsibility. The uppermost concern at the 'Trading Desk' every day is that the prevailing degree of pressure intended . . . shall emerge from the day's confusion as a dominating force." He further notes that:

> it has long since become second nature to the operating personnel to handle each problem with its defensive and dynamic aspects joined together . . . recognizing that System Account purchases or sales, while always made with a view to effecting the general degree of reserve pressure intended by the Committee, can never be taken alone as a signal of the actual credit policy being pursued.

Monetary policy makers are, naturally, quite concerned with the dynamic aspect. However, open market operations, the basic instrument used to pursue these goals, appear to be conducted almost solely in response to short-run stimuli—basically money market pressures, credit conditions, and short-term interest rates. These dynamic goals must be viewed over a considerably longer time-perspective than that required for the execution of short-run policy operations. Therefore, although monetary policy can contribute toward the achievement of these goals, it is unrealistic to expect policy actions taken in the financial sector to always exactly achieve a specific effect upon such "real" variables as production, employment, and industrial output. There are too many non-controllable variables in the linkage between the initial action and its ultimate effects.

It has only been in the post-World War II era that the Federal Reserve has been held responsible for aiding in, if not totally responsible for, the achieving of national economic goals such as those established by Congress in the Employment Act of 1946. Prior to the Accord, Federal Reserve actions along these lines were constrained on occasion by the "obligation" to support the price, and, therefore, also the interest rate, levels of government securities. The 1951 Accord represents the formal statement of an end to this tradition of price support for Treasury obligations. Official support did not seem to stop until March 5, 1953, when the Minutes of the Federal Open Market Committee reflected that the

FOMC and the EC directives were changed from ". . . to maintain orderly conditions in the Government securities market; . . ." to ". . . to correcting a disorderly situation in the Government securities market; . . ." However, FOMC activities subsequent to this have made it appear that, even through the beginning of 1970, the FOMC has continued to facilitate Treasury activities in the money market (Keran and Babb, 1969). This is accomplished by easing, or at least not changing, money market conditions around the time scheduled for a Treasury financing or refunding action. This use of the "even-keel" objective seems to have often postponed adjustments to monetary policy action—some of which might have proved quite necessary at the time—until the Committee meeting following the completion of such activities. In at least one case (1959) this prevented possible correction of monetary policy direction and pressure for fully five consecutive months (Minutes).

Although varying degrees of control over the several ultimate objectives is attributed to Federal Reserve monetary policy actions, the FOMC does not appear to consider, in its decision-making process, all of these as equally important objectives. The same holds true for controlling the movements of various indicator and target variables. The monetary authorities, at least theoretically, attempt to achieve several economic objectives at the same time. It is, therefore, not surprising that the most appropriate measure which would indicate when a change in the level or direction of monetary policy is necessary, is quite uncertain. It depends on the theoretical assumptions. A lack of ambiguity would imply that all the objectives considered indicated the need for a policy change at (approximately) the same time and in the same relative

direction.

In an attempt to reconcile the relatively incompatible goals of price stability, a low rate of unemployment, and a satisfactory level of economic growth (and, occasionally, balance of payments stability), Willes (1967-II) finds that the Federal Reserve has ". . . accepted the proposition that monetary policy should have a stimulating influence during periods of decline in general economic activity and a restraining influence during periods of economic expansion." Thus, it appears that ". . . the Federal Reserve geared changes in the direction of monetary policy primarily to changes in the phase of the business cycle."[3]

Between Committee meetings, the members are kept current on developments in the economy by their own research staffs as well as by that of Board of Governors. Each day, in the process of determining the appropriate reserve position, given the level of System policy then being effected, the Account manager consults with at least one member of both the Board of Governors and the Federal Reserve Bank presidents in his "11 a.m. telephone conference." In this way, changes in economic and/or money market conditions are discussed and the desired daily reserve position is agreed upon, subject to last-minute changes in other factors.[4] As these conditions change, the Account manager brings this to the attention of the Open Market Committee members. If the change is large enough or sufficiently rapid to cause some degree of concern with respect to the current policy directive, the Account manager or any

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[3]There are, however, certain qualifications to this statement which Willes recognizes in a footnote and includes in a later chapter.

[4]For a discussion of many of the factors the Account manager considers before making his decisions, see: Roosa (1956) and Rouse (1968).

member of the FOMC may request a special meeting of the Committee to discuss the consequences of the recent changes.

During much of the post-Accord period, it appears that the Federal Reserve, through the FOMC, has consistently relied on basically two short-run dynamic target variables as a means of measuring the need for, and the results of, its combined policy actions. The main target for dynamic operations has been the general condition of the money market, usually measured in terms of relative "ease" or "tightness." This is an abstract measure of aggregate variables primarily represented by the spectrum of interest rates on important short-term market instruments and by differing levels of credit availability. "Free reserves" is the other principal target. A change in dynamic policy has generally been reflected by a similar movement in both of these.

Other variables in the linkage of open market operations to their intermediate effects which today are recognized as analytically quite important (e.g., total reserves, bank credit, money supply, etc.) were originally not targets which the FOMC specified or even used with any degree of frequency. They were simply part of the "feel" of the market. In 1960, the behavior of total reserves and non-borrowed reserves began to show up in the FOMC directives; in late 1961, references to a desired level (or growth) in reserves began to appear (Minutes). With the evolution of the "proviso clause," policy actions began to be conditioned by developments in commercial bank credit, represented by a "bank credit proxy."[5]

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[5]This is usually measured as a monthly average of daily figures on total member bank deposits. See: Burger and Ruebling (1970).

Obviously, an important composite indicator used by the Account manager and the FOMC to gauge money market conditions is the daily report on, as well as the past and predicted future course of, various measures of bank reserve position and the changes in the factors which affect these reserves. The other important composite indicator has been money market pressure. The Federal Reserve appears to combine the movements of several variables to form some sort of qualitative measure of this guide. These variables include the interest rates on money market instruments and a description of the cash positions of the money market banks and firms, especially Government security dealers. Andersen and Levine (1966) attempted to measure this degree of pressure by combining twelve money market time-series' into two measures of pressure: one, an index of New York City money market pressure; the other, an index of "nation-wide" money market pressure.[6] Each of these time series is a measure either of the adjustments in liquidity positions which result from changes in the availability of funds to the money market firms, or in the cost of their making these adjustments.

By outwardly espousing an eclectic approach to its monetary role in the economic scheme of things, the Federal Reserve has consistently avoided making any formal or precise statement concerning either the quantification of target variables or the theoretical framework by which

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[6] These factors are: the Treasury bill rate; free reserves; the basic reserve position (deficiency) and the borrowings from the Federal Reserve by eight New York money market banks; the basic reserve position and the borrowings from the Federal Reserve Banks by thirty-eight other money market banks outside New York City; all member bank borrowings from the Federal Reserve Banks; the positions of major Government securities dealers; the Federal Reserve discount rate; the Federal funds rate; and the interest rate on four-to-six month commercial paper. Also see: Rouse (1968). He specifies many of these same factors.

it judges its potential impact or determines its behavior. This framework would provide the linkages between their instruments and the desired effects on the ultimate goals. As Professor Guttentag (1966) puts it:

> . . . concerning the 'money market strategy,' which was used exclusively during 1953-60 and in modified form thereafter, the main weakness of the strategy . . . is its incompleteness, i.e., the fact that the Federal Open Market Committee (FOMC) does not set specific quantitative target values, for which it would hold itself accountable, for the money supply, long-term interest rates, or any other 'strategic variable' that could serve as a connecting link between open market operations and system objectives; rather it tends to rationalize the behavior of these variables after the fact.

The degree to which this is true, as evidenced by the "feel" of the market leeway given the Account manager, is illustrated by the "proviso clause" in the second paragraph of the "Current Economic Policy Directive" to the Account manager from the FOMC; and by the following from Purposes and Functions (1963) and Roosa (1956).

> A given level of net reserves at one point may be associated with a faster or slower rate of growth in bank credit than the same level of net reserves at another time because of differences in the strength of credit demand, the level and structure of interest rates, and market-expectations—all of which affect bank preferences for free reserves . . . even in the short run the significance of any given net reserve figure must be assessed alongside a broad assortment of other information that bears on what is typically alluded to as the "tone" and "feel" of the money market. . . . In executing policy it is essential to have these intermediate indicators of money market atmosphere. . . . For this reason Committee instructions have typically directed the Account manager to seek more, less, or about the same amount of reserve availability and money market ease or tightness as has been prevailing. Decisions as to the precise size, timing, and direction (purchase or sale) of any market operations needed to implement these instructions are left to the discretion of the Account Manager. . . .
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> There is no better description for this process than "getting the feel" of the market. It is the combination of both, the projections [of reserves, etc.] as modified or confirmed by the "feel," which provides the basis for deciding what action, if any, is to be taken in carrying out the instructions of the Federal Open Market Committee.

Monetary Policy Tools of the Federal Reserve

Most of the Federal Reserve's existing tools were developed early in the evolution of the System. It is not surprising that the Federal Reserve Act of 1913 specified the use of the discount rate to accommodate the credit needs of business and commerce by providing funds at the request of the member banks. The equivalent of this rate was the main policy instrument of the Bank of England. And the trading in self-liquidating, short-term paper was already well-established at the time. This was the origin of the "real bills" doctrine.

The Federal Reserve Banks were allowed to trade in the open market, mostly in eligible paper and securities. This reflected an attempt to increase earnings by employing idle funds and not the desire to use these operations for policy purposes. The monetary effects of open market transactions, however, were noticed fairly quickly. As more Banks indicated their preference for using open market transactions rather than the discounting regulation as an instrument to control interest rates and credit availability, this trading was centralized at the Bank in New York to avoid competing among themselves.

Coordination of these two tools for policy purposes began in the early 1920's. Since the public did not initially consider open market operations as an indication of policy actions, these were used to test the reaction to policy moves. Once this initial reaction was observed, if additional action was needed, or if a reversal was required, the discount rate would be changed to effect the desired result. Other ways of coordinating the effort were to let the discount borrowing supply seasonal needs and offset irregular needs with open market operations;

or to use OMO to increase the supply of funds in order to reduce the level of discount borrowing.

In the process of discharging its primary "fiscal function" during war-time, that of facilitating the Treasury's financing activities (a function which was delegated to it by the Treasury during World War I), the System not only provided new market instruments but it also exercised considerable market control over interest rates. In addition, during hostile periods, the Federal Reserve made a great deal of use of moral suasion in an attempt to retard the rapidly expanding use of private credit for nonessential purposes and for speculation. This involved both limiting the amount of discounting which banks had access to from the Federal Reserve and attempting to restrict the amount of credit provided by the commercial banks. Selective credit controls were thus born when some Banks began to require more than 100 percent collateral for discounts and advances. In the 1920's, reserve requirements were used as a method of securing deposits against loss. But it was not until the late 1920's that the Federal Reserve specifically began to use reserve requirements to control speculative uses of credit.

During the "Great Depression," it appeared to the analysts of that day that none of the existing monetary policy tools were very effective. The large increase in credit availability in the early stages of the depression, the subsequent increase in activity of open market operations, and the intentional build-up of excess reserves did not do much to stimulate business and economic recovery to any significant degree.[7] Finally, in an effort to absorb excess funds, the Federal

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[7]Many monetarists, especially of the group closely associated with Professor Friedman, do not visualize the depression developments

Reserve, in 1936-7, raised the reserve requirements. This worked only temporarily since neither discount rate changes nor open market operations were effective as long as banks did not need to borrow, or be supplied, funds.

Again, during World War II, the System's activity was mainly oriented toward assisting in financing of the war as well as providing a sizable portion of the necessary funds. Part of this function included stabilizing the market for Government securities. Selective credit controls were again used and expanded. After the war, the "pegged" interest rate schedules were retained to facilitate monetization of the debt. The Federal Reserve-Treasury Accord of 1951 finally permitted the Federal Reserve to return to controlling the money supply and bank reserves. At various times after that, policies regarding the use of the discount function were based on "bills only" or "bills usually." But these policies were officially ended by the last of 1961.

The Lag and Its Measurement in Monetary Policy

Although there exists a vast spectrum of estimates establishing the "true" length of the lag in monetary policy, it is significant that most of the researchers reach the conclusion of either a short (a few months) or a long lag (fifteen to eighteen months or more), with seldom

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in this way. From their viewpoint, excess reserves remained negligible and the money supply declined in response to a continued decline in the level of Federal Reserve credit outstanding. Because of this, a liquidity crisis arose. These, together with intensified financial and economic weakness, contributed to the overall financial collapse. This approach sees the renewed open market purchases, which increased the money supply, as preventing further deterioration. The monetary collapse, to this group, was not a result of, but a large contributing factor in, the overall economic contraction. See Chapter VII of Friedman and Schwartz (1963) for a full discussion of this viewpoint.

anyone proposing one of an intermediate length. The extent of the lag depends on how it is defined, what empirical data are used to illustrate it, and the particular research method chosen, among other factors.[8]

In 1964 the Minutes of the Federal Open Market Committee, 1936-1960, and Its Executive Committee, 1936-1955, were made available to the public by the Board of Governors of the Federal Reserve System. Since that time several studies of the Federal Open Market Committee's behavior have been conducted, using these Minutes to interpret and evaluate the actions taken by the FOMC. These actions were judged against the policy-discussion and actual economic developments which occurred prior to each of the Committee meetings. These studies have typically been related to an investigation of the "true" length of the "inside lag."[9]

The "inside lag" is a measure of the time elapsed between the occurrence of an initial change in general economic activity and the taking of a positive action to alter the direction and/or magnitude of monetary policy action. This lag is more often analyzed in terms of its two components: the "recognition lag"—the length of time between the economic change and the Committee's recognition of that change—and the "action lag"—the duration between the Committee's recognition of the change and the consequent alteration of monetary action.

The dating of a major change in the direction or levels of general economic activity is compared with various reference points which are

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[8]See Sections I and III of Mayer (1967) and Chapter II of Schneider (1968).

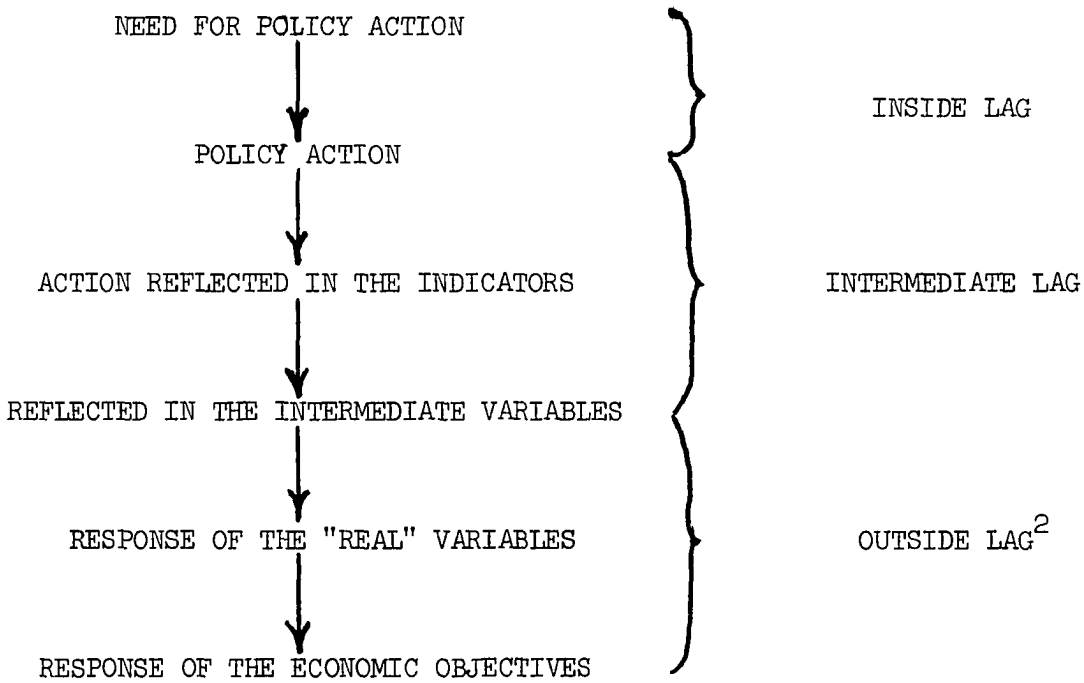
[9]Among these, two of the better studies are by Willes (1967-II) and Hinshaw (1967).

determined by relating them to important dates in the FOMC's decision process. These changes in economic activity are usually assumed to coinside with the peaks and troughs in the National Bureau of Economic Research reference cycle series. The most important of the FOMC's reference dates, which have been obtained from the Minutes, the Annual Reports of the Board of Governors (1947-1969), and the "Record of Policy Actions" (1965-1969), are: when the change, or the prospect of change, is first mentioned by a Committee member; when the full Committee generally recognizes the possibility or probability of such a change; when the change is confirmed by the Committee; and when positive action is taken to offset or compensate for this change in economic activity.

In a highly simplified form, the various major components of the total lag may be represented by Figure 2-1. This serves to illustrate the alternative stages at which an economic analysis of a particular policy action may be carried out. The indicators are short-run financial variables which first reflect the effects of a policy action. The intermediate variables are a group of both financial and "real" sector variables which are affected by the policy action after a longer period. And the economic objectives are those variables which the original policy action was designed to have an effect on. These various aspects are discussed in detail in the following chapter. Figure 2-2 presents a more explicit view of these components, as visualized by Frazier and Yohe (1966).

FIGURE 2-1

THE TIME SEQUENCE OF THE LAG BETWEEN A NEED FOR POLICY ACTION AND THE FINAL RESULTS[1]



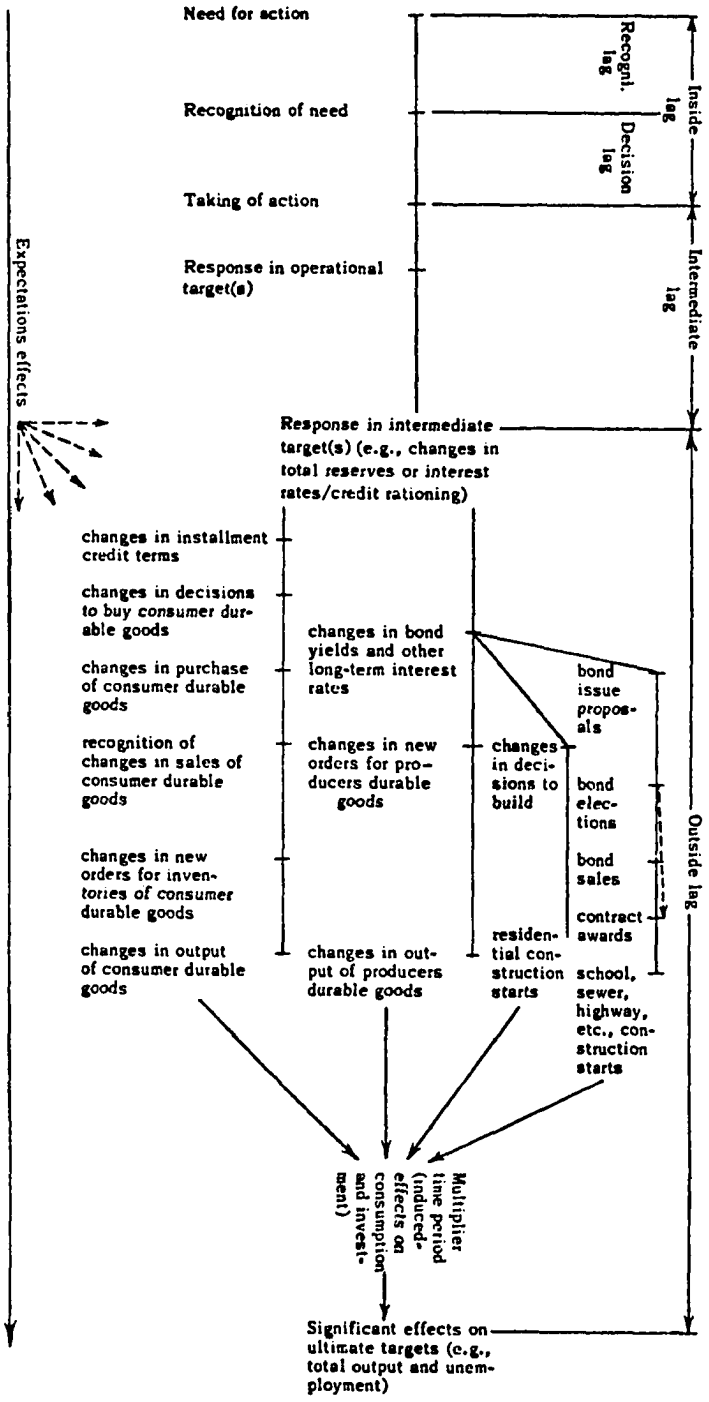
Source: Author.

[1]At each level after the initiation of the policy action, there is a possibility of feedback effects on at least one of the previous levels from the reactions of any specific level. And there are exogenous forces acting on the various levels, especially on the "real" variables and economic objectives, which cannot be accounted for but which might be offset by policy action if forecast.

[2]There is some disagreement concerning the point at which the outside lag is terminated. Some reference this point at the time when some response is reflected in the "real" variables; others use the beginning of noticeable effects on the economic objectives; and still others use the peak in the noticeable effects on these objectives as the "appropriate" reference point.

FIGURE 2-2

MONETARY POLICY: TIME LAG PROBLEMS



Monetary Policy: Some Time Lags.

Source: W. J. Frazier and W. P. Yohe, Introduction to the Analytics and Institutions of Money and Banking, Princeton, 1966, p. 586.

CHAPTER III

DIFFERENT THEORETICAL APPROACHES AND POLICY CONSIDERATIONS IN THE ANALYSIS OF MONETARY POLICY ACTIVITY

Albert Burger (1971) has presented an apt analogy to explain the "implementation problem" of monetary policy by equating it to the heating of a room with a steam furnace. Mr. Homeowner, the policymaker, seeks to maintain a comfortable temperature level in his room. He uses his room thermometer to determine whether or not the furnace is keeping the room at a desired temperature level. This is analogous to the FOMC using its measuring devices—e.g., the consumer price index, constant dollar GNP, unemployment rate—to determine if the financial sector is keeping the real sector policy objectives—e.g., employment, prices, output—within some desired range. If the individual wants to raise the temperature level in the room, he advances the heat control gauge, and, after a lag, again consults the thermometer to determine whether or not the action he took was sufficient. Similarly for the FOMC as they would increase the use of their policy instruments—basically open market operations, the discount rate, and reserve requirements on demand and time deposits. If the action was not sufficient, he would further advance the level of the gauge and, after another lag, again consult the thermometer.

If the policymaker is not certain that his furnace is efficient and operating correctly, he may install at least two gauges at intermediate positions in the process to improve his control. He may introduce a fuel flow gauge to measure the amount of flow between the fuel supply and the furnace, and a steam pressure gauge to measure the efficiency of operation of the furnace. In the case of certainty these measuring devices were not necessary. Continuing the analogy, the indicators of monetary policy, like the fuel flow gauge, are measures that provide information concerning the current effect of the newly-actuated, or of the existing level of, monetary (as well as fiscal) policy actions on the financial sector. These indicators are often "operational targets" which the Federal Reserve attempts to control on a day-to-day basis. They may also include variables over which the Federal Reserve feels it has relatively effective control but which are measured for the policy affect on them only after a short lag (a few days to a week or a little more). Policy targets are analogous to either (or both) the steam pressure gauge or the thermometer—both being intermediate measuring devices. These reflect the current effect of the financial sector, including the movements of the policy instruments, on the real sector. The ultimate goals of a policy action correspond to a comfortable room temperature level.

Theoretical Framework Linkages

In theory, one could determine the framework assumed by the Federal Reserve in its economic analysis by tracing the effects of specific monetary policy action from its inception, which generally involves changes in the levels of the policy tools, to its denouement,

as evidenced by changes in the ultimate objectives. However, nothing like a concensus exists concerning the exact specification of this linkage.

There appears to be general agreement that the original effects arising from monetary policy actions exert their primary influence on, and are transmitted by changes in, supply schedules and the prices of financial assets. The changes in the former initially are due to an adjustment in the availability and/or cost of member bank reserves. Those in the latter are represented by interest rate changes. Both sets of changes are brought about by portfolio adjustments which are made necessary because the policy action created an initial, or a larger, disequilibrium in some market(s). A change in the supply schedules or in the prices of financial assets may cause a modification in the existing levels of money and/or bank credit as well as reaction movements in these schedules and prices because of their basic interrelationships. These changes are then disseminated through portfolio adjustments of both the banking sector (central and commercial) and the private sector.

As these adjustments are made, they affect interest rates, the general availability of credit, and the relative prices of both real and financial assets. These effects, together with those resulting from the reaction and readjustment of potentially all of the relevant economic variables in the system, are eventually transmitted to the ultimate policy objectives via some economic framework. Although this generalized discussion of the transmission process may, in principle at least, present an acceptable summary of the theory implicit in most of the popularly-proposed theoretical approaches, the exact specifications

of the linkages differ significantly. The way one postulates the framework depends, to a large extent, on his monetary theory "bent."

The "strict-Keynesian" interpretation maintains that monetary policy is not important except as it facilitates fiscal policy operations—"money does not matter." Neglecting this, however, the theoretical importance assigned to changes in monetary policy (generally, changes in the "money supply") ranges from "money matters little" to the polar case that "money is all that matters." The basic neo-Keynesian theory, which considers fiscal policy to be the best approach to stabilization of the economy, recognizes that monetary policy can also be effective in stabilization; but it is not as efficient since fiscal policy is assumed to more directly affect the ultimate economic objectives (e.g., consumption and investment) and to have a shorter time-lag. The initial effects of a monetary policy action are assumed to be reflected by changes in interest rates. The implication of this for "countercyclical stabilization policies" is that restrictive monetary policy is reflected in high and/or rising interest rates while a policy of relative ease is identified with low and/or falling interest rates.

The monetarist position considers monetary policy to be the most important, though not necessarily all-important, approach to stabilization policy (Fand, 1970-I and II; Davis, 1969). It measures the initial effects of monetary policy by changes in monetary aggregates (typically, the monetary base). Restrictive monetary policy is exemplified by a declining aggregate, often accompanied by a low and/or falling interest rate; a rising monetary aggregate, and possibly also a high and/or rising interest rate, reflects relative policy ease.

Thus, which basic theoretical framework one adopts in describing the channels through which monetary policy actions are transmitted, determines the relative importance he assigns to the money supply as opposed to interest rate or other variables as an indicator of the effectiveness of those specific actions. If one adopts the basic neo-Keynesian version, he then assumes that changes in the money supply affect output and/or prices in the short-run only through its effect on the interest rates of a group of financial assets (principally Government and corporate bonds). The emphasis is on the substitution between money and securities. Income and total net worth positions are not assumed to be immediately and directly affected by changes in the money supply. If they were affected to the extent that the demand for money increased to exactly the new level of the supply of money, interest rates would remain unchanged. But the essence of the "liquidity" (Keynes) or "substitution" effect is that, since income and net worth positions are not so affected, interest rates must change in the opposite direction from the money supply change if the substitution is to bring about the equality between the demand for and supply of money.

The liquidity preference theory of interest rate determination seeks to equate changes in the nominal, as well as the real (due to the assumption of a constant price level), money supply to equivalent changes in the demand for real balances. In terms of this theory, the demand for money, which is assumed to be relatively interest-inelastic, is shown to determine the level of "the" interest rate. Since business investment and government spending are considered the basic factors determining economic growth, the interest rate change results in changing investment.

This, in turn, eventually manifests itself in changes in economic activity. In simplified form, this might appear as:

Open Market Operations → Money Supply → Interest Rates → Investment → Income

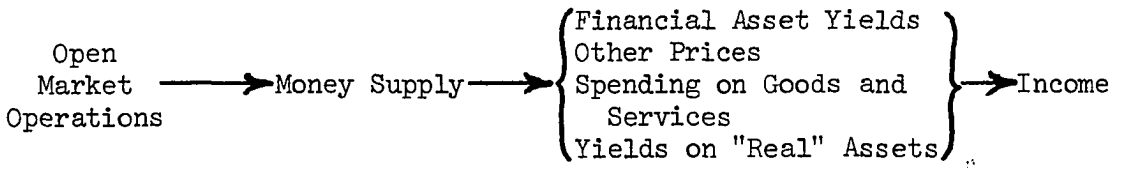
This should not, however, be interpreted to mean that a change in the money supply will only be reflected by changes in the interest rate. Certainly it will affect also the levels of consumption and other forms of investment. This is only meant to expose the primary influence which Keynesian theory hypothesizes will evolve from a change in the money supply. Therefore, the effectiveness of monetary policy in the short-run is measured by the magnitude of the change in "the" interest rate due to a change in the money supply. It is also measured by the size of the change in investment resulting from the interest rate change.

Monetarists, on the other hand, postulate that changes in the money supply will directly affect not only the yields on financial assets, but also other prices, spending on goods and services, and the yields on real assets. By assuming a relatively-more interest-elastic demand for money, "the" interest rate is regarded as simply another price—the price of holding real balances; the demand for money will determine the desired level of real balances rather than the level of interest rate. This position adds to the Keynesian substitutability, which initially is strictly between money and financial assets, the possibility of substituting between money and/or financial assets and "real" assets. Thus, for an initial increase in the supply of money, income and net worth positions (as well as the interest rate) may both be affected. The individual may reestablish portfolio balance by purchasing

either financial or real assets, or both, in addition to increasing his holdings of cash balances.

The immediate impact of an increase in the money supply, resulting from open market purchases, is to increase the demand for and prices of real as well as financial assets. It is possible that if one purchases a real asset, which carries no explicit yield, the effect on the price level might precede that on the interest rate if the demand for bonds is not also changed initially. More normally, however, one should expect that the interest rate will react, if not prior to, at least simultaneously with the reactions of other prices and the rates of return on other assets. The price of money, then, is really just an exchange price with respect to other commodities, both financial and real.

With an increase in the money supply, increases are initially experienced in nominal relative to real cash balances, and in expenditures relative to income. The attempt to eliminate some of the excess cash balances results in increased spending or increased purchases of capital or output, all of which result in changes in relative prices. This stimulates borrowing and production. Banks respond by increasing loans, and there is an increase in the demand for labor and other resources. This leads to additional spending and more demand for credit. Eventually this results in further increases in output and a general rise in the price level. Although a diagrammatic representation of the monetarist linkage is not as straight-forward as in the Keynesian case, it may be adequately illustrated by:



The monetarist's emphasis is on the long-run income and price-expectations effects. An income effect originates when changes in the money supply result in similar movements in the level of income. Income is directly affected by the production of additional capital goods. This occurs because changes in the money supply cause interest rates to vary, thus changing the spread between interest rates and the rate of return on capital. Income is probably also affected indirectly by changes due to the multiplier effect. The price-expectations (Fisher), or wealth, effects arise if changes in the money supply produce changes in nominal income that result mainly from price changes at a rate that is expected to continue into the future. Real assets would change in value relative to the liabilities created to purchase them—therefore, net worth would be changed (Gibson, 1970).

Thus, it is possible that a change in the money supply may affect the prices of all assets and the desired level of real balances (since money is also a substitute for real assets) as well as that portion of the portfolio which is spent on goods and services. All of this could occur without having to change the interest rate level, although because it affects the implicit yield on real assets, it will also affect the implicit yield on financial assets. For this to occur, however, the liquidity effects must be exactly offset by a combination of the income and price-expectations effects. More generally, though, it is recognized that interest rates will usually move immediately in the

direction opposite to the money supply change. Since these interest rate movements alter the amount of money demanded, a change in the demand for money will not have to be as large proportionally as the interest rate change in the Keynesian case. Thus, the monetarists also recognize the possibility of an inverse relationship between changes in the money supply and interest rates, at least initially. However, in successive periods, the increased levels of expenditures and income change may serve to create income and price-expectations effects which exceed the liquidity effects, thus justifying a return to, or an increase to some level above, the initial interest rate level.

In summary, a comparison of these two basic frameworks reveals that in the neo-Keynesian approach, the interest rate serves to equate the supply of and the demand for money, either in nominal or "real" terms. Since a change in nominal money is assumed to directly affect interest rates but not price levels, the price level is determined exogenously by wage and cost factors. The price level in the monetarist approach serves to equate the supply of and the demand for real balances; "the" interest rate is the part of this price that is determined by the nominal money stock. Thus, where the neo-Keynesian emphasis is on the substitution between money and financial assets resulting from an initial change in the money stock, the monetarist emphasis is on the wealth and income effects of the money supply change. Both hypothesize an initial opposite movement between money and interest rates. But when the income and wealth effects cause income and price-expectations to change at or above the new rate of money supply change, interest rates will reverse direction and approach the original level if this new rate of

monetary change is maintained.[1]

These crucial differences account for the divergent interpretations of interest rate movements. The neo-Keynesian's negative correspondence between changes in the money supply and changes in interest rates is due to the assumed price rigidities. This does not imply that prices are fixed; it means that they are determined by factors which are exogenous to the financial sector. The negative relationship still holds given flexible prices. The monetarist's hypothesis of a correspondence between money and price movements results from the direct relation between the nominal stock of money and the "price" of this money and other assets (Fand, 1970-I).

Havrilsky (1968) appears to present an approach which incorporates features of both major theoretical frameworks into a description which may be more acceptable to the "eclectic" policy-maker:

> I believe the linkage between monetary policy action and the target-variables and goal-variables is as follows. Open market transactions in short-term securities affect money market conditions (marginal reserve measures, short-term interest rates, etc.); after a short lag total reserves and the monetary base respond; as bank purchases or sales of earning assets eventually respond, the money supply and short-term interest rates are affected; effects are transmitted in the market after a lag to long-term interest rates and a range of credit conditions. Certain components of investment spending respond after a lag to the changed short- and long-term interest rates and credit terms via the cost effect as well as the effect on the price of real assets relative to their supply price. There may, in addition, be a wealth effect wrought by changes in the stock of financial assets. Eventually aggregate investment and aggregate consumption respond and finally the goal-variables of policy are affected. This final reaction overlooks the earlier response of certain measures of the balance-of-payments problem to the change in short-term rates.

In an attempt to analyze the strategy of the Federal Reserve's

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[1]For a detailed development of these effects see: Gibson (1968, 1970); Davis (1968); and Fand (1970-I and II).

policy-oriented activities, Professor Guttentag (1966) developed a diagrammatic approach which, although admittedly highly simplified, outlines the basic framework of policy action and reaction:

	Day	Week	Month	Quarter	Quarter
Open Market Operation	→ Money Market Condition	→ Free Reserve	→ Total Reserves	→ Money Supply	→ Gross National Product

In spite of the fact that there exist arguments concerning the proper entries in this example (which was designed to show a "money supply strategy"), it still adds some perspective to an analysis of policy operations.

Tobin (1969) attempts to clarify the linkage problem by saying that:

> From a policy maker's standpoint . . . instruments are variables he controls completely himself. Targets are variables he is trying to control, that is, to cause to reach certain numerical values, or to minimize fluctuations. Intermediate variables lie in-between. Neither are they under perfect control nor are their values ends in themselves. Generally, these intermediate variables are of interest when two conditions are met: (1) they are easier to control than the target variables, and (2) they are links in the chain of causation from instruments to goals.

Figure 3-1, although altered in content somewhat from Townsend's (1970) original version, presents a proposed outline delimiting several components of the "linkages" at each level of the analysis. No cause-effect relationship is intended between the variables simply because they happened to be placed on the same line in the Figure.

When looked at from a somewhat different perspective, an analysis of the economy's adjustment to a policy action (or a sequence of such actions) may appear as a series of simultaneously-determined, momentary values for the variables in the system. Starting from a point of general

FIGURE 3-1

POLICY TOOLS, INDICATORS AND TARGETS*

POLICY TOOLS	MONETARY VARIABLES		"REAL VARIABLES"	
	INTERMEDIATE	ULTIMATE	INTERMEDIATE	ULTIMATE
Open Market Operations	Federal Reserve Credit Outstanding	Money Supply	Expenditures on Consumer Durables	Gross National Product
Discount Rate	Total Member Bank Reserves	Bank Credit	Business Investment in Plant and Equipment	Industrial Production
Legal Required Reserve Ratio	Free Reserves	Interest Rates	Residential Construction	Unemployment Rate
Regulation Q		Long-term Government Bond Prices	Retail Sales	Consumer Price Index
Selective Credit Controls		Stock Market Prices		Balance of Payments

Source: W. S. Townsend, "Monetary Policy and Economic Objectives: A Suggested Framework for Analysis," Southern Journal of Business, April, 1970, p. 119.

*Altered by the addition of several entries.

equilibrium with this system of equations approach, a policy action induces responses which affect, and are affected by, the movements and values of the other variables within the system. Given the initial assumption that the underlying economic situation does not change,[2] the economy is assumed to be initially in equilibrium. It is also assumed to remain generally in equilibrium although observed values of the endogenous variables may differ significantly from the predicted values due to random errors. Thus, the economy as a whole is assumed to be in at least temporary equilibrium even though several, if not all, of the endogenous variables may be experiencing a momentary disequilibrium. Therefore, this general approach requires less actual attempt to specify the exact framework or components of this linkage.

An example might dwell on the equality of the supply of and demand for nominal money balances. The systems approach involves finding a functional relationship for both the supply of and demand for money, and then postulating that the two are equal. The simpler technique involves either supposing one to be exogenously determined (e.g., the money supply) and assuming it to be equal to the functional relationship of the other (e.g., the demand for money), or proposing that both are exogenously determined and always equivalent.

Alternative Indicators of Policy Effects

"No subject is engulfed in more confusion and controversy than the measurement of monetary policy. Is it tight? Is it easy? Is it

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[2]This assumes a given level of technology, and given institutional and behavioral constraints, all of which are expressed in the model by parameters.

tighter than it was last month, or last year, or ten years ago? Or is is easier? Such questions receive a bewildering variety of answers . . ." (Tobin, 1969). Indicators of monetary policy are measures of the direction and extent to which monetary policy has changed in recent periods. They serve much the same function for monetary policy as the full-employment budget position or the level of autonomous spending does for fiscal policy. The variables which are used as indicators are often required to play a dual role: (1) to provide an ordinal scale against which the direction and magnitude of various possible policy actions may be assessed and compared (indicator); (2) to act as a desired level toward which Federal Reserve operations in the money market may be directed in the presence of uncertainties that exist in the economy as well as in the theoretical framework (target).

> The problem is not only descriptive but normative; that is, we all want an indicator of ease or tightness not just to describe what is happening, but to appraise current policy against some criterion of desirable or optimal policy. We want to be able to say whether policy is too easy or too tight, and we appeal to indicators to support such a judgment. (Tobin, 1969)

During the 1953-69 period under consideration, measures of money market conditions were widely used both inside and outside the Federal Reserve as indicators because, in large part, they were thought to play an important role in the transmission process. In the day-to-day operations in this market for cash balances and close cash substitutes (both of which are used by banks to satisfy their liquidity requirements), the most often mentioned indicators of money market conditions are the liquidity positions of money market institutions and the degree of pressure or ease on the money market itself. The main component of the measure of liquidity positions is the level of reserve availability.

This is usually measured in terms of the value, relative change, or rate of change of its proxy, free reserves.

The FOMC generally instructs the Account manager to seek more, or less, or about the same amount of reserve availability and money market ease or tightness as has been prevailing. Most of the actions the FOMC takes are to correct or allow for daily, seasonal, or other short-run reserve changes (e.g., changes in the levels of currency, float, monetary gold stock). Therefore, the FOMC is more interested in maintaining the supply of reserves available to facilitate bank demand and credit growth at some desired level than it is in the overall volume of open market operations. This is evidenced by the establishment of an approximate growth objective for reserve availability in the policy directive. This was done to avoid over-emphasis on free reserves; its effectiveness toward this end, however, is questionable as was especially apparent during the 1950's and early 1960's. Thus, the marginal measures of bank reserve position, or, more correctly, of reserve availability, are said to basically reflect sizable short-run changes in reserve needs.

There are three primary factors used to gauge the demand for available reserves—the levels of excess reserves, borrowed reserves, and net free or net borrowed reserves. Excess reserves represent the difference between the total reserves available and those that are required as "margin" against demand and time deposits in member banks. Borrowed reserves is usually a measure of the level of discounts and advances granted by the Federal Reserve Banks to provide banks with reserves on a "loan" basis when needed. The difference between these two levels is a measure of free reserves—a positive value indicates net free reserves;

a negative value, net borrowed reserves. As the most often used proxy for the measure of reserve availability, an increase in free reserve is considered to reflect an increased availability of marginal reserves for credit expansion. An increase in net borrowed reserves signifies decreased marginal availability. But free reserves is not a good measure by itself since it does not necessarily reflect either the level of demand for credit or the bank's demand for free reserves (as evidenced by the tremendous amount of net free reserves in the early and middle 1930's). Therefore, although it may be a sensitive short-run guide to open market operations, it must be considered in conjunction with developments in the money market and the economy, as well as with changes or trends in the basic measures of reserve availability: total reserves, required reserves, and nonborrowed reserves (the difference between total reserves and member bank borrowing of reserves from the Federal Reserve Banks).[3] These basic measures, however, are not sensitive enough to be daily indicators. Their importance as indicators of basic changes in the overall reserve base is reflected in their trend and in the magnitude of their change.

The other important component of the measure of liquidity positions is typically thought to be the volume of net Federal funds purchases.[4] This is generally considered to be a sensitive indicator of

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[3]For a more detailed analysis of reserve availability, see: Fry (1963) and Keir (1963).

[4]Federal funds are reserve deposit balances maintained either at the Federal Reserve Banks or in the vaults of member banks. These funds are deposit accounts which are traded between banks having excess reserve positions and those with deficient positions. This trading enables those banks with deficient positions to meet the minimum legal reserve position requirements over the two week period. See: Anderson, et.al. (1959) and Willes (no date).

current changes in bank reserve positions and reserve availability since it is one frequently proposed measure of the supply and demand for excess reserves. Although this source of reserve adjustment was previously thought to be available primarily to large money market banks, the high interest rates payable on the loan of these excess reserves, especially in the relatively recent past, has drawn smaller banks (particularly those which traditionally have a net excess position) into the market as well.

"Money market pressure" is the general designation for the other overall indicator of money market conditions. The degree of pressure is determined by the size of the net reserve adjustments necessary to maintain at least a minimum required position and/or by the cost of making these adjustments to a bank's liquidity position. Each of the components of this index provide a measure of at least one of these. Thus, pressure is high when the demand for money market funds (reserves) is more than the available supply at the existing interest rate (cost), and conversely. There appear to be at least seven basic factors which are often combined to provide an index of money market pressure: the interest rate on three-month Treasury bills; the interest rate on Federal funds, and sometimes also the volume; the trend of free reserves; the reserve position of major money market banks; the level of member bank borrowings from the Federal Reserve Banks; the discount rate at the Federal Reserve Bank of New York; and, the interest rate on four-to-six month commercial paper.[5]

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[5]Perhaps the most in-depth study of the components of the "feel of the market" has been conducted by Andersen and Levine (1965, 1966), and Levine (1969). The Federal Reserve also lists the rate on three-month

The Federal funds rate and the discount rate are the real costs of adjusting reserve positions; as these rates increase, pressure increases. However, the Federal funds rate becomes a less sensitive measure of pressure as it approaches the discount rate level because this rate has traditionally been considered the ceiling rate on Federal funds. The Treasury bill rate and the rate on four-to-six month commercial paper represents the alternative or opportunity cost options available to banks to adjust their reserve positions. If "opportunity rates" are high, the cost of obtaining borrowed or purchased reserves is high; therefore, money market pressure is high. The measure of the trend in free reserves is the only inverse relationship. As the trend level rises, pressure decreases, and as it falls, pressure increases.

The reserve position of the major money market banks (not, therefore, restricting this simply to New York City banks) is determined by subtracting the level of their net purchases of Federal funds from the level of their free reserves. This measures the extent to which total reserves of these banks are insufficient to at least cover the necessary level of their required reserves. The larger the deficiency, the greater the money market pressure. This index is often combined with a measure of the borrowings of these banks from the Federal Reserve. If the borrowings are large and the deficit quite large, a significant degree of pressure is felt; but, if the borrowings are small, this pressure is lessened. The overall level of total member bank borrowing is an important factor in its own right. Although it is a component of free

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Euro-dollars (see: Federal Reserve Statistical Release No. H. 9 "Weekly Summary of Banking and Credit Measures").

reserves, when it is associated with high levels of interest rates and a general inavailability of reserves, it provides a potent measure of market pressure.

In addition to these components of money market pressure, there also exists a largely amorphous measure often referred to as the "feel," or "tone," or "behavior" of the money market. The Account manager, through the "Trading Desk,"[6] maintains continuous contact with the money and capital markets. In addition to frequent reports on the level or changes in the components of the measure "liquidity positions of money market institutions" and on the factors dealing with market pressure, the Account manager receives many additional pieces of information. Although they can be listed, the importance of these cannot be adequately assigned (at least not on a quantitative basis). Certainly one of the most important factors in this "feel" is the financial position of the dealers in U.S. Government securities. This is measured by the ease of financing, through call loans, the dealer's inventory, and by the magnitude of the borrowings of these dealers.

In discussing "A'Day's Work' at the Trading Desk," Roosa (1956) indicates that there are many other factors, in addition to the measures of money market pressure, that receive attention. A partial listing of these would include: (1) preliminary closing figures on the Treasury's balances for the previous day and the prospects for the present day; (2) the necessity of stabilizing the market prior to or following a Treasury security issue, or compensating for other Treasury activities; (3) the

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[6]The "Trading Desk" is the operating arm of the FOMC, carrying out the daily analysis as well as the daily operations within the instructions of the FOMC. See: Roosa (1956).

advisability of "rolling-over" maturing banker's acceptances; (4) the movement of prices in the various sectors of the Government securities market (with special emphasis on some issues, e.g., three-month Treasury Bills) and the Federal Funds market, as well as price movements in corporate and municipal bond markets, and the activity on the various stock exchanges; and (5) projections of factors affecting bank reserve positions daily for the next four weeks.

Then, during the "11 o'clock telephone conference," policy action for the day is decided upon subject to unexpected changes which may result in overall pressure deviating from that which is expected. The amount of latitude given the Account manager, through his use of the "feel of the market," allows him to adjust his operations in an attempt to bring these deviations back into line.

In addition to all this, the FOMC's directive since May 10, 1966, has contained a "proviso clause" which has been stated in terms of "bank credit." This is a variable which is often classified as a monetary aggregate rather than strictly as a money market indicator. This is yet another attempt to provide flexibility in the Account manager's operations. He can alter the guidelines concerning money market pressure in order to compensate for a deviation of the actual reserves available from the desired level which was projected for that period at the time the directive was originally issued. The actual measure of bank credit, total loans and investments of commercial banks (adjusted), is available only on the call date—the last Wednesday of the month. Therefore, the Federal Reserve adopted the measure "average daily total member bank deposits subject to reserve requirements (adjusted for nondeposit items)"

to serve as the bank credit proxy. But, as before, the Account manager must, when possible, receive clearance during the "11 o'clock telephone conference" before changing the money market pressure target.

As a result of the growing analytical acceptance of the "monetary" approach during the 1960's, monetary policy, as well as theory, has experienced an increased rejection of the relative importance of money market condition variables as indicators of the effectiveness of monetary policy. These measures have too often failed to accurately predict the actual or relative movements in the ultimate objectives which have occurred at some later time. Also, there has appeared to be a growing recognition that, since free reserves is not generally included in explicit statements of most theoretical frameworks, it should not continue in its position as a primary indicator and/or target in the linkage. It should be replaced by some variable or group of variables which hold a more important place within this structure. Instead of these condition variables, the "monetarists" have substituted some level of, or rate of change in, a monetary aggregate. And, in general, the policy makers have at least begun to take cognizance of this type of measure. Examples of these aggregates include "narrowly defined money," M_1 (demand deposits plus currency outstanding), "broadly defined money," M_2 (M_1 plus time deposits), still broader definitions of the money supply, time deposits, bank credit (total member bank deposits, or total member bank deposits plus nondeposit items—the "bank credit proxy"), the volume of bank assets, and the volume of U.S. Government demand deposits at member banks. The monetarist's analysis maintains that the behavior of the monetary aggregate has important effects in determining

the behavior of the ultimate objectives. Therefore, as Meltzer (1968) points out, a monetary aggregate that is often chosen is the rate of growth of the money supply (either M_1 or M_2).

> Research suggests also that the growth rate of the money supply, currency and demand deposits, is the least unreliable of the currently available indicators of monetary policy. The growth rate of the money supply is not an ideal indicator since it is affected by fiscal policies and by other changes that are not closely related to current monetary policies. However, all of the variables commonly used as indicators such as free reserves, market interest rates, bank credit, and the bank credit proxy suffer from the same defect to greater degree. The growth rate of the money supply provides a more reliable scale of the thrust of monetary policy than the alternatives mentioned.

Others, recognizing that the response of such intermediate variables to policy action reflects not only the results attributable to these actions but also to those which may be ascribed to exogenous factors, find this sufficient justification to reject the use of these variables as indicators. Realizing that a more expedient measure of the effectiveness of monetary policy would be one which isolates the former effects, many have chosen a variable that is more closely controlled by the Federal Reserve; one for which relatively accurate data is available about it and its components quite frequently. The figure generally adopted is the monetary base (or its almost equivalents, adjusted monetary base or high-powered money). Figure 3-2 presents Andersen's (1967) generalized outline on the calculation of the monetary base; he later (1968) specified this process in greater detail (Figure 3-3).

Brunner and Meltzer (1964) and Dewald (1963), who are among a large and growing contingent of "quantity-watchers"—those who follow the money supply (as opposed to the "price-watchers" who follow the interest rates)—propose that some measure of the reserve base be the

FIGURE 3-2

CALCULATION OF HIGH-POWERED MONEY OR MONETARY BASE[1,2]

Source Method		Use Method	
Member Bank Borrowings from the Federal Reserve	+	Member Bank Reserves	+
Other Federal Reserve Credit	+	Currency Held by Public	+
Gold Stock	+		
Treasury Currency Outstanding	+		
Treasury Deposits at the Federal Reserve	-		
Treasury Cash Holdings	-		
Other Deposits and Other Federal Reserve Accounts	-		

Source: L. C. Andersen, "Three Approaches to Money Stock Determination," Review--Federal Reserve Bank of St. Louis, October, 1967, p. 8.

[1]Altered to eliminate the numbers, totals, and description of the types of data and the period to which the data referred.

[2]Adjusted monetary base equals the sum of member bank reserves plus currency held by the public, minus borrowed reserves (TR - MBB + CC) = unborrowed reserves plus currency held by the public (UBR + CC). This is the variable which is assumed to be the proxy for open market operations.

FIGURE 3-3

FACTORS AFFECTING BASIC CONCEPTS[1]

	MONETARY BASE	HIGH-POWERED MONEY	TOTAL RESERVES	FREE RESERVES
Federal Reserve Holdings of U.S. Government Securities	+	+	+	+
Other Factors Supplying:				
Member bank borrowings	+	+	+	
Other discounts and advances	+	+	+	+
Vault cash			+	+
Federal Reserve float	+	+[2]	+	+
Gold stock	+	+	+	+
Treasury currency outstanding	+	+	+	+
Acceptances held by Federal Reserve	+	+	+	+
Non-member bank clearing accounts		+		
Factors Absorbing:				
Currency in circulation			-	-
Treasury cash holdings	-	-	-	-
Treasury deposits at Federal Reserve	-	-	-	-
Other deposits and accounts at Federal Reserve	-	-	-	-
Required reserves of member banks				-

Source: L. C. Andersen,"Federal Reserve Defensive Operations and Short-Run Control of the Money Stock," Journal of Political Economy, March/April, 1968, p. 278.

[1]Altered to eliminate the numbers, totals, and description of the types of data and the period to which the data referred.

[2]Friedman and Schwartz exclude float in calculating this. Usually it is included.

replacement for free reserves. Free reserves, they feel, has a significantly smaller degree of relation with the money supply than do any of the various types of reserve base measures. However, as Dewald (1966) points out, they are quick to reject the money supply as an indicator:

> . . . the quantity of money . . . need [not] be a correct indicator of the expansionary or contractionary influence of monetary policy. Despite an increase in high-powered money, the money supply may decline as the result of a decline in the rate of interest on private securities, and . . . as the result of a decrease in the private security rate relative to the rate of interest on time deposits, if time deposits are good substitutes for private securities. Thus, the test of an expansionary monetary policy is not an expanding money supply as interest rates decline due to a decline in planned expenditure. But an expanding money supply ceteris paribus would provide some assurance that open market purchases by the central bank or reductions in required reserve ratios were exerting an expansionary effect. It is also true that the test of an expansionary monetary policy is not a decline in the private security rate of interest. . . . Hence the test of an expansionary policy is again found in the changes in the variables that are controlled by the monetary authorities. . . .
>
> However, it is important to note that a decline in the rate of interest on private securities may give less information about the expansionary influence of monetary policy actions than an increase in the money supply does. In face of decline [sic] in planned expenditure and no change in other behavioral relations, an increase in the money supply would be a sign of an expansionary monetary policy. But a decline in the rate on private securities might mask contractionary policy actions that hold rates from falling as far as they otherwise would.
>
> It is necessary to measure the expansionary effect of monetary policy in terms of changes in policy-controlled variables. Thus . . . the quantity of money . . . is [not] a sure measure of the expansion of policy actions. A parallel argument applies to the measurement of contractionary monetary policy actions.

Free reserves, interest rates, the money supply, bank credit, and the rate of change in the money supply are five of the most often suggested indicators to measure the relative impact of monetary policy. But each of these is an endogenous variable, so that current movements in them are partly due to feedback from the financial and/or "real" markets. The fluctuations of M_1, as Brunner and Meltzer (1967) explain,

are due to policy effects, feedback effects, and the influence of fiscal policy and noncontrollable exogenous variables—mainly the decisions of the Treasury, commercial banks, nonbank financial institutions, and nonfinancial business and consumers. The same general statement also must hold for changes in interest rates—probably the most popular indicator—and for free reserves—the most often used indicator. So also for M_2 and the rate of change in the money supply. And as Hendershott (1967) points out, the monetary base and its variants are also far from being exogenous. As such, all these variables could prove to be misleading indicators. But the Federal Reserve's ability to control the levels of the monetary base, or its variants, determines the extent to which it is a relatively good measure.

Still other scholars propose that the indicator should be totally unaffected by exogenous forces—it should reflect only the results of policy actions. Since the policy-maker seeks to judge the appropriateness of the potential effects of a given policy action by the reaction he observes in his indicator(s), he may be misled if the effects of the exogenous forces so dominate the true policy effects that the guides give him incorrect signals. The indicator in this case is all-important. Not only is it affected more quickly, but it also should reflect only the reaction to the policy action. Many investigators have tried to establish a set of standards by which one could select the most appropriate indicator(s), given the theoretical framework one assumes.[6]

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[6]For example, see Saving (1967) and Havrilsky (1967). It should not be inferred by the reader that these considerations are ranked in any specific order (e.g., order of importance); a meaningful ordering in terms of importance results from the user's own assumptions reflecting his personal evaluation (utility).

If it is possible to draw a consensus concerning these standards, it might contain some or all of the following components: (1) the indicator should be readily and easily observable, and reasonably subject to Federal Reserve control; (2) it should clearly reflect not only changes in the market situation and the policy tools, but also the expected effects of the policy action on the target(s), intervening "real" variables, and ultimate goals; (3) it should not be affected by the exogenous variables, the effects of which are part of what is measured by the target variable(s); (4) it should be related to the decision-maker's hypothesized linkage and his knowledge about the economy in general; (5) it should minimize the amount of knowledge he is assumed to have concerning the economic framework; and, (6) if the exogenous variables do affect the indicator, the magnitude of this effect, when compared with that due to the policy action, should be relatively small. Thus, what is actually wanted is a variable which is endogenous only to the effects of monetary policy actions—one that is exogenous to all other effects. However, since any set of standards would probably be objected to by some investigators, the choice of an "optimal" indicator remains largely one which is based on a subjective evaluation of the alternatives by the policy-maker. The choice is made on the basis of the individual's, or group's, utility function, given the constraints imposed by the economy and/or by other external forces.

In terms of some combination of the above standards, the money supply, interest rates, bank credit, free reserves, and the rate of change in the money supply are again rejected, and for much the same reason as before. Not only are these variables subject to influences

from factors which are not strictly a part of policy action—the exogenous variables—but there also are several leakages in the transmission linkage between the policy action and the effect on the indicator. The individuals supporting this view typically propose some form of a reserve aggregate as the proper indicator. Those aggregates often proposed include total reserves, nonborrowed reserves, or one of these adjusted for legal reserve requirement changes.[7] Davis (1970) and Saving (1967), among others, also include the measure of the monetary base in this grouping of reserve aggregates.

Total reserves is a composite of all the influences operating on the reserve base. It is recognized that all these indicators, including total reserves, are affected to varying degrees by forces other than those attributable directly to policy action (e.g., float, monetary gold flows, member bank borrowings, disintermediation, changing Treasury deposit balances, and changes in the demand for currency). But it is felt that the Federal Reserve is substantially able to forecast fluctuations in most of these forces. Through its defensive operations, the Fed can offset most, if not all, of these fluctuations.

The Fed uses open market operations to dampen the fluctuations in member bank borrowing. To this extent, therefore, it appears that nonborrowed reserves is not an appropriate indicator. Nonborrowed reserves experiences large fluctuations—due to the immediate effect of Federal Reserve actions upon it—which are not offset to the extent that these same fluctuations are in total reserves or the monetary base.

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[7]For an example of each see Davis (1970), Havrilsky (1967), Hamberger (1970), and Hendershott (1969).

When looked at from the perspective of the "standards," no indicator yet proposed could strictly be acceptable to all. And this is not too surprising. If one defines, as the monetarists do, the money supply to be a rather stable function of the monetary base because of the Federal Reserve's defensive activity, ($B \cdot m = M$),[8] then the two should have quite similar patterns of movement. As Guttentag (1966) states:

> Since under the money market strategy the Federal Reserve more or less autonomously accommodates changes in the demand for deposits —in effect, the system "feeds in" reserves as the banks demonstrate they are prepared to use them—an association is generated between actual changes in deposits and in nonborrowed reserves (or related reserve base measures). The result is a high statistical correlation found by Brunner and Meltzer and by Meigs between the money supply and various reserve base measures.

As has been shown in Figure 3-3, many of the components comprising the measures of the monetary base and high-powered money are quite the same ones used to calculate the values for total reserves and free reserves. Thus, their movements over time would tend to have a relatively high correlation (this may be especially true in the case when they are all adjusted). And, it is fairly obvious that changes in interest rates (and some say the term structure of interest rates) and in the rate of change in the money supply, monetary base, total reserves, and bank credit (or its proxy) are all interrelated. They should, therefore, have relatively similar patterns of fluctuations (fluctuations in interest rates will be opposite in direction, however). This further complicates the choice of strictly one variable to serve as "the"

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[8] Defining the money supply (M) as a product of base money (B) and a money supply multiplier (m), where m is a function of consumer preferences between currency and demand deposits, and between demand and time deposits, bank preferences for excess reserves, and the differences between required reserve ratios for demand and time deposits. For an analysis see Weintraub (1967).

indicator.

Teigen (1968) has expressed a position on the selection of "the" indicator which seems well-taken. The problem, however, is that he does not indicate which, if any, of the indicators is preferable.

> I believe, first of all, that the role of monetary policy in stabilization is too complex to be captured in any single variable, and if any strictures are imposed upon the monetary authorities in this respect, their essence should be that the authorities are enjoined from focusing on any one variable as an indicator. In fact, I feel that some of the past problems with monetary policy have arisen precisely because the Federal Reserve System has depended so heavily on a single variable, free reserves, as a policy indicator. . . . The System now seems to realize that it must look seriously at many other variables, and I doubt that policy decisions will be faulty in the future to the same degree as in the past, at least on this account. Those who advocate the use of simplistic single indicators, however, apparently believe (without solid empirical evidence) that we cannot learn, either from careful empirical study or even from past policy mistakes, and now wish to perpetuate the kind of approach to policy which has proven to be so inadequate in the past.

Alternative Intermediate Targets

It is seldom true that the initial effects of a policy action act directly upon the "ultimate economic variables" without at least first passing through a portion of the maze of intervening economic relationships which exist between and among both financial and "real" variables. Therefore, the desired results of an initial action are not usually visible immediately. Sometimes the lag between the taking of an action and the observation of the results of this action, as reflected by movements in these "ultimate" variables, is quite lengthy. This lag, which is not only often sizable but also subject to rather large variation in its length, presents another very real source of problems in the stabilization effort. If an initially incorrect action is taken, or one which was originally correct later proves to be inappropriate or

ineffective, the inability to detect this until some future period when the effects on the ultimate variables becomes visible places added hardships on the stabilization effort.

In an attempt to reduce the degree of uncertainty in this process, the FOMC chooses policy targets (variables which are intermediate in the linkage, but more proximate to the ultimate variables than are the indicators). The value, or the rate of change in the value, of these targets serves as an indication of whether the total influence of the financial sector on the economy is becoming, as a whole, more or less expansionary. The actual values of these target variables are compared with their theoretical ("ideal") values—given the desired results from the policy action—to determine the correctness and adequacy of the chosen policy. If these developments are not satisfactory, the policy tools may be continuously adjusted, subject to a lag both for action and reaction, until the chosen variables reach or approach the target levels. There is, however, a lack of agreement on which intermediate variables or group of variables are "ideal" targets: market interest rates, the money supply, bank credit, or some combination of these or other measures. Brunner and Meltzer (1969) aptly point out one of the major problems in identifying the proper target of policy action.

> There is only a superficial relation between the central banker's use of money market variables and interest rates as targets or indicators and the economist's use of interest rates as an indicator of monetary policy. Central bankers are accustomed by habit and past experience to equate the effects of monetary policy with the effects such policy has on the banking system and the money market. Economists, on the other hand, generally emphasize the effects of monetary policy that spread beyond the banking system and the money market to affect output, employment, and the price level.

The way one interprets the actions and short-run results of monetary

policy depends, to a large extent, on the target(s) he employs. The short-run targets of the FOMC may, at least implicitly, be predetermined by the linkages it theorizes for the transmission of monetary policy actions. The typical neo-Keynesian approach identifies "market interest rate" levels as the most appropriate target, or group of targets, by which both to gauge the short-run effectiveness of a policy action and to estimate the correctness of the policy in terms of its projected ultimate effects. This results from the neo-Keynesian theory's emphasis on interest rate changes as the central feature of the adjustment process and from the assumption that the transmission of the effects of a policy action to the ultimate objectives is carried out basically by changes which result from, or coincide with, the interest rate fluctuations. It is also claimed by this theory that interest rates provide the best variable to link the financial and "real" sectors of the economy. If one employs changes in market interest rates as the target, he recognizes that his counter-cyclical policy operations will result in pro-cyclical changes in interest rates.

Those adopting a monetarist approach to theory propose the money supply, changes in the money supply, or some other such monetary aggregate as the most appropriate target since the money supply plays the central role in their linkage (especially in the direct effects on income and prices). The change in the nominal money supply initially upsets the balance between actual relative to desired levels of financial and real assets. This brings about adjustments to these levels which affect prices and income directly. Thus, they view countercyclical policy action as inducing countercyclical movements in the money supply. "The monetarist

thesis," states Brunner (1969), "attributes the largest weight with respect to price movements to changes in the money supply, and with respect to output and employment to accelerations (decelerations) of the money supply."

If monetary policy, through its effects on portfolio balance, is altered such that there exist excess nominal cash balances and the public wishes to exchange part of these for "real" assets, the production of real assets results in increases in income and investment. Whether one looks at this process of portfolio change as being brought about through interest rate changes or through changes in the money supply makes little difference at the theoretical level. It does, however, make a difference at the policy level.

Following Mayer (1968), if the potential rate of return on investment increases, any attempt to stabilize monetary conditions by stabilizing the interest rate could serve to destabilize income. Stabilizing the money supply would not. As the rate of return on "real" assets rises, the whole structure of interest rates, ceteris parabis, would tend to move in the same direction. As the cost of borrowing to finance capital investments increased, the incentive to do so would decrease until a theoretical position of stability was reached at which it was no longer profitable to borrow to invest in "real" assets at the higher rate of return. Thus, the rise in the interest rate, in itself, was potentially stabilizing. But an attempt to stabilize the interest rate at any other level would be destabilizing. Stabilizing the money supply would let interest rates "freely fluctuate" to achieve their "equilibrium position." If the desire for cash balances increases, stabilizing interest

rates would tend to stabilize income, while stabilizing the money supply could be destabilizing in terms of income. In this case, stabilizing the rate of interest would involve supplying enough money to satisfy the desire for increased money balances. This action would be potentially stabilizing. Stabilizing by controlling the money supply would, if the demand for nominal balances continued to be greater than the quantity supplied, be destabilizing because the interest rate could be continuously (or nearly so) increasing.

Neo-Keynesian theory assumes that the "real" rate of interest (interest on physical capital) is relatively stable; it would, therefore, assume the latter case to be true. The monetarists, on the other hand, postulate a relatively stable demand function for money. They, therefore, assume the former case. But it is uncertain which of these is the more stable.

If a consensus could be arrived at which would establish criteria for selecting the best target variable one might find that the optimal target variable:[9] (1) must have a well-defined position in the theoretical framework and be highly correlated with both the real variables and the ultimate objectives; (2) is one which the Federal Reserve is able to control within some definite limits; and (3) should adequately reflect the condition and current state of the financial sector.

In the often cited Compendium . . . (1968), question three concerned the details of the proposal to give the President the power to establish guidelines for the Federal Reserve in its conduct of monetary

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[9]For examples of attempts to establish these criteria see especially: Havrilsky (1965), Gaines (1968), and Morrison (1968).

policy. In a summary of respondent views:

> By a more than 2 to 1 majority, respondents favored making the growth of the money supply or its cognate, base money, the target of monetary policy. The larger part of the minority was eclectic. . . .
>
> Respondents in the majority group differed in respect to the details of managing the growth of the money supply. . . . there were differences about how to specify the guidelines for money supply growth. Roughly half of the group favored [the President, through the power given in H.R. 11] specifying a target percentage change in money supply for 6 months to a year ahead. . . . Other plans of this type which were advanced by respondents would require the monetary authorities to generate whatever money supply growth it takes (1) to keep the rate of unemployment under some desired maximum, say 4 percent, or (2) to prevent the price level from rising faster than some minimum rate, say 3 percent per year for the CPI.
>
> The other half of the many respondents urging the adoption of a money supply target recommended that the Congress or the President set guidelines for money supply growth in terms of a band or range of percent per annum values [3 to 5 and 2 to 6 percent were the most popular ranges] . . .
>
> A few respondents here recommended setting a quasi-permanent relatively-narrow band of values for monetary growth and instructing the Federal Reserve to stay within this range. The range would be adjusted outward only if it was proved to be clearly inappropriate by a persistent inflationary trend or persistent unemployment. But others wanted the range reviewed each year. Still another strategy that was suggested called for specifying a fairly broad range of allowable money supply growth and using triggers to collapse the range. Thus, the maximum allowable range of money supply growth might be set as zero to 10 percent per year. And the Federal Reserve would be directed to reduce the upper limit to, say, 8 percent when the CPI advances more rapidly than 2 percent per year and by 1 additional percentage point for every additional point of inflation. In the same way the lower limit of allowable money supply growth would be set at, say, 2 percent per year when the rate of unemployment reached 3 percent and raised one point for every point rise in unemployment. Last, some suggested trying to hit an interest rate target subject to the constraint that monetary growth stay within a specified range.[10, 11]

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[10] The questionnaires were sent to the seven members of the Board of Governors, the twelve Reserve Bank presidents, the Secretary of the Treasury, members of the Council of Economic Advisors, and 125 leading academic, bank, and research monetary economists. The responses comprise the contents of the Compendium on Monetary Policy Guidelines and Federal Reserve Structure Pursuant to H.R. 11 (1968).

[11] This summary of respondent views to Question 3, concerning the nature of the details which the President should include or consider

Thus, there appears to be substantial agreement to make some measure of the money supply the exclusive, or at least the primary, short-run target of monetary policy. The narrow definition of the money supply (M_1) has traditionally been the money supply measure. But the exceptional growth of time deposits—much of which is nearly-perfectly substitutable for money—which now represent a sizable proportion of total deposits, has caused many people to include it (either in total or in some percentage form) in the definition of money (M_2). Others (e.g., Gurley and Shaw) have extended this definition much further.

There are occasions when interest rates are a more appropriate target—when balance-of-payments difficulties are the most pressing problems. Otherwise, and to some extent during this exception as well, interest rates are easily misleading indicators of the policy effect. There are other problems with defining "the" interest rate to be considered. There are many different rates which could be relevant and some are difficult to measure. If the Federal Reserve watches only the short-term rates, it can easily be misled. There usually is no distinction made between "nominal" and "real" rates of interest (especially is this true in the Keynesian and neo-Keynesian system). If prices are rising, any attempt by the Federal Reserve to stabilize the nominal rate may be wasted effort since many investors are thought to follow the real rather than the nominal rate. Nor is the interest rate a very good target since it is only one of several cost factors—a partial measure of the cost

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when establishing guidelines on monetary policy, was written under the supervision of Robert Weintraub (pp. 13-15). See page 18 of the Compendium for a listing of the respondents, classified broadly by which view of the appropriate target they held.

of borrowing. When all of these factors are combined, they provide a measure of the state of the market.

The analysis of Friedman, Brunner and Meltzer, and others have cast considerable doubt on the ability of interest rates, free reserves, excess reserves, and money market conditions to effectively be a meaningful target. "Liquidity" is such an amorphous concept that it is rarely even considered today as it was in the past. Although bank credit (which may be a proxy for "liquidity") is often associated with money, no empirically meaningful relationship appears to exist between them. But even if one did exist, bank credit would probably only serve as a proxy for the money supply. Why look at a proxy when one can just as easily watch the primary figure? In addition, it is felt that the money supply is under much tighter control of the Federal Reserve than is bank credit. Other individuals propose the monetary base or one of its variants, including total bank credit, as a target. But the monetary base is just a variable used to control the money supply and not a target.

In answer to question I.3 of the Compendium (1968) concerning monetary guidelines (specification of a target variable, how it or the range around it was determined, and the circumstances under which the guidelines could be violated), William McC. Martin, then Chairman of the Board of Governors of the Federal Reserve System, in summary responded:

> In seeking guidance for the conduct of monetary policy, therefore, incoming information on both financial quantities and financial prices must be assimilated and interpreted. Movements in financial quantities—such as total bank reserves, the money, [sic] stock, commercial bank time deposits, and claims against nonbank intermediaries—on the one hand, together with indications of cost and availability of credit on the other, must be evaluated jointly to assess what effects monetary policy currently is having on the total supply of funds, its distribution among the various sectors of the economy, and hence on the availability of funds to finance spending.

> This interpretation must, of necessity, seek to evaluate the behavior of financial variables in light of underlying real developments in markets for goods and services. It is particularly important to distinguish between the variations in demands for and supplies of credit that are produced by changes in decisions to spend on goods and services, and those associated with the public's desire to rearrange financial asset portfolios, corporate mergers, and similar transactions. Decisions giving rise to the first kind of variation in credit conditions can lead directly to economic instability. The latter class of decision does not directly alter the pace of economic expansion, but the resulting side effects in financial markets may do so. The appropriate monetary policies to be followed, in response to an observed variation in credit demands or supplies, depend on which of these two classes of decisions is responsible.
>
> In the final analysis, evaluation of whether monetary policy has contributed positively to economic stabilization cannot be judged simply on the behavior of financial variables, no matter how carefully they are interpreted. The ultimate test of monetary policy is the extent to which it has succeeded in promoting our national economic goals of maximum practicable employment, reasonable price stability, and a strong dollar at home and abroad.

Development of the "Ultimate Objectives"

The ultimate economic goals of governmental activity, including the use of stabilization policy, (should) consist of promoting the general economic welfare and bringing about an equitable distribution of income. The emphasis on one policy objective relative to another, or a group of others, has shifted markedly over time. During the 19th century, the primary problem of economic concern ranged from the results to be expected from continued underproduction (e.g., Malthus) to the need to maintain a fully-employed economy; and from the requirements necessary to achieve and sustain adequate economic growth (e.g., Smith) to the problems of inflation (e.g., Ricardo). Today, generally stated, the basic economic objectives of governmental actions are thought to be to maintain full (or nearly so) employment, a stable rate of growth in employment and production, widely-shared income and distribution, a relatively stable price level, and international balance and cooperation. At the same time

they must preserve a condition of economic and political freedom within which the market mechanism can be allowed to "freely" allocate resources and output, subject to the "proper" amount of governmental coordination and regulation. The changing socio-economic-political situations determine, to a large extent, the importance attached to each of these objectives.

The 1913 Act which established the Federal Reserve System stressed the importance of using discounts and advances to maintain "sound credit conditions, and [for] the accommodation of commerce, industry, and agriculture." Instead of making the Federal Reserve System responsible for the goals and objectives which today are usually imputed to its control, Congress felt that the Federal Reserve should be more concerned with business conditions and the general inelasticity of credit and money. This followed quite closely the example of the Bank of England, and for good reason. About the only central banking experience any of the Governors of the newly-formed System had revolved around experience with and/or at the Bank of England (Anderson, 1965). It is not, therefore, surprising to note that the administration of the discount rate was the primary monetary weapon. This was also the case at the Bank of England at the time. Nor is it difficult to understand the adoption of the "real bills" doctrine, the basic modus operandi of the Bank of England at that time. This policy assumed that through the passivity of the banks and the extensive use of short-term, self-liquidating notes, the appropriate amount of money necessary to maintain high-level production and stable business and price level conditions would emerge. It was not until the 1930's that this doctrine was ostensibly abandoned, apparently

because of the failure of the "invisible hand." But this abandonment was by no means permanent since this doctrine, in the form of "bills only," or its surrogate, "bills usually," reappeared later; it was "put to rest" again in the early 1960's.

When the United States entered World War I in 1917, the Secretary of the Treasury transferred to the Federal Reserve the fiscal responsibility for facilitating the Treasury's financing (handling both the original sales and the maintaining of markets for Government securities). Performance of this fiscal function, together with a corollary function of stabilizing interest rates (especially those on Government securities) at "reasonable levels," became the primary objective. Providing for credit availability was secondary.

The sudden surge of spending and credit expansion in the post-World War I period resulted in a sharp increase in the price level, reaching a peak before mid-1920. This was followed by an even more pronounced decline in prices in the early 1920's. Among other things, this acute, but not unexpected, price swing reemphasized the need for a policy action which was aimed at maintaining some specific degree of price level stability, the primary economic objective of that time.

After the 1920-1921 depression period, the Federal Reserve began to redefine the objectives and guides of their policy actions in light of the changing economic situation. Given the "demise of the gold standard" as official backing for the dollar, the easing of the post-War economic crisis, and the lessened need to assist in the Treasury financing, the Federal Reserve could, for the first time, turn its attention primarily toward solving domestic economic problems (Anderson, 1965).

Changes in the volume of credit and in the way credit was used

were the most significant monetary policy guides. Basically this reflected the fact that the linkage between Federal Reserve actions—the discount rate changes primarily, supplemented by moral suasion and open market operations—and their effects on the monetary variables was fairly-well developed. That between the monetary variables and the real variables was much less certain. Although the economic system was thought to be relatively stable, concern over price stability and the avoidance of crucial fluctuations in business conditions continued to be high on the priority list of policy goals. Consistent with these goals, the desirability of maintaining stability in production and employment also became apparent. So, also, was concern over gold flows and international economic conditions in general. As was noted earlier, the obligation to aid in the Treasury's financing activities was only occasionally important over the entire period; but when it was, it held a position of preeminance above almost all the other goals.

In spite of the Federal Reserve's efforts to assure credit availability and a liberalized discount policy, the collapse of the economy in the late 1920's and early 1930's soon made it evident to many individuals that monetary policy was not, by itself, adequate to forestall the accompanying economic problems. The prolonged period of economic impotence and stagnation, and the existence of widespread unemployment, together with the continued failures in the financial sector, led to the recognition that easy money could not, by itself, stimulate business recovery. Modern-day "classisists" (or, perhaps more appropriately, Friedmanites) would not agree with this analysis. In their view, monetary policy was too restrictive because interest rates were too low and the money supply was reduced rather than allowed, or forced, to grow.

In these terms, they feel that a less restrictive policy approach would have prevented many of these economic problems. But to the classisists of that day—many of whom were the Keynesians of the following period—it appeared that fiscal policy presented a more effective approach toward a stabilization policy which could be aimed at restoring the economy. Therefore, monetary policy should be relegated to the position of a policy tool which, by virtue of its relative ineffectiveness during this period, should be used basically to facilitate fiscal policy and to impose selective credit controls.

The Federal Reserve's efforts during World War II were, once again, directed mainly toward assisting in financing the war effort and aiding in the stabilization of the Government securities markets. In the post-war period, to avoid the expected recession and the return to high levels of unemployment, coordination of economic policy became highly important. Aware of the potential for inflation that had been created by the war—large amounts of liquid assets, high income levels, and pent-up demand—the Federal Reserve "pegged" the price, and, therefore, also the interest rate, of Government securities at war-time levels and tried to manage the economy from this framework. It is questionable whether this added significantly to the stabilization effort since it was eventually realized that interest rate fluctuations play an important role in corrective monetary policy action. However, the Federal Reserve was <u>explicitly</u> saddled with this chore until the 1951 Accord. During this period, monetary policy actions were, generally, ineffective.

Congress passed the Employment Act in 1946. This Act represented the premier statement of the expressed objectives for the economy as they

were visualized at that time:

> The Congress hereby declares that it is the continuing policy and responsibility of the Federal Government to use all practicable means consistent with its needs and obligations and other essential considerations of national policy, with the assistance and cooperation of industry, agriculture, labor, and state and local governments, to coordinate and utilize all its plans, functions, and resources for the purpose of creating and maintaining, in a manner calculated to foster and promote free competitive enterprise and the general welfare, conditions under which there will be afforded useful employment opportunities, including self-employment, for those able, willing, and seeking to work, and to promote maximum employment, production, and purchasing power.

Goals during the period of the 1930's through the early 1950's underwent a substantial change in composition and ordering. Maintaining full employment was by far the most important; price stability was a much less important second. Economic growth was also recognized as a policy goal although not so much a monetary as a fiscal goal. And there was little concern over gold problems and international balance of payments problems (except perhaps how to handle the large inflows of gold).

Based upon the prevailing Keynesian analytic framework, there was a significant improvement in the theory of the linkage between the monetary sector and the "real" sector. The quantity of money was dropped as the connecting variable and interest rates and credit conditions were substituted as the critical variables. During most of this period, monetary policy did not matter much in the theoretical construct; fiscal policy was almost all-important.

During the period of the 1950's and 1960's our knowledge of the linkage continued to grow significantly through extensive research, especially into the link between the monetary variables and the "real" variables. Unfortunately, there has not existed anything like a consensus view of the "true" monetary theory. The quantity theorists (except for

the polar position held by some "Friedmanite" scholars) appear to be gaining more general theoretic support. But this support is tempered by the recognition that interest rates and credit conditions still appear to have direct and significant impact on investment; this, at the next level, affects the ultimate objectives. Thus, we may be witnessing the evolution, or rebirth, of the eclectic approach to the analysis of policy actions. This approach combines the Keynesian and quantity theories.

Throughout the 1960's, there has existed a multitude of explicit economic objectives: reasonably-full employment; satisfactory growth of consumption and income; orderly growth of output consistent with high-level utilization of the economy's resources; and stability of the price level and balance of payments around some desired level or growth rate.[12] While money market conditions are not mentioned as often or explicitly as before, they still carry considerable weight as objectives that widen the scope of the Federal Reserve's policy responsibility: provision of liquidity in its function as the "bank of last resort" (to insure the flexibility of financial institutions); insuring and stabilizing the market for Government securities; promoting the welfare of certain financial institutions (e.g., savings and loans) by preventing them from getting "locked-in" by long-term, low interest rate assets; and, encouraging the growth of interest-sensitive sectors of the economy (e.g., new housing starts).[13] The first two of these have a well-documented history as

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[12]For a good description of the goals, from the Federal Reserve's point of view, for the 1914-1964 period, see Anderson (1965).

[13]Keran and Babb (1969) explicitly include these last four policy goals in their analysis of Federal Reserve activity during the 1933-1968 period.

goals; the latter two are of relatively recent origin.

Given this multiplicity of goals, the question of compatibility is a very real problem. Generally, the Federal Reserve appears to believe that these goals are compatible and interrelated. This expression of compatibility, however, is easy to understand inasmuch as if they believed that the achievement of these goals was not compatible, the Federal Reserve would be required to explicitly choose among these goals according to some utility function. Since Congress originally delegated to the Federal Reserve the authority for monetary policy manipulation, but did not, and still has not, provided them with a guideline concerning priority of the objectives, the Federal Reserve must operate as though there is no basic incompatibility. However, Mark Willes (1967) has shown that the FOMC, in its conduct of monetary policy operations, has tended to attach greater priority to achieving price stability than to full employment. This results in a built-in tight money bias as a result of their employing a "business cycle framework" for determining the appropriate time to change monetary policy. They direct changes in monetary policy to be effected only after they observe a change in general economic activity—the business cycle.

As Willes (1967) has noted, price stability was probably chosen as the primary objective because not only was it relatively easy to define (in terms of the consumer or wholesale price index or the GNP price deflator), but it was also a well-known objective. It may have been felt that this was one objective which would be relatively easy to achieve with a minimum of interference with the other objectives. However, as the intra- and intersector linkages have become better known

and understood, this assumption of minimum interference has received less explicit usage.

Thus, it is fairly generally recognized that the attempt to achieve these goals simultaneously is not without basic conflict. The goal of full employment, which usually includes an inflationary bias, implies the willingness to accept some degree of price level change. So, also, a rapid economic growth and a high-level of resource utilization may create inflationary pressures which increase the difficulty of maintaining price stability. Other famous examples of this basic conflict in the selection of appropriate goals appear in the Phillips curve trade-off between wages and employment and the "Lipsey curve" (Lipsey, 1960, and Reuber, 1964) for the trade-off between unemployment and the rate of price inflation.

Given the existence of this conflict, it appears that, instead of the Federal Reserve choosing one or two objectives to which they give sole priority, if necessary to the exclusion of all others, they have followed a program that may be described as: "as soon as it appears that we are approaching a position which may result in our achieving one or a group of compatible goals, we turn our attention to another (group). If the position or direction of the primary objective begins to deteriorate, then we return to it and, once more, give it our highest priority until the desired direction or position is again attained."

SECTION TWO

QUANTITATIVE POLICY EVALUATION

CHAPTER IV

A MODEL OF THE U.S. FINANCIAL SECTOR, 1953-1969

Partly as a result of an increased emphasis in current economic theory on policy applications and on the interrelationships between various economic quantities, both within as well as outside the realm of what is often called "effective policy control," the popularity of econometric models has mushroomed. Another factor in this evolution has been the recent, significant improvement in quantitative techniques, especially in estimation methods. By viewing the economy as a system of quantifiably-determinable relationships between measurable magnitudes of several economic variables, attempts have been made to determine some "optimal policy mix." Under ideal conditions,[1] this mix should achieve, or aid in the achievement of, desired levels of the various policy goals, and hopefully also aid in stabilizing, or approaching stability in, the business cycle. However, this emphasis on the quantitative aspects of the problem should not result in a corresponding deemphasis of the problems relating to uncertainty, risk, and error. Duesenberry and Klein (1965) are quick to point this out:

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[1] The main constituents of these "ideal conditions" appear to be a ceteris parabis (or mutatis mutandis) assumption concerning the myriad factors which have varying effects upon several of the economy's main components, and an assumption that the past represents an accurate (and valid) basis from which to predict the future.

> Many questions of economic policy turn on the relative magnitudes of the parameters in some relationship, or set of relationships, among economic variables. . . . The goals of economic policy are usually stated, albeit somewhat vaguely, in terms of the numerical rate of growth of GNP, the price level, the rate of unemployment and the numerical state of the balance of payments. Discussion of measures to achieve those goals [however] involves judgements about the response of various economic magnitudes to previous policy actions.

Elements of Econometric Models

In theory, each individual economic relationship, which represents only a small finite part of the complex behavior and/or interaction of all the distinct household, business, and governmental units, could be brought together in the form of a system of equations. However, the enormous size and complexity of this "Walrasian" approach would make this aggregation virtually impossible to accomplish. Also, it would not be easy to draw any meaningful results from this approach. In an attempt to make the system more manageable and possible, several of the relationships are combined (e.g., the household, business and governmental sectors; the several components of income; and the demand and supply for money and related variables). Also the equations may be hypothesized to be linear—or nearly so—and expectations may be assumed to be adequately represented by some proxy variable.

Many considerations act to determine the appropriate number of equations to include in the system. One usually finds that the smaller the number of equations, the higher the required degree of aggregation and the lessened degree of accuracy and usefulness that can be claimed for the results. The larger the number of equations, the more complicated it becomes to collect the data, establish widely-acceptable relationships, handle the computations, and make meaningful, generalized

statements concerning the findings which evolved from the model.

Although the component structures of econometric models differ in many ways, each represents an attempt to establish interrelationships between the "real" and the monetary sectors. There appear to be two basic approaches which have been used so far in handling this problem: (1) relating the real sector to variables which are considered exogenous to this sector; or (2) relating the real and monetary sectors to variables, generally from both sectors, which are taken as given. Both approaches seek to use the inter- or intra-sector feedbacks, as well as the direct effects of some change in an exogenous variable to analyze the sensitivity to change of other economic quantities and relationships within the hypothesized economic structure. The degree of decomposition of the basic structural relationships within the model also vary significantly—from the basic Keynesian three equation model:

$$C = a + bY$$

$$I = I_o$$

$$Y = C + I$$

to the highly complex Brookings model (1965, 1969) which in 1965 had "upward of a hundred and fifty questions . . . ultimately achieving thirty-two sectors on the production side . . . similar decompositions on the side of final demand. . . ."

It seems, however, that the most "popular" structural size for current models ranges between either 15-20 or 35-50 equations.[2] Models

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[2]See, for example: Ando and Goldfeld (1966); deLeeuw (1965, 1969); deLeeuw and Gramlich (1968); Goldfeld (1966); Teigen (1969); Survey of Current Business (1966); Wharton Forecasting Model (1968); Yohe, et.al. (1968); and Nerlove (1962).

smaller than this appear to be too insensitive or not sufficiently able to discern movements within important components of the major economic relationships. Larger models suffer from problems relating to degrees of freedom, identification, and estimation (because of nonlinearities, multicollinearity, misspecification, etc.).

Three primary examples of "small" models which incorporate both a "real" and a financial sector were developed by deLeeuw (1965), Goldfeld (1966, revised by Goldfeld and Ando, 1968), and Teigen (1964, 1969). Goldfeld's influence on the later Teigen model is unmistakable; and both of these reflect at least a part of deLeeuw's development. The system of equations to be used in the following discussion is the author's attempt to improve upon the revised Teigen model (a listing of which appears in Appendix A). This approach was adopted not only to obtain structural or reduced-form parameter estimates, but also to estimate the total, impact, and interim (lagged) multipliers which result from a given level of change in one of the exogenous variables. From both of these an indication of how effective the FOMC has been in its policy analysis and activities should become apparent.

Basic Structure of the Model

As with most econometric simulations of this type, the model assumes a basically short-run, demand-oriented approach; the supply side is generally exogenously determined. And as Nerlove (1962) has pointed out for all models of this type:

> (the) design of an econometric model depends on a series of compromises among: (a) the structure of the economy to be described; (b) the multiple, and often partially conflicting, objectives of the model . . . And (c), the availability of data. . . . it is an unfortunate fact of life that the last of the three tends to dominate.

Before presenting the model, a few preliminary comments on its derivation are called for. The simulations represent quarterly parameter estimates for the period 1953-1969. 1953 represented a logical starting point for several reasons. Perhaps the most significant was that, although the "Fed" and the Treasury reached an "Accord" in early 1951, it was not until early 1953 that support for the government securities market was dropped in favor of acting only to correct a "disorderly" government securities market. 1953 marked the first fully-effective year of Governor William McC. Martin as Chairman of the Board of Governors of the Federal Reserve System (1969 was also his last full year).

1953 also represented to many the first post-World War II year in which the country had returned to a degree of "normalcy." The whole period encompassed a time during which "Keynesian-type" indicators of monetary policy action were followed quite closely. Beginning in early-1969, there was an evident shift in emphasis toward greater use of monetary aggregates as policy indicators. This period also represented really the first time that monetary policy had regained a recognized, meaningful, place in policy-making since the pre-Depression period. The period extended through (or at least into) a time when many were again beginning to believe that monetary policy was nearly, if not totally, all-important.

In most econometric models, for ease of assumption and simplicity of explanation, a simple Koyck-type lag structure is chosen and the equation is structured as a first-order difference equation plus some constant. This theorizing is based on the assumption that a one period lag of the endogenous variable adequately accounts for the distributed lag

of effects. These effects arise as a result of the influence that previous period levels of the endogenous variable have upon the current level or change. The Koyck lag structure assumes that a uniformly-declining amount of importance is assigned to the effects of previous period levels.

The estimation of the model was subject to all the "special problems of a quarterly model" specified by Nerlove (1962). Interpolation was required to change annual series of productivity and yield on time deposits to a quarterly basis. The mathematical interpolation form (the simplest form discussed) was chosen, subject to all the errors and biases implicit in this form. Seasonally adjusted data were used although it was recognized that after adjustment it is often difficult to determine how the adjustment affected the information available from the new series.

The problem of serial correlation arises as a result of certain variables which were not, but which should have been, included in the specification of a particular equation. Although the effects of this omission may, at least partially, "wash out" during the estimation, the error terms of the equations may still be serially correlated through time and across the sectors. Two additional points about this problem need to be made: (1) it is generally assumed that the shorter the time interval, the more highly correlated a variable is assumed to be with its own past values; and, (2) the Durbin-Watson $\underline{d}$ statistic is only a test for the first-order serial correlation—the lag structure of the model is not necessarily of the first difference type. Finally, the dynamic nature of the model is emphasized by the degree of the lag structure. A question arises concerning whether it would have been more advisable to use a distributed rather than a discrete lag structure.

Actually both types of lags were employed (vis., permanent income, the divisor of the proxy for the expected rate of change in income, etc.).

The sources and types of data employed are described in Appendix C. Unless otherwise indicated, the data are quarterly values which are seasonally adjusted at annual rates. All flow variables and the non-ratio stock values are in billions of current dollars. All interest rates, reserve requirements, and rate of change variables (including proxies) are stated in terms of percent per annum (e.g., 3.5% = 3.50). The proxy for the balance of payments problem is also stated in percent per annum terms. The short-term interest rate, which was used to represent the international rate attracting foreign investments, was multiplied times a dummy which assumed the value of zero (0) for the years when the U. S. did not experience balance of payments problems (1953-1960) and unity (1) for the years after that (1961-1969). The multiplicative interest rate variables were an exception; they were reduced to percentages and then multiplied times income ($\frac{r}{100} \times Y$). The change in the rate of productivity is in index number terms (1955 = 100) as is the variable measuring the rate of capacity utilization in the "big three" sectors of the economy. A listing of the variables used in the model follows; they are explained in more detail in Appendix C.

Endogenous Variables:

ΔDD = quarterly change in demand deposits
ΔCC = quarterly change in coin and currency
ΔTD = quarterly change in time deposits
ΔFR = quarterly change in free reserves
ΔL = quarterly change in bank loans
OMO = proxy for open market operations
r_d = discount rate at the Federal Reserve Bank of New York

Y = income (gross national product)

C^{nd} = consumption of nondurable goods and services

C^{d} = consumption of durable goods

I^{r} = residential fixed investment

I^{nr} = nonresidential fixed investment

ΔI^{i} = quarterly change in nonfarm business inventory

CHP = annual rate of change in prices

Exogenous Variables:

r_b = short-term interest rate (yield on Treasury bills)

r_l = long-term interest rate (yield on Government bonds)

r_{td} = yield on time deposits

TRM = term structure of interest rates $(r_l - r_b)$

ΔRT = change in the required reserve ratio against time deposits

L = level of commercial bank loans

ΔY = quarterly change in income

Y_p = permanent income

WDY = proxy for the expected annual rate of change in income in the next quarter

E^{e} = exogenous expenditures

INV = level of all manufacturing inventories

ΔProd = productivity change

CAP = rate of capacity utilization

B-P = proxy for the balance of payments problem

Each equation was estimated by both single-equation and two-stage least-squares methods. Since most of the equations contain at least one other simultaneously-determined (endogenous to the system) variable, the propriety of the single-equation estimation method was questionable. On the other hand, however, the use of the two-stage estimation method was also not without problems. Multicollinearity, non-linearities, and structural lags of a not-necessarily exponential type tend to make the two-stage estimates ambiguous. Duesenberry and Klein (1965) have pointed up further estimation problems to which both

estimation methods are subject. The accuracy of the parameter estimates may also be affected by the problems of identification, bias, misspecification, and serial correlation.

The initial attempt to specify an acceptable combination of variables for a particular equation involved testing the specification that Teigen (1969) adopted. In many cases a poor statistical "fit" was expected because the endogenous variables of some equations were different than those used by Teigen. After this initial test, a variety of alternative specifications for the same equation were tried. This involved the addition of variables which seemed to be theoretically relevant or which might serve as proxies for other relevant variables. It also meant trying alternative ways of specifying a variable (e.g., quarterly or annual change) or various methods of combining variables.

If none of these alternatives improved the statistical significance of the equation or of the variable, that variable was dropped. The process of selecting the "best" specification of a particular equation, or for testing the appropriateness of a variable, involved applying the rather standard statistical criteria of: the correctness—agreement with *a priori* expectations—of the sign of the coefficients; the goodness of "fit;" the size of the standard error of the estimate; the *t*-test for the significance of the coefficients; and the Durbin-Watson *d* statistic for the detection of serial correlation among the residuals.

In the discussion of the equations that follows, the equations are listed and the "*t*-values" of the coefficients—the coefficients divided by their standard error—are immediately below in parentheses.

Below these are shown the three most often used measures of the goodness of fit of the regression: the coefficient of determination—R^2; the Durbin-Watson d statistic—DW; and the standard error of the regression—SE. The equations shown in the discussion are not necessarily all the best. They are, instead, intended to indicate the direction of the research. Although the differences in the R^2 between the best and the worst specifications of a particular equation may not differ by much, the appropriateness of the chosen equation(s) should be judged on the basis of all the regression criteria, not just R^2. The level of significance of .25 was assumed in determining whether a coefficient is statistically significant or insignificant on the basis of the t-test.

The final selection of the set of equations on the basis of the single-equation parameter estimates is accomplished by a relatively non-standard method. Each of the possible combinations of the fourteen equations could be evaluated on the basis of their convergence characteristics by solving for the characteristic roots (eigenvalues) of the system of equations. The details of this method of selection are explored in depth in a later part of this chapter. Briefly, however, the largest eigenvalue of each of the combinations of 14 equations are compared; that set of equations which had the smallest eigenvalue of those compared was considered "best."

Monetary Sector

Both sectors of this model parallel (in some cases quite closely) those in the model developed by Teigen (1969). The monetary sector contains seven behavioral equations. Five of these seven are demand equations relating changes in the numerical values of the components of

the money supply and closely-related variables to other variables from both the monetary and the "real" sectors. These five are: (1) the demand for demand deposits; (2) the demand for coin and currency; (3) the demand for time deposits; (4) the demand for free reserves (which may also be considered as a type of "supply function" for the loans and/or investments which can be hypothecated on them); and (5) the demand for commercial bank loans. The remaining two equations attempt to make the two most important Federal Reserve policy tools—open market operations and the discount rate—endogenous to the system. The more usual econometric assumption is that the former is exogenous and the latter is usually so.

This highly aggregated sector does not deal with the non-bank financial intermediaries which play an ever increasing role in today's financial markets. Nor does it adequately include the process of the individual, corporate, or bank portfolio adjustment because of the limited number of assets assumed, the assumption of an exogenously-determined interest rate structure, and the restricted size (number of equations) of the model.

The demand for money cannot generally be empirically broken down into the four sources of demand that are hypothesized by the commonly-known body of Keynesian theory—transactions, precautionary, speculative, and finance motives for holding liquid, or near-liquid assets. Instead, the portfolio theory approach is to recognize basically two sources of demand—that which is interest-elastic and that which is not.

If one assumes that the demand for money is strictly for transactions purposes, Tobin (1956) and Teigen (1964) have initially specified

the demand for money of an individual to be a function of income and the rate of interest:

$$M_i^d = \beta_0(r^{\beta_1} Y_i^{\beta_2}).$$

Aggregating this by summing, Teigen obtained:

$$M = \gamma_0 r^{\gamma_1} Y^{\gamma_2}.$$

He approximates this by considering the demand for money to be a product of the interest rate and a function of income. By holding income constant and expanding f(r) by a Taylor power series, he obtains a series which he truncates after the first-order term. This truncated series is assumed to be roughly approximated by

$$f(r) \cong \delta_1 + \delta_2 r.$$

Then holding r constant, he notes that one may expect a relatively-proportional relationship between income and money:

$$M = \delta_3 Y.$$

Multiplying the two parts of the money demand function together yields:

$$M = (\delta_1 + \delta_2 r)\ (\delta_3 Y)$$

$$= M\left[(r,Y),Y\right] = M\left[M_1(r,Y),\ M_2(Y)\right].$$

$$M = \beta_1 Y + \beta_2(rY).$$

Originally the endogenous variables in the financial sectors of econometric models were specified in terms of absolute levels. Subsequent work has recognized that relatively small changes in these levels could hide larger changes or errors in other places. They also could underplay the effects of some small but important dollar volume changes. Therefore, the endogenous variables in the financial sector of this model are expressed in terms of first differences of the dollar volumes. The

real sector variables continue to be expressed in current dollar level terms.

The demand equations for the various components of the money supply (ΔDD, ΔCC, ΔTD) are assumed to reflect the public's demand for financial assets. They are all of basically the same form—functions of: interest rates, strictly or in their multiplicative form; other variables, which primarily are income or a wealth proxy of the type considered by Friedman (1956) and others; and a lagged stock and/or lagged change in the endogenous stock variable. The relation of free reserves—net free reserves if the difference is positive, net borrowed reserves if it is negative—to the money supply is obvious.

Meigs (1962) has shown the relationship to the short-term interest rates of both excess reserves and member bank borrowing. As was mentioned earlier, free reserves has been the primary variable by which the Federal Reserve has measured the stabilizing influence of its control over open market operations, the discount rate, and the reserve requirement ratios. Thus, it is fitting that the change in free reserves (ΔFR) is a function of the changes in the major components of the money supply and in bank loans. It is also a function of changes in the levels of the Federal Reserve's policy tools, the interest rate levels, and a lagged stock and lagged change in the stock of free reserves.

Commercial bank loans are the last financial asset included in this sector. Since the ability to increase the level of loans depends on the availability of free reserves, while this is not strictly the case for other earning assets, the change in loans is highly subject to credit rationing. Although a variable defining the level of credit

rationing is not included in the model, the main influence of changes in the level of bank loans is on "real" sector variables, especially on business inventory investment. Thus, this rationing may be reflected by the need for funds as well as by the relative cost to the individual and the firm of obtaining these funds. Therefore, loans are analyzed as a function of income and interest rates, various real sector variables, and the lagged level and lagged change in the previous level of bank loans.

The operation of monetary policy in the United States was, and to a large extent still is, generally oriented toward regulating the volume of member bank reserves which serve as the base for the money supply and bank credit (thus its popular name—monetary base). Open market operations are undertaken to accomplish basically two major purposes: (1) to offset daily or short-run undesirable money market developments (the defensive aspect); and, (2) to provide the Federal Reserve with an efficient tool which can be used to initiate or alter some level or change in the level of a policy objective (the dynamic aspect). In its monetary policy operations the Federal Reserve is generally regarded as being responsive to its policy objectives, such as full employment, price stability, some desired level of income growth, and a "balance" in international payments. It is also responsive to its intermediate policy targets, such as free reserves, the monetary base, interest rates, or movements in the money supply.

Interest in open market operations lies basically with those actions which are taken to effect some dynamic objective. It is for this reason that some measure of net Federal Reserve purchases (and/or sales) of securities is not used as a measure of open market operations

in this model. Net purchases, or sales, would reflect both the defensive and the dynamic operations of the Fed. But research interest relates mainly to the dynamic aspect. To measure the extent of the dynamic action taken, Teigen (1969) and Goldfeld (1966) have proposed, based on the early works of Dewald and Johnson (1963) and Reuber (1964), the use of unborrowed reserves plus the level of coin and currency held outside the banks (UBR + CC). This is a measure of the "adjusted monetary base." It is thought that any overt dynamic action will be reflected in either (or both) the level of unborrowed reserves or the level of coin and currency outstanding. An alternative, just UBR, has been proposed. The former measure is considered to be preferable since the latter does not sufficiently measure the problem of currency drains.

A Federal Reserve open market purchase would have the effect of increasing either the level of deposits or the level of currency outstanding, or both. An open market sale would have the reverse effect. Therefore, Teigen proposed the rate of change in (UBR+CC) to reflect the movements in open market dynamic actions

$$\frac{\Delta(UBR + CC)}{(UBR + CC)_{-1}} = OMO$$

as the dependent variable in the model. For lack of a better proposal and because of the growing acceptance of this measure, it has been adopted here.

Thus, it seems appropriate for OMO to be some function of the levels, or movements in the levels, of the indicators, targets, and policy objectives, the level or changes in the levels of the other policy tools, and the lagged adjustment to OMO in the previous period.

OMO is primarily used to supply necessary or absorb excess

liquidity to compensate for the regular fluctuations in member bank reserves. In a period of tight money, when open market policy seeks to provide less than the required amount of reserves, banks are forced to seek additional reserves by discounting. Through changing the level of the discount rate—the cost to the banks of borrowing reserves—the Federal Reserve can influence not only the existing level of member bank reserves, but also the desire of banks to seek additional reserves. By restricting this flow, the Banks are slowing down the growth rate of money and bank credit, and eventually the growth rate of income and, hopefully, prices. It is also obvious that the discount rate level follows changes in the levels of other major interest rates, although often with a perceptable time lag. It should be expected, then, that the discount rate would be a function of some measure of income—and possibly prices—free reserves, bank loans and/or money supply, interest rates, and the lagged value of the rate. The lagged rate is extremely important because of the relative infrequency with which the rate is changed.

On several occasions in the model, the short- and long-term interest rates are assumed to act as proxies for the effects of other important variables. Typically, either these variables cannot be measured accurately enough or they are not subject to any specific type of measure. Generally, the proxy role portrayed by the short-term interest rate is one of cost. It may be the cost of holding liquid assets, of maintaining a certain level of inventory, or of obtaining additional capital or financing. It may also be used as a measure of the general level of prices although its capacity in this role is questionable. This rate may also be a measure of investment return, especially from short-term investments.

The long-term interest rate, on the other hand, is often used as a proxy for the expected rate of investment return. The return to expect from an investment in monetary assets, in plant and equipment, or in other assets. This rate may, however, also represent a cost—the cost of obtaining long-term investment funds.

The demand for demand deposits (ΔDD). Professor Friedman originally proposed that the demand for money was primarily a function of permanent income and the interest rate (1956). However, he was not able to find a satisfactory statistical relationship which included the interest rate (1959). Therefore, he specified the money supply to be a function of permanent income. But he did not seem to rule out a functional relationship with the interest rate. Laidler (1966) was able to statistically support the functional dependence on both permanent income and the interest rate. Although he could not conclusively determine which interest rate was more appropriate, he eventually specified the short-term rate.

The initial attempt to derive a regression equation for the demand for demand deposits involved these two plus variables representing the current level of income (Y), the annual rate of change in prices (CHP), the level of commercial bank loans (L), and the lagged stock and change in the stock endogenous variable. Permanent income, the level of loans, and the rate of price change are all lagged: permanent income, to reflect the "normal" income level from the past; the level of loans, because when the loan is granted, it is most often reflected as an increase in demand deposits; and the annual rate of change in prices, to indicate the last rate of change experienced, and used to represent expectations for the present period:

$$(1)\quad \Delta DD = -3.892 + .008223(Y) + .0223(Y_p)_{-1} + .0934(CHP)_{-1}$$
$$(-.672)\quad (.7795)\qquad (1.197)\qquad (1.178)$$
$$-.5985(r_b) - .0319(L)_{-1} - .0428(DD)_{-1} + .5454(\Delta DD)_{-1}$$
$$(-3.690)\qquad (-1.266)\qquad (-.899)\qquad (5.285)$$
$$R^2 = .6686\qquad DW - 1.949\qquad SE = .5853$$

This reveals that ΔDD is responsive to interest rate movements. This does not indicate, however, whether it is interest-elastic or interest-inelastic. Later evidence in this thesis suggests that it is interest-inelastic. The sign of $(L)_{-1}$ was not as expected, and the coefficients of current income and $(DD)_{-1}$ were insignificant on the basis of the t-test at a significance level of 0.25. Thus, income was dropped and the current change in loans was substituted for $(L)_{-1}$. This new equation, and a similar one which contained the current rate of change in prices, were tested. Since there was a negligible difference between them, the one containing the current rate of change was chosen:

$$(2)\quad \Delta DD = .6073 + .01793(Y_p)_{-1} + .1392(CHP) - .6636(r_b) + .1184(\Delta L)$$
$$(.236)\quad (3.119)\qquad (1.558)\qquad (-4.289)\qquad (1.791)$$
$$- .0614(DD)_{-1} + .5146(\Delta DD)_{-1}$$
$$(-1.340)\qquad (4.912)$$
$$R^2 = .6744\qquad DW = 1.936\qquad SE - .5754$$

Lagging the price change one quarter and dropping the constant further improved the results:

$$(3)\quad \Delta DD = .01606(Y_p)_{-1} + .1534(CHP) - .6817(r_b) + .1295(\Delta L)$$
$$(4.586)\qquad (2.013)\qquad (-5.833)\qquad (2.086)$$
$$- .0486(DD)_{-1} + .4912(\Delta DD)_{-1}$$
$$(-3.888)\qquad (5.200)$$
$$R^2 = .6807\qquad DW = 1.959\qquad SE = .5652$$

This equation, to explain the movements of the largest component of the "narrow" definition of the money supply, seems to support a generalized

"Friedmonian" hypothesis. If Y_p had been calculated with constant rather than current-dollar income, the price equation would not have been necessary. The addition of the change in loans and the use of a Koyck-type lag structure represent the only modifications of the "amended-Friedmonian" hypothesis.

The demand for coin and currency (ΔCC). Essentially the same initial regression equation as that assumed for demand deposits (with the exception of $(L)_{-1}$) was used to explain the demand for coin and currency, the other component of the "narrow" definition of the money supply. The rate of price change, however, was insignificant and was therefore dropped:

$$(4)\quad \Delta CC = \underset{}{1.296} + \underset{(3.97)}{.00510(Y)} - \underset{(4.980)}{.00744(Y_p)_{-1}} - \underset{(-4.400)}{.0519(r_b)} - \underset{(-2.599)}{.0112(CC)_{-1}} + \underset{(-1.067)}{.5445(\Delta CC)_{-1}} \quad (5.989)$$

$$R^2 = .8709 \qquad DW = 2.059 \qquad SE = .0984$$

The sign of $(Y_p)_{-1}$ was unexpectedly negative. As another measure of income anticipations, Teigen introduced a ratio which closely resembles an annual rate of change variable—the annual change of income for the current period divided by a "one-year moving total of income:"

$$\frac{(Y - Y_{-4})}{\sum_{i=0}^{3} Y_{-i}}$$

He found, however, that "the best results were obtained when the variable was 'led' one quarter," thus becoming a proxy-like measure of an expected annual rate of change in income in the forthcoming period:

$$WDY = \frac{(Y_{+1} - Y_{-3})}{\sum_{i=0}^{3} Y_{-i}}$$

The lagged level of permanent income was replaced first by the proxy for the expected income change (WDY) and the long-term interest rate in its role as a proxy for investment income return. Then, because one could question the strength of the impact that a change of investment yield or opportunity would have on the demand for coin and currency, it was eliminated and (WDY) was replaced with the quarterly rate of income change (CHY). Although improving the results, both regressions contained statistically insignificant variables:

$$(5)\quad \Delta CC = \underset{(4.952)}{.001352(Y)} + \underset{(3.393)}{.0674(WDY)} - \underset{(-.8695)}{.01955(r_b)} - \underset{(-1.405)}{.0597(r_l)} - \underset{(-3.408)}{.0143(CC)_{-1}} + \underset{(5.603)}{.5084(\Delta CC)_{-1}}$$

$$R^2 = .8988 \qquad DW = 2.403 \qquad SE = .8814$$

$$(6)\quad \Delta CC = \underset{(2.757)}{.00091(Y)} + \underset{(3.827)}{.0450(CHY)} - \underset{(-1.456)}{.0284(r_b)} - \underset{(-.772)}{.00797(CC)_{-1}} + \underset{(7.382)}{.6142(\Delta CC)_{-1}}$$

$$R^2 = .9015 \qquad DW = 2.517 \qquad SE = .08693$$

The final substitution was to replace the other income change variables by the current-quarter change in income (ΔY). It is interesting to note that the final equation coefficients and results are only slightly affected whether one uses current or lagged income:

$$(7)\quad \Delta CC = \underset{(3.450)}{.000858(Y)} + \underset{(4.319)}{.000936(\Delta Y)} - \underset{(-1.501)}{.00258(r_b)} - \underset{(-6.303)}{.01183(CC)_{-1}} + \underset{(7.993)}{.6022(\Delta CC)_{-1}}$$

$$R^2 = .9048 \qquad DW = 2.567 \qquad SE = .08411$$

As expected, the other money supply component also appears to be interest-responsive. And, as anticipated, the current level of income is important, both as an absolute level and as a quarterly change. The Koyck lag structure was again chosen.

The demand for time deposits (ΔTD). The general movement in monetary theory and policy seems increasingly to be to include time deposits as another component of the money supply. The April 22, 1971, Federal Reserve Statistical Release, Number H.6 includes three money stock measures: (a) M_1-"narrowly defined" = DD + CC; (b) M_2=M_1 + bank savings and time deposits and smaller denomination CD's; and (c) M_3 = M_2 + deposits at mutual savings banks and savings and loan associations. The initial equation to specify the demand for time deposits was of the same type as that assumed for the other money supply factors. It involved income, the multiplicative form of the interest rates (to indicate asset substitutability), and the lagged stock variable following Teigen's specification. Because saving is generally thought to result out of previous period incomes, the income variable was lagged one period. Teigen used the lagged stock variable to represent the distributed lag of past effects. But this variable was found to have a higher degree of serial correlation with the residuals—a smaller Durbin-Watson d—than the lagged change in time deposits. Therefore, the latter measure was used:

$$(8)\quad \Delta TD = \underset{}{-10.2504} + \underset{(-4.949)}{.04065(Y)_{-1}} - \underset{(5.649)}{.2387(r_b \cdot Y)} + \underset{(-3.636)}{.06664(r_{td} \cdot Y)} - \underset{(1.072)}{.2965(r_l \cdot Y)} + \underset{(-3.009)}{.1663(\Delta TD)_{-1}} \quad (1.729)$$

$$R^2 = .77398 \qquad DW = 1.8212 \qquad SE = 1.1261$$

The inclusion of the stock variable and the quarterly change in

this variable, both lagged one period, made the time deposit yield statistically insignificant. The addition of various price change variables had little effect. And the eventual re-exclusion of $(TD)_{-1}$ resulted in only a slight improvement:

$$(9)\quad \Delta TD = \underset{(-5.152)}{-10.935} + \underset{(5.836)}{.04288(Y)_{-1}} + \underset{(1.327)}{.1962(CHP)_{-1}} - \underset{(-3.689)}{.2408(r_b \cdot Y)} + \underset{(.8593)}{.0538(r_{td} \cdot Y)} - \underset{(-3.235)}{.3237(r_1 \cdot Y)} + \underset{(1.809)}{.1733(\Delta TD)_{-1}}$$

$$R^2 = .7803 \qquad DW = 1.8802 \qquad SE = 1.1192$$

The addition, individually, of changes in the (other) components of the money supply and of changes in the level of loans also improved the results slightly. The change in coin and currency was not significant and, therefore, was dropped. The best of the tested equations in terms of the statistical tests applied to these individual equations, was:

$$(10)\quad \Delta TD = \underset{(-4.483)}{-10.0045} + \underset{(4.975)}{.0394(Y)_{-1}} - \underset{(-2.933)}{.2361(r_b \cdot Y)} + \underset{(0.7717)}{.0559(r_{td} \cdot Y)} - \underset{(-2.6461)}{.2888(r_1 \cdot Y)} + \underset{(0.5181)}{.1176(\Delta DD)} + \underset{(1.1380)}{.1281(\Delta L)} + \underset{(1.4215)}{.1393(\Delta TD)_{-1}}$$

$$R^2 = .7825 \qquad DW = 1.7515 \qquad SE = 1.1228$$

The statistical insignificance of the time deposit rate and of demand deposits are surprising; both should be expected to be quite highly related to this demand. The inclusion, once more, of $(TD)_{-1}$ corrected this and improved the equation:

$$(11)\quad \Delta TD = \underset{(-4.917)}{-12.5629} + \underset{(4.964)}{.05427(Y)_{-1}} + \underset{(1.164)}{.2756(\Delta DD)} + \underset{(1.416)}{.1574(\Delta L)} - \underset{(-3.071)}{.2419(r_b \cdot Y)} + \underset{(1.838)}{.1692(r_{td} \cdot Y)} - \underset{(-2.785)}{.2976(r_1 \cdot Y)} - \underset{(-1.926)}{.0848(TD)_{-1}} + \underset{(2.134)}{.226(\Delta TD)_{-1}}$$

$$R^2 = .7954 \qquad DW = 1.8186 \qquad SE = 1.0983$$

The results of the regression estimates of the demand for time deposits are interesting. Eliminating for the moment the ΔDD and ΔL, the theory in this equation is quite similar to that for the (other) components of the money supply—function of income, interest rates, and the lagged endogenous variable. The addition of changes in demand deposits reflects a rather obvious a priori interrelationship between the movements of the two variables. Income and economic growth lead to growth in both of these, although not necessarily at the same rate. In addition, there occasionally has been "cyclic-like" substituting between demand and time deposits. Growth in loans is a virtual concomitant of income and economic growth; but its relation to the growth of time deposits is much less certain. Again, the interest-responsiveness is evident though not necessarily indicative of either interest-elasticity or inelasticity. The positive relationship with the yield on time deposits is generally expected.

The demand for free reserves (ΔFR). Net free reserves (or net borrowed reserves) is the arithmetic difference between the levels of excess reserves (ER) and borrowings of member banks from the Federal Reserve (MBB). Total reserves (TR) is made up of unborrowed (UBR) plus borrowed (MBB) reserves. This is equivalent to excess reserves plus the level of required reserves (RR) of member banks:

$$TR = UBR + MBB = ER + RR.$$

And net free (borrowed) reserves—hereafter referred to as free reserves (FR)—is:

$$FR = ER - MBB.$$

Because all member banks are subject to required reserve ratios (RRR) against their deposits, it might at first be natural to expect a

negative relationship between demand or time deposits and free reserves. A change in these required reserve ratios (ΔRD and ΔRT) is definitely expected to be negatively correlated with free reserves because an increase in this rate would increase RR. This would, therefore, lower ER. But since 1960, vault cash has been counted as a source of reserves. This has meant that an addition to vault cash from a deposit of coin and currency will increase either, or both, demand or time deposits as well as FR. This would indicate a positive relation between these deposits and FR as long as the RRR remains fractional ($0 < RRR < 1$). However, as a result of our increasing "checkless" society, the shift of demand deposits, and time deposits to some extent, has made it impossible to know a priori what type of relationship (direct or inverse) to expect between these deposits and free reserves. Whether there would be a net increase or decrease in free reserves as a result of a shift in deposits of the same kind between two banks depends on the current "free" reserve position of the two banks involved. Disintermediation, of course, would free some reserves which were previously subject to the higher RRR on demand deposits ($RRR_{DD} > RRR_{TD}$).

The free reserve situation with respect to interest rates is much more certain. Meigs (1962) and others have amply demonstrated a meaningful relation between them. Since excess reserves are non-interest bearing, an increase in the yield on Treasury bills should cause a reduction in ER's through investment. On the other hand, there is a general reluctance to sell these highly-liquid interest-bearing substitutes for reserves in the bank's portfolio when the rates are high. Therefore, banks often tend to borrow from the Fed rather than sell these bills to

meet short-term reserve requirements. Because the discount rate is the cost of borrowing reserves from the "Fed," one would expect borrowing to be negatively related with this rate. Thus, we might expect a priori, that free reserves would be positively correlated with the discount rate and negatively so with the bill rate. Loans are also related to these rates. As the discount rate increases, the willingness of banks to commit some excess reserves as loans decreases. However, as the interest rate structure increases, it becomes more monetarily profitable for banks to hold loans. Thus, it is apparent that a change in loans should be negatively related to changes in free reserves.

The other major factor which one would expect to influence the level of FR's is the level of open market operations of the Federal Reserve. As has been mentioned, free reserves have served as one of the primary Federal Reserve measures of the stabilizing effects of its open market operations (OMO). Since the process of OMO provides reserves to member banks, it has a direct effect on the level and on changes in FR's. But the direction of causation of a change between the two is difficult to determine. So, also, is the appropriate sign of the regression coefficient to expect in regressing free reserves on OMO. The determining factor appears to be what type of reserve policy the Federal Reserve is attempting to implement. If they are trying to achieve a "tighter monetary position," they will effect a net contraction of reserves whether there exists a net free or a net borrowed reserve position. And vice versa for an "easy money position."

In the regression, the change in the required reserve ratio on demand deposits (ΔRD) was continually statistically insignificant. The decision to keep or exclude the variable ΔCC appeared fairly trivial.

Both were dropped. With the exception of these two, however, free reserves was established as a function of:

$$(12)\quad \Delta FR = \underset{}{.1183} - \underset{(2.069)}{.04305}(\Delta DD) + \underset{(-2.363)}{.01638}(\Delta TF) - \underset{(1.947)}{.03641}(\Delta L) + \underset{(-3.396)}{.1459}(OMO) + \underset{(4.722)}{.1375}(r_d) - \underset{(2.811)}{.1721}(r_b) - \underset{(-4.397)}{.3122}(\Delta RT) - \underset{(-3.847)}{.3509}(FR)_{-1} + \underset{(-7.555)}{.2997}(\Delta FR)_{-1} \quad (3.758)$$

$$R^2 = .7763 \qquad DW = 2.0902 \qquad SE = .0974$$

The demand for commercial bank loans (ΔL). The change in the demand for bank loans and the levels of the various interest rates (short- and long-term and the discount rate) provide the primary linkages between the real and the monetary sectors of this model. As such, therefore, it is not too surprising that changes in the level of the demand for loans are, at least partially, a function of the levels or changes in the levels of several of the real sector variables. It is well-established that the magnitude of the supply of loans serves to determine a large part of the demand for durable goods. Without such financing, many individuals and firms would not be able to make such sizable purchases. Thus, one should expect the level of durable goods consumption to be a factor in determining the amount of loan demand for a particular period. So should changes in inventory levels since many firms require sizable amounts of money to finance their purchases and holdings of inventory goods, finished or not, until they can be processed and/or sold. But the direction of the relation between business inventory changes and changes in loans is slightly uncertain. It depends to some extent on whether inventory purchases and accumulations are paid for out of business funds, loans from banks, or

other types of loans—including sales of securities or credit extensions.

The positive relation of changes in loans to increases in income is well established. And with changes in income go changes in demand deposits. Why changes in demand deposits should affect changes in the demand for loans, however, is less obvious; one would expect the line of causation to flow the other way. Perhaps it does and this is covered-up by the aggregation of terms at quarterly intervals rather than monthly or weekly (or less).

As discussed in connection with the free reserves equation, the supply of loans is inversely related to the discount rate. But it is known that, for at least some range, an increase in interest rates generally results in an increased demand for loans. Whether this is due to an expectation of still higher rates or one or a combination of other factors, it still holds fairly applicable. Unfortunately, the Treasury bill rate (used as a proxy for credit conditions—rationing) was not statistically significant. It is doubtful that the discount rate could fulfill this role. Therefore, one must explain the relationship of the discount rate to the demand for loans along the expectations line:

$$(13)\quad \Delta L = \underset{(-3.874)}{-9.388} + \underset{(2.346)}{.0317(Y)_{-1}} + \underset{(3.319)}{.2151(C^d)} + \underset{(2.878)}{.4759(\Delta DD)} + \underset{(0.3485)}{.1153(r_d)} + \underset{(0.923)}{.02889(\Delta I^i)} - \underset{(-3.848)}{.1408(L)_{-1}} + \underset{(3.829)}{.3993(\Delta L)_{-1}}$$

$$R^2 = .8511 \qquad DW = 2.326 \qquad SE = .9003$$

The statistical insignificance of the discount rate term was surprising; it was retained, however, and later proved to be the only significant interest rate. The positive relation with ΔI^i was also unexpected. The previous level of inventory investment was substituted for

ΔI^i with favorable results:

$$(14)\quad \Delta L = \underset{(-2.673)}{-6.269} + \underset{(3.130)}{.03868(Y)_{-1}} + \underset{(4.225)}{.2413(C^d)} - \underset{(-3.798)}{.1967(I^i)_{-1}} + \underset{(1.389)}{.4273(r_d)} + \underset{(3.322)}{.4954(\Delta DD)} - \underset{(-3.595)}{.1205(L)_{-1}} + \underset{(2.114)}{.2231(\Delta L)}$$

$$R^2 = .8783 \qquad DW = 2.2926 \qquad SE = .81408$$

The attempt to add a price change variable improved the regression results but the coefficient continually proved statistically insignificant. When both the ΔI^i and I^i_{-1} variables were used, the results were, again, improved:

$$(15)\quad \Delta L = \underset{(-2.235)}{-5.313} + \underset{(3.229)}{.03931(Y)_{-1}} + \underset{(4.610)}{.2743(C^d)} - \underset{(-1.697)}{.06002(\Delta I^i)} - \underset{(-4.084)}{.2643(I^i)_{-1}} + \underset{(1.828)}{.5764(r_d)} + \underset{(3.240)}{.4771(\Delta DD)} - \underset{(-3.458)}{.1147(L)_{-1}} + \underset{(1.930)}{.2020(\Delta L)_{-1}}$$

$$R^2 = .8839 \qquad DW = 2.2554 \qquad SE = .80163$$

The use of current income yielded poorer results. This led to the conclusion that the demand for loans is more closely related to a movement in income from the past than with the present income level.

Open market operations (OMO). In an attempt to explain the movements of the Federal Reserve's "dynamic" policy activities, it is appropriate to relate these to movements in the policy targets and ultimate objectives as well as to changes in the indicators. The primary policy objectives are full employment, price stability, a balance of international payments, and an adequate and sustainable rate of economic growth—though not necessarily in that order. The targets adopted by the Federal

Reserve to represent these ideal levels are traditionally thought to include the rate of unemployment, the rate of change in income and prices, and the magnitude of the change in international liquidity—as measured by the difference between net exports and imports. The primary indicators adopted by the Federal Reserve throughout this period have been free reserves and the level of certain interest rates.

Teigen defined two additional variables for price changes and one for changes in income. The rate of change in income and the ratio of a quarterly price change to a normal ("permanent") price level were used to recognize the effects of short-run changes in these two variables:

$$CHY = \left(\frac{\Delta Y}{Y_{-1}}\right) \qquad \text{and} \quad PCH = \left(\frac{\Delta P}{\bar{P}}\right).$$

For longer-term changes in income he used the proxy for the expected annual rate of change in income (WDY). For prices, he adopted a ratio variable using, instead of a quarterly change in prices, the annual change in prices:

$$CHP = \left(\frac{P - P_{-4}}{\bar{P}}\right).$$

He used the rate of unemployment (U) and its reciprocal $\left(\frac{1}{U}\right)$ as measures of the level of employment. As a proxy for the balance of payments problem (B-P), he used the Treasury bill rate as an indicator of the cost of international liquidity. This was multiplied by a dummy variable which assumed the value of zero (0) from 1953 through 1960, and unity (1) for the years 1961-1964 when the U.S. experienced large balance of payments problems. Thus, a fall in this short-term rate would result in a tightening of monetary policy (ceteris paribus).

The long-term interest rate (r_1) was used to represent the growth target. Since the Federal Reserve often used OMO to "cushion" the impact

of changes in the RRR's, he also included the change in the RRR against time deposits. The demand deposit multiplier was used to recognize the changes in open market operations which are taken to offset a change in the velocity of money (Δk).

As an initial attempt to derive a meaningful relation to explain the movements in OMO, the current level and rate of change in income, the short-term rate of change in prices, the long-term growth rate, the balance of payments proxy and the two variables representing the Federal Reserve's "cushioning" activities were employed:

$$\begin{aligned}(16)\quad OMO = {} & .004895 + .00001289(Y) - .02227(CHY) + .1784(PCH) \\ & \quad (1.091) \quad (0.6941) \quad\quad (-0.4033) \quad\quad (1.538) \\ & - .002477(r_1) + .09047(B-P) + .003939(\Delta RT) \\ & \quad (-1.121) \quad\quad (0.965) \quad\quad (1.115) \\ & - .02175(\Delta k) + .3209(OMO)_{-1} \\ & \quad (-4.533) \quad\quad (3.967)\end{aligned}$$

$$R^2 = .7273 \qquad DW = 2.1796 \qquad SE = .004699$$

Surprisingly, both income variables are statistically insignificant; the rate of income change even has as incorrect sign. Some question may be raised concerning Teigen's assumption that the Federal Reserve closely follows the money multiplier, except to the extent that it is significant in affecting the level or rate of change in the money supply. If we choose to eliminate this variable, substitute WDY for Y, and replace the balance of payments proxy with a full complement of interest rate terms, the regression yields:

$$\begin{aligned}(17)\quad OMO = {} & -.003716 - .1260(CHY) + .3578(WDY) + .4159(PCH) \\ & \quad (-1.499) \quad (-1.418) \quad\quad (2.727) \quad\quad (3.689) \\ & - .0007105(r_b \cdot Y) + .0004355(r_{td} \cdot Y) + .000398(r_1 \cdot Y) \\ & \quad (-3.309) \quad\quad (2.309) \quad\quad (1.356)\end{aligned}$$

$$+ .01089(\Delta RT) + .2248(OMO)_{-1}$$
$$(3.476) \qquad (2.646)$$

$R^2 = .7032$ DW = 2.113 SE = .004782

The results were not as good as before and, again, the rate of change in income—and also the ΔY if it was substituted for CHY—is negative, contrary to expectations. It continually had this sign.

For this reason, this income change variable was eliminated in favor of keeping only the expectations variable. Adding the indicator (ΔFR), a term to relate the long- and short-term interest rates—the term structure, TRM—and the level of member bank borrowings, we significantly improved the results, but at the expense of the price change variable:

$$(18)\quad OMO = \underset{(2.192)}{.1963(WDY)} + \underset{(0.2820)}{.03888(PCH)} - \underset{(-3.891)}{.001996(r_b \cdot Y)} + \underset{(2.447)}{.0004102(r_{td} \cdot Y)}$$
$$+ \underset{(3.892)}{.001905(r_l \cdot Y)} - \underset{(-4.219)}{.00992(TRM)} + \underset{(4.425)}{.01218(\Delta FR)}$$
$$- \underset{(-1.443)}{.003128(MBB)} + \underset{(1.218)}{.01018(\Delta RT)} - \underset{(-1.084)}{.1129(OMO)_{-1}}$$

$R^2 = .7975$ DW = 1.873 SE = .003516

The relationship between the change in free reserves and the operations in the open market are not completely determinant. As was discussed earlier, it would depend on the type of monetary policy being effected. The insignificance of the price variable coefficient was not expected; the annual price change variables (CHP) and $(CHP)_{-1}$ were both tried but with similar results. This led to the eventual elimination of the price change variable.

The negative coefficient for member bank borrowings can be explained fairly easily. In terms of total reserves as discussed in the

FR equation:

$$TR = UBR + MBB = RR + ER$$

$$UBR = RR + ER - MBB.$$

But, since MBB is one of the determinants of free reserves, it was dropped to avoid possible double counting. The other interesting result to appear out of this regression was the relation of the signs of the interest rates and the term structure variable.

Given the existence of increasing interest rates:

as TRM ↑ ($\Delta r_l > \Delta r_b$), OMO ↓

as TRM ↓ ($\Delta r_l < \Delta r_b$), OMO ↑

Given the existence of declining interest rates:

as TRM ↑ ($\Delta r_l < \Delta r_b$), OMO ↓

as TRM ↓ ($\Delta r_l > \Delta r_b$), OMO ↑

The conclusion from this is that the Federal Reserve has often practiced a reverse form of "operation twist"—acted to maintain the long-term rate at some (usually indeterminant) level above the short-term rate. An obvious exception was the early 1960's when "operation twist" was the avowed policy position.

The inclusion of the employment proxy (U) or its reciprocal proved relatively unsuccessful. It was continually either statistically insignificant or had an unexpected (negative) sign. Therefore, the final equation for OMO was:

$$\begin{aligned}(19)\quad OMO = {} & \underset{(2.144)}{.1436(WDY)} + \underset{(4.987)}{.01279(\Delta FR)} - \underset{(-4.907)}{.01024(TRM)} - \underset{(-5.607)}{.002262(r_b \cdot Y)} \\ & + \underset{(2.719)}{.0003786(r_{td} \cdot Y)} + \underset{(4.707)}{.002022(r_l \cdot Y)} + \underset{(3.0005)}{.1616(B\text{-}P)} \\ & + \underset{(4.248)}{.0103\ (\Delta RT)} - \underset{(-1.819)}{.1831(OMO)_{-1}}\end{aligned}$$

$R^2 = .8191$ DW = 1.945 SE = .003314

The conclusion from this equation is that the Federal Reserve reacts primarily to movements in the income change and balance of payments targets, and gives less weight to price changes and unemployment. The emphasis given to Teigen's assumed growth target is a moot point because its proxy was subsumed by $(r_1 \cdot Y)$.

The discount rate (r_d). This rate represents the cost to a bank of obtaining necessary reserves by borrowing (discounting) from the Federal Reserve. As may be expected, it is quite closely related to the level of market interest rates although it often moves with a perceptible lag behind these interest rate movements. There are basically three important justifications for the (infrequent) changes in this rate: (1) as an effort to control the amount of MBB; (2) to reflect a changing policy position or to give the psychological appearance of this change; and (3) to bring this rate more in line with other important interest rates, especially the Treasury bill rate.

One should also expect the discount rate to be positively related to changes in the level of income and loans. In both cases, these can put additional pressure on banks which are already in need of more reserves—currently in a net borrowed position. Therefore, it would be negatively related to changes in free reserves. An increase in member bank borrowings, which might bring on a rate increase, is also reducing the level of free reserves. If the level, as well as change in the level, of income are both important:

$$(20)\quad r_d = \underset{(-1.146)}{-.4420} + \underset{(1.829)}{.003774(Y)_{-1}} + \underset{(1.905)}{.007857(\Delta Y)} + \underset{(7.246)}{.3041(r_b)} + \underset{(1.953)}{.01143(L)_{-1}}$$

$$- .2612(\Delta FR)_{-1} + .6472(r_d)_{-1}$$
$$(-2.144) \qquad (11.441)$$

$R^2 = .98675$ DW - 1.4326 SE = .13927

One might also include the annual rate of price change (in this case lagged one period):

$$(21)\quad r_d = -.3747 + .003143(Y)_{-1} + .00613\underline{4}(\Delta Y) - .04978(CHP)_{-1}$$
$$(-1.026) \quad (1.602) \qquad (1.556) \qquad (-2.882)$$
$$+ .3287(r_b) + .00948(L)_{-1} - .2149(\Delta FR)_{-1}$$
$$(8.103) \qquad (1.701) \qquad (-1.850)$$
$$+ .6646(r_d)_{-1}$$
$$(12.35)$$

$R^2 = .98836$ DW = 1.5779 SE = .13161

Interestingly, the sign of the price change coefficient, whether one uses an annual or a quarterly rate, indicates an inverse relationship between these changes and discount rate movements. Although this seems initially to be incorrect, it might be plausible to the extent that discount rate increases will limit the increases in loans which would serve to create additional demand pressures on a limited supply of goods. Since the amount of available goods is relatively fixed over the short-run, an increase in demand through increases in loans or whatever can only be reflected immediately by increases in prices. The level of goods and services produced generally cannot increase substantially until some later period. To the extent that an increase in the discount rate can limit the granting of loans, it might serve to hold down price changes. It is more likely, however, that these should move in approximately the same direction. Increasing prices justify a rising interest rate level.

With the exception of this, however, the other regression results

are generally expected. One could drop the lagged income level. This would make quarterly changes the sole income variable. If one also substituted a lagged change in loans for the lagged absolute level of L:

$$(22)\quad r_d = \underset{}{.01633} + \underset{(2.656)}{.005314(\Delta Y)} - \underset{(1.636)}{.07007(CHP)_{-1}} + \underset{(-3.747)}{.3423(r_b)} + \underset{(8.425)}{.02915(\Delta L)_{-1}} - \underset{(2.019)}{.3113(\Delta FR)_{-1}} + \underset{(-2.838)}{.6806(r_d)_{-1}} \underset{(14.68)}{}$$

$$R^2 = .9885 \qquad DW = 1.4452 \qquad SE = .1296$$

Eliminating the income variable and adding, instead, the other major interest rate variable, results in:

$$(23)\quad r_d = \underset{(-4.178)}{-.0749(CHP)_{-1}} + \underset{(8.023)}{.3242(r_b)} + \underset{(3.147)}{.09095(r_l)} + \underset{(1.872)}{.02554(\Delta L)_{-1}} - \underset{(-3.032)}{.3320(\Delta FR)_{-1}} + \underset{(13.43)}{.6517(r_d)_{-1}}$$

$$R^2 = .9882 \qquad DW = 1.4016 \qquad SE = .13012$$

"Real" Sector

The real sector of this model contains five behavioral equations and an identity. It also includes a quite crude attempt to explain changes in price level along the lines of that done by Teigen with his simplified version of the "Phillips curve." The equations in this sector represent the major classifications of consumption and investment: (1) consumption of nondurable goods and services—C^{nd}; (2) consumption of durable goods—C^{d}; (3) fixed investment in residential structures—I^{r}; (4) fixed investment in nonresidential structures—I^{nr}; and (5) quarterly change in nonfarm business inventories—ΔI^{i}. The income identity is the sum of these five endogenous variables plus another variable, exogenous expenditures—E^{e}. The latter variable includes "all other" factors. Income, then, is:

$$(24)\quad Y = C^{nd} + C^{d} + I^{r} + I^{nr} + \Delta I^{i} + E^{e}.$$

A more complete elaboration of this sector would require further breaking down these highly aggregated components into more realistic levels (e.g., consumption of automobiles, food, housing, furnishings, clothing, services, transportation, etc.). The first step would obviously be to establish the consumption of services as a separate area. And one should remove the governmental sector from the exogenous expenditures classification. Its vast development over this period of years should be accounted for separately. The removal of the net foreign export-import position from the exogenous category would also be justified.

Consumption of nondurable goods and services (C^{nd}). Teigen suggested that "consumption [of both types] is usually related to disposable income, among other variables." Because it was not available in a seasonally-unadjusted form, however, he did not use it. Instead, he made both types of consumption a function of current income, the current-quarter change in income, and the current-quarter rate of change in prices. Also included were a one period lag of the endogenous variable and seasonal-adjustment dummys. Since the present model deals with seasonally-adjusted data, disposable income was substituted for either (and both) of the income variables. The results suggested that the current level and change in the level of income yield much better results.

Loans play a large part in determining the levels of both types of consumption, especially consumption of durable goods. Because consumption of non-durables and services are thought to be mainly out of current income, both the current level and current change in loans were tried—the former yielding generally better results. The change in the

rate of worker productivity was also included in the initial regression attempts. If improved productivity increased the available supply of consumption goods and was reflected in the worker's wages and salaries, it would have a beneficial effect on the distribution of income. It would also increase the purchases of necessities, a major component of total nondurable consumption expenditures:

$$(25)\quad C^{nd} = \underset{(-2.246)}{-22.917} + \underset{(2.430)}{.07615(Y)} + \underset{(2.592)}{38.027(\Delta Prod)} + \underset{(1.255)}{.08079(L)} + \underset{(12.954)}{.7734(C^{nd})_{-1}}$$

$$R^2 = .9997 \qquad DW = 2.2226 \qquad SE = 1.5458$$

With the addition of the quarterly change in income for the current period, this function becomes:

$$(26)\quad C^{nd} = \underset{(-1.787)}{-20.843} + \underset{(1.738)}{.0676(Y)} + \underset{(0.3757)}{.0183(\Delta Y)} + \underset{(2.242)}{35.76(\Delta Prod)} + \underset{(1.301)}{.0878(L)} + \underset{(11.188)}{.7871(C^{nd})_{-1}}$$

$$R^2 = .9997 \qquad DW = 2.2728 \qquad SE = 1.5565$$

The income change coefficient was unexpectedly insignificant. It was retained, however, in hopes of correcting this. To this equation was added a price change variable; this was to reflect the effect that expectations of future price increases have on consumption in the current period. Both current and lagged (one period) price changes were tried—the latter provided better results although it was statistically insignificant:

$$(27)\quad C^{nd} = \underset{(-1.913)}{-25.669} + \underset{(1.829)}{.07243(Y)} + \underset{(0.4319)}{.02120(\Delta Y)} + \underset{(0.7368)}{.1657(CHP)_{-1}} + \underset{(2.274)}{43.436(\Delta Prod)} + \underset{(1.394)}{.09551(L)} + \underset{(9.689)}{.7616(C^{nd})_{-1}}$$

$$R^2 = .9997 \qquad DW = 2.2316 \qquad SE = 1.5621$$

Elimination of the income change variable improved the DW and the SE of this equation without reducing the R^2. The price change variable, though, was still insignificant:

$$(28)\quad C^{nd} = \underset{(-2.250)}{-27.8289} + \underset{(2.252)}{.08204(Y)} + \underset{(0.7092)}{.1579(CHP)_{-1}} + \underset{(2.502)}{45.679(\Delta Prod)} + \underset{(1.335)}{.08711(L)} + \underset{(10.597)}{.7470(C^{nd})_{-1}}$$

$$R^2 = .9997 \qquad DW = 2.1746 \qquad SE = 1.5518$$

And, if the level of bank loans is replaced by the current period change in these loans, still more improvement is noted:

$$(29)\quad C^{nd} = \underset{(-1.815)}{-22.8899} + \underset{(2.924)}{.0861(Y)} + \underset{(1.022)}{.2369(CHP)_{-1}} + \underset{(1.816)}{31.647(\Delta Prod)} + \underset{(1.594)}{.2774(\Delta L)} + \underset{(11.025)}{.8096(C^{nd})_{-1}}$$

$$R^2 = .99971 \qquad DW = 2.3034 \qquad SE = 1.5429$$

Consumption of durable goods (C^d). Starting again from Teigen's equation specifications for C^d—current level and change in the level of income, current annual rate of change in prices, and lagged C^d—a variable describing the rate of capacity utilization in the manufacturing industries was included. The lagged form performed better than the current one. This variable takes into account the increased capital stock and accelerated use of productive facilities which previously were measured only by part of an increase in income.

Surprisingly, Teigen did not include a loan variable in his demand for durable goods equation. Since a large percentage of durable goods purchases are financed this way, it became obvious that some loan variable was necessary. With the addition of current changes in the

level of bank loans, the regression became:

$$(30)\quad C^d = \underset{(-3.354)}{-11.946} + \underset{(5.327)}{.05138(Y)} + \underset{(3.856)}{.1319(\Delta Y)} + \underset{(0.5796)}{.09272(CHP)} + \underset{(3.462)}{.4912(\Delta L)} + \underset{(3.457)}{.1436(CAP)_{-1}} + \underset{(3.535)}{.3844(C^d)_{-1}}$$

$$R^2 = .99581 \qquad DW = 2.1274 \qquad SE = 1.1802$$

The attempt to introduce other price change variables as well as a variable which would account for changes in worker productivity were not successful. The coefficients of both became either statistically insignificant or maintained negative signs throughout the regressions. Nor was the addition of one of the employment proxy variables (U or $\frac{1}{U}$) successful. Dropping the price change variable made only a slight difference in the results:

$$(31)\quad C^d = \underset{(-3.404)}{-12.0453} + \underset{(5.325)}{.05067(Y)} + \underset{(3.839)}{.1301(\Delta Y)} + \underset{(3.448)}{.1422(CAP)_{-1}} + \underset{(3.594)}{.4548(\Delta L)} + \underset{(3.885)}{.4025(C^d)_{-1}}$$

$$R^2 = .9958 \qquad DW = 2.1331 \qquad SE = 1.1739$$

Residential fixed investment (I^r). Teigen described his elaborate housing equation in terms of the rate of household formation, income and change in income, stock of vacancies, a rent ratio, downpayment requirements, credit terms, and mortgage rates. However, the relative infrequency with which some of this data is available and the questionable accuracy of much of it when it is available, led to the search for a new specification. There is a substantial lag between collection and publication for all of this data except credit terms, mortgage rates and income. The new specification sought would be in variables which were more familiar

and more frequently available.

Since housing starts generally occur in anticipation of the actual sale, they can be assumed to depend on expected sales. These sales might be simulated by current period income and the rate of change in income expected in the next quarter (WDY). Starts would also reflect the level of market interest rates and the level of loans outstanding. One would prefer to use the long-term interest rate because of its relevance to the borrower's demand; the short-term rate, however, might be acceptable. If we use the government bond rate—as Teigen does—as a proxy for the ceiling rate on FHA and VA mortgages and use this in combination with the discount rate to reflect credit conditions and terms, a plausable case can be made for specifying this equation as:

$$(32)\quad I^r = \underset{(-1.265)}{-3.4607} + \underset{(1.564)}{.02659(Y)} + \underset{(1.698)}{.3650(WDY)} - \underset{(-3.799)}{1.3157(r_d)} + \underset{(1.678)}{.9360(r_l)} + \underset{(1.349)}{.06017(L)} + \underset{(14.004)}{.8694(I^r)_{-1}}$$

$$R^2 = .9487 \qquad DW = 1.3734 \qquad SE = .92007$$

Although the sign of the discount rate coefficient is unexpected, it is not unreasonable in terms of the proxy role it is to play (credit-rationing). A one-period lag of loans had no effect. But the replacement of current income by the change in current income led to some interesting results:

$$(33)\quad I^r = \underset{(0.619)}{.7123} + \underset{(1.752)}{.05871(\Delta Y)} + \underset{(0.594)}{.1616(WDY)} - \underset{(-4.113)}{1.3821(r_d)} + \underset{(3.133)}{1.4117(r_l)} + \underset{(0.9025)}{.005568(L)} + \underset{(14.171)}{.8749(I^r)_{-1}}$$

$$R^2 = .94924 \qquad DW = 1.3932 \qquad SE = .9156$$

The expected rate of income change becomes statistically

insignificant and the influence of the current level of loans becomes questionable. If we use the current change in loans, the regression becomes:

$$(34)\quad I^r = \underset{}{2.9091} + \underset{(2.501)}{.06648(\Delta Y)} + \underset{(2.318)}{.16145(WDY)} - \underset{(-0.629)}{1.5212(r_d)} + \underset{(-5.235)}{1.8038(r_l)} + \underset{(4.983)}{.3969(\Delta L)} + \underset{(3.890)}{.7348(I^r)_{-1}} \quad (11.08)$$

$$R^2 = .95878 \qquad DW = 1.5197 \qquad SE = .82505$$

Eventually it was recognized that residential financing involves a sizable portion of a person's income and/or wealth. And, if he borrows, he faces a lengthy pay-back period. Therefore, it was decided to replace WDY with permanent income (Y_p). Various combinations of (Y_p), r_l, and loans were tried. The final form was:

$$(35)\quad I^r = \underset{}{-22.4553} + \underset{(3.312)}{.07199(\Delta Y)} + \underset{(4.681)}{.09509(Y_p)_{-1}} - \underset{(-3.341)}{.8991(r_d)} + \underset{(4.041)}{.1781(r_l \cdot Y)} + \underset{(4.769)}{.1588(L)_{-1}} + \underset{(16.640)}{.8563(I^r)_{-1}} \quad (-3.959)$$

$$R^2 = .9605 \qquad DW = 1.64899 \qquad SE = .80728$$

This meant that in making an investment in housing, the individual takes into account his last-periods permanent income, the current change in income, the ceiling interest rate, and credit terms. I^r is a function also of the level of loans in the previous period and of the lagged I^r.

Nonresidential fixed investment (I^{nr}). Teigen based his nonresidential investment function on the capital stock multiplier principle. Investment depends on the level of investment in the previous period, the size of the capital stock at the beginning of the period, and the expected output of the period. The interest rate enters in the multiplicative form to introduce the adjustment to the capital/output ratio.

In addition to eliminating the seasonal-adjustment dummys which are not needed, the only change from his specification was to lag income one quarter, thus relating investment and income in the same period:

$$(36)\quad I^{nr} = \underset{(-3.441)}{-10.73} + \underset{(1.411)}{.01044(Y)_{-1}} + \underset{(5.121)}{.1216(\Delta Y)} + \underset{(4.459)}{.1416(CAP)_{-1}} + \underset{(2.511)}{.2432(\Delta L)} + \underset{(1.863)}{.08636(r_1 \cdot Y)} + \underset{(14.551)}{.8117(I^{nr})_{-1}}$$

$$R^2 = .99815 \qquad DW = 1.9546 \qquad SE = .88961$$

It seemed, however, better to use the long-term interest rate to represent the cost of capital to the borrower. This would reflect the fact that a large portion of the funds borrowed for long-term capital investment are secured through the issuance of bonds or some type of stocks:

$$(37)\quad I^{nr} = \underset{(-4.702)}{-14.1735} + \underset{(1.434)}{.01018(Y)_{-1}} + \underset{(5.373)}{.1264(\Delta Y)} + \underset{(4.867)}{.1542(CAP)_{-1}} + \underset{(2.618)}{.2509(\Delta L)} + \underset{(2.261)}{.91468(r_1)} + \underset{(14.915)}{.8273(I^{nr})_{-1}}$$

$$R^2 = .99820 \qquad DW = 2.009 \qquad SE = .8785$$

Inventory investment (ΔI^i). Teigen again used the accelerator approach in the equation to explain changes in the investment in nonfarm business inventories. He assumes this investment to be dependent on the level and change in the level of current demand, the level and change of past inventories, changes in bank loans and unfilled orders, and the product of the short-term interest rate times the level of demand (Y). Although the change in unfilled orders did prove significant, the level of demand for consumer durables proved to be a better explanatory variable. Inventory investment is geared to expected sales and the past performance of sales in various areas. Since the inventory stock of durable goods often

constitutes an expensive and important portion of the items produced during a period, production of these goods could be geared to the level of sales or consumption—including depreciation—of these items during the immediate past period. The short-term interest rate is included to represent both the cost of financing the purchases of inventory goods and the cost of holding finished but unsold items:

$$(38)\quad \Delta I^{i} = \underset{(4.285)}{12.5359} + \underset{(1.065)}{.01927(Y)} + \underset{(5.973)}{.4098(\Delta Y)} + \underset{(2.062)}{.3268(C^{d})_{-1}} - \underset{(-2.925)}{.7222(\Delta L)} + \underset{(2.434)}{.1733(r_{b}\cdot Y)} - \underset{(-4.491)}{.7319(I^{i})_{-1}} + \underset{(5.698)}{.45095(\Delta I^{i})_{-1}}$$

$$R^{2} = .85248 \qquad DW = 2.3513 \qquad SE = 2.0307$$

Lagging income one period has no significant effect on the results. An unusual facit of this equation is that the change in loans has a negative coefficient and the short-term interest rate has a positive one. This is contrary to normal expectations. It can be interpreted in at least two ways. It can first be assumed that these are simply the reverse of the a priori expected signs—this would cast doubt on the specification of this equation. The other interpretation, however, might be that the rising cost of holding large inventories and the reduced availability of loans as interest rates—especially the discount rate—rise had made industry economize on its investment in inventory. This would leave the producers of these items with increases in their stocks of finished goods not yet sold.

Further experimenting with this equation did not cause these signs to change although it did result in the eventual elimination of the current level of income. This substantially improved the size of the standard error of the regression and caused slight improvement in

the other estimation measures:

$$(39)\quad \Delta I^{i} = \underset{(5.202)}{8.4992} + \underset{(8.494)}{.4431(\Delta Y)} + \underset{(4.060)}{.4646(C^{d})_{-1}} - \underset{(-3.032)}{.7145(\Delta L)} + \underset{(3.325)}{1.5073(r_{b})} - \underset{(-5.567)}{.6213(I^{i})_{-1}} + \underset{(5.244)}{.4039(\Delta I^{i})_{-1}}$$

$$R^{2} = .86274 \qquad DW = 2.3117 \qquad SE = 1.9427$$

Thus, it appears that changes in current income result in a better estimate of the predicted change in the demand for inventory items than does the combination of the current level and the current change in the level of income.

The rate of change in prices (CHP). As previously indicated, the equation estimating the rate of change in prices is the crudest and least satisfactory of the equations in the model. Not one completely satisfactory regression was found. Either one or more of the important variables proved to be statistically insignificant or they had signs which did not agree with *a priori* expectations. If both of these were acceptable, there appeared to be too much autocorrelation; the Durbin-Watson *d* statistic was too low—at or below 1.4. In this case, also, the standard error of the regression tended to be higher than that of other equations.

Teigen introduced another variable for income change in his price equation—a one-period lagged form of WDY—(WTY) which was to serve as a proxy for wage and profit changes. A factor which Teigen did not consider, but which might have a significant impact on price change, was the change in worker productivity. An increase in this productivity would serve to initially lessen demand pressures because of increased output. Until wages reflected this change, its occurrence could tend to have a retarding effect on price advances. Also Teigen

did not consider the discount rate. As a cost (price) factor for borrowing reserves, this rate has a significant impact on the prevailing price of loans and, conceivably, on other prices as well. Using these, together with current income, the long-term interest rate, and lagged price changes, the initial specification was:

$$\begin{array}{lll} (40)\ CHP = .02865 + .0000118(Y) + .02592(WTY) - .03508(\Delta Prod) \\ \qquad\qquad (1.534)\ \ (0.8509)\qquad (0.2861)\qquad (-1.483) \\ \qquad\qquad +.005774(r_d) - .003437(r_l) + .8808(CHP)_{-1} \\ \qquad\qquad\ \ (4.091)\qquad (-1.754)\qquad (16.019) \end{array}$$

$$R^2 = .95087 \qquad DW = 1.6378 \qquad SE = .003623$$

This regression result contained two unexpected results: (1) both income variables were not statistically significant, although the coefficient of the current income term might be considered by some to be in a "grey area" where the line between acceptance and rejection is not well defined; and (2) the signs of the interest rates—both basically being used as measures of credit availability—conflict with each other. This latter conflict reoccurred often because the long-term interest rate continually had a negative coefficient. But strangely, the short-term rate coefficient was generally positive.

In other regressions, the proxies for the employment level (U and $\frac{1}{U}$) were either statistically insignificant or of the wrong sign. So also were measures of the income gap—the difference between current and potential income—and expected rate of income change (WDY):

$$\begin{array}{lll} (41)\ CHP = .03203 + .00001585(Y) - .05808(WDY) - .03937(\Delta Prod) \\ \qquad\qquad (1.806)\ \ (1.118)\qquad\quad (-0.7335)\qquad (-1.742) \\ \qquad\qquad + .005951(r_d) - .003416(r_l) + .85597(CHP)_{-1} \\ \qquad\qquad\ \ (4.816)\qquad\quad (-1.742)\qquad\quad (16.06) \end{array}$$

$$R^2 = .95112 \qquad DW = 1.5856 \qquad SE = .003618$$

Finally, the expected rate of income changes was eliminated. And, in an attempt to get the interest rates to agree, the short-term interest rate was substituted for the long-term rate. The result was best with the discount rate lagged one period to reflect some time span elapsing before the effect of a change in the discount rate is reflected in credit terms and, therefore, in prices:

$$(42)\quad \underset{}{CHP} = \underset{}{.03433} + \underset{(1.805)}{.000007086}(Y) - \underset{(0.4844)}{.04661}(\Delta Prod) - \underset{(-1.940)}{.001746}(r_b) + \underset{(1.857)}{.003452}(r_d)_{-1} + \underset{(2.6014)}{.8103}(CHP)_{-1} \underset{(16.1288)}{}$$

$$R^2 = .9483 \qquad DW = 1.4809 \qquad SE = .003691$$

These regression results, as a whole, are not as good as those in the previous equations, but at least the signs of the coefficients meet a priori expectations and give the equation more economic meaning.

Lag Structure

The Koyck lag structure assumes that a uniformly declining amount of importance can be assigned to the effects of the previous periods. This can be proven mathematically by using either the "homogenous solution" ($Y_t = \rho Y_{t-1}$) or the "homogenous plus the particular solution" ($Y_t = \rho Y_{t-1} + \text{Constant}$). The first is a special case of the second and solvable in the same manner as the second. The type of equation specification adopted supposes that the endogenous variable is a function of exogenous variables (constants) plus the absolute value of the endogenous variable lagged one quarter and the change in that variable, also lagged one quarter:

$$\Delta Y_t = C_t + \alpha Y_{t-1} + \beta \Delta Y_{t-1} .$$

In terms of the difference equation, this becomes:

$$Y_t - Y_{t-1} = C_t + \alpha Y_{t-1} + \beta (Y_{t-1} - Y_{t-2})$$

$$Y_t = C_t + (1+\alpha+\beta) Y_{t-1} - \beta Y_{t-2}$$

$$Y_t - (1+\alpha+\beta) Y_{t-1} + \beta Y_{t-2} = C_t.$$

Solving for the characteristic equation:

let: $\gamma = (1+\alpha+\beta)$

then:

$$Y_t - \gamma Y_{t-1} + \beta Y_{t-2} = C_t.$$

and let: $Y_{t-2} = r^t$

then:

$$r^2 - \gamma r + \beta = C$$

The homogenous solution is applicable when the constant term (C) is equal to zero. In this case one can solve for the "normalized" state by:

Solve: $Y_t = \rho Y$

for t=1 $Y_1 = \rho Y_0$

for t=2 $Y_2 = \rho Y_1 = \rho^2 Y_0$

. . . . . .

for t=n $Y_n = \rho^n Y_0$

Solving for the characteristic function in terms of a homogenous solution:

$$r^2 - \gamma r + \beta = 0$$

After appropriate manipulations, this characteristic function can be solved for its roots by using the quadratic formula:

$$r = \frac{-(-\gamma) \pm \sqrt{\gamma^2 - 4(1)(\beta)}}{2(1)}.$$

If, however, the constant does not equal zero ($C \neq 0$), a

nonhomogenous solution is sought. The characteristic function is:

$$r^2 - \gamma r + \beta = C$$

It this case, one works with the deviation forms:

$$Y_t = \rho Y_{t-1} + C$$
$$\underline{-\bar{Y} = -\rho\bar{Y} - C}$$
$$(Y_t - \bar{Y}) = \rho(Y_{t-1} - \bar{Y})$$

And solving for the normalized state as before, at the limit (t=n):

$$(Y_n - \bar{Y}) = \rho^n(Y_0 - \bar{Y})$$
$$Y_n = \rho^n(Y_0 - \bar{Y}) + \bar{Y}$$
$$Y_n = \rho^n Y_0 + (1 - \rho^n)\bar{Y}$$

In essence, this result is much the same as the homogenous solution except that the intercept of the slope of the expansion path has been shifted.[3] Thus, for the cases when the constant is non-zero or is a function of time (C = f(t)), the scale of the results will differ from that of the homogenous solution. This does not, however, change the nature of the convergence or the oscillation conditions.

The discriminant ($D = \gamma^2 - 4\alpha\beta$) and the roots of the characteristic equation provide the information necessary to determine the distinctive features of the lag assumption. If the discriminant is:

$D < 0$, the lag structure is oscillating

$D \geq 0$, the lag structure is not oscillating

and if the absolute value of

$|r| < 1$, the series converges

$|r| = 1$, the series is a straight line (neither converging nor diverging)

$|r| > 1$, the series diverges.

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[3]For a more precise explanation of the non-homogenous solution, see Goldberg (1961).

For the demand deposit equation

$$DD_t + 1.4426\ (DD)_{t-1} - .4912\ (DD)_{t-2} = \text{constant}$$

we first assume that we can neglect the effect of the non-zero constant. The D is greater than zero and the characteristic root is less than one. Therefore, the demand deposit series does not oscillate but it does converge. This is also the case for the coin and currency, time deposit, and loan equations:

$$CC_t + 1.5904\ (CC)_{t-1} - .6022\ (CC)_{t-2} = \text{constant}$$

$$TD_t + 1.1412\ (TD)_{t-1} - .2260\ (TD)_{t-2} = \text{constant}$$

$$L_t + 1.0873\ (L)_{t-1} - .2020\ (L)_{t-2} = \text{constant}.$$

The free reserve and inventory change equations, however, are not of this type. For the free reserve equation:

$$FR_t + .9488\ (FR)_{t-1} - .2997\ (FR)_{t-2} = \text{constant}$$

$$\frac{-.9488 \pm \sqrt{.9002 - 1.1988}}{2}$$

the discriminant (D) is less than zero. Thus, the lag structure is oscillating. From the characteristic (largest) root:

$$(r = .7476) \qquad (r = .2012)$$

since $r < 1$, the series is oscillating but converging. For the inventory change equation:

$$\frac{-.7826 \pm \sqrt{.6125 - 1.6156}}{2}$$

the discriminant (D) is less than zero. From the characteristic root:

$$(r = 1.784) \qquad (r = .2188)$$

since $r > 1$, the series is oscillating and diverging.

The remainder of the equations were assumed to be affected by a Koyck-type lag distribution for first-order difference equations. This

series assumes that a geometrically-declining set of weights, applied to successively earlier periods, adequately expresses the distribution effect. It also assumes that this series can be measured by a single figure—a one-period lag of the endogenous variable.

Selection of the Model Based on Ordinary Least-Squares Estimates

The "normal" procedure for selecting the "best" equation to explain a particular endogenous variable is to base the decision upon theoretical relevance, *a priori* expectations—concerning which explanatory variables to include, and the expected magnitude and sign of the coefficients which result—the relative amounts of explained correlation, and the size of the standard error (especially important if the function is to be used for forecasting). However, if several specifications for a particular relationship are judged about equally acceptable on the basis of the above criteria, the final choice is quite subjective. It is, therefore, often not optimal.

A way to eliminate some of this subjectivity in the final selection is provided by the use of eigenvalues. An eigenvalue is a characteristic value of an equation which satisfies certain specifications. Theil and Boot (1962) have shown that a necessary and sufficient condition for the convergence of the matrix of lagged endogenous variables, and therefore for the system of equations as a whole, is that the largest root of this matrix be less than one.

A square matrix is one having as many rows as it does columns. A matrix of this type can be written as the sum of as many matrices of rank one (not a zero matrix) as the rank of the square matrix. Each of

these separate matrices of rank one is equal to the product of a non-zero characteristic root of that matrix and the corresponding characteristic column and row.

Since there are fourteen endogenous variables in the system, there are fourteen equations. If one were to arrange the coefficients of a chosen set of the fourteen equations into matrices according to the type of variable they represent (e.g., endogenous), one would have a square matrix for the endogenous variables. If all fourteen equations are linearly independent, the rank would be fourteen. The same would be true for the matrix of lagged endogenous variables.

If r_i is a characteristic root—eigenvalue—of this matrix, and w_i and w_i^* are the corresponding characteristic column and row of this matrix A, then:

$$(A - r_i I)w_i = 0$$

$$w_i^* (A - r_i I) = 0$$

One can then write the A matrix as the sum of the matrices of rank one times the corresponding vectors of the characteristic columns and rows:

$$A = r_1 w_1 w_1^* + r_2 w_2 w_2^* + \cdots + r_{14} w_{14} w_{14}^*$$

If one raises the matrix A to the nth power the eigenvalues become r_i^n while the vectors $(w_i w_i^*)$ remain constant:

$$A^n = r_1^n w_1 w_1^* + r_2^n w_2 w_2^* + \cdots$$

Therefore, if A^n is to approach zero as n approaches infinity, it is necessary—and sufficient—for all the eigenvalues to be less than one in absolute value (Theil and Boot, 1961).

The speed of convergence depends on the size of the largest eigenvalue. For "Klein's Model I," Theil and Boot found this dominant

root to be .838. The closer the value of this dominant root is to zero, the more rapid the rate of convergence. The closer it is to one, the more unstable the system is. If it is greater than one, the system is explosive. A second convergence criteria requires that there must be at least one pair of conjugate complex roots—one non-zero element for both the real and imaginary parts of the set of eigenvalues for the system. This requirement assures that the system is subject to a damped oscillatory type of convergence rather than uniform convergence.

These criteria were used to determine, on the basis of the ordinary least-squares parameter estimates, which subset of equations was finally chosen. That set which best met these criteria—the smallest dominant root and at least one pair of conjugate complex roots—was considered "best." From among the forty equations considered in the last stage (746,496 possible combinations), the final set of fourteen equations was: 3, 7, 11, 12, 15, 19, 21, 24, 29, 31, 35, 37, 39, 42. The set of eigenvalues for this system of equations was:

TABLE 4-1

EIGENVALUES OF THE SYSTEM OF EQUATIONS

	REAL PART OF EIGENVALUE (RE)	IMAGINARY PART OF EIGENVALUE (IE)	EIGENVALUE $\sqrt{RE^2 + IE^2}$
1)	0.60219	0.0	0.60219
2)	-0.18323	0.0	0.18323
3)	0.21582	0.0	0.21582
4)	0.19936	0.0	0.19936
5)	0.33411	0.02765	0.33526
6)	0.33411	-0.02765	0.33526
7)	0.55676	0.0	0.55676
8)	0.50140	0.0	0.50140
9)	0.91976	0.0	0.91976
10)	0.68804	0.0	0.68804
11)	0.87238	0.0	0.87238
12)	-0.00000	0.0	0.00000
13)	0.78277	0.0	0.78277
14)	0.80940	0.0	0.80940

Source: author.

Simultaneous Estimates of the Model Parameters

Ordinary least-squares estimation procedures are known to give biased and inconsistent estimates of a model's parameters if they are applied to relationships having current endogenous variables on the right hand side. With the assumption of normal and serially-independent disturbances, the two-stage least-squares estimation method yields consistent estimates having the asyptotic properties of normality and efficiency. By first regressing each of the jointly-determined variables—those which are simultaneously endogenous and exogenous within the system—individually on all of the exogenous variables, it is hoped to eliminate the influence of the disturbances (stochastic fluctuations) from these jointly determined variables. Then these "cleansed" variables replace their counterparts in the original equations being estimated by the ordinary least-squares method.

The two-stage estimates of this model were accomplished by the use of these instrumental variables. It is generally expected that, because the model as a whole, and each of the equations, is overidentified, the ordinary least-squares estimates are biased downward. Thus, we would commonly expect the two-stage estimates to be more correct, though not necessarily more statistically significant, than the ordinary least-squares estimates:

$$(43)\quad \Delta DD = \underset{(4.132)}{.06153}(Y_p)_{-1} + \underset{(2.087)}{.1598}(CHP)_{-1} - \underset{(-4.381)}{.6172}(r_b) + \underset{(2.310)}{.1202}(\Delta L) - \underset{(-3.915)}{.04819}(DD)_{-1} + \underset{(5.533)}{.4787}(\Delta DD)_{-1}$$

$$R^2 = .6790 \qquad SE = .5835$$

(44) $\Delta CC = \underset{(3.531)}{.0008583(Y)} + \underset{(4.307)}{.009243(\Delta Y)} - \underset{(-1.524)}{.02465(r_b)} - \underset{(-3.594)}{.01219(CC)_{-1}} + \underset{(8.023)}{.6077(\Delta CC)_{-1}}$

$R^2 = .9043$ SE = .08505

(45) $\Delta TD = \underset{(-4.854)}{-13.01} + \underset{(4.849)}{.05463(Y)} + \underset{(1.162)}{.2692(\Delta DD)} + \underset{(1.464)}{.1561(\Delta L)} - \underset{(-3.148)}{.2421(r_b \cdot Y)} + \underset{(1.895)}{.1712(r_{td} \cdot Y)} - \underset{(-2.836)}{.2985(r_l \cdot Y)} - \underset{(-1.919)}{.08489(TD)_{-1}} + \underset{(2.162)}{.2259(\Delta TD)_{-1}}$

$R^2 = .7946$ SE = 1.1306

(46) $\Delta FR = \underset{(1.599)}{.09425} - \underset{(-2.166)}{.03985(\Delta DD)} + \underset{(1.808)}{.01532(\Delta TD)} - \underset{(-3.422)}{.03671(\Delta L)} + \underset{(4.588)}{.1426(OMO)} + \underset{(3.235)}{.1706(r_d)} - \underset{(-4.690)}{.1977(r_b)} - \underset{(-3.732)}{.3047(\Delta RT)} - \underset{(-7.578)}{.3537(FR)_{-1}} + \underset{(3.598)}{.2885(\Delta FR)_{-1}}$

$R^2 = .7745$ SE = .09755

(47) $\Delta L = \underset{(-1.813)}{-4.528} + \underset{(2.815)}{.03610(Y)_{-1}} + \underset{(4.704)}{.3841(C^d)} - \underset{(-2.886)}{.1244(\Delta I^i)} - \underset{(-4.662)}{.3430(I^i)_{-1}} + \underset{(2.096)}{.7321(r_d)} + \underset{(2.659)}{.4281(\Delta DD)} - \underset{(-3.324)}{.1152(L)_{-1}} + \underset{(0.8907)}{.1060(\Delta L)_{-1}}$

$R^2 = .8737$ SE = .8351

(48) $OMO = \underset{(2.176)}{.1465(WDY)} + \underset{(4.116)}{.01272(\Delta FR)} - \underset{(-4.594)}{.009085(TRM)} - \underset{(-5.696)}{.002308(r_b \cdot Y)} + \underset{(2.535)}{.0003739(r_{td} \cdot Y)} + \underset{(4.715)}{.00235(r_l \cdot Y)} + \underset{(3.298)}{.1642(B\text{-}P)} + \underset{(4.017)}{.01004(\Delta RT)} - \underset{(-1.761)}{.1673(OMO)_{-1}}$

$R^2 = .8148$ SE = .00338

(49) $r_d = \underset{(-1.027)}{-.3750} + \underset{(1.602)}{.003145(Y)_{-1}} + \underset{(1.556)}{.006134(\Delta Y)} - \underset{(-2.882)}{.04978(CHP)_{-1}} + \underset{(8.103)}{.3287(r_b)} + \underset{(1.701)}{.009484(L)_{-1}} - \underset{(-1.849)}{.2149(\Delta FR)_{-1}} + \underset{(12.35)}{.6646(r_d)_{-1}}$

$R^2 = .9884$ SE = .1332

(50) $Y = C^{nd} + C^d + I^r + I^{nr} + \Delta I^i + E^e$

$$(51)\quad C^{nd} = \underset{(-1.827)}{-23.02} + \underset{(2.937)}{.08648}(Y) + \underset{(1.026)}{.2378}(CHP)_{-1} + \underset{(1.828)}{.3184}(\Delta Prod) + \underset{(1.589)}{.2765}(\Delta L) + \underset{(11.01)}{.8087}(C^{nd})_{-1}$$

$$R^2 = .9997 \qquad SE = 1.545$$

$$(52)\quad C^{d} = \underset{(-3.452)}{-12.57} + \underset{(5.451)}{.05103}(Y) + \underset{(3.389)}{.1287}(\Delta Y) + \underset{(3.210)}{.1398}(CAP)_{-1} + \underset{(3.652)}{.4612}(\Delta L) + \underset{(3.978)}{.4189}(C^{d})_{-1}$$

$$R^2 = .9953 \qquad SE = 1.180$$

$$(53)\quad I^{r} = \underset{(-3.877)}{-22.07} + \underset{(3.152)}{.06879}(\Delta Y) + \underset{(4.601)}{.09375}(Y_p)_{-1} - \underset{(-3.858)}{1.068}(r_d) + \underset{(4.179)}{.1853}(r_1 \cdot Y) + \underset{(4.660)}{.1557}(L) + \underset{(16.81)}{.8668}(I^{r})_{-1}$$

$$R^2 = .9603 \qquad SE = .8099$$

$$(54)\quad I^{nr} = \underset{(-4.652)}{-15.09} + \underset{(1.501)}{.01056}(Y)_{-1} + \underset{(5.171)}{.1273}(\Delta Y) + \underset{(4.813)}{.1529}(CAP)_{-1} + \underset{(2.762)}{.9764}(r_1) + \underset{(2.210)}{.2449}(\Delta L) + \underset{(1.434)}{.8243}(I^{nr})_{-1}$$

$$R^2 = .9981 \qquad SE = .8789$$

$$(55)\quad \Delta I^{i} = \underset{(5.447)}{8.887} + \underset{(8.832)}{.4711}(\Delta Y) + \underset{(3.772)}{.4487}(C^{d})_{-1} - \underset{(-3.124)}{.7264}(\Delta L) + \underset{(3.441)}{1.679}(r_b) - \underset{(-5.263)}{.6063}(I^{i})_{-1} + \underset{(5.061)}{.4001}(\Delta I^{i})_{-1}$$

$$R^2 = .8609 \qquad SE = 1.939$$

$$(56)\quad CHP = \underset{(1.710)}{.0334} + \underset{(0.5233)}{.0000118}(Y) - \underset{(-2.093)}{.04790}(\Delta Prod) + \underset{(1.668)}{.001572}(r_b) + \underset{(2.685)}{.003499}(r_d) + \underset{(1.651)}{.8183}(CHP)_{-1}$$

$$R^2 = .9437 \qquad SE = .00369$$

Interestingly, almost to an equation the coefficient of determination and the standard error of the regression were poorer for the two-stage estimation of the parameters than for the ordinary least-squares estimation. The reason probably lies in the first-stage estimation of

the instruments which replace the appropriate jointly-determined variables in the equations of the second-stage. Using the standard errors of the estimates as guides, those of the instruments were continually greater than the standard errors of the original variable. If they had been smaller, it is possible that the two-stage estimates would have been better.

Looking at the differences between the two estimates provides us with some meaningful comparisons of estimations methods and interpretations:

Equations (3) and (43)—the two-stages (2SLS) estimate gives increased weight to permanent income and price changes as determinants of the demand for DD. It deemphasizes the importance of changes in loans, the short-term interest rate, and the lagged change. The only noteable result is the lessened importance assigned to the level of the interest rate on assets which are thought to be highly substitutable for the holding of demand deposits. Apparently the demand for DD is more stable than is generally hypothesized.

Equations (7) and (44)—the 2SLS gives less weight to income changes and to the interest rate. Apparently the previous level of coin and currency is the most important determinant of the demand for CC in the current period.

Equations (11) and (45)—the theory that the demand for time deposits is basically a function of past income and the interest rate is borne out in this comparison. The 2SLS estimate reduces the importance of ΔDD and ΔL, and increases that of $(Y)_{-1}$ and the yield paid on time deposits. The latter is also emphasized by the large coefficient of $(\Delta TD)_{-1}$ which

means that there exists a fairly short adjustment lag.

Equations (12) and (46)—the 2SLS result, unexpectedly, reduces the importance the ordinary least-squares (OLSQ) estimates gave to changes in DD, TD, and the RRR_{td}. OMO is shown to be less important as the interest rates gain significantly. One would not a priori expect these results since the level of FR's is determined by the levels of DD and TD, and by the RRR on DD's and TD's.

Equations (15) and (47)—the importance of the real sector variables in determining the demand for bank loans is amply illustrated by this comparison. Income and the lag adjustment variables are discounted. Those of the real sector, especially that for inventory investment, are improved. The importance of the discount rate is expected.

Equations (19) and (48)—the 2SLS estimate more closely approximates a priori expectations. OMO is seen to depend more heavily on the market interest rates and on the balance of payments situation than on the time deposit variables and the lagged OMO level. The significance of the expected income change is slightly improved.

Equations (21) and (49)—there is no noticeable difference in this equation under either estimation procedure. Since there are no jointly-dependent variables on the right-hand side of the function, this result should be expected.

Turning briefly to the real sector:

Equations (24) and (50)—income identity.

Equations (29) and (51)—only slight differences are observed.

Equations (31) and (52)—the importance of income, loans, and the previous level of durable goods consumption are obvious and increased by the 2SLS estimation.

Equations (35) and (53)—the increased emphasis on the discount rate and the long-term interest rate is understandable; but the reduced importance of income and loans is quite unexpected in light of the theory underlying the equation.

Equations (37) and (54)—the 2SLS estimate places more reliance on income and the long-term interest rate and less on the lagged-adjustment.

Equations (39) and (55)—income, loans, and the short-term interest rate are, as expected, increasingly important at the expense of the lagged adjustment variables.

Equations (42) and (56)—the reduced reliance on the interest rate terms is surprising as is the increased emphasis on (ΔProd).

It appears that, although the statistical measures of the 2SLS estimates were not as favorable as those from OLSQ, they did tend to place more emphasis (importance) on those variables in the equations which theory would lead us to expect should be more important. In the multiplier analysis which follows, however, the coefficients which were estimated by OLSQ were used. For some reason, the multipliers from the 2SLS estimation diverged rather than converged. This is evident from the fact that the largest eigenvalue was greater than one.

CHAPTER V

ELASTICITY AND MULTIPLIER ANALYSIS OF THE MODEL

The purpose of this chapter is twofold—to briefly look at the elasticities and to study in more depth the multipliers that evolve from the specification of the model. Both types of analyses employed in this chapter reflect, with varying degrees of emphasis, results of the modeling and estimation efforts which were rather summarily discussed in the previous chapter. The initial part involves analyzing several of the interesting demand and income "elasticities" which have resulted from the (structural) parameter estimation. The remainder of the chapter presents a "multiplier analysis" which describes the time path of the response of the endogenous variables to a given unit change in a predetermined variable, given a ceteris parabis assumption. The distinction between the impact, interim, and total multipliers is emphasized, and the response path, as a whole, is considered as still another important part of policy considerations.

The Concept of Elasticity Measurement

The basic concept of an elasticity measure is to indicate the degree of responsiveness of an endogenous variable (W) to changes in one of the exogenous variables (X) of which it is a function. Thus, the elasticity measure depends upon the relative (percentage) changes between

the two and is independent of their units of measure. Strictly speaking, any movement from one point (which represents a single paired-observation) on a scatter diagram of the time series data to any other point permits the measure of an elasticity. Elasticity is measured between these two points in time and under a given set of conditions. However, of more general interest is a summary measure of elasticity which attempts to describe, on an average, what the reaction of one variable would be to a given percentage change in the other.

Since this summary figure should, at least theoretically, represent the elasticity of change between any two points in time, it seems appropriate to use the "arc-elasticity" concept as the basis of the analysis:

$$E = \frac{\Delta W}{\Delta X} \cdot \frac{(X_1 + X_2)/2}{(W_1 + W_2)/2} .$$

In making an elasticity computation of this type between any two points in time, one multiplies the ratio of the changes times the ratio of the averages between the two points. To extend this concept to allow for strictly one summary measure, one simply inserts the average value for each series over the time horizon in place of the average value of the variable between any two points:

$$E = \frac{\Delta W}{\Delta X} \cdot \frac{\overline{X}}{\overline{W}} .$$

There are two basic elasticity concepts: (1) short-run; and (2) long-run. For the equation:

$$Y_t = \alpha + \beta X_t + \gamma Y_{t-1},$$

the short-run elasticity of Y_t with respect to changes in X_t is:

$$E = \frac{\Delta Y}{\Delta X} \cdot \frac{\overline{X}}{\overline{Y}} = \beta \cdot \frac{\overline{X}}{\overline{Y}} .$$

The long-run concept requires two additional assumptions: (1) that the long-run values in the time series are in equilibrium; and (2) that the equilibrium values in the long-run do not change. Given these two assumptions, we can solve for Y_t:

$$\text{Since: } Y_t = Y_{t-1}$$

$$Y_t = \alpha + \beta X_t + \gamma Y_t$$

$$(1-\gamma)Y_t = \alpha + \beta X_t$$

$$Y_t = \frac{\alpha}{(1-\gamma)} + \frac{\beta}{(1-\gamma)} X_t .$$

The long-run elasticity then becomes:

$$E = \frac{\beta}{(1-\gamma)} \cdot \frac{\overline{X}}{\overline{Y}} .$$

Because of the unrealistic assumptions relating to equilibrium and the constancy of the terms, plus the uncertainty surrounding the determination of how long is the "long-run," the short-run concept was considered preferable and potentially more meaningful. This choice, however, eliminates comparisons of the elasticities generated by this model and those resulting from other econometric studies since the latter are calculated on a long-run basis.

The regressions of the previous chapter provide us with estimates of the ratio of the changes. These are measured by the regression coefficients, assuming ceteris parabis. For example, in the functional relationship describing movement in the discount rate (r_d), the coefficient of the Treasury bill rate variable (r_b) was (.3041). This, then, is the figure represented by ($\Delta Y/\Delta X = \beta$). Completing the elasticity calculation,

the average discount rate level over the sixty-eight quarters was 3.348 percent; that for the bill rate was 3.283 percent. Therefore:

$$E = .3041 \left(\frac{3.283}{3.348}\right) = .29819$$

Table (5-1) contains several of the more interesting demand and income elasticities. These measures are based on the parameter estimates derived by the OLSQ estimation.

TABLE (5-1)

DEMAND AND INCOME ELASTICITIES WITH RESPECT TO CHANGES IN
****** *** ****** ********** **** ******* ** ******* **

	BILL R	DISC R	DIS -1	FR RES	C M O	DEMD D	B LOAN	CBL -1	INCOME	PERM Y	WTDCHY	BALPAY
CH DD	-0.0187						0.1492			0.0644		
CH CC	-0.0026								0.1815			
CH TD						0.3306						
+CH FR	-1.2945	1.1542			2.5291	-14.699	-13.311					
-CH FR	2.1262	-1.6239			-3.0544	16.391	16.958					
CH CBL		0.0140				0.4141						
+ OMO				-0.0017							0.0248	0.0483
- OMO				-0.1322							-0.3889	-0.0902
DISC R	0.2982							0.4595	1.3466			
NOND C							0.0423		1.7362			
DUR C							1.2734		1.9774			
RES FI		-0.1239						0.9002	1.7000	1.8748		
NONR I							0.6076		1.2751			
CH INV	0.0837						-1.6596		4.2984			
ANCH P	0.2876		0.5799						0.2039			

Evaluation of the Demand and Income Elasticities

The elasticities of the demand deposit equation (3) are much smaller than would normally be expected, although the signs are as expected. The elasticities with respect to permanent income (.064) and the bill rate (-.019) indicate that one percent changes in these two have very little effect on the level of demand deposits. This does not appear to uphold the "Friedmonian" thesis because of the extreme inelasticities. However, this is a short-run elasticity and the quantity theory is a long-run theoretical concept. One would also expect a ten percent change in loans to boost demand deposits by more than one and one-half percent. The other component of the "narrowly-defined" money stock, coin and currency, also appears to be extremely interest-inelastic. Again the income-elasticity figure is quite small (.182); so, also, is it for time deposits (.308).

The elasticities of free reserves and of open market operations required special considerations because the quarterly averages alternated between positive and negative values quite frequently—for FR, thirty-five positive and thirty-three negative; for OMO, fifty-seven positive and eleven negative. To aggregate these would distort any meaningful interpretation of the elasticities. Thus, two elasticities for each relationship were calculated—one using the mean of the positive values and the other using the mean of the negative values. In order not to bias the results, the means of the exogenous variables were also adjusted. Taking FR's as an example, the individual values of the exogenous variables were divided into two groups. One group contained values of the exogenous variables which occurred during periods when FR's were positive;

another held the values for the periods when free reserves were negative.

To illustrate this, we examine the free reserve elasticities with respect to a one percent increase in demand deposits:

$$E = \frac{\Delta(-FR)}{\Delta DD} \cdot \frac{\overline{DD}}{(-\overline{FR})} \qquad E = \frac{\Delta(+FR)}{\Delta DD} \cdot \frac{\overline{DD}}{(+\overline{FR})}$$

$$= -.04305 \left(\frac{123.17}{-.3235}\right) \qquad = -.04305 \left(\frac{115.56}{.33915}\right)$$

$$= 16.39 \qquad = -14.67$$

When the beginning level of free reserves is positive, the elasticity measure reflects the fact that a one percent increase in demand deposits results in a 14 2/3 percent <u>decline</u> in the existing net <u>free</u> reserve position. The other measure shows that a one percent increase in demand deposits when free reserves are initially at a negative level will result in a 16 1/3 percent <u>increase</u> in net <u>borrowed</u> reserves.

Since loans are usually taken out, at least initially, in the form of an increase in demand deposits, we might expect approximately the same results for an increase of one percent in loans as we observed for the increase in demand deposits. This is in fact the case. The positive level of free reserves declines a little less and the negative level of free reserves increases a little more than in the demand deposit case. If the funds that are lent are withdrawn, this increase in coin and currency outstanding reduces reserves, presumably free reserves, by the full amount of the loan. The elasticities for a change in time deposits are also interesting, especially in terms of what they tell us about the effects of disintermediation. An increase in time deposits usually comes about as a result of a transfer of funds from either demand deposits or coin and currency. With a transfer from DD to TD, the amount

of reserves required to be held against these deposits declines ($RRR_{DD} > RRR_{TD}$), thus creating additional free reserves. The deposit of cash creates almost totally new free reserves. This explains the signs of the elasticities. A one percent increase in time deposits results in a 4 1/3 percent increase in net free reserves or a 5 1/2 percent reduction in net borrowed reserves (a reduction of the negative level).

In terms of interest rates also, the free reserve elasticities are not unexpected. A one percent increase in the percentage level of the discount rate should lessen the interest in member bank borrowing from the Fed and should make banks less willing to grant new business loans. This combination of events should serve to increase the amount of net free—decrease the amount of net borrowed—reserves. This is reflected in the elasticity measures. Also, as anticipated, an increase in the percentage level of the bill rate should (as discussed in the last chapter) make other investments more attractive than holding demand or time deposits. This movement results in a decline in the levels of free—an increase in the level of borrowed—reserves.

The final free reserve elasticity of interest reflects the fact that an increase in open market operations (purchase by the Fed) provides reserves to the banks. A one percent increase in the level of open market operations in the short-run will increase free reserves by 2 1/2 percent. Or it may lower the net borrowed reserve position by three percent.

As with the money supply components, the loan elasticities are not as large as expected. A ten percent increase in the level of income during the previous quarter results in only a one and one-half percent

increase in loans. And an increase of ten percent in durable goods consumption results in only a one percent increase in loans. Along more expected lines, the short-run elasticity of an increase in the discount rate has almost no effect (.106%) toward increasing loans although the level may initially increase in anticipation of future discount rate increases.

Previously it was observed that open market operations, like free reserves, frequently experienced quarterly averages which alternated between positive and negative values. Therefore, two measures of each OMO elasticity were calculated (by the same method used for FR's). For example:

$$E = \frac{\Delta(-OMO)}{\Delta FR} \cdot \frac{\overline{FR}}{(-\overline{OMO})} \qquad E = \frac{\Delta(+OMO)}{\Delta FR} \cdot \frac{\overline{FR}}{(+\overline{OMO})}$$

$$= .012795 \left(\frac{.047}{-.00455}\right) \qquad = .012795 \left(\frac{-.01139}{.08439}\right)$$

$$= -.1322 \qquad = -.00123$$

These elasticities reflect the fact that when the level of open market operations is increasing, an increase of one, or even ten, percent in the level of free reserves has little, if any, effect toward changing the OMO trend. Nor does a comparible decline in free reserves have much effect. But when the trend in OMO is downward, a ten percent increase in free reserves would lead to a 1 1/3 percent decrease in the negative level of Federal Reserve operations in the open market. This seems to imply that when the Federal Reserve is allowing or forcing the use of more OMO, they expect to see a sizable increase in free reserves. Part of this, at least, would be due to their provision of additional reserves through purchases. But when they are restricting the level of OMO, an increase

in free reserves will force them to increase their use of this market tool. A decrease in free reserves would allow the "Fed" to further restrict these operations.

When the rate of income change is expected to rise by one percent, OMO will not be altered very much if its trend is already increasing. If the trend is downward, however, the increased rate of income change will cause a significant reversal of this decline in the trend. Surprisingly, the magnitude of the balance of payments problem had very little influence on the size or the trend in open market operations.

The discount rate reacts rather as anticipated. A ten percent rise in the level of the Treasury bill rate would induce a three percent rise in level of the discount rate. An equal rise in income and in loans (of the previous period) will induce rate level increases of 13 1/2 and 4 1/2 percent respectively. The sizable elasticity as a result of an income rise probably reflects both a rise in income and consumption as well as an increase in loans in the same period.

As expected, all the major real sector components of income respond significantly to a one percent increase in the level of income. This is also true, with the exception of nondurable consumption, for a similar rise in the level of bank loans. Nondurable consumption involves numerous but generally "inexpensive" purchases, basically of staples and necessities. These purchases seldom require the extension of a loan except for consumer credit in some cases. Based on the discussion of inventory investment in the last chapter, the negative elasticity between loans and inventory investment is also expected. Apparently, the elasticities with respect to interest rates support the often proposed

thesis that real sector components are relatively interest-inelastic.

Changes in the price level, however, appear to be highly susceptible to interest rate changes. A ten percent increase in the level of the bill rate or the discount rate will induce increases of almost 3 and about 5 3/4 percent in the annual rate of price changes. The income elasticity of price changes is only 0.2. The most interesting factors to arise out of the price elasticities are the high degree of responsiveness to changes in the discount rate, and the fact that the price changes lag the discount rate changes by a perceptible period.

Multiplier Analysis of an Econometric Model

The structural model of economic relationships which was estimated in the previous chapter proposed that the endogenous variables were functions of other current endogenous variables, lagged endogenous variables, and the exogenous variables—both current and lagged. The coefficients—the "structural parameters"—which were estimated by both estimation procedures (OLSQ and 2SLS) are of the type often used to evaluate both the theoretical basis and the empirical results of the proposed relationships. However, these are only tentative specifications because many equations involve jointly-determined variables. An improved specification would include only exogenous variables on the right-hand side of these equations.

This is accomplished by solving for the "reduced-form" equations. The coefficients of these reduced-form equations indicate the level of influence, both direct and indirect, which results from a given level of movement in the exogenous variables (employing a ceteris parabis assumption for changes in the other predetermined variables). In matrix

notation, the structural equations may be represented, in general terms, by:

$$WY = AY_{-1} + BX + CX_{-1} + \rho$$

where: Y = current endogenous variables;

Y_{-1} = endogenous variables, lagged one period;

X = current exogenous variables;

X_{-1} = exogenous variables, lagged one period;

ρ = residuals

and: W, A, B, C = structural coefficients.

Simplification of the model could have been facilitated by the fact that one of the equations (r_d) depends solely on predetermined variables. Therefore, this recursive system could have been solved by initially calculating (r_d) and then using the predetermined variables plus the discount rate to solve for the remaining unknowns. However, the simultaneous solution of these equations for the reduced form equations involves dividing each of the structural coefficient matrices by the W-matrix. In matrix terminology, this means (pre)multiplying the other coefficient matrices by the inverse of the W-matrix:

$$Y = W^{-1}A(Y)_{-1} + W^{-1}B(X) + W^{-1}C(X)_{-1} + W^{-1}\rho$$

$$= A^*(Y)_{-1} + B^*(X) + C^*(X)_{-1} + (\rho^*)$$

In the simplified approach to Keynesian theory (as exemplified by the basic three equation model in terms of income, consumption and investment), the $(\frac{1}{1-b})$ is said to be the multiplier which measures the amount of change in income that would result from a given level of change in investments. Each of the reduced-form coefficients in the (B^*) matrix are multipliers—"impact multipliers"—which express the amount of change

in the endogenous variables that results from a one-unit change in the level of one of the exogenous variables during the same period, ceteris parabis:

$$\frac{\partial Y_t}{\partial X_t} .$$

Given that the equations in the model are linear, if the estimated coefficients had remained constant over the time span (and for sub-periods of this horizon), these impact multipliers should have been the same as those timeless multipliers of the Keynesian theory. Since this is not the case, there is also considerable interest in the effects of lagged variables on the endogenous variables. The implication of these lagged values is that their current levels will affect the next period levels of the endogenous variables. They may also have a definite effect on subsequent values in the future time path of responses of the endogenous variables. The "interim (intermediate) multipliers" reflect the effects on the future time paths which will result from an initial unit change in an exogenous variable during the current period—still maintaining the ceteris parabis assumption. Therefore, they are of extremely vital importance in a multiplier analysis.

It should not be inferred, however, that the (C^*) matrix measures the influence of the exogenous variables on the endogenous variables one-quarter (or even further) into the future. As Theil and Boot (1962) point out, this is because X_{t-1} not only affects Y_t directly—as is reflected in the (C^*) matrix—but also indirectly through Y_{t-1}. Therefore, the total effect of X_{t-1} on Y_t can be found only by eliminating Y_{t-1}:

$$Y_t = A^*(A^*Y_{t-2} + B^*X_{t-1} + C^*X_{t-2} + W^{-1}\rho_{-1}) + B^*X_t + C^*X_{t-1} + W^{-1}\rho$$

$$= A^{*2}Y_{t-2} + B^*X_t + (C^* + A^*B^*)X_{t-1} + A^*C^*X_{t-2} + (\text{residuals}).$$

Taking the limit of A^{*s} as $s \to \infty$:

$$Y_t = B^*X_t + \sum_{s=0}^{\infty} A^{*s-1}(C^* + A^*B^*)X_{t-s} + \sum_{s=0}^{\infty} A^{*s}(\text{residuals}).$$

The interim multipliers (for time periods $s > t$) are:

$$\frac{\partial Y_s}{\partial X_t}.$$

From this can be found the multipliers for the successive time periods (neglecting the residuals):

impact: s=0, B^*

interim: s=1, $(C^* + A^*B^*)$

s=2, $A^*(C^* + A^*B^*)$

s=3, $A^{*2}(C^* + A^*B^*)$

It therefore, becomes obvious that the "total multiplier" is:

$$\sum_{s=0}^{\infty} \frac{\partial Y_s}{\partial X_t} = B^* + A^{*s-1}(C^* + A^*B^*)$$

This expresses the sum of the impact plus all the interim multipliers under the assumption that the series converges toward some level.

Time Path Response in a Dynamic System

As was previously discussed, the question relating to convergence of the series over time can be answered by determining the eigenvalues (roots of a characteristic function) of the system of equations. Additionally, given the existence of certain other conditions, one can tell the type of movement (e.g., damped oscillatory) to be expected from the

interim multipliers. Convergence is a necessary condition for a meaningful study of the multipliers since divergence would mean not only that the economy as a whole is explosively unstable but also that the sum of the interim multipliers would be meaningless. The damped oscillatory movement in the multipliers is generally expected because of the cyclic-like fluctuations generally observed in the economy. The other type of convergence is uniform, but this seems incongruous in terms of our a priori expectations.

The multipliers in this analysis differ—significantly in some cases—from those of the "Klein Model I" as found by Theil and Boot (1962) and those by Goldberger (1959). They also differ from the multipliers of the Fromm and Taubman (1967) simulation. In the Klein case, at least part of the difference can be explained by the difference in the eigenvalues and tested convergence of the two models. Another part can be attributed to the difference in the number of equations, variables, time periods, estimation methods, etc. The dissimilarities between the present model and the Fromm and Taubman model are not as clearly defined, however, because the latter does not appear to have been tested for convergence or for the type of movement to be expected of the multipliers. The multipliers of both models, however, do converge.

Goldberger (1959) appears to recognize the possibility of these differences. He seems to down-play them in favor of analyzing the time paths:

> It appears that initial conditions can play a critical role in the behavior of dynamic systems; and hence that the conventional procedure of studying dynamics by mere examination of characteristic roots may not be adequate . . . in analyzing econometric models, truncated time paths are at least as important as complete solutions.

Fromm and Taubman (1967) uphold the first contention but appear to reject

the second. They seem to say that differences in conclusions from various models should not concern one unless the differences appear to be quite serious, leading to markedly differing conclusions:

> because of various factors (including the impact of initial conditions), not too much emphasis should be given to the exact time path of increase of the various multipliers. A complex, dynamic, difference equation system is likely to have roots that produce fluctuation responses to any stepped changes in its forcing functions (exogenous inputs). Such a model is also likely to be influenced by specification choices and the techniques used to estimate parameters. Consequently, the dynamic multipliers fluctuate.

Tables (5-2) through (5-8) contain the structural and reduced form coefficients for the model specified in Chapter IV. The ordinary least-squares parameter estimates were used. The two-stage estimates would have been preferable, but the multipliers diverged instead of exhibiting the convergence which is generally expected a priori. These expectations reflect the theoretical implications that, although the economy more or less constantly verges on the "knife's edge," the cycle experiences implosive rather than explosive fluctuations as a result of exogenous "shocks."

TABLE (5-2)

THIS IS THE- W -MATRIX--ENDOGENOUS COEFFICIENTS

	CH DEM D	CH CCINC	CH TIMED	CH FF RS	CH LOANS	OPEN M C	DISC'T R
C DD	1.CCOCC	C.C	C.C	C.C	-C.12555	C.C	C.C
C CC	C.C	1.CCCCC	C.C	C.C	C.C	C.C	C.C
C TD	-C.2756C	C.C	1.CCCCC	C.C	-C.15737	C.C	C.C
C FR	C.C43C5	C.C	-C.C1635	1.CCCCC	C.C3641	-C.14553	-C.13746
CH L	-C.477C6	C.C	C.C	C.C	1.CCCCC	C.C	-C.57635
CMC	C.C	C.C	C.C	-C.C1279	C.C	1.CCCCC	C.C
DIS	C.C	C.C	C.C	C.C	C.C	C.C	1.CCCCC
GNP	C.C	C.C	C.C	C.C	C.C	C.C	C.C
C NC	C.C	C.C	C.C	C.C	C.C	C.C	C.C
C C	C.C	C.C	C.C	C.C	-C.45479	C.C	C.C
RES	C.C	C.C	C.C	C.C	C.C	C.C	C.85911
NCNR	C.C	C.C	C.C	C.C	-C.25C91	C.C	C.C
CH I	C.C	C.C	C.C	C.C	C.71446	C.C	C.C
CH P	C.C	C.C	C.C	C.C	C.C	C.C	C.C

	GNP	C NCNDLR	C DLR C	RESID FI	NONRES I	CH INVEN AMA	CH P
C DD	C.C	C.C	C.C	C.C	C.C	C.C	C.C
C CC	-C.CCC86	C.C	C.C	C.C	C.C	C.C	C.C
C TD	C.C	C.C	C.C	C.C	C.C	C.C	C.C
C FR	C.C	C.C	C.C	C.C	C.C	C.C	C.C
CH L	C.C	C.C	-C.27428	C.C	C.C	C.C6CC2	C.C
CMC	C.C	C.C	C.C	C.C	C.C	C.C	C.C
DIS	C.C	C.C	C.C	C.C	C.C	C.C	C.C
GNP	1.CCOCC	-1.CCCCC	-1.CCCCC	-1.CCCCC	-1.CCCCC	-1.CCCCC	C.C
C NC	-C.C8203	1.CCCCC	C.C	C.C	C.C	C.C	C.C
C C	-C.C5C67	C.C	1.CCCCC	C.C	C.C	C.C	C.C
RES	C.C	C.C	C.C	1.CCCCC	C.C	C.C	C.C
NCNR	C.C	C.C	C.C	C.C	1.CCCCC	C.C	C.C
CH I	C.C	C.C	C.C	C.C	C.C	1.CCCCC	C.C
CH P	-C.CCOC1	C.C	C.C	C.C	C.C	C.C	1.CCCCC

TABLE (5-3)

THIS IS THE W-INVERSE MATRIX

	CH DEM C	CH CCINC	CH TIMEC	CH FF RS	CH LOANS	CPEN M C	DISC'T R
C DC	1.C8C1E	C.C	C.C	C.C	C.1E8C9	C.C	C.C944E
C CC	-C.CCOC1	1.CCCCC	C.C	C.C	-C.CCCC1	C.C	-C.CCC9C
C TC	C.39511	C.C	1.CCCCC	C.C	C.25C91	C.C	C.14C79
C FR	-C.C626E	C.C	C.C1642	1.CC187	-C.C5C4E	C.14621	C.1C93E
CH L	C.61895	C.C	C.C	C.C	1.29749	C.C	C.72917
CMC	-C.CCC8C	C.C	C.CCC21	C.C1282	-C.CCC65	1.CC187	C.CC14C
DIS	C.C	C.C	C.C	C.C	C.C	C.C	1.CCCCC
GNP	-C.CC625	C.C	C.C	C.C	-C.C1311	C.C	-1.C44C9
C NC	-C.CCC51	C.C	C.C	C.C	-C.CC1C8	C.C	-C.C8565
C C	C.28119	C.C	C.C	C.C	C.58942	C.C	C.27872
RES	C.C	C.C	C.C	C.C	C.C	C.C	-C.89911
NCNR	C.15531	C.C	C.C	C.C	C.32556	C.C	C.18256
CH I	-C.44224	C.C	C.C	C.C	-C.927C1	C.C	-C.52C97
CH P	-C.CCCCC	C.C	C.C	C.C	-C.CCCCC	C.C	-C.CCCC1

	GNP	C NCNCLR	C CLR C	RESIC FI	NCNRES I	CH INVEN ANN	CH P
C DC	C.CC269	C.CC269	C.C48EC	C.CC269	C.CC269	-C.CC74C	C.C
C CC	C.CCC99	C.CCC99	C.CCC99	C.CCC99	C.CCC99	C.CCC99	C.C
C TC	C.CC4C1	C.CC4C1	C.C7273	C.CC4C1	C.CC4C1	-C.C11C2	C.C
C FR	-C.CCC81	-C.CCC81	-C.C1465	-C.CCC81	-C.CCC81	C.CC222	C.C
CH L	C.C2C79	C.C2C79	C.37667	C.C2C79	C.C2C79	-C.C57C8	C.C
CMC	-C.CCOC1	-C.CCCC1	-C.CCC19	-C.CCCC1	-C.CCCC1	C.CCCC3	C.C
DIS	C.C	C.C	C.C	C.C	C.C	C.C	C.C
GNP	1.1528C	1.1528C	1.14921	1.1528C	1.1528C	1.15359	C.C
C NC	C.C9457	1.C9457	C.C9428	C.C9457	C.C9457	C.C9463	C.C
C C	C.C6787	C.C6787	1.22954	C.C6787	C.C6787	C.C3249	C.C
RES	C.C	C.C	C.C	1.CCCCC	C.C	C.C	C.C
NCNR	C.CC522	C.CC522	C.C9451	C.CC522	1.CC522	-C.C1432	C.C
CH I	-C.C1486	-C.C1486	-C.26912	-C.C1486	-C.C1486	1.C4C78	C.C
CH P	C.CCOC1	C.CCCC1	C.CCCC1	C.CCCC1	C.CCCC1	C.CCCC1	1.CCCCC

TABLE (5-4)

A -MATRIX--COEFFICIENTS OF ENDOGENOUS VARIABLES LAGGED ONE-PERIOD

	CH DEM D	CH COINC	CH TIMED	CH FF RS	CH LOANS	CREDIT C	DISCNT R
C DD	C.49121	C.C	C.C	C.C	C.C	C.C	C.C
C CC	C.C	C.6C218	C.C	C.C	C.C	C.C	C.C
C TD	C.C	C.C	C.22599	C.C	C.C	C.C	C.C
C FR	C.C	C.C	C.C	C.29572	C.C	C.C	C.C
CH L	C.C	C.C	C.C	C.C	C.2C2C1	C.C	C.C
CMC	C.C	C.C	C.C	C.C	C.C	-C.18307	C.C
DIS	C.C	C.C	C.C	-C.21493	C.C	C.C	C.66463
GNP	C.C	C.C	C.C	C.C	C.C	C.C	C.C
C ND	C.C	C.C	C.C	C.C	C.C	C.C	C.C
C D	C.C	C.C	C.C	C.C	C.C	C.C	C.C
RES	C.C	C.C	C.C	C.C	C.C	C.C	C.C
NCNR	C.C	C.C	C.C	C.C	C.C	C.C	C.C
CH I	C.C	C.C	C.C	C.C	C.C	C.C	C.C
CH P	C.C	C.C	C.C	C.C	C.C	C.C	C.CC345

	GNP	C NCNDLR	C DLR	C RESID FI	NONRES I	CH INVEN ANN	CH P
C DD	C.C	C.C	C.C	C.C	C.C	C.C	C.15335
C CC	C.C	C.C	C.C	C.C	C.C	C.C	C.C
C TD	C.C5427	C.C	C.C	C.C	C.C	C.C	C.C
C FR	C.C	C.C	C.C	C.C	C.C	C.C	C.C
CH L	C.C3931	C.C	C.C	C.C	C.C	C.C	C.C
CMC	C.C	C.C	C.C	C.C	C.C	C.C	C.C
DIS	C.CC314	C.C	C.C	C.C	C.C	C.C	-C.C4978
GNP	C.C	C.C	C.C	C.C	C.C	C.C	C.C
C ND	C.C	C.74705	C.C	C.C	C.C	C.C	C.15756
C D	C.C	C.C	C.4C253	C.C	C.C	C.C	C.C
RES	C.C	C.C	C.C	C.85634	C.C	C.C	C.C
NCNR	C.C1018	C.C	C.C	C.C	C.82733	C.C	C.C
CH I	C.C	C.C	C.46459	C.C	C.C	C.4C388	C.C
CH P	C.C	C.C	C.C	C.C	C.C	C.C	C.81C34

TABLE (5-5)

THIS IS THE A* MATRIX -- C-MATRIX * (W-MATRIX * WI-MATRIX)

	CH DEM D	CH CCINC	CH TIMED	CH FF RS	CH LOANS	CREN M C	DISC*T R
C DD	C.53C6C	C.C	C.C	-C.C2C3C	C.C3356	C.C	C.C6278
C CC	-C.CCOCC	C.6C218	C.C	C.CCC19	-C.CCCCC	C.C	-C.CCC6C
C TD	C.194C8	C.C	C.22559	-C.C3C26	C.C5C61	C.C	C.C9357
C FR	-C.C3C79	C.C	C.CC371	C.27678	-C.C1C19	-C.C2677	C.C7268
CH L	C.3C4C5	C.C	C.C	-C.15672	C.26211	C.C	C.48463
CMC	-C.CCC39	C.C	C.CCCC5	C.CC354	-C.CCC13	-C.18341	C.CCC93
DIS	C.C	C.C	C.C	-C.21493	C.C	C.C	C.66463
GNP	-C.CC3C7	C.C	C.C	C.2244C	-C.CC265	C.C	-C.69391
C ND	-C.CCC29	C.C	C.C	C.C1841	-C.CCC22	C.C	-C.C5693
C C	C.13812	C.C	C.C	-C.C599C	C.11907	C.C	C.18524
RES	C.C	C.C	C.C	C.19329	C.C	C.C	-C.59758
NCNR	C.C7629	C.C	C.C	-C.C3932	C.C6577	C.C	C.1216C
CH I	-C.21723	C.C	C.C	C.11197	-C.18727	C.C	-C.34625
CH P	-C.CCOCC	C.C	C.C	C.CCCCC	-C.CCCCC	C.C	C.CC349

	GNP	C NCNCLR	C CLR G	RESID FI	NCNFES I	CH INVEN ANN	CH P
C DD	C.CC693	C.CC2C1	C.C1621	C.CC231	C.CC223	-C.CC299	C.16137
C CC	C.CCOC1	C.CCC74	C.CCCE6	C.CCCE5	C.CCC82	C.CCC4C	C.CCC2C
C TD	C.C646C	C.CC3CC	C.C2415	C.CC344	C.CC332	-C.CC445	C.C5422
C FR	-C.CCC7E	-C.CCCEC	-C.CC4F7	-C.CCCE9	-C.CCCE7	C.CCC9C	-C.C1518
CH L	C.C5351	C.C1553	C.12910	C.C1781	C.C172C	-C.C23C6	C.C6191
CMC	-C.CCOC1	-C.CCCC1	-C.CCCC6	-C.CCCC1	-C.CCCC1	C.CCCC1	-C.CCC19
DIS	C.CC314	C.C	C.C	C.C	C.C	C.C	-C.C4978
GNP	C.CC793	C.8612C	C.99853	C.98719	C.99379	C.46992	C.23311
C ND	C.CC065	C.8177C	C.C8191	C.CEC98	C.C7824	C.C3822	C.17709
C C	C.C2474	C.C5C7C	C.51CC2	C.C5812	C.C5615	C.C1312	C.C3997
RES	-C.CC283	C.C	C.C	C.85634	C.C	C.C	C.C4476
NCNR	C.C236C	C.CC39C	C.C2139	C.CC447	C.83165	-C.CC578	C.C1553
CH I	-C.C3823	-C.C111C	C.37521	-C.C1272	-C.C1229	C.42C36	-C.C4423
CH P	C.CCCCC	C.CCCC1	C.CCCC1	C.CCCC1	C.CCCC1	C.CCCCC	C.E1C34

TABLE (5-6)

THIS IS THE- B -MATRIX--EXCESS COEFFICIENTS

	CB LOANS G	CH GNP WTD Y+1	CHPRCDLC	TERM STR T	BILL R	CCVT E R	BILL R*Y	TIMEDR*Y	ECNC R*Y
C CC	C.C	C.C	C.C	C.C	-C.66167	C.C	C.C	C.C	C.C
C CC	C.C	C.CC936	C.C	C.C	-C.C2581	C.C	C.C	0.C	C.C
C TC	C.C	C.C	C.C	C.C	C.C	C.C	-C.24196	C.16925	-C.2976C
C FR	C.C	C.C	C.C	C.C	-C.17212	C.C	C.C	C.C	C.C
CH L	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C
CMC	C.C	C.C	C.14355	C.C	-C.C1C24	C.C	-C.CC226	C.CCC38	C.CC2C2
DIS	C.C	C.CC613	C.C	C.C	C.C	C.32874	C.C	C.C	C.C
GNP	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C
C NC	C.C8711	C.C	C.C	C.4568C	C.C	C.C	C.C	C.C	C.C
C C	C.C	C.13C12	C.C	C.C	C.C	C.C	C.C	C.C	C.C
RES	C.C	C.C7195	C.C	C.C	C.C	C.C	C.C	C.C	C.17810
NCNR	C.C	C.12636	C.C	C.C	C.C	C.91468	C.C	C.C	C.C
CH I	C.C	C.44313	C.C	C.C	1.5C73C	C.C	C.C	C.C	C.C
CH P	C.C	C.C	C.C	-C.C4661	C.CC175	C.C	C.C	C.C	C.C

	BAL-PAYM	CHRR-TC EXCG EXP	PERM Y-1	INVENT-1	CAPAC -1	CEMC C-1	CCIN C-1	TIME C-1	FR RES-1
C CC	C.C	C.C	C.C	C.C1EC6	C.C	C.C	-C.C4856	C.C	C.C	C.C
C CC	C.C	C.C	C.C	C.C	C.C	C.C	C.C	-C.C1183	C.C	C.C
C TC	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	-C.C848C	C.C
C FR	C.C	-C.31224	C.C	C.C	C.C	C.C	C.C	C.C	C.C	-C.35C91
CH L	C.C	C.C	C.C	C.C	-C.26427	C.C	C.C	C.C	C.C	C.C
CMC	C.16162	C.C1C3C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C
DIS	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C
GNP	C.C	C.C	1.CCCCC	C.C	C.C	C.C	C.C	C.C	C.C	C.C
C NC	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C
C C	C.C	C.C	C.C	C.C	C.C	C.14224	C.C	C.C	C.C	C.C
RES	C.C	C.C	C.C	C.C9SC9	C.C	C.C	C.C	C.C	C.C	C.C
NCNR	C.C	C.C	C.C	C.C	C.C	C.15417	C.C	C.C	C.C	C.C
CH I	C.C	C.C	C.C	C.C	-C.62133	C.C	C.C	C.C	C.C	C.C
CH P	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C

TABLE (5-7)

THIS IS THE B* MATRIX -- C-MATRIX + (W-MATRIX * WI-MATRIX)

	CB LOANS	G CH GNP	WTC Y+1	CHPRCDLC	TERM STR	T BILL R	CCNT B R	BILL R*Y	TIMECR*Y	ECNC R*Y
C DD	C.CCC23	C.CC419	C.C	C.CC123	C.C	-C.71642	C.CC24E	C.C	C.C	C.CCC4E
C CC	C.CCOC9	C.C1C12	C.C	C.CCC45	C.C	-C.C2461	C.CCC9C	C.C	C.C	C.CCC1E
C TC	C.CC035	C.CC624	C.C	C.CC183	C.C	-C.23966	C.CC367	-C.24196	C.16925	-C.25E8E
C FR	-C.CCOC7	-C.CCC41	C.C2C99	-C.CCC37	-C.CC15C	-C.C9C42	-C.CCC74	-C.CC43C	C.CC283	-C.CC473
CH L	C.CC181	C.C3231	C.C	C.CC95C	C.C	-C.26E2E	C.C19C2	C.C	C.C	C.CC37C
CMC	-C.CCCCC	-C.CCCC1	C.14382	-C.CCCCC	-C.C1C2E	-C.CC11E	-C.CCCC1	-C.CC232	C.CCC41	C.CC19E
DIS	C.C	C.CC613	C.C	C.C	C.C	C.32874	C.C	C.C	C.C	C.C
GNP	C.1C042	C.88299	C.C	C.52659	C.C	1.39985	1.C5444	C.C	C.C	C.2C532
C NC	C.C9535	C.C7244	C.C	C.49999	C.C	C.11484	C.CE65C	C.C	C.C	C.C1E84
C C	C.CC591	C.18956	C.C	C.C31CC	C.C	-C.C51CE	C.C62C8	C.C	C.C	C.C12C9
RES	C.C	C.C6648	C.C	C.C	C.C	-C.29557	C.C	C.C	C.C	C.1781C
NCNR	C.CC045	C.13447	C.C	C.CC23E	C.C	-C.CE731	C.91945	C.C	C.C	C.CCC93
CH I	-C.CC129	C.42CC5	C.C	-C.CC679	C.C	1.69857	-C.C1359	C.C	C.C	-C.CC265
CH P	C.CCOCC	C.CCCC1	C.C	-C.C4661	C.C	C.CC17E	C.CCCC1	C.C	C.C	C.CCCCC

	BAL-PAYM	CHRR-TC	EXCG EXP	PERM Y-1	INVENT-1	CAPAC -1	DEMC C-1	CCIN C-1	TIME C-1	FR RES-1
C DD	C.C	C.C	C.CC269	C.C176C	-C.C3983	C.CC736	-C.C5245	C.C	C.C	C.C
C CC	C.C	C.C	C.CCC99	C.CCCC5	-C.CCC61	C.CCC29	C.CCCCC	-C.C1183	C.C	C.C
C TC	C.C	C.C	C.CC4C1	C.CC673	-C.C5936	C.C1C9E	-C.C1919	C.C	-C.C848C	C.C
C FR	C.C2363	-C.31132	-C.CCC81	-C.CC1C8	C.C1196	-C.CC221	C.CC3C4	C.C	-C.CC139	-C.35157
CH L	C.C	C.C	C.C2C79	C.C1192	-C.3C742	C.C9678	-C.C3CC6	C.C	C.C	C.C
CMC	C.16192	C.CC631	-C.CCCC1	-C.CCCC1	C.CCC15	-C.CCCC3	C.CCCC4	C.C	-C.CCCC2	-C.CC45C
DIS	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C	C.C
GNP	C.C	C.C	1.19286	C.1C952	-C.71336	C.34119	C.CCC3C	C.C	C.C	C.C
C NC	C.C	C.C	C.C9457	C.CC898	-C.C5852	C.C2799	C.CCCC2	C.C	C.C	C.C
C C	C.C	C.C	C.C6787	C.C1C97	-C.17596	C.18536	-C.C1365	C.C	C.C	C.C
RES	C.C	C.C	C.C	C.C9509	C.C	C.C	C.C	C.C	C.C	C.C
NCNR	C.C	C.C	C.CC522	C.CC299	-C.C7714	C.16E42	-C.CC754	C.C	C.C	C.C
CH I	C.C	C.C	-C.C1486	-C.CC851	-C.4C169	-C.C4C57	C.C2148	C.C	C.C	C.C
CH P	C.C	C.C	C.CCCC1	C.CCCCC	-C.CCCC1	C.CCCCC	C.CCCCC	C.C	C.C	C.C

TABLE (5-8)

THIS IS THE- C -MATRIX
COEFFICIENTS OF EXOGENOUS VARIABLES
LAGGED ONE-PERIOD

	CB LOANS
C DD	C.C
C CC	C.C
C TD	C.C
C FR	C.C
CH L	-C.11473
CMC	C.C
DIS	C.CC948
GNP	C.C
C ND	C.C
C C	C.C
RES	C.15880
NCNR	C.C
CH I	C.C
CH F	C.C

THIS IS THE- C* -MATRIX

	CB LOANS
C DD	-C.C1796
C CC	C.CCC15
C TD	-C.C2677
C FR	C.CC670
CH L	-C.13865
CMC	C.CCCC9
DIS	C.CC948
GNP	C.17467
C ND	C.C1433
C C	-C.C542C
RES	C.15C2E
NCNR	-C.C3479
CH I	C.C99C6
CH F	C.CCCCC

Impact Multipliers

The impact multipliers of this system of equations—B^*-matrix—reflect the magnitude of the current-quarter change of an endogenous variable which results from a unit change in one of the current exogenous (or contemporary endogenous) variables. In terms of the B^*-matrix, an element, b_{ij}, would indicate the magnitude of the change in the i^{th} endogenous variable given a unit change during the current period in the j^{th} exogenous variable. For example, from Table (5-6), a one percent increase in the rate of worker productivity would immediately result in an increase of more than $525 million in income. Most of this increase, apparently, would be spent to purchase nondurable goods and services. A one billion dollar increase in government expenditures (accounted for by a rise in exogenous expenditures) would apparently result in a $20 million addition to the level of loans. These two would combine to raise income by $1.15 billion—the initial increase in government spending plus about $95 million in new nondurable and service consumption and $68 million in durable goods consumption.

Several of the entries in this Table do not agree with the results which, a priori, are more generally expected. These multipliers tend to be larger than those normally expected. At least part of the reason for this is that the effects of lagged endogenous and exogenous variables have not yet had an effect on the magnitude of this reaction. Also, as pointed out before, the multipliers are quite subject to differences resulting from other dissimilarities in specification and estimation. Fromm and Taubman (1967) also explain why these impact multipliers may differ from model to model:

> The impact multipliers reported here are somewhat greater than those customarily estimated. However, most of the other information we have on such multipliers is derived from models which are highly recursive, rather than simultaneous. This high degree of recursion tends to dampen the reaction of the multipliers. . . .
>
> It should also be emphasized that these are one-quarter impact multipliers; in a system with lags, longer-term multipliers tend to be different.

Interim and Total Multipliers

As Goldberger (1959) points out, the procedure that has usually been employed to trace the effects of a unit change in the exogenous variable on the various endogenous variables during periods subsequent to the occurrence of the impact effect has been: ". . . to first estimate a value of the marginal propensity to consume and specify a one-period lag in the consumption-income relationship. The time path of response is then easily traced out in terms of unit periods." However, the preferable method recognizes that the impact multipliers do not include lagged effects of either the exogenous or endogenous variables. The time path of changes in the endogenous variables when a unit increase in one of the exogenous variables is sustained in successive periods is better explained by also including the effects of the lagged endogenous (A^*-matrix) and lagged exogenous (C^*-matrix) variables. This means that the impact multipliers—the B^*-matrix—will differ substantially from the interim multipliers which are obtained by (pre-) multiplying the product matrix $(C^* + A^*B^*)$ by an appropriate power of the A^*-matrix. The appropriate power is one less than the number of the future period in which one is interested—e.g., for the fourth quarter in the future, one would use A^{*3}.

Also following Goldberger (1959) use was made of the "truncated

time paths" although it was recognized that:

> . . . They are quite particularized, in that they refer to the response to a particular sequence of exogenous stimuli beginning from a particular initial situation. The particular response path, then, may be regarded as being determined by these two particular factors, superimposed upon the inherent response characteristics of the system.

The "total multiplier" is a concept which measures the aggregated effects of a sustained increase of one unit in the exogenous variable. Table (5-9) contains the "total multipliers" for the dynamic effects of a unit change in each of the exogenous variables on all of the endogenous variables. As previously noted, this multiplier represents the arithmetic sum of the impact multiplier and all (summed theoretically to infinity) the interim multipliers. Since in this analysis, a truncated time path covering a ten year future time span—forty quarters—was employed, the sum of the impact plus all the interim multipliers shown does not total to the figure shown as the "total multipliers."

Tables (5-10) through (5-25) present all the multiplier measures: (1) the total multiplier; (2) the impact multiplier (for a zero time lag); and, (3) the forty interim multipliers for the ten year (forty-quarter) truncated time path. The length of this time path was arbitrarily chosen to be forty-quarters because it seemed that, for almost all the endogenous variables, the rate of convergence had "settled-down" into a slightly damped, monotonic convergence path. It was, therefore, felt that most of the economically relevant developments had already taken place.

TABLE (5-9)

DYNAMIC TOTAL MULTIPLIERS
****

	CB LOANS	C CH GNP	WTD Y+1	CHPRODUC	TERM STR
CH DEM D	0.06249	0.31040	0.00281	0.09810	-0.00020
CH COINC	0.00688	0.04021	0.00045	0.01013	-0.00003
CH TIMED	0.29559	0.89981	0.01776	0.50122	-0.00127
CH FR RS	0.00158	-0.03873	0.02254	-0.01211	-0.00161
CH LOANS	0.24404	1.21624	0.01128	0.67410	-0.00081
OPEN M O	0.00002	-0.00042	0.12158	-0.00013	-0.00868
DISC'T R	0.05699	0.11521	-0.01248	0.08798	0.00089
GNP	3.19092	7.73043	0.20637	4.69571	-0.01473
C NONDUR	1.37995	2.50854	0.06679	3.17636	-0.00477
C DUR G	0.45639	1.79920	0.02609	0.91136	-0.00186
RESID FI	0.74871	-0.21995	0.07812	-0.55066	-0.00557
NONRES I	0.54267	2.95476	0.02856	1.25628	-0.00204
CH INVEN	0.06320	0.68788	0.00681	-0.09765	-0.00049
ANN CH P	0.00116	0.00239	-0.00022	-0.24397	0.00002

	T BILL R	GOVT B R	BILL R*Y	TIMEDR*Y	BOND R*Y
CH DEM D	-2.03279	0.69096	-0.00086	0.00058	0.16075
CH COINC	-0.09578	0.03822	-0.00014	0.00009	0.00879
CH TIMED	-2.28730	2.03899	-0.31803	0.22230	0.08665
CH FR RS	0.11921	-0.09176	-0.00688	0.00462	-0.02918
CH LOANS	-2.74857	2.70808	-0.00344	0.00231	0.62995
OPEN M O	0.00129	-0.00099	-0.00199	0.00037	0.00139
DISC'T R	0.76617	0.22418	0.00381	-0.00256	0.05673
GNP	-14.32898	17.71928	-0.06295	0.04230	4.07657
C NONDUR	-4.63291	5.74950	-0.02037	0.01369	1.32281
C DUR G	-3.30744	3.56416	-0.00796	0.00535	0.82525
RESID FI	-4.79527	-1.40309	-0.02383	0.01601	0.88471
NONRES I	-4.83847	10.27671	-0.00871	0.00585	1.15565
CH INVEN	3.24509	-0.46796	-0.00208	0.00140	-0.11185
ANN CH P	0.02261	0.00474	0.00007	-0.00004	0.00118

TABLE (5-9)
CONTINUED

DYNAMIC TOTAL MULTIPLIERS
****

	BAL-PAYM	CHRRR-TD	EXOG EXP	PERM Y-1	INVENT-1
CH DEM D	0.00316	-0.04929	0.13044	0.13370	-0.34998
CH COINC	0.00050	-0.00782	0.00721	0.00511	-0.01245
CH TIMED	0.02000	-0.31194	0.38491	0.29524	-0.80827
CH FR RS	0.02538	-0.39590	-0.01732	-0.01582	0.05641
CH LOANS	0.01270	-0.19816	0.51122	0.40032	-1.37233
OPEN M O	0.13688	0.00442	-0.00019	-0.00017	0.00061
DISC'T R	-0.01405	0.21919	0.04232	0.03226	-0.08997
GNP	0.23234	-3.62410	3.34500	2.37102	-5.77113
C NONDUR	0.07519	-1.17292	1.08537	0.76937	-1.87279
C DUR G	0.02937	-0.45821	0.67283	0.50580	-1.53406
RESID FI	0.08795	-1.37184	-0.26487	0.46000	0.56311
NONRES I	0.03215	-0.50154	0.94001	0.72144	-2.33428
CH INVEN	0.00767	-0.11960	-0.08834	-0.08559	-0.59311
ANN CH P	-0.00025	0.00385	0.00090	0.00068	-0.00185

	CAPAC -1	DEMD D-1	COIN C-1	TIME D-1	FR RES-1
CH DEM D	0.22919	-0.14319	0.0	-0.00028	-0.05563
CH COINC	0.01082	-0.00102	-0.02974	-0.00005	-0.00882
CH TIMED	0.61603	-0.12231	0.0	-0.11136	-0.35200
CH FR RS	-0.03310	0.01318	0.0	-0.00229	-0.44675
CH LOANS	0.89843	-0.18723	0.0	-0.00114	-0.22361
OPEN M O	-0.00036	0.00014	0.0	-0.00002	-0.00483
DISC'T R	0.06803	-0.01286	0.0	0.00127	0.24734
GNP	5.01705	-0.47431	0.0	-0.02092	-4.08958
C NONDUR	1.62797	-0.15398	0.0	-0.00677	-1.32357
C DUR G	1.34745	-0.18274	0.0	-0.00265	-0.51706
RESID FI	-0.42577	0.08046	0.0	-0.00792	-1.54803
NONRES I	2.49405	-0.30002	0.0	-0.00290	-0.56595
CH INVEN	-0.02664	0.08198	0.0	-0.00069	-0.13496
ANN CH P	0.00143	-0.00025	0.0	0.00002	0.00435

TABLE (5-1C)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE CB LOANS

	CH DEM D	CH CCINC	CH TIMED	CH FR RS	CH LOANS	CPEN M C	DISC'T R
TOTAL	C.C6249	C.CC6EE	C.29559	C.CC158	C.2440C4	C.CCCC2	C.C5699
LAG							
C	C.CCC23	C.0CCC9	C.CCC35	-C.CCCC7	C.CC181	-C.CCCCC	C.C
1	-C.C1679	C.CCC2E	-C.C1963	C.CC649	-C.13C46	C.CCCCE	C.CC981
2	-C.C1156	C.CCC34	C.CC265	C.CC424	-C.C2556	C.CCCC4	C.CC595
3	-C.CC53E	C.CCC34	C.C1C12	C.CC2C9	C.CC227	C.CCCC2	C.CC3E6
4	-C.CC11C	C.CCC33	C.C127C	C.CCC79	C.C1187	C.CCCC1	C.CC249
5	C.CC155	C.CCC32	C.C1392	C.CCCCE	C.C16C5	-C.CCCCC	C.CC195
6	C.CC311	C.CCC31	C.C1453	-C.CCC29	C.C18C3	-C.CCCCC	C.CC172
7	C.CC39E	C.CCC3C	C.C1473	-C.CCC4E	C.C1888	-C.CCCC1	C.CC163
8	C.CC443	C.CCC29	C.C1462	-C.CCC57	C.C19C4	-C.CCCC1	C.CC16C
9	C.CC462	C.CCC27	C.C1429	-C.CCC6C	C.C188C	-C.CCCC1	C.CC157
1C	C.CC464	C.CCC2E	C.C138C	-C.CCC61	C.C1829	-C.CCCC1	C.CC154
11	C.CC457	C.0CC25	C.C1323	-C.CCC6C	C.C1762	-C.CCCC1	C.CC151
12	C.CC443	C.CCC24	C.C1261	-C.CCC5E	C.C1685	-C.CCCC1	C.CC14E
13	0.CC42E	C.CCC22	C.C1196	-C.CCC55	C.C1EC4	-C.CCCC1	C.CC141
14	C.CC4C7	C.CCC21	C.C1131	-C.CCC52	C.C152C	-C.CCCC1	C.CC135
15	C.CC3E6	C.CCC2C	C.C1C66	-C.CCC5C	C.C143E	-C.CCCC1	C.CC128
16	C.CC366	C.CCC19	C.C1CC3	-C.CCC47	C.C1353	-C.CCCC1	C.CC122
17	C.CC345	C.CCC17	C.CC942	-C.CCC44	C.C1272	-C.CCCCC	C.CC115
18	C.CC324	C.CCC1E	C.CC8E3	-C.CCC41	C.C1193	-C.CCCCC	C.CC1C9
19	C.CC3C5	C.CCC15	C.CC827	-C.CCC3S	C.C111E	-C.CCCCC	C.CC1C2
2C	C.CC2E6	C.CCC14	C.CC773	-C.CCC3E	C.C1C4E	-C.CCCCC	C.CCC9E
21	C.CC267	C.CCC13	C.CC722	-C.CCC34	C.CC97E	-C.CCCCC	C.CCC9C
22	C.CC25C	C.CCC12	C.CC674	-C.CCC32	C.CC913	-C.CCCCC	C.CCC84
23	C.CC233	C.CCC12	C.CC62E	-C.CCC2S	C.CC851	-C.CCCCC	C.CCC79
24	C.CC21E	C.CCC11	C.CC5E5	-C.CCC27	C.CC793	-C.CCCCC	C.CCC73
25	C.CC2C3	C.CCC1C	C.CC544	-C.CCC26	C.CC73S	-C.CCCCC	C.CCC6S
26	C.CC19S	C.CCCCS	C.CC5CE	-C.CCC24	C.CC687	-C.CCCCC	C.CCC64
27	C.CC176	C.CCCCS	C.CC47C	-C.CCC22	C.CC63S	-C.CCCCC	C.CCC59
28	C.CC164	C.CCCCE	C.CC437	-C.CCC21	C.CC594	-C.CCCCC	C.CCC55
29	C.CC152	C.CCCC7	C.CC4CE	-C.CCC1S	C.CC551	-C.CCCCC	C.CCC51
3C	C.CC141	C.CCCC7	C.CC37E	-C.CCC1E	C.CC511	-C.CCCCC	C.CCC4E
31	C.CC131	C.CCCCE	C.CC34S	-C.CCC1E	C.CC474	-C.CCCCC	C.CCC44
32	C.CC122	C.CCCCE	C.CC324	-C.CCC15	C.CC44C	-C.CCCCC	C.CCC41
33	C.CC113	C.CCCCS	C.CC3CC	-C.CCC14	C.CC4CE	-C.CCCCC	C.CCC3E
34	C.CC1C4	C.CCCCS	C.CC27E	-C.CCC13	C.CC37E	-C.CCCCC	C.CCC35
35	C.CCC97	C.CCCCS	C.CC257	-C.CCC12	C.CC35C	-C.CCCCC	C.CCC33
36	C.CCC9C	C.CCCC4	C.CC23E	-C.CCC11	C.CC324	-C.CCCCC	C.CCC3C
37	C.CC083	C.CCCC4	C.CC22C	-C.CCC1C	C.CC2SS	-C.CCCCC	C.CCC2E
38	C.CCC77	C.CCCC4	C.CC2C3	-C.CCC1C	C.CC277	-C.CCCCC	C.CCC2E
39	C.CCC71	C.CCCC3	C.CC1EE	-C.CCCCS	C.CC25E	-C.CCCCC	C.CCC24
40	C.CC06E	C.CCCC3	C.CC174	-C.CCCCE	C.CC237	-C.CCCCC	C.CCC22

TABLE (5-10)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE CE LOANS

	GNP	C NONDUR	C DUR	C RESID	FI NONRES I	CH INVEN	ANN CH P
TOTAL	3.19092	1.37955	0.45639	0.74871	0.54267	0.06320	0.00116
LAG							
0	0.10042	0.09535	0.00991	0.0	0.00045	-0.00129	0.00000
1	0.26330	0.09283	-0.04361	0.14998	-0.03134	0.09543	0.00000
2	0.19617	0.08544	-0.01924	0.12308	-0.02966	0.03654	0.00004
3	0.16311	0.07722	0.00155	0.10211	-0.02197	0.00420	0.00005
4	0.14910	0.06992	0.01358	0.08520	-0.01354	-0.00606	0.00006
5	0.14176	0.06387	0.01995	0.07120	-0.00566	-0.00761	0.00005
6	0.13604	0.05889	0.02313	0.05943	0.00129	-0.00669	0.00005
7	0.13035	0.05469	0.02450	0.04942	0.00719	-0.00544	0.00005
8	0.12441	0.05107	0.02483	0.04089	0.01205	-0.00442	0.00005
9	0.11827	0.04786	0.02454	0.03360	0.01595	-0.00368	0.00004
10	0.11204	0.04495	0.02387	0.02738	0.01899	-0.00319	0.00004
11	0.10585	0.04227	0.02295	0.02210	0.02127	-0.00277	0.00004
12	0.09977	0.03977	0.02197	0.01761	0.02290	-0.00248	0.00004
13	0.09386	0.03742	0.02089	0.01381	0.02399	-0.00225	0.00004
14	0.08815	0.03519	0.01979	0.01062	0.02461	-0.00206	0.00004
15	0.08267	0.03307	0.01868	0.00794	0.02486	-0.00190	0.00003
16	0.07742	0.03106	0.01759	0.00570	0.02481	-0.00175	0.00003
17	0.07242	0.02915	0.01654	0.00385	0.02450	-0.00162	0.00003
18	0.06767	0.02734	0.01551	0.00232	0.02400	-0.00150	0.00003
19	0.06317	0.02561	0.01453	0.00107	0.02335	-0.00139	0.00003
20	0.05891	0.02397	0.01359	0.00005	0.02259	-0.00128	0.00003
21	0.05490	0.02241	0.01270	-0.00076	0.02174	-0.00119	0.00003
22	0.05112	0.02094	0.01185	-0.00141	0.02084	-0.00110	0.00002
23	0.04756	0.01955	0.01105	-0.00192	0.01989	-0.00102	0.00002
24	0.04422	0.01824	0.01030	-0.00230	0.01893	-0.00094	0.00002
25	0.04109	0.01700	0.00959	-0.00259	0.01797	-0.00087	0.00002
26	0.03816	0.01583	0.00892	-0.00279	0.01701	-0.00081	0.00002
27	0.03542	0.01473	0.00829	-0.00292	0.01606	-0.00075	0.00002
28	0.03285	0.01371	0.00770	-0.00300	0.01514	-0.00069	0.00002
29	0.03046	0.01274	0.00715	-0.00303	0.01424	-0.00064	0.00002
30	0.02823	0.01184	0.00663	-0.00303	0.01338	-0.00059	0.00001
31	0.02615	0.01099	0.00615	-0.00299	0.01254	-0.00055	0.00001
32	0.02422	0.01020	0.00570	-0.00293	0.01175	-0.00050	0.00001
33	0.02241	0.00946	0.00529	-0.00285	0.01099	-0.00047	0.00001
34	0.02074	0.00877	0.00490	-0.00276	0.01027	-0.00043	0.00001
35	0.01919	0.00813	0.00453	-0.00266	0.00958	-0.00040	0.00001
36	0.01774	0.00753	0.00419	-0.00255	0.00893	-0.00037	0.00001
37	0.01640	0.00697	0.00388	-0.00244	0.00832	-0.00034	0.00001
38	0.01516	0.00645	0.00359	-0.00232	0.00775	-0.00031	0.00001
39	0.01400	0.00597	0.00332	-0.00220	0.00721	-0.00029	0.00001
40	0.01294	0.00552	0.00307	-0.00209	0.00670	-0.00027	0.00001

TABLE (5-11)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE G OF GNP

LAG	OF DEM G	OF CCINC	OF TIMEC	OF FR RS	OF LOANS	OPEN M C	DISC'T R
TOTAL	C.21040	C.04021	C.89981	-C.03873	1.21624	-C.00042	C.11521
0	C.00419	C.01012	C.00624	-C.00041	C.03231	-C.00001	C.00413
1	C.01229	C.00665	C.06508	-C.00150	C.07867	-C.00002	C.00694
2	C.01649	C.00444	C.06691	-C.00205	C.08082	-C.00002	C.00696
3	C.01788	C.00305	C.05980	-C.00224	C.07544	-C.00002	C.00668
4	C.01779	C.00217	C.05320	-C.00223	C.06947	-C.00002	C.00630
5	C.01705	C.00162	C.04808	-C.00214	C.06407	-C.00002	C.00589
6	C.01607	C.00126	C.04403	-C.00202	C.05928	-C.00002	C.00550
7	C.01503	C.00102	C.04064	-C.00189	C.05499	-C.00002	C.00512
8	C.01402	C.00086	C.03769	-C.00176	C.05109	-C.00002	C.00476
9	C.01306	C.00074	C.03502	-C.00164	C.04752	-C.00002	C.00443
10	C.01216	C.00066	C.03257	-C.00153	C.04422	-C.00002	C.00412
11	C.01132	C.00059	C.03030	-C.00142	C.04115	-C.00002	C.00384
12	C.01053	C.00054	C.02819	-C.00132	C.03828	-C.00001	C.00357
13	C.00980	C.00049	C.02621	-C.00123	C.03560	-C.00001	C.00332
14	C.00911	C.00046	C.02436	-C.00114	C.03309	-C.00001	C.00309
15	C.00847	C.00042	C.02263	-C.00106	C.03075	-C.00001	C.00287
16	C.00787	C.00039	C.02101	-C.00099	C.02855	-C.00001	C.00267
17	C.00731	C.00036	C.01950	-C.00092	C.02650	-C.00001	C.00248
18	C.00679	C.00033	C.01809	-C.00085	C.02459	-C.00001	C.00230
19	C.00630	C.00031	C.01677	-C.00079	C.02280	-C.00001	C.00213
20	C.00584	C.00029	C.01554	-C.00073	C.02113	-C.00001	C.00198
21	C.00541	C.00026	C.01439	-C.00068	C.01958	-C.00001	C.00184
22	C.00502	C.00024	C.01333	-C.00063	C.01813	-C.00001	C.00170
23	C.00465	C.00023	C.01233	-C.00058	C.01678	-C.00001	C.00158
24	C.00430	C.00021	C.01141	-C.00054	C.01553	-C.00001	C.00146
25	C.00398	C.00019	C.01055	-C.00050	C.01436	-C.00001	C.00135
26	C.00368	C.00018	C.00976	-C.00046	C.01328	-C.00000	C.00125
27	C.00341	C.00017	C.00902	-C.00043	C.01228	-C.00000	C.00116
28	C.00315	C.00015	C.00833	-C.00039	C.01134	-C.00000	C.00107
29	C.00291	C.00014	C.00770	-C.00036	C.01048	-C.00000	C.00099
30	C.00269	C.00013	C.00711	-C.00034	C.00968	-C.00000	C.00091
31	C.00248	C.00012	C.00656	-C.00031	C.00894	-C.00000	C.00084
32	C.00229	C.00011	C.00606	-C.00029	C.00825	-C.00000	C.00078
33	C.00212	C.00010	C.00559	-C.00026	C.00762	-C.00000	C.00072
34	C.00195	C.00009	C.00516	-C.00024	C.00703	-C.00000	C.00066
35	C.00180	C.00009	C.00476	-C.00022	C.00649	-C.00000	C.00061
36	C.00166	C.00008	C.00439	-C.00021	C.00599	-C.00000	C.00057
37	C.00154	C.00007	C.00405	-C.00019	C.00552	-C.00000	C.00052
38	C.00142	C.00007	C.00374	-C.00018	C.00509	-C.00000	C.00048
39	C.00131	C.00006	C.00344	-C.00016	C.00469	-C.00000	C.00044
40	C.00120	C.00006	C.00318	-C.00015	C.00433	-C.00000	C.00041

TABLE (5-11)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE G OF GNP

LAG	GNP	C NONDUR	C DUR	G RESID FI	NONRES I	CH INVEN	ANN CH F
TOTAL	7.72043	2.50854	1.79920	-0.21995	2.95476	0.66788	0.00239
0	0.88299	0.07244	0.18956	0.06648	0.13447	0.42005	0.00001
1	0.64380	0.10693	0.14470	0.05069	0.13998	0.20151	0.00003
2	0.51372	0.12203	0.12104	0.03715	0.14264	0.09087	0.00005
3	0.43954	0.12723	0.10930	0.02581	0.14216	0.03903	0.00007
4	0.39208	0.12722	0.09385	0.01644	0.13952	0.01505	0.00008
5	0.35760	0.12439	0.08503	0.00878	0.13549	0.00391	0.00009
6	0.32982	0.11999	0.07790	0.00258	0.13061	-0.00127	0.00010
7	0.30581	0.11474	0.07186	-0.00240	0.12521	-0.00361	0.00010
8	0.28423	0.10905	0.06657	-0.00633	0.11952	-0.00458	0.00010
9	0.26439	0.10317	0.06180	-0.00941	0.11370	-0.00488	0.00010
10	0.24596	0.09727	0.05745	-0.01177	0.10785	-0.00485	0.00010
11	0.22874	0.09144	0.05343	-0.01353	0.10206	-0.00466	0.00009
12	0.21262	0.08577	0.04969	-0.01479	0.09637	-0.00441	0.00009
13	0.19753	0.08029	0.04620	-0.01565	0.09082	-0.00413	0.00009
14	0.18341	0.07504	0.04294	-0.01618	0.08545	-0.00385	0.00008
15	0.17020	0.07004	0.03989	-0.01644	0.08028	-0.00357	0.00008
16	0.15786	0.06528	0.03704	-0.01648	0.07531	-0.00331	0.00008
17	0.14633	0.06079	0.03438	-0.01634	0.07057	-0.00306	0.00007
18	0.13555	0.05654	0.03189	-0.01606	0.06604	-0.00283	0.00007
19	0.12547	0.05255	0.02957	-0.01567	0.06174	-0.00262	0.00006
20	0.11625	0.04881	0.02740	-0.01520	0.05766	-0.00242	0.00006
21	0.10758	0.04529	0.02538	-0.01467	0.05380	-0.00223	0.00006
22	0.09952	0.04201	0.02350	-0.01409	0.05015	-0.00206	0.00005
23	0.09203	0.03894	0.02176	-0.01348	0.04671	-0.00190	0.00005
24	0.08508	0.03608	0.02013	-0.01286	0.04348	-0.00175	0.00005
25	0.07863	0.03341	0.01862	-0.01222	0.04044	-0.00162	0.00004
26	0.07265	0.03092	0.01722	-0.01159	0.03759	-0.00149	0.00004
27	0.06711	0.02861	0.01591	-0.01097	0.03492	-0.00138	0.00004
28	0.06197	0.02647	0.01471	-0.01035	0.03242	-0.00127	0.00003
29	0.05722	0.02447	0.01359	-0.00975	0.03008	-0.00117	0.00003
30	0.05282	0.02262	0.01255	-0.00917	0.02790	-0.00108	0.00003
31	0.04874	0.02090	0.01159	-0.00861	0.02586	-0.00099	0.00003
32	0.04498	0.01931	0.01070	-0.00808	0.02396	-0.00092	0.00003
33	0.04149	0.01783	0.00987	-0.00756	0.02220	-0.00084	0.00002
34	0.03827	0.01644	0.00911	-0.00707	0.02055	-0.00078	0.00002
35	0.03530	0.01520	0.00841	-0.00661	0.01902	-0.00072	0.00002
36	0.03255	0.01403	0.00776	-0.00617	0.01760	-0.00066	0.00002
37	0.03001	0.01294	0.00715	-0.00575	0.01627	-0.00061	0.00002
38	0.02767	0.01194	0.00660	-0.00536	0.01505	-0.00056	0.00002
39	0.02550	0.01102	0.00608	-0.00499	0.01391	-0.00052	0.00001
40	0.02351	0.01016	0.00561	-0.00464	0.01285	-0.00047	0.00001

TABLE (5-12)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE WTC Y+1

	CH DEM D	CH CCINC	CH TIMED	CH FR RS	CH LOANS	OPEN M C	DISC'T R
TOTAL	C.CC281	C.CCC45	C.C1176	C.C2254	C.C1128	C.12158	-C.C1248
LAG							
C	C.C	C.C	C.C	C.02C59	C.C	C.14382	C.C
1	-C.CC043	C.CCCCC	-C.CCC64	C.CC196	-C.CC329	-C.C263C	-C.CC451
2	-C.CCC65	C.CCCC1	-C.C0C6C	C.CCC97	-C.CC338	C.CC483	-C.CC34C
3	-C.CCC67	C.CCCC1	-C.CCC3E	-C.CCCC6	-C.CC26E	-C.CCC8E	-C.CC245
4	-C.CC056	C.CCCC1	-C.CCCCE	-C.CCC12	-C.CC177	C.CCC1E	-C.CC159
5	-C.CC04C	C.CCCC2	C.CCC1E	-C.CCC12	-C.CCC9E	-C.CCCC3	-C.CC1CC
6	-C.CC024	C.CCCC2	C.CCC3E	-C.CCCC9	-C.CCC31	C.CCCCC	-C.CCC61
7	-C.CC01C	C.CCCC2	C.CCC54	-C.CCCC7	C.CCC1E	-C.CCCCC	-C.CCC3E
8	C.CCCC1	C.CCCC2	C.CCC6E	-C.CCCC6	C.CCC5C	-C.CCCCC	-C.CCC2C
9	C.CCC1C	C.CCCC2	C.CCC74	-C.CCCC5	C.CCC73	-C.CCCCC	-C.CCCC9
1C	C.CCC16	C.CCCC2	C.CCC7S	-C.CCCC4	C.CCC8E	-C.CCCCC	-C.CCCC2
11	C.CC02C	C.CCCC2	C.CCC82	-C.CCCC4	C.CCC9E	-C.CCCCC	C.CCCC2
12	C.CCC23	C.CCCC2	C.CCC83	-C.CCCC4	C.CC1C3	-C.CCCCC	C.CCCC5
13	C.CCC25	C.CCCC2	C.CCC82	-C.CCCC4	C.CC1C5	-C.CCCCC	C.CCCC6
14	C.CCC26	C.CCCC2	C.CCC81	-C.CCCC4	C.CC1C5	-C.CCCCC	C.CCCC7
15	C.CCO26	C.CCCC1	C.CCC7S	-C.CCCC4	C.CC1C3	-C.CCCCC	C.CCCC8
16	C.CCC2E	C.CCCC1	C.CCC7E	-C.CCCC3	C.CC1CC	-C.CCCCC	C.CCCCE
17	C.CCO25	C.CCCC1	C.CCC73	-C.CCCC3	C.CCC97	-C.CCCCC	C.CCCC8
18	C.CCO24	C.CCCC1	C.CCC6S	-C.CCCC3	C.CCC93	-C.CCCCC	C.CCCCE
19	C.CCO23	C.CCCC1	C.CCC6E	-C.CCCC3	C.CCC88	-C.CCCCC	C.CCCC8
2C	C.CCO22	C.CCCC1	C.CCC62	-C.CCCC3	C.CCC84	-C.CCCCC	C.CCCC7
21	C.CCC21	C.OCCC1	C.CCC5S	-C.CCCC3	C.CCC7S	-C.CCCCC	C.CCCC7
22	C.CCC2C	C.CCCC1	C.CCC56	-C.CCCC3	C.CCC75	-C.CCCCC	C.CCCC7
23	C.CCC1S	C.CCCC1	C.CCC52	-C.CCCC2	C.CCC7C	-C.CCCCC	C.CCCC6
24	C.CCC1E	C.CCCC1	C.CCC4S	-C.CCCC2	C.CCC6E	-C.CCCCC	C.CCCC6
25	C.CCC17	C.CCCC1	C.CCC4E	-C.CCCC2	C.CCC62	-C.CCCCC	C.CCCC6
26	C.CCC16	C.CCCC1	C.CCC43	-C.CCCC2	C.CCC5E	-C.CCCCC	C.CCCC5
27	C.CCC15	C.CCCC1	C.CCC4C	-C.CCCC2	C.CCC54	-C.CCCCC	C.CCCC5
28	C.CCC14	C.CCCC1	C.CCC3E	-C.CCCC2	C.CCC51	-C.CCCCC	C.CCCC5
29	C.CCC13	C.CCCC1	C.CCC35	-C.CCCC2	C.CCC47	-C.CCCCC	C.CCCC4
3C	C.CCC12	C.CCCC1	C.CCC33	-C.CCCC2	C.CCC44	-C.CCCCC	C.CCCC4
31	C.CCO11	C.CCCC1	C.CCC3C	-C.CCCC1	C.CCC41	-C.CCCCC	C.CCCC4
32	C.CCC11	C.CCCC1	C.CCC2E	-C.CCCC1	C.CCC3E	-C.CCCCC	C.CCCC4
33	C.CCC1C	C.CCCCC	C.CCC2E	-C.CCCC1	C.CCC3E	-C.CCCCC	C.CCCC3
34	C.CCOCS	C.CCCCC	C.CCC24	-C.CCCC1	C.CCC33	-C.CCCCC	C.CCCC3
35	C.CCCCE	C.CCCCC	C.CCC23	-C.CCCC1	C.CCC31	-C.CCCCC	C.CCCC3
36	C.CCCCE	C.CCCCC	C.CCC21	-C.CCCC1	C.CCC29	-C.CCCCC	C.CCCC3
37	C.CCOC7	C.CCCCC	C.CCC1S	-C.CCCC1	C.CCC2E	-C.CCCCC	C.CCCC2
38	C.CCCC7	C.CCCCC	C.CCC1E	-C.CCCC1	0.CCC25	-C.CCCCC	C.CCCC2
39	C.CCCC6	C.CCCCC	C.CCC17	-C.CCCC1	C.CCC23	-C.CCCCC	C.CCCC2
4C	C.CCCC6	C.CCCCC	C.CCC1E	-C.CCCC1	C.CCC21	-C.CCCCC	C.CCCC2

TABLE (5-12)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE WTC Y+1

	GNP	C NONDUR	C DUR	C RESID	FI NONRES I	CH INVEN	ANN CH F
TOTAL	C.20637	C.06679	C.02609	C.07812	C.02856	C.00681	-C.00022
LAG							
0	C.0	C.0	C.0	C.0	C.0	C.0	C.0
1	C.00471	C.00039	-C.00126	C.00406	-C.00083	C.00235	C.00000
2	C.00701	C.00086	-C.00169	C.00653	-C.00148	C.00278	-C.00002
3	C.00803	C.00130	-C.00149	C.00780	-C.00183	C.00225	-C.00002
4	C.00839	C.00166	-C.00098	C.00810	-C.00187	C.00148	-C.00003
5	C.00849	C.00193	-C.00040	C.00784	-C.00170	C.00083	-C.00003
6	C.00849	C.00213	C.00013	C.00726	-C.00140	C.00037	-C.00003
7	C.00844	C.00228	C.00055	C.00654	-C.00103	C.00009	-C.00002
8	C.00833	C.00238	C.00087	C.00578	-C.00064	-C.00006	-C.00002
9	C.00817	C.00245	C.00110	C.00503	-C.00026	-C.00014	-C.00002
10	C.00796	C.00248	C.00129	C.00433	C.00009	-C.00018	-C.00001
11	C.00771	C.00248	C.00134	C.00369	C.00040	-C.00019	-C.00001
12	C.00744	C.00246	C.00138	C.00312	C.00067	-C.00019	-C.00001
13	C.00714	C.00242	C.00140	C.00261	C.00089	-C.00018	-C.00001
14	C.00682	C.00237	C.00138	C.00217	C.00107	-C.00017	-C.00001
15	C.00649	C.00230	C.00135	C.00179	C.00121	-C.00016	-C.00000
16	C.00617	C.00222	C.00131	C.00146	C.00132	-C.00015	-C.00000
17	C.00584	C.00214	C.00126	C.00118	C.00140	-C.00014	-C.00000
18	C.00551	C.00205	C.00121	C.00094	C.00145	-C.00013	-C.00000
19	C.00520	C.00196	C.00115	C.00073	C.00148	-C.00012	-C.00000
20	C.00489	C.00186	C.00109	C.00056	C.00148	-C.00011	-C.00000
21	C.00459	C.00177	C.00103	C.00042	C.00148	-C.00010	-C.00000
22	C.00430	C.00167	C.00097	C.00030	C.00146	-C.00010	C.00000
23	C.00403	C.00158	C.00092	C.00020	C.00143	-C.00009	C.00000
24	C.00377	C.00149	C.00086	C.00011	C.00139	-C.00008	C.00000
25	C.00352	C.00140	C.00081	C.00005	C.00134	-C.00008	C.00000
26	C.00328	C.00132	C.00076	-C.00001	C.00129	-C.00007	C.00000
27	C.00306	C.00124	C.00071	-C.00005	C.00124	-C.00007	C.00000
28	C.00285	C.00116	C.00066	-C.00009	C.00118	-C.00006	C.00000
29	C.00265	C.00108	C.00062	-C.00011	C.00113	-C.00006	C.00000
30	C.00247	C.00101	C.00057	-C.00013	C.00107	-C.00005	C.00000
31	C.00229	C.00094	C.00053	-C.00015	C.00101	-C.00005	C.00000
32	C.00213	C.00088	C.00050	-C.00016	C.00096	-C.00005	C.00000
33	C.00198	C.00082	C.00046	-C.00017	C.00090	-C.00004	C.00000
34	C.00184	C.00076	C.00043	-C.00017	C.00085	-C.00004	C.00000
35	C.00170	C.00071	C.00040	-C.00017	C.00080	-C.00004	C.00000
36	C.00158	C.00066	C.00037	-C.00017	C.00075	-C.00003	C.00000
37	C.00146	C.00061	C.00034	-C.00017	C.00070	-C.00003	C.00000
38	C.00135	C.00057	C.00032	-C.00017	C.00066	-C.00003	C.00000
39	C.00125	C.00053	C.00030	-C.00016	C.00062	-C.00003	C.00000
40	C.00116	C.00049	C.00027	-C.00016	C.00058	-C.00002	C.00000

TABLE (5-13)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE CHPRODUC

	CH DEM C	CH CCINC	CH TIMEC	CH FR RS	CH LOANS	OPEN M C	DISC'T R
TOTAL	C.C981C	C.C1C13	C.5C122	-C.C1211	C.6741C	-C.CCC13	C.C8798
LAG							
C	C.CC123	C.CCC45	C.CC183	-C.CCC37	C.CC95C	-C.CCCCC	C.C
1	-C.CC135	C.CCC66	C.C3492	-C.CCC38	C.C4CC5	-C.CCCCC	C.CC4C5
2	-C.CC028	C.CCC74	C.C3995	-C.CCC35	C.C4767	-C.CCCCC	C.CC6C8
3	C.CC147	C.CCC75	C.C3867	-C.CCC36	C.C4859	-C.CCCCC	C.CC689
4	C.CC3CC	C.CCC72	C.C3CC1	-C.CCC39	C.C4694	-C.CCCCC	C.CC699
5	C.CC412	C.CCC67	C.C33C5	-C.CCC44	C.C4413	-C.CCCCC	C.CC67C
6	C.CC482	C.CCC61	C.C3CC9	-C.CCC48	C.C4C81	-C.CCCC1	C.CC622
7	C.CC52C	C.CCC55	C.C2725	-C.CCC5C	C.C3735	-C.CCCC1	C.CC565
8	C.CC532	C.CCC49	C.C246C	-C.CCC52	C.C3394	-C.CCCC1	C.CC5C6
9	C.CC528	C.CCC44	C.C2215	-C.CCC52	C.C3C7C	-C.CCCC1	C.CC45C
1C	C.CC512	C.CCC4C	C.C1993	-C.CCC51	C.C277C	-C.CCCC1	C.CC398
11	C.CC489	C.CCC35	C.C1793	-C.CCC5C	C.C2496	-C.CCCC1	C.CC35C
12	C.CC462	C.CCC32	C.C1613	-C.CCC48	C.C2247	-C.CCCC1	C.CC3C8
13	C.CC433	C.CCC28	C.C1453	-C.CCC46	C.C2C23	-C.CCCCC	C.CC271
14	C.CC4C4	C.CCC25	C.C13C9	-C.CCC43	C.C1822	-C.CCCCC	C.CC238
15	C.CC375	C.CCC23	C.C1181	-C.CCC41	C.C1643	-C.CCCCC	C.CC21C
16	C.CC347	C.CCC2C	C.C1C66	-C.CCC38	C.C1482	-C.CCCCC	C.CC185
17	C.CC32C	C.CCC1E	C.CC9E4	-C.CCC3E	C.C133E	-C.CCCCC	C.CC163
18	C.CC295	C.CCC17	C.CC873	-C.CCC33	C.C121C	-C.CCCCC	C.CC145
19	C.CC271	C.CCC15	C.CC791	-C.CCC31	C.C1C95	-C.CCCCC	C.CC128
2C	C.CC249	C.CCC13	C.CC717	-C.CCC29	C.CC992	-C.CCCCC	C.CC114
21	C.CC229	C.CCC12	C.CC651	-C.CCC27	C.CC9CC	-C.CCCCC	C.CC1C2
22	C.CC21C	C.CCC11	C.CC592	-C.CCC25	C.CC817	-C.CCCCC	C.CCC91
23	C.CC193	C.CCC1C	C.CC53E	-C.CCC23	C.CC742	-C.CCCCC	C.CCC81
24	C.CC177	C.CCCC9	C.CC49C	-C.CCC21	C.CC675	-C.CCCCC	C.CCC73
25	C.CC162	C.CCCC8	C.CC446	-C.CCC19	C.CC614	-C.CCCCC	C.CCC66
26	C.CC149	C.CCCC8	C.CC4C7	-C.CCC18	C.CC56C	-C.CCCCC	C.CCC59
27	C.CC137	C.CCCC7	C.CC371	-C.CCC16	C.CC51C	-C.CCCCC	C.CCC53
28	C.CC125	C.CCCC6	C.CC339	-C.CCC15	C.CC465	-C.CCCCC	C.CCC48
29	C.CC115	C.CCCC6	C.CC3C9	-C.CCC14	C.CC424	-C.CCCCC	C.CCC44
3C	C.CC1C5	C.CCCC5	C.CC282	-C.CCC13	C.CC388	-C.CCCCC	C.CCC39
31	C.CCC97	C.CCCC5	C.CC25E	-C.CCC12	C.CC354	-C.CCCCC	C.CCC3E
32	C.CCC89	C.CCCC4	C.CC23E	-C.CCC11	C.CC324	-C.CCCCC	C.CCC33
33	C.CC081	C.CCCC4	C.CC21E	-C.CCC1C	C.CC296	-C.CCCCC	C.CCC3C
34	C.CCC74	C.CCCC4	C.CC198	-C.CCCC9	C.CC271	-C.CCCCC	C.CCC27
35	C.CCC6E	C.CCCC3	C.CC181	-C.CCCC8	C.CC24E	-C.CCCCC	C.CCC25
36	C.CC063	C.CCCC3	C.CC16E	-C.CCCC8	C.CC227	-C.CCCCC	C.CCC22
37	C.CCC57	C.CCCC3	C.CC152	-C.CCCC7	C.CC2C7	-C.CCCCC	C.CCC2C
38	C.CCC53	C.CCCC3	C.CC139	-C.CCCC6	C.CC19C	-C.CCCCC	C.CCC19
39	C.CC04E	C.CCCC2	C.CC127	-C.CCCC6	C.CC174	-C.CCCCC	C.CCC17
4C	C.CC044	C.CCCC2	C.CC117	-C.CCCC5	C.CC159	-C.CCCCC	C.CCC16

TABLE (5-13)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE CHPRODC

	GNP	C NONDUR	C DUR	G	RESID FI	NONRES I	CH INVEN	ANN CH F
TOTAL	4.69571	3.17636	0.91136	-0.55066	1.25628	-0.09765	-0.24397	
LAG								
0	0.52659	0.49999	0.03100	0.0	0.00238	-0.00679	-0.04661	
1	0.45387	0.40339	0.05369	-0.00365	0.01738	-0.01695	-0.03776	
2	0.39789	0.32803	0.06345	-0.00859	0.02096	-0.01596	-0.03058	
3	0.35107	0.26902	0.06543	-0.01355	0.02185	-0.01168	-0.02476	
4	0.31013	0.22250	0.06340	-0.01789	0.02998	-0.00786	-0.02004	
5	0.27398	0.18553	0.05947	-0.02135	0.02557	-0.00525	-0.01621	
6	0.24216	0.15590	0.05477	-0.02387	0.02301	-0.00365	-0.01311	
7	0.21428	0.13198	0.04989	-0.02552	0.02065	-0.00271	-0.01066	
8	0.18994	0.11250	0.04514	-0.02641	0.01888	-0.00216	-0.00857	
9	0.16871	0.09653	0.04068	-0.02666	0.01766	-0.00184	-0.00693	
10	0.15019	0.08334	0.03658	-0.02641	0.01681	-0.00163	-0.00560	
11	0.13400	0.07237	0.03287	-0.02577	0.01603	-0.00149	-0.00452	
12	0.11983	0.06318	0.02952	-0.02484	0.01533	-0.00139	-0.00365	
13	0.10739	0.05543	0.02652	-0.02371	0.01470	-0.00130	-0.00295	
14	0.09643	0.04885	0.02385	-0.02244	0.01413	-0.00122	-0.00238	
15	0.08677	0.04324	0.02147	-0.02111	0.01361	-0.00115	-0.00192	
16	0.07820	0.03841	0.01934	-0.01974	0.01312	-0.00108	-0.00155	
17	0.07060	0.03424	0.01745	-0.01837	0.01268	-0.00101	-0.00125	
18	0.06384	0.03062	0.01576	-0.01703	0.01226	-0.00095	-0.00100	
19	0.05780	0.02746	0.01425	-0.01574	0.01187	-0.00088	-0.00081	
20	0.05240	0.02468	0.01290	-0.01451	0.01150	-0.00082	-0.00065	
21	0.04756	0.02224	0.01170	-0.01334	0.01113	-0.00077	-0.00052	
22	0.04321	0.02008	0.01061	-0.01224	0.01078	-0.00071	-0.00042	
23	0.03930	0.01816	0.00964	-0.01121	0.01044	-0.00066	-0.00034	
24	0.03577	0.01644	0.00876	-0.01026	0.01012	-0.00061	-0.00027	
25	0.03259	0.01492	0.00797	-0.00937	0.00981	-0.00056	-0.00022	
26	0.02971	0.01355	0.00726	-0.00856	0.00952	-0.00052	-0.00017	
27	0.02710	0.01231	0.00661	-0.00781	0.00924	-0.00048	-0.00014	
28	0.02473	0.01121	0.00603	-0.00712	0.00897	-0.00045	-0.00011	
29	0.02259	0.01021	0.00550	-0.00649	0.00871	-0.00041	-0.00009	
30	0.02064	0.00931	0.00502	-0.00591	0.00846	-0.00038	-0.00007	
31	0.01887	0.00849	0.00459	-0.00538	0.00822	-0.00035	-0.00005	
32	0.01725	0.00775	0.00419	-0.00490	0.00799	-0.00032	-0.00004	
33	0.01578	0.00708	0.00383	-0.00446	0.00777	-0.00030	-0.00003	
34	0.01445	0.00647	0.00351	-0.00407	0.00756	-0.00027	-0.00002	
35	0.01323	0.00591	0.00321	-0.00370	0.00736	-0.00025	-0.00002	
36	0.01211	0.00541	0.00294	-0.00337	0.00717	-0.00023	-0.00001	
37	0.01109	0.00495	0.00269	-0.00307	0.00698	-0.00021	-0.00001	
38	0.01016	0.00453	0.00246	-0.00280	0.00681	-0.00019	-0.00001	
39	0.00932	0.00415	0.00225	-0.00255	0.00664	-0.00018	-0.00001	
40	0.00854	0.00380	0.00207	-0.00232	0.00648	-0.00016	-0.00000	

TABLE (5-14)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE TERM STR

	CH DEM D	CH CCINC	CH TIMED	CH FR RS	CH LOANS	OPEN M C	DISC'T R
TOTAL	-0.00020	-0.00003	-0.00127	-0.00161	-0.00081	-0.00888	0.00089
LAG							
0	0.0	0.0	0.0	-0.00150	0.0	-0.01026	0.0
1	0.00003	-0.00000	0.00005	-0.00014	0.00023	0.00188	0.00032
2	0.00005	-0.00000	0.00004	-0.00007	0.00024	-0.00034	0.00024
3	0.00005	-0.00000	0.00003	0.00000	0.00019	0.00006	0.00017
4	0.00004	-0.00000	0.00001	0.00001	0.00013	-0.00001	0.00011
5	0.00003	-0.00000	-0.00001	0.00001	0.00007	0.00000	0.00007
6	0.00002	-0.00000	-0.00003	0.00001	0.00002	-0.00000	0.00004
7	0.00001	-0.00000	-0.00004	0.00000	-0.00001	0.00000	0.00003
8	-0.00000	-0.00000	-0.00005	0.00000	-0.00004	0.00000	0.00001
9	-0.00001	-0.00000	-0.00005	0.00000	-0.00005	0.00000	0.00001
10	-0.00001	-0.00000	-0.00006	0.00000	-0.00006	0.00000	0.00000
11	-0.00001	-0.00000	-0.00006	0.00000	-0.00007	0.00000	-0.00000
12	-0.00002	-0.00000	-0.00006	0.00000	-0.00007	0.00000	-0.00000
13	-0.00002	-0.00000	-0.00006	0.00000	-0.00007	0.00000	-0.00000
14	-0.00002	-0.00000	-0.00006	0.00000	-0.00007	0.00000	-0.00001
15	-0.00002	-0.00000	-0.00006	0.00000	-0.00007	0.00000	-0.00001
16	-0.00002	-0.00000	-0.00005	0.00000	-0.00007	0.00000	-0.00001
17	-0.00002	-0.00000	-0.00005	0.00000	-0.00007	0.00000	-0.00001
18	-0.00002	-0.00000	-0.00005	0.00000	-0.00007	0.00000	-0.00001
19	-0.00002	-0.00000	-0.00005	0.00000	-0.00006	0.00000	-0.00001
20	-0.00002	-0.00000	-0.00004	0.00000	-0.00006	0.00000	-0.00001
21	-0.00002	-0.00000	-0.00004	0.00000	-0.00006	0.00000	-0.00001
22	-0.00001	-0.00000	-0.00004	0.00000	-0.00005	0.00000	-0.00000
23	-0.00001	-0.00000	-0.00004	0.00000	-0.00005	0.00000	-0.00000
24	-0.00001	-0.00000	-0.00003	0.00000	-0.00005	0.00000	-0.00000
25	-0.00001	-0.00000	-0.00003	0.00000	-0.00004	0.00000	-0.00000
26	-0.00001	-0.00000	-0.00003	0.00000	-0.00004	0.00000	-0.00000
27	-0.00001	-0.00000	-0.00002	0.00000	-0.00004	0.00000	-0.00000
28	-0.00001	-0.00000	-0.00003	0.00000	-0.00004	0.00000	-0.00000
29	-0.00001	-0.00000	-0.00002	0.00000	-0.00003	0.00000	-0.00000
30	-0.00001	-0.00000	-0.00002	0.00000	-0.00003	0.00000	-0.00000
31	-0.00001	-0.00000	-0.00002	0.00000	-0.00003	0.00000	-0.00000
32	-0.00001	-0.00000	-0.00002	0.00000	-0.00003	0.00000	-0.00000
33	-0.00001	-0.00000	-0.00002	0.00000	-0.00003	0.00000	-0.00000
34	-0.00001	-0.00000	-0.00002	0.00000	-0.00002	0.00000	-0.00000
35	-0.00001	-0.00000	-0.00002	0.00000	-0.00002	0.00000	-0.00000
36	-0.00001	-0.00000	-0.00001	0.00000	-0.00002	0.00000	-0.00000
37	-0.00001	-0.00000	-0.00001	0.00000	-0.00002	0.00000	-0.00000
38	-0.00000	-0.00000	-0.00001	0.00000	-0.00002	0.00000	-0.00000
39	-0.00000	-0.00000	-0.00001	0.00000	-0.00002	0.00000	-0.00000
40	-0.00000	-0.00000	-0.00001	0.00000	-0.00002	0.00000	-0.00000

TABLE (5-14)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE TERM STR

	GNP	C NONDUR	C DUR	C RESID FI	NONRES I	CH INVEN	ANN CH P
TOTAL	-0.01473	-0.00477	-0.00186	-0.00557	-0.00204	-0.00049	0.00002
LAG							
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	-0.00034	-0.00003	0.00005	-0.00029	0.00006	-0.00017	-0.00000
2	-0.00050	-0.00006	0.00012	-0.00047	0.00011	-0.00020	0.00000
3	-0.00057	-0.00009	0.00011	-0.00056	0.00013	-0.00016	0.00000
4	-0.00060	-0.00012	0.00007	-0.00058	0.00013	-0.00011	0.00000
5	-0.00061	-0.00014	0.00003	-0.00056	0.00012	-0.00006	0.00000
6	-0.00061	-0.00015	-0.00001	-0.00052	0.00010	-0.00003	0.00000
7	-0.00060	-0.00016	-0.00004	-0.00047	0.00007	-0.00001	0.00000
8	-0.00059	-0.00017	-0.00006	-0.00041	0.00005	0.00000	0.00000
9	-0.00058	-0.00017	-0.00008	-0.00036	0.00002	0.00001	0.00000
10	-0.00057	-0.00018	-0.00009	-0.00031	-0.00001	0.00001	0.00000
11	-0.00055	-0.00018	-0.00010	-0.00026	-0.00003	0.00001	0.00000
12	-0.00053	-0.00018	-0.00010	-0.00022	-0.00005	0.00001	0.00000
13	-0.00051	-0.00017	-0.00010	-0.00019	-0.00006	0.00001	0.00000
14	-0.00049	-0.00017	-0.00010	-0.00015	-0.00008	0.00001	0.00000
15	-0.00046	-0.00016	-0.00010	-0.00013	-0.00009	0.00001	0.00000
16	-0.00044	-0.00016	-0.00009	-0.00010	-0.00009	0.00001	0.00000
17	-0.00042	-0.00015	-0.00009	-0.00008	-0.00010	0.00001	0.00000
18	-0.00039	-0.00015	-0.00009	-0.00007	-0.00010	0.00001	0.00000
19	-0.00037	-0.00014	-0.00008	-0.00005	-0.00011	0.00001	0.00000
20	-0.00035	-0.00013	-0.00008	-0.00004	-0.00011	0.00001	0.00000
21	-0.00033	-0.00012	-0.00007	-0.00003	-0.00011	0.00001	0.00000
22	-0.00031	-0.00012	-0.00007	-0.00002	-0.00010	0.00001	-0.00000
23	-0.00029	-0.00011	-0.00007	-0.00001	-0.00010	0.00001	-0.00000
24	-0.00027	-0.00011	-0.00006	-0.00001	-0.00010	0.00001	-0.00000
25	-0.00025	-0.00010	-0.00006	-0.00000	-0.00010	0.00001	-0.00000
26	-0.00023	-0.00009	-0.00005	0.00000	-0.00009	0.00001	-0.00000
27	-0.00022	-0.00009	-0.00005	0.00000	-0.00009	0.00000	-0.00000
28	-0.00020	-0.00008	-0.00005	0.00001	-0.00008	0.00000	-0.00000
29	-0.00019	-0.00008	-0.00004	0.00001	-0.00008	0.00000	-0.00000
30	-0.00018	-0.00007	-0.00004	0.00001	-0.00008	0.00000	-0.00000
31	-0.00016	-0.00007	-0.00004	0.00001	-0.00007	0.00000	-0.00000
32	-0.00015	-0.00006	-0.00004	0.00001	-0.00007	0.00000	-0.00000
33	-0.00014	-0.00006	-0.00003	0.00001	-0.00006	0.00000	-0.00000
34	-0.00013	-0.00005	-0.00003	0.00001	-0.00006	0.00000	-0.00000
35	-0.00012	-0.00005	-0.00003	0.00001	-0.00006	0.00000	-0.00000
36	-0.00011	-0.00005	-0.00003	0.00001	-0.00005	0.00000	-0.00000
37	-0.00010	-0.00004	-0.00002	0.00001	-0.00005	0.00000	-0.00000
38	-0.00010	-0.00004	-0.00002	0.00001	-0.00005	0.00000	-0.00000
39	-0.00009	-0.00004	-0.00002	0.00001	-0.00004	0.00000	-0.00000
40	-0.00008	-0.00003	-0.00002	0.00001	-0.00004	0.00000	-0.00000

TABLE (5-15)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE T BILL R

	CH CEM C	CH CCINC	CH TIMEC	CH FR RS	CH LOANS	CPEN M C	DISC'T R
TOTAL	-2.03279	-0.09578	-2.28730	0.11921	-2.74857	0.00129	0.76617
LAG							
0	-0.71642	-0.02461	-0.23966	-0.09042	-0.26828	-0.00116	0.32874
1	-0.36328	-0.01461	-0.09246	0.02367	-0.08985	0.00051	0.24224
2	-0.18291	-0.00906	-0.06366	0.03687	-0.03749	0.00038	0.15657
3	-0.09388	-0.00593	-0.06216	0.02844	-0.03461	0.00029	0.09504
4	-0.05186	-0.00416	-0.06632	0.01902	-0.04775	0.00019	0.05515
5	-0.03330	-0.00313	-0.07097	0.01247	-0.06354	0.00012	0.03030
6	-0.02600	-0.00252	-0.07479	0.00852	-0.07721	0.00009	0.01506
7	-0.02379	-0.00215	-0.07743	0.00629	-0.08744	0.00006	0.00575
8	-0.02364	-0.00191	-0.07883	0.00506	-0.09424	0.00005	0.00007
9	-0.02411	-0.00175	-0.07909	0.00437	-0.09812	0.00005	-0.00338
10	-0.02459	-0.00164	-0.07837	0.00397	-0.09965	0.00004	-0.00544
11	-0.02482	-0.00154	-0.07686	0.00371	-0.09938	0.00004	-0.00664
12	-0.02475	-0.00146	-0.07474	0.00352	-0.09777	0.00004	-0.00728
13	-0.02441	-0.00138	-0.07216	0.00335	-0.09519	0.00004	-0.00757
14	-0.02384	-0.00131	-0.06925	0.00320	-0.09192	0.00003	-0.00762
15	-0.02309	-0.00124	-0.06615	0.00305	-0.08819	0.00003	-0.00752
16	-0.02221	-0.00117	-0.06292	0.00290	-0.08418	0.00003	-0.00732
17	-0.02126	-0.00111	-0.05964	0.00275	-0.08001	0.00003	-0.00706
18	-0.02025	-0.00104	-0.05637	0.00261	-0.07578	0.00003	-0.00676
19	-0.01921	-0.00098	-0.05314	0.00246	-0.07156	0.00003	-0.00643
20	-0.01817	-0.00092	-0.04999	0.00232	-0.06741	0.00002	-0.00610
21	-0.01714	-0.00087	-0.04693	0.00218	-0.06337	0.00002	-0.00577
22	-0.01613	-0.00081	-0.04399	0.00205	-0.05945	0.00002	-0.00543
23	-0.01514	-0.00076	-0.04117	0.00192	-0.05569	0.00002	-0.00511
24	-0.01420	-0.00071	-0.03848	0.00180	-0.05209	0.00002	-0.00479
25	-0.01329	-0.00066	-0.03592	0.00168	-0.04866	0.00002	-0.00449
26	-0.01242	-0.00062	-0.03350	0.00157	-0.04541	0.00002	-0.00420
27	-0.01160	-0.00057	-0.03121	0.00146	-0.04232	0.00002	-0.00392
28	-0.01081	-0.00053	-0.02905	0.00136	-0.03942	0.00001	-0.00366
29	-0.01008	-0.00050	-0.02702	0.00127	-0.03668	0.00001	-0.00341
30	-0.00938	-0.00046	-0.02512	0.00118	-0.03410	0.00001	-0.00318
31	-0.00872	-0.00043	-0.02333	0.00110	-0.03166	0.00001	-0.00295
32	-0.00811	-0.00040	-0.02165	0.00102	-0.02942	0.00001	-0.00275
33	-0.00753	-0.00037	-0.02009	0.00094	-0.02730	0.00001	-0.00255
34	-0.00699	-0.00034	-0.01863	0.00088	-0.02532	0.00001	-0.00237
35	-0.00648	-0.00032	-0.01726	0.00081	-0.02347	0.00001	-0.00220
36	-0.00601	-0.00029	-0.01599	0.00075	-0.02175	0.00001	-0.00204
37	-0.00557	-0.00027	-0.01481	0.00070	-0.02014	0.00001	-0.00189
38	-0.00516	-0.00025	-0.01371	0.00065	-0.01864	0.00001	-0.00175
39	-0.00478	-0.00023	-0.01268	0.00060	-0.01725	0.00001	-0.00162
40	-0.00442	-0.00021	-0.01173	0.00055	-0.01596	0.00001	-0.00150

TABLE (5-15)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE T BILL R

	GNP	C NONDUR	C DUR	RESID FI NONRES I	CH INVEN	ANN CH P
TOTAL	-14.32898	-4.63291	-3.30744	-4.79527 -4.83847	3.24509	0.02261
LAG						
0	1.39985	0.11484	-0.05108	-0.29557 -0.06731	1.69897	0.00176
1	0.24951	0.10653	-0.04878	-0.47091 -0.06399	0.72665	0.00256
2	-0.30316	0.05512	-0.05205	-0.54403 -0.05981	0.29761	0.00291
3	-0.56138	-0.00442	-0.06514	-0.55133 -0.06125	0.12075	0.00289
4	-0.67824	-0.05848	-0.08230	-0.52171 -0.06837	0.05262	0.00267
5	-0.72673	-0.10288	-0.09885	-0.47400 -0.07941	0.02841	0.00235
6	-0.74092	-0.13727	-0.11245	-0.41945 -0.09247	0.02072	0.00200
7	-0.73678	-0.16267	-0.12236	-0.36436 -0.10598	0.01859	0.00167
8	-0.72211	-0.18050	-0.12871	-0.31208 -0.11882	0.01800	0.00137
9	-0.70099	-0.19213	-0.13195	-0.26421 -0.13027	0.01758	0.00110
10	-0.67575	-0.19879	-0.13268	-0.22135 -0.13992	0.01699	0.00088
11	-0.64788	-0.20152	-0.13144	-0.18359 -0.14757	0.01623	0.00069
12	-0.61841	-0.20116	-0.12871	-0.15067 -0.15321	0.01535	0.00053
13	-0.58808	-0.19844	-0.12490	-0.12222 -0.15693	0.01441	0.00040
14	-0.55747	-0.19391	-0.12033	-0.09781 -0.15888	0.01347	0.00029
15	-0.52700	-0.18805	-0.11525	-0.07700 -0.15925	0.01255	0.00021
16	-0.49701	-0.18122	-0.10986	-0.05936 -0.15824	0.01167	0.00014
17	-0.46773	-0.17373	-0.10431	-0.04449 -0.15605	0.01084	0.00008
18	-0.43937	-0.16581	-0.09872	-0.03202 -0.15288	0.01006	0.00004
19	-0.41204	-0.15767	-0.09316	-0.02163 -0.14891	0.00933	0.00001
20	-0.38584	-0.14943	-0.08771	-0.01304 -0.14430	0.00865	-0.00002
21	-0.36082	-0.14124	-0.08241	-0.00598 -0.13921	0.00802	-0.00004
22	-0.33703	-0.13316	-0.07729	-0.00024 -0.13376	0.00743	-0.00005
23	-0.31446	-0.12529	-0.07237	0.00439 -0.12807	0.00688	-0.00006
24	-0.29311	-0.11765	-0.06767	0.00807 -0.12223	0.00637	-0.00007
25	-0.27296	-0.11029	-0.06320	0.01095 -0.11631	0.00590	-0.00008
26	-0.25400	-0.10324	-0.05896	0.01315 -0.11040	0.00546	-0.00008
27	-0.23617	-0.09651	-0.05495	0.01479 -0.10454	0.00505	-0.00008
28	-0.21944	-0.09011	-0.05116	0.01595 -0.09878	0.00467	-0.00008
29	-0.20376	-0.08405	-0.04760	0.01673 -0.09316	0.00432	-0.00008
30	-0.18910	-0.07831	-0.04425	0.01718 -0.08770	0.00399	-0.00008
31	-0.17539	-0.07290	-0.04111	0.01737 -0.08243	0.00369	-0.00007
32	-0.16259	-0.06781	-0.03817	0.01734 -0.07737	0.00341	-0.00007
33	-0.15066	-0.06303	-0.03541	0.01714 -0.07251	0.00315	-0.00007
34	-0.13954	-0.05854	-0.03284	0.01681 -0.06788	0.00291	-0.00007
35	-0.12919	-0.05434	-0.03044	0.01637 -0.06346	0.00269	-0.00006
36	-0.11956	-0.05041	-0.02820	0.01585 -0.05928	0.00248	-0.00006
37	-0.11061	-0.04675	-0.02612	0.01528 -0.05531	0.00229	-0.00006
38	-0.10229	-0.04332	-0.02418	0.01466 -0.05156	0.00211	-0.00005
39	-0.09457	-0.04013	-0.02237	0.01401 -0.04803	0.00195	-0.00005
40	-0.08741	-0.03716	-0.02069	0.01334 -0.04470	0.00180	-0.00005

TABLE (5-16)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE CONSTANT

	CH DEM D	CH CCINC	CH TIMED	CH FF RS	CH LOANS	OPEN M C	DISCNT R
TOTAL	0.69096	0.03822	2.03899	-0.09176	2.70808	-0.00099	0.22418
LAG							
0	0.00246	0.00090	0.00367	-0.00074	0.01902	-0.00001	0.0
1	0.01255	0.00142	0.07528	-0.00224	0.08751	-0.00003	0.00347
2	0.02099	0.00170	0.09990	-0.00335	0.11444	-0.00004	0.00598
3	0.02675	0.00184	0.10238	-0.00403	0.12683	-0.00004	0.00779
4	0.03026	0.00189	0.10385	-0.00438	0.13208	-0.00005	0.00903
5	0.03211	0.00189	0.10281	-0.00451	0.13304	-0.00005	0.00981
6	0.03279	0.00185	0.10022	-0.00450	0.13123	-0.00005	0.01022
7	0.03265	0.00178	0.09662	-0.00440	0.12759	-0.00005	0.01036
8	0.03197	0.00170	0.09240	-0.00424	0.12277	-0.00005	0.01028
9	0.03091	0.00162	0.08781	-0.00406	0.11722	-0.00004	0.01005
10	0.02962	0.00153	0.08304	-0.00385	0.11127	-0.00004	0.00972
11	0.02820	0.00144	0.07823	-0.00364	0.10512	-0.00004	0.00931
12	0.02670	0.00135	0.07347	-0.00343	0.09896	-0.00004	0.00887
13	0.02517	0.00127	0.06883	-0.00321	0.09288	-0.00003	0.00840
14	0.02366	0.00118	0.06434	-0.00301	0.08696	-0.00003	0.00792
15	0.02217	0.00110	0.06005	-0.00281	0.08125	-0.00003	0.00744
16	0.02074	0.00103	0.05596	-0.00262	0.07579	-0.00003	0.00698
17	0.01936	0.00096	0.05208	-0.00244	0.07059	-0.00003	0.00652
18	0.01804	0.00089	0.04841	-0.00227	0.06568	-0.00002	0.00609
19	0.01679	0.00083	0.04497	-0.00211	0.06104	-0.00002	0.00567
20	0.01561	0.00077	0.04173	-0.00196	0.05667	-0.00002	0.00528
21	0.01450	0.00071	0.03870	-0.00182	0.05258	-0.00002	0.00491
22	0.01346	0.00066	0.03586	-0.00169	0.04874	-0.00002	0.00456
23	0.01248	0.00061	0.03322	-0.00156	0.04516	-0.00002	0.00423
24	0.01157	0.00056	0.03075	-0.00145	0.04182	-0.00002	0.00392
25	0.01071	0.00052	0.02845	-0.00134	0.03871	-0.00001	0.00363
26	0.00992	0.00048	0.02632	-0.00124	0.03581	-0.00001	0.00337
27	0.00918	0.00045	0.02433	-0.00115	0.03312	-0.00001	0.00311
28	0.00849	0.00041	0.02249	-0.00106	0.03061	-0.00001	0.00288
29	0.00785	0.00038	0.02078	-0.00098	0.02829	-0.00001	0.00266
30	0.00725	0.00035	0.01919	-0.00091	0.02614	-0.00001	0.00246
31	0.00670	0.00032	0.01773	-0.00084	0.02414	-0.00001	0.00228
32	0.00619	0.00030	0.01636	-0.00077	0.02229	-0.00001	0.00210
33	0.00572	0.00028	0.01510	-0.00071	0.02057	-0.00001	0.00194
34	0.00528	0.00026	0.01394	-0.00066	0.01899	-0.00001	0.00179
35	0.00487	0.00024	0.01286	-0.00061	0.01752	-0.00001	0.00166
36	0.00450	0.00022	0.01186	-0.00056	0.01616	-0.00001	0.00153
37	0.00415	0.00020	0.01094	-0.00052	0.01491	-0.00001	0.00141
38	0.00383	0.00018	0.01009	-0.00048	0.01375	-0.00001	0.00130
39	0.00353	0.00017	0.00930	-0.00044	0.01268	-0.00000	0.00120
40	0.00325	0.00016	0.00858	-0.00041	0.01169	-0.00000	0.00111

TABLE (5-16)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE GOVT E F

	GNP	C NONDUR	C DUR	C RESID	FI NONRES I	CH INVEN	ANN CH F
TOTAL	17.71928	5.74950	3.56416	-1.40305	10.27671	-0.46796	0.00474
LAG							
0	1.05444	0.08650	0.06208	0.0	0.91945	-0.01355	0.00001
1	1.01522	0.14791	0.11623	-0.00312	0.79338	-0.03917	0.00001
2	0.98366	0.19119	0.14868	-0.00805	0.69543	-0.04358	0.00003
3	0.95066	0.22082	0.16570	-0.01390	0.61718	-0.03914	0.00005
4	0.91313	0.23988	0.17304	-0.02002	0.55343	-0.03319	0.00008
5	0.87154	0.25071	0.17432	-0.02596	0.50054	-0.02807	0.00010
6	0.82733	0.25518	0.17177	-0.03142	0.45591	-0.02411	0.00012
7	0.78189	0.25479	0.16679	-0.03622	0.41782	-0.02105	0.00014
8	0.73631	0.25077	0.16028	-0.04026	0.38427	-0.01875	0.00015
9	0.69139	0.24408	0.15287	-0.04351	0.35482	-0.01686	0.00016
10	0.64767	0.23549	0.14495	-0.04600	0.32851	-0.01528	0.00017
11	0.60552	0.22563	0.13684	-0.04777	0.30475	-0.01394	0.00018
12	0.56516	0.21494	0.12872	-0.04888	0.28312	-0.01276	0.00018
13	0.52674	0.20381	0.12074	-0.04941	0.26329	-0.01170	0.00018
14	0.49033	0.19251	0.11300	-0.04943	0.24501	-0.01076	0.00018
15	0.45595	0.18125	0.10554	-0.04902	0.22808	-0.00990	0.00018
16	0.42358	0.17017	0.09841	-0.04825	0.21235	-0.00911	0.00017
17	0.39318	0.15941	0.09164	-0.04718	0.19771	-0.00840	0.00017
18	0.36470	0.14903	0.08524	-0.04588	0.18405	-0.00774	0.00016
19	0.33807	0.13909	0.07920	-0.04439	0.17129	-0.00713	0.00015
20	0.31319	0.12962	0.07352	-0.04276	0.15938	-0.00658	0.00015
21	0.29000	0.12065	0.06820	-0.04103	0.14824	-0.00606	0.00014
22	0.26839	0.11217	0.06322	-0.03923	0.13782	-0.00559	0.00013
23	0.24829	0.10418	0.05857	-0.03740	0.12805	-0.00515	0.00012
24	0.22960	0.09669	0.05423	-0.03555	0.11899	-0.00475	0.00012
25	0.21225	0.08966	0.05019	-0.03371	0.11049	-0.00438	0.00011
26	0.19614	0.08309	0.04643	-0.03190	0.10256	-0.00404	0.00010
27	0.18120	0.07695	0.04293	-0.03011	0.09516	-0.00372	0.00010
28	0.16736	0.07123	0.03968	-0.02838	0.08825	-0.00343	0.00009
29	0.15453	0.06590	0.03667	-0.02670	0.08181	-0.00316	0.00008
30	0.14265	0.06095	0.03388	-0.02508	0.07582	-0.00291	0.00008
31	0.13166	0.05634	0.03129	-0.02352	0.07023	-0.00268	0.00007
32	0.12149	0.05207	0.02889	-0.02203	0.06504	-0.00247	0.00007
33	0.11208	0.04810	0.02666	-0.02061	0.06021	-0.00228	0.00006
34	0.10338	0.04443	0.02461	-0.01927	0.05572	-0.00210	0.00006
35	0.09535	0.04102	0.02271	-0.01799	0.05154	-0.00193	0.00005
36	0.08792	0.03787	0.02095	-0.01678	0.04767	-0.00178	0.00005
37	0.08106	0.03495	0.01932	-0.01563	0.04407	-0.00164	0.00005
38	0.07473	0.03224	0.01782	-0.01456	0.04074	-0.00151	0.00004
39	0.06888	0.02975	0.01643	-0.01355	0.03765	-0.00139	0.00004
40	0.06349	0.02744	0.01515	-0.01259	0.03478	-0.00128	0.00004

TABLE (5-17)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE BILL RAY

	CH DEM D	CH CCINC	CH TIMED	CH FR RS	CH LOANS	OPEN M C	DISC*T R
TOTAL	-0.00086	-0.00014	-0.31803	-0.00688	-0.00344	-0.00199	0.00281
LAG							
0	0.0	0.0	-0.24196	-0.00430	0.0	-0.00232	0.0
1	0.00005	-0.00000	-0.05455	-0.00203	0.00067	0.00040	0.00092
2	0.00017	-0.00000	-0.01219	-0.00072	0.00055	-0.00008	0.00105
3	0.00019	-0.00000	-0.00266	-0.00018	0.00087	0.00001	0.00084
4	0.00018	-0.00000	-0.00057	-0.00001	0.00064	-0.00000	0.00059
5	0.00014	-0.00000	-0.00016	0.00003	0.00040	0.00000	0.00039
6	0.00009	-0.00001	-0.00012	0.00003	0.00018	0.00000	0.00024
7	0.00005	-0.00001	-0.00015	0.00002	0.00002	0.00000	0.00015
8	0.00001	-0.00001	-0.00019	0.00002	-0.00010	0.00000	0.00008
9	-0.00002	-0.00001	-0.00022	0.00002	-0.00019	0.00000	0.00004
10	-0.00004	-0.00001	-0.00023	0.00001	-0.00025	0.00000	0.00002
11	-0.00006	-0.00001	-0.00025	0.00001	-0.00028	0.00000	0.00000
12	-0.00007	-0.00001	-0.00025	0.00001	-0.00031	0.00000	-0.00001
13	-0.00007	-0.00000	-0.00025	0.00001	-0.00032	0.00000	-0.00002
14	-0.00008	-0.00000	-0.00025	0.00001	-0.00032	0.00000	-0.00002
15	-0.00008	-0.00000	-0.00024	0.00001	-0.00032	0.00000	-0.00002
16	-0.00008	-0.00000	-0.00023	0.00001	-0.00031	0.00000	-0.00002
17	-0.00008	-0.00000	-0.00023	0.00001	-0.00030	0.00000	-0.00002
18	-0.00007	-0.00000	-0.00022	0.00001	-0.00029	0.00000	-0.00002
19	-0.00007	-0.00000	-0.00021	0.00001	-0.00027	0.00000	-0.00002
20	-0.00007	-0.00000	-0.00019	0.00001	-0.00026	0.00000	-0.00002
21	-0.00007	-0.00000	-0.00018	0.00001	-0.00025	0.00000	-0.00002
22	-0.00006	-0.00000	-0.00017	0.00001	-0.00023	0.00000	-0.00002
23	-0.00006	-0.00000	-0.00016	0.00001	-0.00022	0.00000	-0.00002
24	-0.00006	-0.00000	-0.00015	0.00001	-0.00021	0.00000	-0.00002
25	-0.00005	-0.00000	-0.00014	0.00001	-0.00019	0.00000	-0.00002
26	-0.00005	-0.00000	-0.00014	0.00001	-0.00018	0.00000	-0.00002
27	-0.00005	-0.00000	-0.00013	0.00001	-0.00017	0.00000	-0.00002
28	-0.00004	-0.00000	-0.00012	0.00001	-0.00016	0.00000	-0.00001
29	-0.00004	-0.00000	-0.00011	0.00001	-0.00015	0.00000	-0.00001
30	-0.00004	-0.00000	-0.00010	0.00000	-0.00014	0.00000	-0.00001
31	-0.00004	-0.00000	-0.00010	0.00000	-0.00013	0.00000	-0.00001
32	-0.00003	-0.00000	-0.00009	0.00000	-0.00012	0.00000	-0.00001
33	-0.00003	-0.00000	-0.00008	0.00000	-0.00011	0.00000	-0.00001
34	-0.00003	-0.00000	-0.00008	0.00000	-0.00010	0.00000	-0.00001
35	-0.00003	-0.00000	-0.00007	0.00000	-0.00010	0.00000	-0.00001
36	-0.00002	-0.00000	-0.00007	0.00000	-0.00009	0.00000	-0.00001
37	-0.00002	-0.00000	-0.00006	0.00000	-0.00008	0.00000	-0.00001
38	-0.00002	-0.00000	-0.00006	0.00000	-0.00008	0.00000	-0.00001
39	-0.00002	-0.00000	-0.00005	0.00000	-0.00007	0.00000	-0.00001
40	-0.00002	-0.00000	-0.00005	0.00000	-0.00007	0.00000	-0.00001

TABLE (5-17)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE FILL R*Y

	GNP	C NONDUR	C DUR	C RESID FI	NONRES I	CH INVEN	ANN CH F
TOTAL	-0.06295	-0.02037	-0.00796	-0.02383	-0.00871	-0.00208	0.00007
LAG							
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	-0.00097	-0.00008	0.00026	-0.00083	0.00017	-0.00048	-0.00000
2	-0.00180	-0.00021	0.00044	-0.00165	0.00037	-0.00075	0.00000
3	-0.00227	-0.00034	0.00046	-0.00218	0.00050	-0.00072	0.00001
4	-0.00248	-0.00046	0.00035	-0.00240	0.00055	-0.00054	0.00001
5	-0.00256	-0.00055	0.00019	-0.00240	0.00053	-0.00034	0.00001
6	-0.00258	-0.00062	0.00003	-0.00228	0.00046	-0.00018	0.00001
7	-0.00258	-0.00067	-0.00011	-0.00208	0.00036	-0.00007	0.00001
8	-0.00255	-0.00071	-0.00022	-0.00186	0.00025	-0.00001	0.00001
9	-0.00251	-0.00074	-0.00030	-0.00163	0.00013	0.00003	0.00001
10	-0.00245	-0.00075	-0.00036	-0.00141	0.00002	0.00005	0.00000
11	-0.00238	-0.00076	-0.00039	-0.00121	-0.00008	0.00006	0.00000
12	-0.00230	-0.00075	-0.00041	-0.00103	-0.00017	0.00006	0.00000
13	-0.00221	-0.00074	-0.00042	-0.00086	-0.00024	0.00006	0.00000
14	-0.00212	-0.00073	-0.00042	-0.00072	-0.00030	0.00005	0.00000
15	-0.00202	-0.00071	-0.00042	-0.00060	-0.00035	0.00005	0.00000
16	-0.00192	-0.00069	-0.00041	-0.00049	-0.00039	0.00005	0.00000
17	-0.00182	-0.00066	-0.00039	-0.00040	-0.00042	0.00004	0.00000
18	-0.00172	-0.00064	-0.00038	-0.00032	-0.00043	0.00004	0.00000
19	-0.00163	-0.00061	-0.00036	-0.00025	-0.00045	0.00004	0.00000
20	-0.00153	-0.00058	-0.00034	-0.00019	-0.00045	0.00004	0.00000
21	-0.00144	-0.00055	-0.00032	-0.00015	-0.00045	0.00003	0.00000
22	-0.00135	-0.00052	-0.00030	-0.00011	-0.00045	0.00003	-0.00000
23	-0.00126	-0.00049	-0.00029	-0.00007	-0.00044	0.00003	-0.00000
24	-0.00118	-0.00047	-0.00027	-0.00005	-0.00043	0.00003	-0.00000
25	-0.00111	-0.00044	-0.00025	-0.00002	-0.00041	0.00002	-0.00000
26	-0.00103	-0.00041	-0.00024	-0.00001	-0.00040	0.00002	-0.00000
27	-0.00096	-0.00039	-0.00022	0.00001	-0.00038	0.00002	-0.00000
28	-0.00090	-0.00036	-0.00021	0.00002	-0.00037	0.00002	-0.00000
29	-0.00084	-0.00034	-0.00019	0.00003	-0.00035	0.00002	-0.00000
30	-0.00078	-0.00032	-0.00018	0.00004	-0.00033	0.00002	-0.00000
31	-0.00072	-0.00030	-0.00017	0.00004	-0.00032	0.00002	-0.00000
32	-0.00067	-0.00028	-0.00016	0.00005	-0.00030	0.00001	-0.00000
33	-0.00062	-0.00026	-0.00015	0.00005	-0.00028	0.00001	-0.00000
34	-0.00058	-0.00024	-0.00014	0.00005	-0.00027	0.00001	-0.00000
35	-0.00054	-0.00022	-0.00013	0.00005	-0.00025	0.00001	-0.00000
36	-0.00050	-0.00021	-0.00012	0.00005	-0.00024	0.00001	-0.00000
37	-0.00046	-0.00019	-0.00011	0.00005	-0.00022	0.00001	-0.00000
38	-0.00043	-0.00018	-0.00010	0.00005	-0.00021	0.00001	-0.00000
39	-0.00040	-0.00017	-0.00009	0.00005	-0.00019	0.00001	-0.00000
40	-0.00037	-0.00015	-0.00009	0.00005	-0.00018	0.00001	-0.00000

TABLE (5-1E)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE TIMEDRMY

	CH DEM C	CH CCINC	CH TIMED	CH FR RS	CH LOANS	OPEN M C	DISC*T R
TOTAL	C.CCO5E	C.CCCC9	C.2223C	C.CC462	C.CC231	C.CCC37	-C.CC25E
LAG							
C	C.C	C.C	C.16925	C.CC283	C.C	C.CCC41	C.C
1	-C.CCOC6	C.CCCCC	C.C3816	C.CC14C	-C.CCC44	-C.CCCC6	-C.CCC61
2	-C.CCO11	C.CCCCC	C.CC853	C.CCC49	-C.CCC63	C.CCCC2	-C.CCC7C
3	-C.CCC13	C.CCCCC	C.CC186	C.CCC13	-C.CCC59	-C.CCCCC	-C.CCC57
4	-C.CCO12	C.CCCCC	C.CCC4C	C.CCCC1	-C.CCC43	C.CCCCC	-C.CCC4C
5	-C.CCC1C	C.CCCCC	C.CCC11	-C.CCCC2	-C.CCC27	-C.CCCCC	-C.CCC2E
6	-C.CCOC6	C.CCCCC	C.CCCC8	-C.CCCC2	-C.CCC13	-O.CCCCC	-C.CCC17
7	-C.CCOC3	C.CCCCC	C.CCC1C	-C.CCCC2	-C.CCCC1	-C.CCCCC	-C.CCC1C
8	-C.CCOC1	C.CCCCC	C.CCC13	-C.CCCC1	C.CCCC7	-C.CCCCC	-C.CCCC6
9	C.CCOC1	C.CCCCC	C.CCC14	-C.CCCC1	C.CCC13	-C.CCCCC	-C.CCCC3
1C	C.CCOC3	C.CCCCC	C.CCC16	-C.CCCC1	C.CCC17	-C.CCCCC	-C.CCCC1
11	C.CCCC4	C.CCCCC	C.CCC17	-C.CCCC1	C.CCC19	-C.CCCCC	-C.CCCCC
12	C.CCOC4	C.CCCCC	C.CCC17	-C.CCCC1	C.CCC21	-C.CCCCC	C.CCCC1
13	C.CCOC5	C.CCCCC	C.CCC17	-C.CCCC1	C.CCC21	-C.CCCCC	C.CCCC1
14	C.CCOC5	C.CCCCC	C.CCC17	-C.CCCC1	C.CCC21	-C.CCCCC	C.CCCC1
15	C.CCOC5	C.CCCCC	C.CCC16	-C.CCCC1	C.CCC21	-C.CCCCC	C.CCCC2
16	C.CCOC5	C.CCCCC	C.CCC16	-C.CCCC1	C.CCC21	-C.CCCCC	C.CCCC2
17	C.CCOC5	C.CCCCC	C.CCC15	-C.CCCC1	C.CCC2C	-C.CCCCC	C.CCCC2
18	C.CCOC5	C.CCCCC	C.CCC15	-C.CCCC1	C.CCC19	-C.CCCCC	C.CCCC2
19	C.CCOC5	C.CCCCC	C.CCC14	-C.OCCC1	C.CCC18	-C.CCCCC	C.CCCC2
2C	C.CCCC5	C.CCCCC	C.CCC13	-C.CCCC1	C.CCC18	-C.CCCCC	C.CCCC2
21	C.CCOC4	C.CCCCC	C.CCC12	-C.CCCC1	C.CCC17	-C.CCCCC	C.CCCC1
22	C.CCCC4	C.CCCCC	C.CCC12	-C.CCCC1	C.CCC16	-C.CCCCC	C.CCCC1
23	C.CCOC4	C.CCCCC	C.CCC11	-C.CCCC1	C.CCC15	-C.CCCCC	C.CCCC1
24	C.CCOC4	C.CCCCC	C.CCC1C	-C.CCCCC	C.CCC14	-C.CCCCC	C.CCCC1
25	C.CCCC4	C.CCCCC	C.CCC1C	-C.CCCCC	C.CCC13	-C.CCCCC	C.CCCC1
26	C.CCOC3	C.CCCCC	C.CCCC9	-C.CCCCC	C.CCC12	-C.CCCCC	C.CCCC1
27	C.CCCC3	C.CCCCC	C.CCCC8	-C.CCCCC	C.CCC11	-C.CCCCC	C.CCCC1
28	C.CCCC3	C.CCCCC	C.CCCC8	-C.CCCCC	C.CCC11	-C.CCCCC	C.CCCC1
29	C.CCOC3	C.CCCCC	C.CCCC7	-C.CCCCC	C.CCC1C	-C.CCCCC	C.CCCC1
3C	C.CCCC3	C.CCCCC	C.CCCC7	-C.CCCCC	C.CCCC9	-C.CCCCC	C.CCCC1
31	C.CCCC2	C.CCCCC	C.CCCC6	-C.CCCCC	C.CCCC9	-C.CCCCC	C.CCCC1
32	C.CCOC2	C.CCCCC	C.CCCC6	-C.CCCCC	C.CCCC8	-C.CCCCC	C.CCCC1
33	C.CCOC2	C.CCCCC	C.CCCC6	-C.CCCCC	C.CCCC8	-C.CCCCC	C.CCCC1
34	C.CCOC2	C.CCCCC	C.CCCC5	-C.CCCCC	C.CCCC7	-C.CCCCC	C.CCCC1
35	C.CCOC2	C.CCCCC	C.CCCC5	-C.CCCCC	C.CCCC7	-C.CCCCC	C.CCCC1
36	C.CCOC2	C.CCCCC	C.CCCC4	-C.CCCCC	C.CCCC6	-C.CCCCC	C.CCCC1
37	C.CCOC2	C.CCCCC	C.CCCC4	-C.CCCCC	C.CCCC6	-C.CCCCC	C.CCCC1
38	C.CCCC1	C.CCCCC	C.CCCC4	-C.CCCCC	C.CCCC5	-C.CCCCC	C.CCCCC
39	C.CCCC1	C.CCCCC	C.CCCC4	-C.CCCCC	C.CCCC5	-C.CCCCC	C.CCCCC
4C	C.CCOC1	C.CCCCC	C.CCCC3	-C.CCCCC	C.CCCC4	-C.CCCCC	C.CCCCC

TABLE (5-18)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE TIMEDRY

	GNP	C NONDUR	C DUR	RESID FI	NONRES I	CH INVEN	ANN CH F
TOTAL	C.C423C	C.C136S	C.CC535	C.C16C1	C.CC58S	C.CC14C	-C.CCCC4
LAG							
C	C.C	C.C	C.C	C.C	C.C	C.C	C.C
1	C.CC064	C.CCCC5	-C.CCC17	C.CCC55	-C.CCC11	C.CCC32	C.CCCCC
2	C.CC12C	C.CCC14	-C.CCC3C	C.CC11C	-C.CCC24	C.CCC5C	-C.CCCCC
3	C.CC152	C.CCC23	-C.CCC31	C.CC146	-C.CCC34	C.CCC4E	-C.CCCCC
4	C.CC167	C.CCC31	-C.CCC24	C.CC161	-C.CCC37	C.CCC3E	-C.CCCC1
5	C.CC172	C.CCC37	-C.CCC13	C.CC161	-C.CCC3E	C.CCC23	-C.CCCC1
6	C.CC174	C.CCC42	-C.CCCC2	C.CC153	-C.CCC31	C.CCC12	-C.CCCC1
7	C.CC173	C.CCC45	C.CCCC7	C.CC14C	-C.CCC24	C.CCCC5	-C.CCCC1
8	C.CC171	C.CCC48	C.CCC15	C.CC125	-C.CCC17	C.CCCCC	-C.CCCCC
9	C.CC16S	C.CCC4S	C.CCC2C	C.CC11C	-C.CCCC9	-C.CCCC2	-C.CCCCC
10	C.CC16E	C.CCC5C	C.CCC24	C.CCC95	-C.CCCC1	-C.CCCC3	-C.CCCCC
11	C.CC16C	C.CCC51	C.CCC26	C.CCC82	C.CCCC5	-C.CCCC4	-C.CCCCC
12	C.CC155	C.CCC51	C.CCC28	C.CCC69	C.CCC11	-C.CCCC4	-C.CCCCC
13	C.CC14S	C.CCC5C	C.CCC2E	C.CCC5E	C.CCC16	-C.CCCC4	-C.CCCCC
14	C.CC143	C.CCC4S	C.CCC2E	C.CCC4S	C.CCC2C	-C.CCCC4	-C.CCCCC
15	C.CC13E	C.CCC4E	C.CCC2E	C.CCC4C	C.CCC23	-C.CCCC3	-C.CCCCC
16	C.CC12S	C.CCC4E	C.CCC27	C.CCC33	C.CCC2E	-C.CCCC3	-C.CCCCC
17	C.CC123	C.CCC45	C.CCC26	C.CCC27	C.CCC2E	-C.CCCC3	-C.CCCCC
18	C.CC11E	C.CCC43	C.CCC25	C.CCC21	C.CCC2S	-C.CCCC3	-C.CCCCC
19	C.CC1CS	C.CCC41	C.CCC24	C.CCC17	C.CCC3C	-C.CCCC3	-C.CCCCC
20	C.CC1C3	C.CCC3S	C.CCC23	C.CCC13	C.CCC3C	-C.CCCC2	-C.CCCCC
21	C.CC0S7	C.CCC37	C.CCC22	C.CCC1C	C.CCC3C	-C.CCCC2	-C.CCCCC
22	C.CC0S1	C.CCC35	C.CCC2C	C.CCCC7	C.CCC3C	-C.CCCC2	C.CCCCC
23	C.CC0ES	C.CCC33	C.CCC19	C.CCCC5	C.CCC2S	-C.CCCC2	C.CCCCC
24	C.CC08C	C.CCC31	C.CCC1E	C.CCCC3	C.CCC2S	-C.CCCC2	C.CCCCC
25	C.CC074	C.CCC3C	C.CCC17	C.CCCC2	C.CCC2E	-C.CCCC2	C.CCCCC
26	C.CC06S	C.CCC2E	C.CCC16	C.CCCCC	C.CCC27	-C.CCCC2	C.CCCCC
27	C.CCC6S	C.CCC2E	C.CCC15	-C.CCCC1	C.CCC2E	-C.CCCC1	C.CCCCC
28	C.CCC6C	C.CCC24	C.CCC14	-C.CCCC1	C.CCC25	-C.CCCC1	C.CCCCC
29	C.CCC56	C.CCC23	C.CCC13	-C.CCCC2	C.CCC24	-C.CCCC1	C.CCCCC
30	C.CC052	C.CCC21	C.CCC12	-C.CCCC3	C.CCC22	-C.CCCC1	C.CCCCC
31	C.CCC4S	C.CCC2C	C.CCC11	-C.CCCC3	C.CCC21	-C.CCCC1	C.CCCCC
32	C.CCC45	C.CCC1S	C.CCC11	-C.CCCC3	C.CCC2C	-C.CCCC1	C.CCCCC
33	C.CC042	C.CCC17	C.CCC1C	-C.CCCC3	C.CCC1S	-C.CCCC1	C.CCCCC
34	C.CCC3S	C.CCC1E	C.CCCC9	-C.CCCC3	C.CCC1E	-C.CCCC1	C.CCCCC
35	C.CCC3E	C.CCC1S	C.CCCCE	-C.CCCC4	C.CCC17	-C.CCCC1	C.CCCCC
36	C.CCC33	C.CCC14	C.CCCCE	-C.CCCC4	C.CCC1E	-C.CCCC1	C.CCCCC
37	C.CCC31	C.CCC13	C.CCCC7	-C.CCCC3	C.CCC15	-C.CCCC1	C.CCCCC
38	C.CC02S	C.CCC12	C.CCCC7	-C.CCCC3	C.CCC14	-C.CCCC1	C.CCCCC
39	C.CCC27	C.CCC11	C.CCCC6	-C.CCCC3	C.CCC13	-C.CCCC1	C.CCCCC
40	C.CC025	C.CCC1C	C.CCCC6	-C.CCCC3	C.CCC12	-C.CCCC1	C.CCCCC

TABLE (5-19)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE BOND RATE

	CH DEM D	CH CCINC	CH TIMED	CH FR RS	CH LOANS	OPEN M C	DISC'T R
TOTAL	C.16075	C.00879	C.08665	-C.02918	C.62995	C.00139	C.05673
LAG							
0	C.00048	C.00018	-C.29688	-C.00473	C.00370	C.00196	C.0
1	C.00255	C.00028	-C.05244	-C.00287	C.01787	-C.00040	C.00166
2	C.00435	C.00034	C.00411	-C.00152	C.02392	C.00005	C.00226
3	C.00561	C.00037	C.01757	-C.00104	C.02682	-C.00002	C.00252
4	C.00641	C.00039	C.02088	-C.00093	C.02815	-C.00001	C.00252
5	C.00685	C.00040	C.02158	-C.00092	C.02856	-C.00001	C.00248
6	C.00705	C.00039	C.02146	-C.00093	C.02841	-C.00001	C.00243
7	C.00708	C.00039	C.02100	-C.00093	C.02787	-C.00001	C.00238
8	C.00699	C.00037	C.02034	-C.00091	C.02709	-C.00001	C.00233
9	C.00683	C.00036	C.01957	-C.00089	C.02613	-C.00001	C.00226
10	C.00661	C.00035	C.01873	-C.00086	C.02506	-C.00001	C.00219
11	C.00635	C.00033	C.01784	-C.00082	C.02392	-C.00001	C.00210
12	C.00607	C.00031	C.01694	-C.00078	C.02275	-C.00001	C.00202
13	C.00578	C.00030	C.01603	-C.00074	C.02156	-C.00001	C.00192
14	C.00549	C.00028	C.01513	-C.00070	C.02038	-C.00001	C.00183
15	C.00519	C.00026	C.01425	-C.00066	C.01922	-C.00001	C.00173
16	C.00490	C.00025	C.01339	-C.00062	C.01808	-C.00001	C.00164
17	C.00461	C.00023	C.01257	-C.00059	C.01698	-C.00001	C.00155
18	C.00433	C.00022	C.01178	-C.00055	C.01592	-C.00001	C.00145
19	C.00407	C.00020	C.01102	-C.00052	C.01491	-C.00001	C.00137
20	C.00381	C.00019	C.01029	-C.00048	C.01394	-C.00001	C.00128
21	C.00356	C.00018	C.00961	-C.00045	C.01302	-C.00000	C.00120
22	C.00333	C.00016	C.00896	-C.00042	C.01215	-C.00000	C.00112
23	C.00311	C.00015	C.00835	-C.00039	C.01132	-C.00000	C.00105
24	C.00290	C.00014	C.00777	-C.00036	C.01054	-C.00000	C.00098
25	C.00270	C.00013	C.00723	-C.00034	C.00981	-C.00000	C.00091
26	C.00251	C.00012	C.00672	-C.00032	C.00912	-C.00000	C.00085
27	C.00233	C.00011	C.00624	-C.00029	C.00847	-C.00000	C.00079
28	C.00217	C.00011	C.00579	-C.00027	C.00786	-C.00000	C.00073
29	C.00201	C.00010	C.00537	-C.00025	C.00730	-C.00000	C.00068
30	C.00187	C.00009	C.00498	-C.00023	C.00677	-C.00000	C.00063
31	C.00173	C.00008	C.00461	-C.00022	C.00627	-C.00000	C.00059
32	C.00161	C.00008	C.00427	-C.00020	C.00581	-C.00000	C.00054
33	C.00149	C.00007	C.00396	-C.00019	C.00538	-C.00000	C.00050
34	C.00138	C.00007	C.00366	-C.00017	C.00498	-C.00000	C.00047
35	C.00128	C.00006	C.00339	-C.00016	C.00461	-C.00000	C.00043
36	C.00118	C.00006	C.00314	-C.00015	C.00427	-C.00000	C.00040
37	C.00109	C.00005	C.00290	-C.00014	C.00395	-C.00000	C.00037
38	C.00101	C.00005	C.00268	-C.00013	C.00365	-C.00000	C.00034
39	C.00094	C.00005	C.00248	-C.00012	C.00337	-C.00000	C.00032
40	C.00086	C.00004	C.00229	-C.00011	C.00312	-C.00000	C.00029

TABLE (5-19)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE ECNC PAY

	GNP	C NONDUR	C DUR	RESID FI	NONRES I	CH INVEN	ANN CH F
TOTAL	4.07657	1.32281	0.82525	0.88471	1.15565	-0.11185	0.00118
LAG							
0	0.20532	0.01684	0.12C9	0.17E1C	0.0009	-0.0026	0.00000
1	0.20261	0.02920	0.02326	0.15102	0.00734	-0.00822	0.00000
2	0.20039	0.03826	0.03040	0.12721	0.01414	-0.00961	0.00001
3	0.19742	0.04478	0.03444	0.10666	0.02047	-0.00892	0.00002
4	0.19311	0.04929	0.03645	0.08908	0.02600	-0.00772	0.00002
5	0.18748	0.05221	0.03716	0.07405	0.03065	-0.00659	0.00003
6	0.18080	0.05384	0.03704	0.06122	0.03439	-0.00569	0.00003
7	0.17338	0.05445	0.03637	0.05028	0.03728	-0.00500	0.00004
8	0.16550	0.05426	0.03534	0.04097	0.03941	-0.00448	0.00004
9	0.15737	0.05345	0.03408	0.03305	0.04084	-0.00405	0.00004
10	0.14916	0.05217	0.03268	0.02634	0.04168	-0.00371	0.00004
11	0.14098	0.05055	0.03118	0.02066	0.04200	-0.00341	0.00004
12	0.13293	0.04867	0.02963	0.01588	0.04189	-0.00315	0.00004
13	0.12508	0.04663	0.02807	0.01187	0.04142	-0.00291	0.00004
14	0.11748	0.04448	0.02652	0.00852	0.04066	-0.00269	0.00004
15	0.11016	0.04227	0.02500	0.00574	0.03965	-0.00250	0.00004
16	0.10315	0.04005	0.02351	0.00344	0.03847	-0.00231	0.00004
17	0.09646	0.03784	0.02208	0.00156	0.03713	-0.00214	0.00004
18	0.09009	0.03566	0.02069	0.00002	0.03570	-0.00199	0.00004
19	0.08406	0.03354	0.01937	-0.00121	0.03419	-0.00184	0.00004
20	0.07835	0.03149	0.01811	-0.00219	0.03264	-0.00170	0.00003
21	0.07296	0.02952	0.01691	-0.00295	0.03107	-0.00158	0.00003
22	0.06789	0.02762	0.01577	-0.00354	0.02949	-0.00146	0.00003
23	0.06313	0.02582	0.01469	-0.00397	0.02793	-0.00135	0.00003
24	0.05865	0.02411	0.01368	-0.00428	0.02640	-0.00125	0.00003
25	0.05446	0.02248	0.01273	-0.00448	0.02490	-0.00116	0.00003
26	0.05054	0.02094	0.01183	-0.00460	0.02344	-0.00107	0.00002
27	0.04688	0.01950	0.01099	-0.00465	0.02203	-0.00099	0.00002
28	0.04346	0.01813	0.01020	-0.00464	0.02068	-0.00091	0.00002
29	0.04027	0.01685	0.00947	-0.00459	0.01938	-0.00084	0.00002
30	0.03730	0.01565	0.00878	-0.00450	0.01814	-0.00078	0.00002
31	0.03453	0.01453	0.00814	-0.00438	0.01696	-0.00072	0.00002
32	0.03196	0.01348	0.00754	-0.00424	0.01584	-0.00066	0.00002
33	0.02957	0.01250	0.00698	-0.00409	0.01478	-0.00061	0.00002
34	0.02734	0.01158	0.00646	-0.00392	0.01378	-0.00056	0.00001
35	0.02528	0.01073	0.00598	-0.00375	0.01284	-0.00052	0.00001
36	0.02337	0.00993	0.00553	-0.00357	0.01195	-0.00048	0.00001
37	0.02159	0.00919	0.00512	-0.00339	0.01111	-0.00044	0.00001
38	0.01995	0.00851	0.00473	-0.00321	0.01033	-0.00041	0.00001
39	0.01842	0.00787	0.00437	-0.00304	0.00960	-0.00038	0.00001
40	0.01701	0.00727	0.00404	-0.00286	0.00891	-0.00035	0.00001

TABLE (5-2C)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE BAL-PAYM

	CH DEM D	CH CCINC	CH TIMED	CH FR RS	CH LOANS	OPEN M C	DISC'T R
TOTAL	C.CC316	C.CCC5C	C.C2CCC	C.C2538	C.C127C	C.13688	-C.C14C5
LAG							
C	C.C	C.C	C.C	C.C2363	C.C	C.16192	C.C
1	-C.CC048	C.CCCCC	-C.CCC72	C.CC221	-C.CC37C	-C.C2961	-C.CC5C8
2	-C.CCC73	C.CCCC1	-C.CCC67	C.CC1C9	-C.CC381	C.CC544	-C.CC383
3	-C.CCC79	C.CCCC1	-C.CCC41	-C.CCCC6	-C.CC3C2	-C.CC1CC	-C.CC276
4	-C.CC063	C.CCCC2	-C.CCCC9	-C.CCC14	-C.CC199	C.CCC1F	-C.CC179
5	-C.CC045	C.CCCC2	C.CCC2C	-C.CCC14	-C.CC1C8	-C.CCCC3	-C.CC113
6	-C.CC027	C.CCCC2	C.CCC43	-C.CCC1C	-C.CCC35	C.CCCC1	-C.CCC69
7	-C.CC012	C.CCCC2	C.CCC61	-C.CCCCE	C.CCC1E	-C.CCCCC	-C.CCC4C
8	C.CCCC1	C.CCCC2	C.CCC75	-C.CCCC6	C.CCC5E	-C.CCCCC	-C.CCC22
9	C.CC011	C.CCCC2	C.CCC84	-C.CCCC5	C.CCC82	-C.CCCCC	-C.CCC1C
1C	C.CCC1E	C.CCCC2	C.CCC8S	-C.CCCC5	C.CC1CC	-C.CCCCC	-C.CCCC3
11	C.CC023	C.CCCC2	C.CCC92	-C.CCCC5	C.CC11C	-C.CCCCC	C.CCCC2
12	C.CC026	C.CCCC2	C.CCC93	-C.CCCC4	C.CC11E	-C.CCCCC	C.CCCC5
13	C.CC02E	C.CCCC2	C.CCC93	-C.CCCC4	C.CC11E	-C.CCCCC	C.CCCC7
14	C.CCC2S	C.CCCC2	C.CCC91	-C.CCCC4	C.CC11E	-C.CCCCC	C.CCCCE
15	C.CC02S	C.CCCC2	C.CCCE5	-C.CCCC4	C.CC11E	-C.CCCCC	C.CCCCS
16	C.CC02S	C.CCCC2	C.CCCE5	-C.CCCC4	C.CC113	-C.CCCCC	C.CCCCS
17	C.CCC2E	C.CCCC2	C.CCCE2	-C.CCCC4	C.CC1CS	-C.CCCCC	C.CCCCS
18	C.CC027	C.CCCC1	C.CCC7E	-C.CCCC4	C.CC1C4	-C.CCCCC	C.CCCCS
19	C.CCC2E	C.CCCC1	C.CCC74	-C.CCCC3	C.CCC9S	-C.CCCCC	C.CCCCS
2C	C.CC025	C.CCCC1	C.CCC7C	-C.CCCC3	C.CCC94	-C.CCCCC	C.CCCCE
21	C.CCC24	C.CCCC1	C.CCC66	-C.CCCC3	C.CCC8S	-C.CCCCC	C.CCCCE
22	C.CCC23	C.CCCC1	C.CCC63	-C.CCCC3	C.CCC84	-C.CCCCC	C.CCCCE
23	C.CC021	C.CCCC1	C.CCC59	-C.CCCC3	C.CCC7S	-C.CCCCC	C.CCCC7
24	C.CCC2C	C.CCCC1	C.CCC55	-C.CCCC3	C.CCC75	-C.CCCCC	C.CCCC7
25	C.CCC1S	C.CCCC1	C.CCC52	-C.CCCC2	C.CCC7C	-C.CCCCC	C.CCCC6
26	C.CC01E	C.CCCC1	C.CCC48	-C.CCCC2	C.CCC6E	-C.CCCCC	C.CCCCE
27	C.CC017	C.CCCC1	C.CCC45	-C.CCCC2	C.CCC61	-C.CCCCC	C.CCCC6
28	C.CCC1E	C.CCCC1	C.CCC42	-C.CCCC2	C.CCC57	-C.CCCCC	C.CCCC5
29	C.CCC1S	C.CCCC1	C.CCC3S	-C.CCCC2	C.CCC53	-C.CCCCC	C.CCCC5
3C	C.CCC14	C.CCCC1	C.CCC37	-C.CCCC2	C.CCC5C	-C.CCCCC	C.CCCC5
31	C.CC013	C.CCCC1	C.CCC34	-C.CCCC2	C.CCC4E	-C.CCCCC	C.CCCC4
32	C.CCC12	C.CCCC1	C.CCC32	-C.CCCC1	C.CCC43	-C.CCCCC	C.CCCC4
33	C.CCC11	C.CCCC1	C.CCC3C	-C.CCCC1	C.CCC4C	-C.CCCCC	C.CCCC4
34	C.CCC1C	C.CCCC1	C.CCC27	-C.CCCC1	C.CCC37	-C.CCCCC	C.CCCC3
35	C.CCC1C	C.CCCCC	C.CCC26	-C.CCCC1	C.CCC35	-C.CCCCC	C.CCCC3
36	C.CCCCS	C.CCCCC	C.CCC24	-C.CCCC1	C.CCC32	-C.CCCCC	C.CCCC3
37	C.CCCCE	C.CCCCC	C.CCC22	-C.CCCC1	C.CCC3C	-C.CCCCC	C.CCCC3
38	C.CCCCE	C.CCCCC	C.CCC2C	-C.CCCC1	C.CCC28	-C.CCCCC	C.CCCC3
39	C.CCCC7	C.CCCCC	C.CCC1S	-C.CCCC1	C.CCC2E	-C.CCCCC	C.CCCC2
4C	C.CCCC7	C.CCCCC	C.CCC17	-C.CCCC1	C.CCC24	-C.CCCCC	C.CCCC2

TABLE (5-2C)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE BAL-PAYM

	GNP	C NONDUR	C DUR	C RESID FI	NONRES I	CH INVEN	ANN CH F
TOTAL	0.23234	0.07519	0.02937	0.08795	0.03215	0.00767	-0.00025
LAG							
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.00530	0.00043	-0.00142	0.00457	-0.00093	0.00265	0.00000
2	0.00789	0.00097	-0.00190	0.00736	-0.00167	0.00313	-0.00002
3	0.00904	0.00147	-0.00168	0.00878	-0.00206	0.00254	-0.00003
4	0.00944	0.00186	-0.00110	0.00912	-0.00211	0.00167	-0.00003
5	0.00956	0.00217	-0.00045	0.00883	-0.00192	0.00093	-0.00003
6	0.00956	0.00240	0.00014	0.00818	-0.00158	0.00042	-0.00003
7	0.00950	0.00257	0.00062	0.00736	-0.00116	0.00011	-0.00003
8	0.00937	0.00268	0.00098	0.00650	-0.00073	-0.00007	-0.00002
9	0.00919	0.00276	0.00124	0.00566	-0.00030	-0.00016	-0.00002
10	0.00896	0.00279	0.00140	0.00487	0.00010	-0.00020	-0.00002
11	0.00868	0.00279	0.00151	0.00415	0.00045	-0.00022	-0.00001
12	0.00837	0.00277	0.00156	0.00351	0.00075	-0.00022	-0.00001
13	0.00803	0.00273	0.00157	0.00294	0.00100	-0.00021	-0.00001
14	0.00768	0.00267	0.00156	0.00244	0.00121	-0.00020	-0.00001
15	0.00731	0.00259	0.00152	0.00201	0.00137	-0.00018	-0.00000
16	0.00694	0.00250	0.00148	0.00164	0.00149	-0.00017	-0.00000
17	0.00657	0.00241	0.00142	0.00133	0.00157	-0.00016	-0.00000
18	0.00621	0.00231	0.00136	0.00105	0.00163	-0.00015	-0.00000
19	0.00585	0.00220	0.00130	0.00083	0.00166	-0.00014	-0.00000
20	0.00550	0.00210	0.00123	0.00063	0.00167	-0.00013	-0.00000
21	0.00517	0.00199	0.00116	0.00047	0.00166	-0.00012	-0.00000
22	0.00485	0.00188	0.00110	0.00033	0.00164	-0.00011	0.00000
23	0.00454	0.00178	0.00103	0.00022	0.00160	-0.00010	0.00000
24	0.00424	0.00168	0.00097	0.00013	0.00156	-0.00009	0.00000
25	0.00396	0.00158	0.00091	0.00005	0.00151	-0.00009	0.00000
26	0.00370	0.00148	0.00085	-0.00001	0.00145	-0.00008	0.00000
27	0.00345	0.00139	0.00080	-0.00006	0.00139	-0.00007	0.00000
28	0.00321	0.00130	0.00074	-0.00010	0.00133	-0.00007	0.00000
29	0.00299	0.00122	0.00069	-0.00013	0.00127	-0.00006	0.00000
30	0.00278	0.00114	0.00065	-0.00015	0.00121	-0.00006	0.00000
31	0.00258	0.00106	0.00060	-0.00017	0.00114	-0.00006	0.00000
32	0.00240	0.00099	0.00056	-0.00018	0.00108	-0.00005	0.00000
33	0.00223	0.00092	0.00052	-0.00019	0.00102	-0.00005	0.00000
34	0.00207	0.00086	0.00048	-0.00019	0.00096	-0.00004	0.00000
35	0.00192	0.00080	0.00045	-0.00019	0.00090	-0.00004	0.00000
36	0.00178	0.00074	0.00042	-0.00019	0.00085	-0.00004	0.00000
37	0.00164	0.00069	0.00039	-0.00019	0.00079	-0.00003	0.00000
38	0.00152	0.00064	0.00036	-0.00019	0.00074	-0.00003	0.00000
39	0.00141	0.00059	0.00033	-0.00018	0.00069	-0.00003	0.00000
40	0.00130	0.00055	0.00031	-0.00017	0.00065	-0.00003	0.00000

TABLE (5-21)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE CHRR-TC

LAG	CH DEM D	CH CCINC	CH TIMED	CH FR RS	CH LOANS	OPEN M C	DISC'T R
TOTAL	-C.C4925	-C.CC782	-C.31194	-C.39590	-C.19816	C.CC442	C.21919
0	C.C	C.C	C.C	-C.31132	C.C	C.CC631	C.C
1	C.CC632	-C.CCCC6	C.CC942	-C.CE634	C.C4879	-C.CC226	C.C6691
2	C.C1C76	-C.CCC14	C.C1C61	-C.C1966	C.C5912	C.CCC16	C.C6281
3	C.C1167	-C.CCC2C	C.CC699	-C.CC181	C.C4899	-C.CCCC5	C.C4559
4	C.C1013	-C.CCC25	C.CC214	C.CC2CC	C.C3351	C.CCCC4	C.C3C24
5	C.CC751	-C.CCC28	-C.CC24C	C.CC219	C.C1899	C.CCCC2	C.C1918
6	C.CC471	-C.CCC29	-C.CC618	C.CC171	C.CC727	C.CCCC2	C.C1179
7	C.CC219	-C.CCC3C	-C.CC913	C.CC128	-C.CC152	C.CCCC1	C.CC697
8	C.CCC12	-C.CCC31	-C.C1131	C.CC1C1	-C.CC784	C.CCCC1	C.CC387
9	-C.CC147	-C.CCC31	-C.C1283	C.CCC86	-C.C1221	C.CCCC1	C.CC188
10	-C.CC263	-C.CCC31	-C.C1381	C.CCC78	-C.C1511	C.CCCC1	C.CCC6C
11	-C.CC345	-C.CCC3C	-C.C1435	C.CCC73	-C.C1652	C.CCCC1	-C.COC23
12	-C.CC398	-C.CCC29	-C.C1455	C.CCC7C	-C.C1753	C.CCCC1	-C.CCC75
13	-C.CC431	-C.CCC29	-C.C1449	C.CCC68	-C.C1336	C.CCCC1	-C.CC1C7
14	-C.CC448	-C.CCC28	-C.C1425	C.CCC66	-C.C1339	C.CCCC1	-C.CC126
15	-C.CC453	-C.CCC26	-C.C1387	C.CCC64	-C.C1812	C.CCCC1	-C.CC136
16	-C.CC45C	-C.CCC25	-C.C1339	C.CCC62	-C.C1765	C.CCCC1	-C.CC141
17	-0.CC441	-C.CCC24	-C.C1285	C.CCC59	-C.C17C5	C.CCCC1	-C.CC141
18	-C.CC42E	-C.OCC23	-C.C1227	C.CCC57	-C.C163E	C.CCCC1	-C.CC139
19	-C.CC412	-C.CCC22	-C.C1167	C.CCC54	-C.C1561	C.CCCC1	-C.CC136
20	-C.CC394	-C.CCC2C	-C.C11C6	C.CCC51	-C.C1483	C.CCCC1	-C.CC131
21	-C.CC37E	-C.CCC19	-C.C1C45	C.CCC48	-0.C14C5	C.CCCC1	-C.CC125
22	-C.CC356	-C.CCC1E	-C.CC985	C.CCC46	-C.C132E	C.CCCCC	-C.CC119
23	-C.CC337	-C.CCC17	-0.CC926	C.CCC43	-C.C124S	C.CCCCC	-C.CC113
24	-C.CC31E	-C.CCC1E	-C.CC87C	C.CCC4C	-C.C1175	C.CCCCC	-C.CC1C7
25	-C.CC299	-C.CCC15	-C.CC815	C.CCC3E	-C.C11C2	C.CCCCC	-C.CC1C1
26	-C.CC281	-C.CCC14	-C.CC763	C.CCC3E	-C.C1C33	C.CCCCC	-C.CCC95
27	-C.CC263	-C.CCC13	-C.CC714	C.CCC33	-C.CC966	C.CCCCC	-C.CCC89
28	-0.CC247	-C.CCC12	-C.CC666	C.CCC31	-C.CC9C3	C.CCCCC	-C.CCC83
29	-C.CC23C	-C.CCC11	-C.CC622	C.CCC29	-0.CC843	C.CCCCC	-C.CCC78
30	-C.CC215	-C.CCC11	-C.CC579	C.CCC27	-C.CC786	C.CCCCC	-C.CCC73
31	-C.CC2C1	-C.CCC1C	-C.CC539	C.CCC25	-C.CC732	C.CCCCC	-C.CCC6E
32	-C.CC187	-C.CCCC9	-C.CC5C2	C.CCC24	-0.CC681	C.CCCCC	-C.CCC63
33	-C.CC174	-C.CCCC9	-C.CC467	C.CCC22	-C.CC634	C.CCCCC	-C.CCC59
34	-C.CC162	-C.CCCC8	-0.CC434	C.CCC2C	-0.CC589	C.CCCCC	-C.CCC55
35	-C.CC151	-C.CCCC7	-C.CC4C3	C.CCC19	-C.CC547	C.CCCCC	-C.CCC51
36	-C.CC14C	-C.CCCC7	-C.CC374	C.CCC18	-C.CC5C8	C.CCCCC	-C.CCC47
37	-C.CC13C	-C.CCCC6	-C.CC347	C.CCC16	-C.CC471	C.CCCCC	-C.CCC44
38	-C.CC121	-C.CCCC6	-C.CC321	C.CCC15	-C.CC437	C.CCCCC	-C.CCC41
39	-C.CC112	-C.CCCC5	-C.CC298	C.CCC14	-C.CC4C5	C.CCCCC	-C.CCC38
40	-C.CC1C4	-C.CCCC5	-C.CC276	C.CCC13	-0.CC375	C.CCCCC	-C.CCC35

TABLE (5-21)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE CHRR-TC

	CAP	C NONDUR	C DUR	RESID FI	NONRES I	CH INVEN	ANN CH P
TOTAL	-3.62410	-1.17252	-0.45821	-1.37184	-0.50154	-0.11960	0.00385
LAG							
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	-0.06986	-0.00573	0.01865	-0.06016	0.01224	-0.03486	-0.00000
2	-0.11678	-0.01386	0.02848	-0.10799	0.02425	-0.04765	0.00023
3	-0.13824	-0.02166	0.02674	-0.13347	0.03117	-0.04102	0.00040
4	-0.14631	-0.02812	0.01859	-0.14148	0.03279	-0.02809	0.00048
5	-0.14884	-0.03314	0.00858	-0.13840	0.03040	-0.01627	0.00049
6	-0.14915	-0.03692	-0.00080	-0.12912	0.02546	-0.00778	0.00047
7	-0.14830	-0.03967	-0.00853	-0.11684	0.01917	-0.00243	0.00042
8	-0.14651	-0.04159	-0.01442	-0.10354	0.01238	0.00066	0.00036
9	-0.14383	-0.04281	-0.01865	-0.09035	0.00569	0.00229	0.00030
10	-0.14034	-0.04345	-0.02149	-0.07791	-0.00055	0.00306	0.00025
11	-0.13613	-0.04358	-0.02324	-0.06651	-0.00613	0.00334	0.00021
12	-0.13135	-0.04330	-0.02416	-0.05629	-0.01095	0.00336	0.00016
13	-0.12614	-0.04267	-0.02447	-0.04724	-0.01501	0.00325	0.00013
14	-0.12063	-0.04175	-0.02432	-0.03932	-0.01831	0.00308	0.00010
15	-0.11494	-0.04066	-0.02386	-0.03245	-0.02092	0.00289	0.00008
16	-0.10918	-0.03928	-0.02316	-0.02652	-0.02291	0.00270	0.00006
17	-0.10341	-0.03782	-0.02232	-0.02144	-0.02434	0.00251	0.00004
18	-0.09770	-0.03626	-0.02137	-0.01711	-0.02530	0.00233	0.00003
19	-0.09211	-0.03464	-0.02037	-0.01343	-0.02584	0.00216	0.00002
20	-0.08667	-0.03299	-0.01934	-0.01032	-0.02604	0.00201	0.00001
21	-0.08142	-0.03132	-0.01830	-0.00771	-0.02595	0.00186	0.00000
22	-0.07636	-0.02966	-0.01727	-0.00553	-0.02562	0.00173	-0.00000
23	-0.07151	-0.02803	-0.01626	-0.00372	-0.02511	0.00160	-0.00001
24	-0.06689	-0.02642	-0.01528	-0.00223	-0.02445	0.00149	-0.00001
25	-0.06250	-0.02487	-0.01433	-0.00100	-0.02367	0.00138	-0.00001
26	-0.05833	-0.02337	-0.01342	-0.00001	-0.02281	0.00128	-0.00001
27	-0.05439	-0.02192	-0.01255	0.00079	-0.02189	0.00118	-0.00002
28	-0.05067	-0.02053	-0.01172	0.00143	-0.02093	0.00110	-0.00002
29	-0.04716	-0.01921	-0.01094	0.00192	-0.01995	0.00102	-0.00002
30	-0.04387	-0.01795	-0.01020	0.00230	-0.01895	0.00094	-0.00002
31	-0.04077	-0.01676	-0.00950	0.00258	-0.01796	0.00087	-0.00002
32	-0.03787	-0.01563	-0.00884	0.00278	-0.01698	0.00080	-0.00002
33	-0.03516	-0.01456	-0.00822	0.00291	-0.01603	0.00074	-0.00001
34	-0.03262	-0.01356	-0.00764	0.00298	-0.01509	0.00069	-0.00001
35	-0.03025	-0.01261	-0.00710	0.00301	-0.01419	0.00064	-0.00001
36	-0.02804	-0.01172	-0.00659	0.00301	-0.01332	0.00059	-0.00001
37	-0.02598	-0.01089	-0.00611	0.00297	-0.01249	0.00054	-0.00001
38	-0.02406	-0.01011	-0.00566	0.00291	-0.01169	0.00050	-0.00001
39	-0.02227	-0.00938	-0.00525	0.00283	-0.01093	0.00046	-0.00001
40	-0.02061	-0.00870	-0.00486	0.00274	-0.01021	0.00043	-0.00001

TABLE (5-22)

INTERIM MULTIPLIERS FOR THE EXCOGENOUS VARIABLE EXCG EXP

	CH CONS D	CH CCINC	CH TIMED	CH FR RS	CH LOANS	OPEN M C	DISC'T R
TOTAL	C.13044	C.CC721	C.38491	-C.C1732	C.51122	-C.CCC19	C.C4232
LAG							
0	C.CC269	C.CCC99	C.CC4C1	-C.CCC81	C.C2C79	-C.CCCC1	C.C
1	C.C1149	C.00073	C.C7898	-C.CC178	C.C7847	-C.CCCC2	C.CC38C
2	C.C116C	C.CCC57	C.C3675	-C.CC164	C.C4596	-C.CCCC2	C.CC34C
3	C.C1025	C.CCC47	C.C2519	-C.CC138	C.C3515	-C.CCCC1	C.CC31C
4	C.CC889	C.CCC4C	C.C2C93	-C.CC115	C.C2968	-C.CCCC1	C.CC283
5	C.CC774	C.CCC35	C.C1847	-C.CCC97	C.C2599	-C.CCCC1	C.CC256
6	C.CC68C	C.CCC31	C.C1658	-C.CCC84	C.C2313	-C.CCCC1	C.CC231
7	C.CC6C4	C.CCC28	C.C1499	-C.CCC74	C.C2C79	-C.CCCC1	C.CC2C8
8	C.CC541	C.CCC25	C.C1362	-C.CCC66	C.C1882	-C.CCCC1	C.CC187
9	C.CC488	C.CCC23	C.C1242	-C.CCC6C	C.C1711	-C.CCCC1	C.CC169
1C	C.CC443	C.CCC21	C.C1136	-C.CCC54	C.C1562	-C.CCCC1	C.CC153
11	C.CC4C3	C.CCC19	C.C1C42	-C.CCC49	C.C1429	-C.CCCC1	C.CC139
12	C.CC36E	C.CCC18	C.CC957	-C.CCC45	C.C131C	-C.CCCCC	C.CC127
13	C.CC337	C.CCC16	C.CC879	-C.CCC42	C.C12C3	-C.CCCCC	C.CC116
14	C.CC31C	C.CCC15	C.CC8C9	-C.CCC38	C.C11C6	-C.CCCCC	C.CC1C6
15	C.CC284	C.CCC14	C.CC745	-C.CCC35	C.C1C18	-C.CCCCC	C.CCC97
16	C.CC262	C.CCC13	C.CC6E6	-C.CCC32	C.CC937	-C.CCCCC	C.CCC89
17	C.CC241	C.CCC12	C.CC632	-C.CCC3C	C.CC8E3	-C.CCCCC	C.CCC82
18	C.CC222	C.CCC11	C.CC583	-C.CCC28	C.CC795	-C.CCCCC	C.CCC7E
19	C.CC2C4	C.CCC1C	C.CC537	-C.CCC25	C.CC733	-C.CCCCC	C.CCC7C
2C	C.CC18E	C.CCCC9	C.CC495	-C.CCC23	C.CC675	-C.CCCCC	C.CCC64
21	C.CC173	C.CCCC8	C.CC456	-C.CCC22	C.CC622	-C.CCCCC	C.CCC59
22	C.CC16C	C.CCCC8	C.CC421	-C.CCC2C	C.CC574	-C.CCCCC	C.CCC54
23	C.CC147	C.CCCC7	C.CC388	-C.CCC18	C.CC529	-C.CCCCC	C.CCC5C
24	C.CC13E	C.CCCC7	C.CC357	-C.CCC17	C.CC487	-C.CCCCC	C.CCC4E
25	C.CC125	C.CCCC6	C.CC329	-C.CCC16	C.CC449	-C.CCCCC	C.CCC43
26	C.CC115	C.CCCC6	C.CC3C4	-C.CCC14	C.CC414	-C.CCCCC	C.CCC39
27	C.CC1C6	C.CCCC5	C.CC2EC	-C.CCC13	C.CC381	-C.CCCCC	C.CCC3E
28	C.CC098	C.CCCC5	C.CC25E	-C.CCC12	C.CC352	-C.CCCCC	C.CCC33
29	C.CC09C	C.CCCC4	C.CC238	-C.CCC11	C.CC324	-C.CCCCC	C.CCC31
3C	C.CC083	C.CCCC4	C.CC219	-C.CCC1C	C.CC29E	-C.CCCCC	C.CCC2E
31	C.CCC77	C.CCCC4	C.CC2C2	-C.CCC1C	C.CC275	-C.CCCCC	C.CCC2E
32	C.CCC71	C.CCCC3	C.CC186	-C.CCCC9	C.CC253	-C.CCCCC	C.CCC24
33	C.CCC65	C.CCCC3	C.CC171	-C.CCCCE	C.CC233	-C.CCCCC	C.CCC22
34	C.CCC6C	C.CCCC3	C.CC15E	-C.CCCC7	C.CC215	-C.CCCCC	C.CCC2C
35	C.CCC55	C.CCCC3	C.CC145	-C.CCCC7	C.CC19E	-C.CCCCC	C.CCC19
36	C.CC051	C.CCCC2	C.CC134	-C.CCCC6	C.CC182	-C.CCCCC	C.CCC17
37	C.CCC47	C.CCCC2	C.CC123	-C.CCCC6	C.CC16E	-C.CCCCC	C.CCC1E
38	C.CC043	C.CCCC2	C.CC113	-C.CCCC5	C.CC155	-C.CCCCC	C.CCC15
39	C.CCC4C	C.CCCC2	C.CC1C4	-C.CCCC5	C.CC142	-C.CCCCC	C.CCC14
4C	C.CC037	C.CCCC2	C.CCC96	-C.CCCC5	C.CC131	-C.CCCCC	C.CCC12

TABLE (5-22)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE EXOG EXP

	GNP	C NONDUR	C DUR	RESID FI	NONRES I	CH INVEN	ANN CH F
TOTAL	3.3450	1.0853	0.6728	-0.2648	0.9400	-0.0834	0.0090
LAG							
0	1.1528	0.0957	0.0678	0.0	0.0052	-0.0146	0.0001
1	0.1561	0.0834	0.0792	-0.0034	0.0357	-0.0053	0.0001
2	0.1571	0.0752	0.0574	-0.0059	0.0426	-0.0122	0.0002
3	0.1496	0.0684	0.0466	-0.0079	0.0457	-0.0037	0.0003
4	0.1384	0.0625	0.0393	-0.0093	0.0468	-0.0008	0.0004
5	0.1269	0.0571	0.0347	-0.0102	0.0466	-0.0007	0.0004
6	0.1161	0.0522	0.0312	-0.0107	0.0457	-0.0007	0.0004
7	0.1065	0.0477	0.0285	-0.0111	0.0442	-0.0012	0.0004
8	0.0978	0.0437	0.0243	-0.0112	0.0423	-0.0014	0.0004
9	0.0898	0.0400	0.0221	-0.0111	0.0403	-0.0014	0.0004
10	0.0827	0.0366	0.0202	-0.0109	0.0382	-0.0014	0.0004
11	0.0761	0.0336	0.0184	-0.0106	0.0360	-0.0014	0.0004
12	0.0701	0.0309	0.0169	-0.0102	0.0338	-0.0013	0.0004
13	0.0646	0.0284	0.0155	-0.0098	0.0317	-0.0012	0.0003
14	0.0596	0.0261	0.0143	-0.0095	0.0297	-0.0011	0.0003
15	0.0549	0.0240	0.0131	-0.0088	0.0277	-0.0010	0.0003
16	0.0506	0.0221	0.0121	-0.0084	0.0258	-0.0010	0.0003
17	0.0467	0.0203	0.0111	-0.0079	0.0240	-0.0009	0.0003
18	0.0430	0.0187	0.0103	-0.0074	0.0223	-0.0007	0.0002
19	0.0397	0.0172	0.0094	-0.0070	0.0208	-0.0006	0.0002
20	0.0366	0.0159	0.0087	-0.0066	0.0193	-0.0006	0.0002
21	0.0337	0.0146	0.0080	-0.0062	0.0179	-0.0006	0.0002
22	0.0311	0.0135	0.0074	-0.0057	0.0166	-0.0006	0.0002
23	0.0286	0.0124	0.0068	-0.0054	0.0153	-0.0005	0.0002
24	0.0264	0.0114	0.0063	-0.0050	0.0142	-0.0005	0.0002
25	0.0243	0.0105	0.0058	-0.0047	0.0131	-0.0004	0.0001
26	0.0224	0.0097	0.0053	-0.0043	0.0121	-0.0004	0.0001
27	0.0207	0.0089	0.0049	-0.0040	0.0112	-0.0004	0.0001
28	0.0191	0.0082	0.0045	-0.0037	0.0104	-0.0003	0.0001
29	0.0175	0.0076	0.0042	-0.0035	0.0096	-0.0003	0.0001
30	0.0161	0.0070	0.0038	-0.0032	0.0089	-0.0003	0.0001
31	0.0149	0.0064	0.0035	-0.0030	0.0082	-0.0003	0.0001
32	0.0137	0.0059	0.0032	-0.0028	0.0076	-0.0002	0.0001
33	0.0126	0.0054	0.0030	-0.0026	0.0070	-0.0002	0.0001
34	0.0116	0.0050	0.0027	-0.0024	0.0064	-0.0002	0.0001
35	0.0107	0.0046	0.0025	-0.0022	0.0059	-0.0002	0.0001
36	0.0098	0.0042	0.0023	-0.0020	0.0055	-0.0002	0.0001
37	0.0091	0.0039	0.0021	-0.0018	0.0050	-0.0001	0.0001
38	0.0083	0.0036	0.0020	-0.0017	0.0046	-0.0001	0.0001
39	0.0077	0.0033	0.0018	-0.0016	0.0043	-0.0001	0.0000
40	0.0071	0.0030	0.0017	-0.0015	0.0039	-0.0001	0.0000

TABLE (5-23)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE PERM Y-1

LAG	CH DEM D	CH CCINC	CH TIMED	CH FF RS	CH LOANS	CPEN M D	DISC'T R
TOTAL	C.13370	C.CC511	C.29524	-C.C1582	C.4CC32	-C.CCC17	C.C3226
0	C.C176C	C.CCCC9	C.CC673	-C.CC1C8	C.C1192	-C.CCCC1	C.C
1	C.C1C97	C.CCC15	C.C1331	-C.CC116	C.C1796	-C.CCCC1	C.CCC58
2	C.CC783	C.CCC19	C.C1421	-C.CC1CC	C.C1887	-C.CCCC1	C.CCC98
3	C.CC628	C.CCC21	C.C1411	-C.CCC86	C.C1879	-C.CCCC1	C.CC123
4	C.CC548	C.CCC23	C.C1385	-C.CCC75	C.C1847	-C.CCCC1	C.CC136
5	C.CC5C3	C.CCC23	C.C1352	-C.CCC68	C.C18C5	-C.CCCC1	C.CC142
6	C.CC475	C.CCC23	C.C1313	-C.CCC64	C.C1754	-C.CCCC1	C.CC144
7	C.CC453	C.CCC22	C.C1269	-C.CCC6C	C.C1696	-C.CCCC1	C.CC143
8	C.CC434	C.CCC22	C.C1219	-C.CCC57	C.C1632	-C.CCCC1	C.CC14C
9	C.CC416	C.CCC21	C.C1167	-C.CCC54	C.C1564	-C.CCCC1	C.CC136
1C	C.CC39E	C.CCC2C	C.C1112	-C.CCC52	C.C1492	-C.CCCC1	C.CC131
11	C.CC38C	C.CCC19	C.C1C56	-C.CCC49	C.C142C	-C.CCCC1	C.CC12E
12	C.CC361	C.CCC18	C.C1CC1	-C.CCC46	C.C1346	-C.CCCCC	C.CC12C
13	C.CC343	C.CCC17	C.CC945	-C.CCC44	C.C1273	-C.CCCCC	C.CC114
14	C.CC324	C.CCC16	C.CC891	-C.CCC41	C.C12C2	-C.CCCCC	C.CC1C8
15	C.CC3C6	C.CCC15	C.CC838	-C.CCC39	C.C1131	-C.CCCCC	C.CC1C2
16	C.CC289	C.CCC14	C.CC787	-C.CCC37	C.C1C63	-C.CCCCC	C.CCC97
17	C.CC271	C.CCC14	C.CC738	-C.CCC34	C.CC998	-C.CCCCC	C.CCC91
18	C.CC255	C.CCC13	C.CC691	-C.CCC32	C.CC935	-C.CCCCC	C.CCC86
19	C.CC239	C.CCC12	C.CC646	-C.CCC3C	C.CC874	-C.CCCCC	C.CCC8C
2C	C.CC223	C.CCC11	C.CC6C3	-C.CCC28	C.CC817	-C.CCCCC	C.CCC75
21	C.CC2C9	C.CCC1C	C.CC563	-C.CCC26	C.CC763	-C.CCCCC	C.CCC7C
22	C.CC199	C.CCC1C	C.CC524	-C.CCC25	C.CC711	-C.CCCCC	C.CCC66
23	C.CC182	C.CCCC9	C.CC488	-C.CCC23	C.CC662	-C.CCCCC	C.CCC61
24	C.CC169	C.CCCC8	C.CC454	-C.CCC21	C.CC616	-C.CCCCC	C.CCC57
25	C.CC158	C.CCCC8	C.CC422	-C.CCC2C	C.CC573	-C.CCCCC	C.CCC53
26	C.CC147	C.CCCC7	C.CC392	-C.CCC18	C.CC533	-C.CCCCC	C.CCC5C
27	C.CC136	C.CCCC7	C.CC364	-C.CCC17	C.CC495	-C.CCCCC	C.CCC46
28	C.CC127	C.CCCC6	C.CC338	-C.CCC16	C.CC459	-C.CCCCC	C.CCC43
29	C.CC118	C.CCCC6	C.CC313	-C.CCC15	C.CC426	-C.CCCCC	C.CCC4C
3C	C.CC1C9	C.CCCC5	C.CC291	-C.CCC14	C.CC395	-C.CCCCC	C.CCC37
31	C.CC1C1	C.CCCC5	C.CC269	-C.CCC13	C.CC366	-C.CCCCC	C.CCC34
32	C.CCC94	C.CCCC5	C.CC249	-C.CCC12	C.CC339	-C.CCCCC	C.CCC32
33	C.CCC87	C.CCCC4	C.CC231	-C.CCC11	C.CC314	-C.CCCCC	C.CCC29
34	C.CCC8C	C.CCCC4	C.CC214	-C.CCC1C	C.CC291	-C.CCCCC	C.CCC27
35	C.CCC74	C.CCCC4	C.CC198	-C.CCCC9	C.CC269	-C.CCCCC	C.CCC25
36	C.CCC69	C.CCCC3	C.CC183	-C.CCCC9	C.CC249	-C.CCCCC	C.CCC23
37	C.CCC64	C.CCCC3	C.CC169	-C.CCCC8	C.CC23C	-C.CCCCC	C.CCC22
38	C.CC059	C.CCCC3	C.CC156	-C.CCCC7	C.CC212	-C.CCCCC	C.CCC2C
39	C.CC054	C.CCCC3	C.CC144	-C.CCCC7	C.CC196	-C.CCCCC	C.CCC18
4C	C.CC05C	C.CCCC2	C.CC133	-C.CCCC6	C.CC181	-C.CCCCC	C.CCC17

TABLE (5-23)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE PERM Y-1

	GNP	C NONDUR	C DUR	C RESID	I NONRES	I CH INVEN	ANN CH P
TOTAL	2.37102	0.76937	0.50580	0.46000	0.72144	-0.08559	0.00068
LAG							
0	0.10952	0.00898	0.01097	0.09509	0.00299	-0.00851	0.00000
1	0.11199	0.01590	0.01826	0.08091	0.00809	-0.01117	0.00000
2	0.11446	0.02127	0.02173	0.06840	0.01257	-0.00951	0.00000
3	0.11503	0.02532	0.02312	0.05747	0.01628	-0.00717	0.00001
4	0.11362	0.02824	0.02347	0.04799	0.01927	-0.00535	0.00001
5	0.11074	0.03018	0.02327	0.03982	0.02163	-0.00416	0.00001
6	0.10690	0.03132	0.02276	0.03280	0.02342	-0.00340	0.00002
7	0.10248	0.03181	0.02207	0.02680	0.02472	-0.00292	0.00002
8	0.09774	0.03178	0.02126	0.02170	0.02559	-0.00258	0.00002
9	0.09284	0.03136	0.02037	0.01736	0.02609	-0.00234	0.00002
10	0.08790	0.03064	0.01944	0.01369	0.02627	-0.00214	0.00002
11	0.08300	0.02971	0.01849	0.01059	0.02619	-0.00198	0.00002
12	0.07819	0.02861	0.01753	0.00799	0.02589	-0.00183	0.00002
13	0.07351	0.02741	0.01657	0.00581	0.02541	-0.00169	0.00002
14	0.06899	0.02614	0.01563	0.00401	0.02479	-0.00157	0.00002
15	0.06465	0.02483	0.01471	0.00251	0.02405	-0.00146	0.00002
16	0.06049	0.02352	0.01382	0.00128	0.02322	-0.00135	0.00002
17	0.05653	0.02221	0.01297	0.00028	0.02233	-0.00125	0.00002
18	0.05277	0.02093	0.01214	-0.00053	0.02140	-0.00116	0.00002
19	0.04921	0.01967	0.01136	-0.00118	0.02043	-0.00107	0.00002
20	0.04585	0.01846	0.01061	-0.00169	0.01946	-0.00099	0.00002
21	0.04268	0.01730	0.00990	-0.00208	0.01848	-0.00092	0.00002
22	0.03969	0.01618	0.00923	-0.00237	0.01750	-0.00085	0.00002
23	0.03689	0.01512	0.00860	-0.00258	0.01655	-0.00079	0.00002
24	0.03427	0.01411	0.00802	-0.00272	0.01561	-0.00073	0.00002
25	0.03181	0.01315	0.00744	-0.00281	0.01470	-0.00067	0.00002
26	0.02951	0.01225	0.00691	-0.00285	0.01383	-0.00062	0.00001
27	0.02736	0.01140	0.00642	-0.00286	0.01298	-0.00057	0.00001
28	0.02536	0.01060	0.00596	-0.00283	0.01217	-0.00053	0.00001
29	0.02349	0.00984	0.00553	-0.00279	0.01140	-0.00049	0.00001
30	0.02175	0.00914	0.00512	-0.00272	0.01066	-0.00045	0.00001
31	0.02013	0.00848	0.00475	-0.00264	0.00996	-0.00042	0.00001
32	0.01863	0.00787	0.00440	-0.00254	0.00929	-0.00039	0.00001
33	0.01723	0.00729	0.00407	-0.00244	0.00867	-0.00036	0.00001
34	0.01593	0.00676	0.00377	-0.00234	0.00807	-0.00033	0.00001
35	0.01473	0.00626	0.00349	-0.00223	0.00752	-0.00030	0.00001
36	0.01361	0.00579	0.00322	-0.00212	0.00699	-0.00028	0.00001
37	0.01257	0.00536	0.00298	-0.00201	0.00650	-0.00026	0.00001
38	0.01161	0.00496	0.00275	-0.00190	0.00604	-0.00024	0.00001
39	0.01072	0.00458	0.00255	-0.00179	0.00561	-0.00022	0.00001
40	0.00990	0.00424	0.00235	-0.00169	0.00520	-0.00020	0.00001

TABLE (5-24)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE INVENT-1

	CH DEM D	CH CCINC	CH TIMEC	CH FR RS	CH LOANS	OPEN M C	DISC'T R
TOTAL	-C.34998	-C.01245	-C.8C827	C.05641	-1.37233	C.CCCE1	-C.CE997
LAG							
0	-C.C3983	-C.CCCE1	-C.C5936	C.C1196	-C.3C742	C.CCC15	C.C
1	-C.C387C	-C.CCC79	-C.C86C3	C.CC857	-C.14771	C.CCCC8	-C.CC481
2	-C.C32C4	-C.CCC81	-C.C7CE3	C.CC556	-C.1CC57	C.CCCC6	-C.CC658
3	-C.C26CE	-C.CCC78	-C.C572C	C.CC382	-C.C7978	C.CCCC4	-C.CC6E1
4	-C.C2151	-C.CCC73	-C.C48C1	C.CC285	-C.C6714	C.CCCC3	-C.CC642
5	-C.C1811	-C.CCC6E	-C.C4154	C.CC227	-C.C5815	C.CCCC2	-C.CC584
6	-C.C1555	-C.CCC62	-C.C3671	C.CC19C	-C.C5129	C.CCCC2	-C.CC523
7	-C.C1359	-C.CCC57	-C.C3252	C.CC164	-C.C4582	C.CCCC2	-C.CC467
8	-C.C12C4	-C.CCC53	-C.C2981	C.CC145	-C.C4133	C.CCCC2	-C.CC418
9	-C.C1C79	-C.CCC49	-C.C2718	C.CC131	-C.C3754	C.CCCC1	-C.CC37E
1C	-C.CC975	-C.CCC45	-C.C248S	C.CC119	-C.C3427	C.CCCC1	-C.CC339
11	-C.CC887	-C.CCC41	-C.C2287	C.CC1C8	-C.C314C	C.CCCC1	-C.CC3CE
12	-C.CC811	-C.CCC38	-C.C21C5	C.CC1CC	-C.C2884	C.CCCC1	-C.CC28C
13	-C.CC743	-C.CCC35	-C.C194C	C.CCC92	-C.C2654	C.CCCC1	-C.CC256
14	-C.CC683	-C.CCC33	-C.C179C	C.CCC84	-C.C244E	C.CCCC1	-C.CC235
15	-C.CC629	-C.CCC3C	-C.C1652	C.CCC78	-C.C2255	C.CCCC1	-C.CC215
16	-C.CC579	-C.CCC28	-C.C1525	C.CCC72	-C.C2C81	C.CCCC1	-C.CC19E
17	-C.CC534	-C.CCC26	-C.C14C8	C.CCC66	-C.C192C	C.CCCC1	-C.CC182
18	-C.CC493	-C.CCC24	-C.C13CC	C.CCC61	-C.C1772	C.CCCC1	-C.CC16E
19	-C.CC455	-C.CCC22	-C.C12CC	C.CCC57	-C.C163E	C.CCCC1	-C.CC155
2C	-C.CC42C	-C.CCC2C	-C.C11C8	C.CCC52	-C.C151C	C.CCCC1	-C.CC143
21	-C.CC3EE	-C.CCC19	-C.C1C23	C.CCC48	-C.C1394	C.CCCC1	-C.CC132
22	-C.CC35E	-C.CCC17	-C.CC944	C.CCC45	-C.C1287	C.CCCCC	-C.CC122
23	-C.CC33C	-C.CCC16	-C.CC871	C.CCC41	-C.C1187	C.CCCCC	-C.CC112
24	-C.CC3C5	-C.CCC15	-C.CC8C4	C.CCC38	-C.C1C9E	C.CCCCC	-C.CC1C4
25	-C.CC281	-C.CCC14	-C.CC742	C.CCC35	-C.C1C11	C.CCCCC	-C.CCC9E
26	-C.CC25S	-C.CCC13	-C.CC684	C.CCC32	-C.CC932	C.CCCCC	-C.CCC8E
27	-C.CC23S	-C.CCC12	-C.CC631	C.CCC3C	-C.CC86C	C.CCCCC	-C.CCC81
28	-C.CC221	-C.CCC11	-C.CC582	C.CCC28	-C.CC793	C.CCCCC	-C.CCC75
29	-C.CC2C4	-C.CCC1C	-C.CC53E	C.CCC25	-C.CC731	C.CCCCC	-C.CCC69
30	-C.CC18E	-C.CCCC9	-C.CC495	C.CCC23	-C.CC674	C.CCCCC	-C.CCC64
31	-C.CC173	-C.CCCCE	-C.CC45E	C.CCC22	-C.CC621	C.CCCCC	-C.CCC59
32	-C.CC159	-C.CCCCE	-C.CC42C	C.CCC2C	-C.CC573	C.CCCCC	-C.CCC54
33	-C.CC147	-C.CCCC7	-C.CC387	C.CCC18	-C.CC52E	C.CCCCC	-C.CCC5C
34	-C.CC135	-C.CCCC7	-C.CC357	C.CCC17	-C.CC48E	C.CCCCC	-C.CCC46
35	-C.CC125	-C.CCCCE	-C.CC329	C.CCC16	-C.CC44E	C.CCCCC	-C.CCC42
36	-C.CC115	-C.CCCC6	-C.CC3C3	C.CCC14	-C.CC413	C.CCCCC	-C.CCC39
37	-C.CC1CE	-C.CCCC5	-C.CC279	C.CCC13	-C.CC38C	C.CCCCC	-C.CCC3E
38	-C.CC09E	-C.CCCC5	-C.CC257	C.CCC12	-C.CC35C	C.CCCCC	-C.CCC33
39	-C.CCC9C	-C.CCCC4	-C.CC237	C.CCC11	-C.CC323	C.CCCCC	-C.CCC31
4C	-C.CC083	-C.CCCC4	-C.CC21E	C.CCC1C	-C.CC297	C.CCCCC	-C.CCC28

TABLE (5-24)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE INVEN-1

	GNP	C NONDUR	C DUR	C RESID	FI NONRES I	CH INVEN ANN	CH P
TOTAL	-5.77113	-1.87279	-1.53406	0.56311	-2.33428	-0.59311	-0.00185
LAG							
0	-0.71330	-0.05852	-0.17596	0.0	-0.07714	-0.40169	-0.00001
1	-0.48886	-0.08382	-0.16278	0.00433	-0.10814	-0.13845	-0.00001
2	-0.39620	-0.09512	-0.13134	0.00962	-0.11967	-0.05969	-0.00003
3	-0.34249	-0.09916	-0.10650	0.01436	-0.12306	-0.02813	-0.00005
4	-0.30490	-0.09910	-0.08886	0.01807	-0.12214	-0.01287	-0.00006
5	-0.27581	-0.09667	-0.07619	0.02072	-0.11875	-0.00493	-0.00008
6	-0.25186	-0.09289	-0.06676	0.02245	-0.11392	-0.00074	-0.00008
7	-0.23127	-0.08838	-0.05943	0.02342	-0.10831	0.00142	-0.00009
8	-0.21305	-0.08351	-0.05351	0.02382	-0.10233	0.00249	-0.00009
9	-0.19662	-0.07853	-0.04858	0.02377	-0.09625	0.00296	-0.00009
10	-0.18163	-0.07358	-0.04434	0.02341	-0.09023	0.00311	-0.00008
11	-0.16786	-0.06875	-0.04063	0.02281	-0.08437	0.00305	-0.00008
12	-0.15516	-0.06410	-0.03734	0.02205	-0.07875	0.00298	-0.00008
13	-0.14342	-0.05966	-0.03437	0.02119	-0.07339	0.00282	-0.00007
14	-0.13255	-0.05546	-0.03167	0.02025	-0.06831	0.00264	-0.00007
15	-0.12248	-0.05149	-0.02921	0.01928	-0.06353	0.00247	-0.00007
16	-0.11316	-0.04776	-0.02695	0.01829	-0.05902	0.00229	-0.00006
17	-0.10452	-0.04426	-0.02488	0.01730	-0.05480	0.00212	-0.00006
18	-0.09652	-0.04099	-0.02297	0.01633	-0.05085	0.00196	-0.00005
19	-0.08911	-0.03794	-0.02120	0.01537	-0.04716	0.00181	-0.00005
20	-0.08226	-0.03510	-0.01957	0.01445	-0.04371	0.00167	-0.00005
21	-0.07591	-0.03246	-0.01806	0.01356	-0.04050	0.00154	-0.00004
22	-0.07005	-0.03000	-0.01667	0.01271	-0.03751	0.00142	-0.00004
23	-0.06462	-0.02772	-0.01539	0.01189	-0.03472	0.00131	-0.00004
24	-0.05961	-0.02560	-0.01420	0.01111	-0.03213	0.00121	-0.00003
25	-0.05497	-0.02364	-0.01310	0.01038	-0.02973	0.00111	-0.00003
26	-0.05069	-0.02183	-0.01208	0.00968	-0.02749	0.00103	-0.00003
27	-0.04674	-0.02014	-0.01114	0.00902	-0.02542	0.00095	-0.00003
28	-0.04309	-0.01859	-0.01027	0.00840	-0.02350	0.00087	-0.00003
29	-0.03972	-0.01715	-0.00947	0.00781	-0.02171	0.00080	-0.00002
30	-0.03660	-0.01582	-0.00873	0.00727	-0.02006	0.00074	-0.00002
31	-0.03373	-0.01459	-0.00805	0.00675	-0.01853	0.00068	-0.00002
32	-0.03108	-0.01345	-0.00742	0.00627	-0.01711	0.00063	-0.00002
33	-0.02864	-0.01240	-0.00684	0.00582	-0.01579	0.00058	-0.00002
34	-0.02638	-0.01142	-0.00630	0.00540	-0.01458	0.00053	-0.00002
35	-0.02431	-0.01054	-0.00581	0.00500	-0.01346	0.00049	-0.00001
36	-0.02239	-0.00971	-0.00535	0.00464	-0.01242	0.00045	-0.00001
37	-0.02062	-0.00895	-0.00493	0.00429	-0.01145	0.00041	-0.00001
38	-0.01899	-0.00824	-0.00454	0.00398	-0.01057	0.00038	-0.00001
39	-0.01749	-0.00760	-0.00418	0.00368	-0.00974	0.00035	-0.00001
40	-0.01611	-0.00700	-0.00385	0.00341	-0.00899	0.00032	-0.00001

TABLE (5-25)

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE CAPAC -1

	CH DEM D	CH CCINC	CH TIMED	CH FF RS	CH LOANS	OPEN M C	DISC'T R
TOTAL	C.22919	C.01082	C.61603	-C.03310	C.89843	-C.00036	C.06803
LAG							
0	C.00736	C.00029	C.01096	-C.00221	C.05678	-C.00003	C.0
1	C.01180	C.00048	C.02419	-C.00270	C.06318	-C.00003	C.00155
2	C.01335	C.00057	C.03973	-C.00249	C.05828	-C.00003	C.00272
3	C.01341	C.00060	C.03871	-C.00216	C.05292	-C.00002	C.00337
4	C.01287	C.00059	C.03605	-C.00188	C.04843	-C.00002	C.00363
5	C.01211	C.00057	C.03328	-C.00166	C.04467	-C.00002	C.00367
6	C.01132	C.00054	C.03078	-C.00150	C.04143	-C.00002	C.00358
7	C.01056	C.00051	C.02855	-C.00137	C.03853	-C.00001	C.00343
8	C.00985	C.00048	C.02655	-C.00126	C.03590	-C.00001	C.00325
9	C.00918	C.00045	C.02472	-C.00117	C.03346	-C.00001	C.00306
10	C.00856	C.00042	C.02302	-C.00108	C.03119	-C.00001	C.00287
11	C.00798	C.00039	C.02143	-C.00101	C.02906	-C.00001	C.00269
12	C.00743	C.00037	C.01995	-C.00094	C.02706	-C.00001	C.00251
13	C.00692	C.00034	C.01856	-C.00087	C.02518	-C.00001	C.00234
14	C.00644	C.00032	C.01725	-C.00081	C.02342	-C.00001	C.00218
15	C.00599	C.00029	C.01602	-C.00075	C.02176	-C.00001	C.00203
16	C.00557	C.00027	C.01487	-C.00070	C.02021	-C.00001	C.00189
17	C.00517	C.00025	C.01380	-C.00065	C.01875	-C.00001	C.00175
18	C.00480	C.00023	C.01279	-C.00060	C.01739	-C.00001	C.00163
19	C.00445	C.00022	C.01186	-C.00056	C.01612	-C.00001	C.00151
20	C.00413	C.00020	C.01098	-C.00052	C.01493	-C.00001	C.00140
21	C.00383	C.00019	C.01016	-C.00048	C.01383	-C.00001	C.00130
22	C.00354	C.00017	C.00941	-C.00044	C.01280	-C.00000	C.00120
23	C.00328	C.00016	C.00870	-C.00041	0.01184	-C.00000	C.00111
24	C.00303	C.00015	C.00804	-C.00038	C.01095	-C.00000	C.00103
25	C.00281	C.00014	C.00743	-C.00035	C.01012	-C.00000	C.00095
26	C.00259	C.00013	C.00687	-C.00032	C.00935	-C.00000	C.00088
27	C.00240	C.00012	C.00635	-C.00030	C.00864	-C.00000	C.00081
28	C.00222	C.00011	C.00586	-C.00028	0.00798	-C.00000	C.00075
29	C.00205	C.00010	C.00541	-C.00026	C.00737	-C.00000	C.00070
30	C.00189	C.00009	C.00499	-C.00024	C.00680	-C.00000	C.00064
31	C.00174	C.00008	C.00461	-C.00022	0.00628	-C.00000	C.00059
32	C.00161	C.00008	C.00425	-C.00020	C.00579	-C.00000	C.00055
33	C.00149	C.00007	C.00392	-C.00019	C.00535	-C.00000	C.00051
34	C.00137	C.00007	C.00362	-C.00017	0.00493	-C.00000	C.00047
35	C.00127	C.00006	C.00334	-C.00016	C.00455	-C.00000	C.00043
36	C.00117	C.00006	C.00308	-C.00015	0.00419	-C.00000	C.00040
37	C.00108	C.00005	C.00284	-C.00013	C.00387	-C.00000	C.00037
38	C.00099	C.00005	C.00261	-C.00012	C.00356	-C.00000	C.00034
39	C.00091	C.00004	C.00241	-C.00011	0.00329	-C.00000	C.00031
40	C.00084	C.00004	C.00222	-C.00011	C.00303	-C.00000	C.00029

TABLE (5-25)
CONTINUED

INTERIM MULTIPLIERS FOR THE EXOGENOUS VARIABLE CAPAC -1

	GNP	C NONDUR	C DUR	C RESID	FI NONRES I	CH INVEN	ANN CH P
TOTAL	5.01705	1.62797	1.34745	-0.42577	2.49405	-0.02664	0.00143
LAG							
0	0.34119	0.02799	0.18536	0.0	0.16842	-0.04057	0.00000
1	0.35295	0.04986	0.12123	-0.00139	0.15866	0.02459	0.00000
2	0.32632	0.06402	0.09184	-0.00363	0.14948	0.02461	0.00001
3	0.29724	0.07221	0.07610	-0.00614	0.14027	0.01480	0.00002
4	0.27215	0.07628	0.06645	-0.00852	0.13122	0.00673	0.00003
5	0.25097	0.07757	0.05978	-0.01060	0.12254	0.00167	0.00004
6	0.23261	0.07704	0.05469	-0.01230	0.11433	-0.00115	0.00005
7	0.21621	0.07530	0.05050	-0.01362	0.10663	-0.00259	0.00005
8	0.20121	0.07276	0.04685	-0.01459	0.09942	-0.00323	0.00005
9	0.18730	0.06972	0.04357	-0.01525	0.09270	-0.00345	0.00006
10	0.17430	0.06640	0.04055	-0.01564	0.08642	-0.00344	0.00006
11	0.16212	0.06291	0.03776	-0.01581	0.08057	-0.00331	0.00006
12	0.15068	0.05937	0.03514	-0.01579	0.07510	-0.00313	0.00006
13	0.13995	0.05584	0.03269	-0.01563	0.06998	-0.00293	0.00006
14	0.12990	0.05238	0.03039	-0.01534	0.06520	-0.00273	0.00005
15	0.12049	0.04902	0.02823	-0.01496	0.06072	-0.00253	0.00005
16	0.11169	0.04579	0.02621	-0.01451	0.05653	-0.00234	0.00005
17	0.10348	0.04271	0.02432	-0.01400	0.05261	-0.00216	0.00005
18	0.09582	0.03977	0.02256	-0.01345	0.04894	-0.00200	0.00005
19	0.08869	0.03699	0.02090	-0.01288	0.04551	-0.00184	0.00004
20	0.08205	0.03438	0.01936	-0.01229	0.04230	-0.00170	0.00004
21	0.07588	0.03191	0.01793	-0.01169	0.03930	-0.00157	0.00004
22	0.07015	0.02960	0.01659	-0.01109	0.03650	-0.00145	0.00004
23	0.06483	0.02744	0.01535	-0.01050	0.03388	-0.00133	0.00003
24	0.05990	0.02542	0.01419	-0.00991	0.03144	-0.00123	0.00003
25	0.05533	0.02353	0.01312	-0.00935	0.02916	-0.00113	0.00003
26	0.05109	0.02177	0.01212	-0.00880	0.02703	-0.00105	0.00003
27	0.04716	0.02014	0.01120	-0.00826	0.02505	-0.00096	0.00003
28	0.04353	0.01862	0.01034	-0.00775	0.02321	-0.00089	0.00002
29	0.04017	0.01721	0.00955	-0.00727	0.02149	-0.00082	0.00002
30	0.03706	0.01590	0.00882	-0.00680	0.01990	-0.00075	0.00002
31	0.03419	0.01469	0.00814	-0.00636	0.01841	-0.00069	0.00002
32	0.03153	0.01356	0.00751	-0.00593	0.01704	-0.00064	0.00002
33	0.02908	0.01252	0.00693	-0.00554	0.01578	-0.00059	0.00002
34	0.02681	0.01155	0.00639	-0.00516	0.01457	-0.00054	0.00002
35	0.02472	0.01066	0.00589	-0.00481	0.01347	-0.00050	0.00001
36	0.02278	0.00984	0.00543	-0.00447	0.01245	-0.00046	0.00001
37	0.02100	0.00907	0.00501	-0.00416	0.01150	-0.00042	0.00001
38	0.01935	0.00837	0.00462	-0.00386	0.01062	-0.00039	0.00001
39	0.01783	0.00771	0.00426	-0.00359	0.00981	-0.00036	0.00001
40	0.01643	0.00711	0.00392	-0.00333	0.00906	-0.00033	0.00001

Dynamic Structural Response Patterns of the Model

In the following discussion of the multiplier results from the model, primary emphasis will be given to the dynamic effects of a sustained unit change in one of the exogenous variables on the components of the money supply and other monetary sector variables. The effects on the "real" sector income components and on the rate of price change, while not necessarily secondary in the Fed's analysis of the economy, are considered secondary here because of the primary orientation of the model and this analysis. An exception to this latter statement is necessary because of the apparent (often) undue amount of emphasis given to the level and change in the level of income. The level and time path of income will, for this reason, receive more emphasis than the other real sector elements.

The effects of some of the "exogenous" variables will be excluded from the discussion—principally the lagged levels of DD, CC, TD, FR and I^i. The reason for this exclusion is that these variables are not truly exogenous. They enter directly into determining the amount of change in the current period that was experienced by DD, CC, TD, FR and I^i. They were only considered "exogenous" in this analysis because their associated change variables (current and lagged) were the endogenous variables. The total exclusion of these "exogenous" variables would have had little, if any, effect on the overall result being analyzed. Much the same argument could be made for exclusion of the current level of loans and the current change in the level of income. But their inclusion was regarded as necessary because of the part they play in the Fed's decision-making process.

Before entering the analysis proper, one more point must be brought out. Occasionally a group of interim multipliers have a sign which is not, a priori, expected. The occurrence of this can be explained mathematically. For example, in Table (5-10), the impact multiplier of a unit change in the level of loans has a slight but positive effect on ΔDD. The first period multiplier, however, is negative:

$$\frac{\partial \Delta DD}{\partial L} = \frac{\partial (DD_t - DD_{t-1})}{\partial L_t} = -.01679$$

This tells us that:

$$\frac{\partial DD_t}{\partial L} - \frac{\partial DD_{t-1}}{\partial L} < 0$$

or that:

$$\frac{\partial DD_t}{\partial L} < \frac{\partial DD_{t-1}}{\partial L} .$$

This means that the influence of the previous period so "overpowers" the current period effect, that the endogenous variable appears to be over-correcting for the previous period's level. This might also be observed to be a "cyclic" effect.

From Table (5-10) it can be seen that the sustained impact of a unit (one billion dollar) increase in loans has little immediate effect on demand deposits. The multiplier effects for the subsequent four quarters appear to reflect the act of paying back the loan. However, the residual effect of this continued increase eventually results in a sixty-two and one-half million dollar increase in DD. Apparently changes in coin and currency are little affected. Nor is the level of time deposits except for the first period which may also reflect a large

amount of loan repayment. So also could repayment account for several quarters of positive additions to free reserves. It seems that the reaction of open market operations and of the discount rate are delayed one period—perhaps an adjustment period. When they do reflect this change, though, OMO is only slightly altered; after the first period, the impact on the discount rate decays rapidly.

GNP reflects a substantial growth with the peak impact coming in the first period. This is a result of the one-period lag in the impact of a change in loans on the level of residential construction. Overall it appears that, because of income growth, a positive impact on changes in free reserves, and a not too inflationary impact on other things, a change in loans of this magnitude would not occasion any overt OMO to offset undesirable trends. Nor would it tighten the economy to the extent that the Fed would have to move significantly to restrict the flow of loanable funds (through raising the discount rate).

Table (5-11) reflects the multiplier effects of a unit change in the quarterly level of income change. As should be expected, the increased level of income change would raise the desire—demand—for more DD, CC, TD, and loans. The combination of all these increased demands would lower the level of "free" reserves. Apparently the increased loan demand would eventually lead to Federal Reserve action. This action would seem to come as a result of a desire to limit the further expansion of loans and diminution of the level of free reserves. Note should be taken of two interesting development in the real sector variables. First, the initial impact of this change seems to be to spur long-term investment and consumption. But, it seems that the continuation

of this percentage increase soon becomes evident. Shortly thereafter, the level of nondurable consumption reaches a peak. Secondly, it seems that housing, as a result of this increase, soon gets "over-built." As a result, investment in this area must decline. Again the Federal Reserve appears to be relatively unconcerned about this type of growth.

The multipliers of the proxy representing the expected rate of income increase in the next period are presented in Table (5-12). A one percent increase in this expected rate appears to lead to a reduced demand for demand deposits, time deposits, and loans. Whether this reflects a lessened degree of uncertainty, an improved ability to "match" income flows, or some other factor or combination of factors, the initial impact on free reserves is to "free" a large amount of these reserves. Part of this comes from the impact effect on open market operations; the Fed substantially increases OMO to take up part of the slack, thus providing reserves in anticipation of this increase. Apparently, however, the Fed sees itself as overreacting and, for several subsequent periods, successively alternates policy positions in an attempt to correct for previous errors. It also seems that the ability to "forecast" this increase, together with the improved free reserve position, allows for an easing of the discount rate. The prospect of this increase in the next period evidently has only a minimal effect on the real sector variables. It thus appears that this increased expectation has significant effects only upon variables directly related to the Federal Reserve.

Table (5-13) contains the multipliers that evolve from a sustained increase of one percent in the rate of worker productivity. Whether the increase results from increased effort, more efficient

production, improved technology, or some other factor or grouping of factors, the primary influence of this change is thought to be reflected by increased output. And, at the next level, increased income. The magnitudes of the total and quarterly multipliers bear this out. As expected, if the distribution of this increased income goes to the workers and other factors of production, this would be mirrored by increased consumption, particularly of nondurables and services, and by further investment in plant and equipment. On the monetary side, this increased activity should lead to an additional demand for loans (both consumer and industrial)—reflected both by increases in ΔL and r_d—and a decline in the level of free—an increase in the level of borrowed—reserves. Not quite as expected were the rather large multipliers for the effects on changes in time deposits.

One noticeable feature of this increased productivity is the effect on, and the multipliers for, the annual rate of change in prices. Apparently the increased availability of goods leads to a negative price change multiplier which is decaying but remaining negative. If this is the case, it might serve as an empirical justification for tentatively accepting either a "demand-pull" or an expected rate of wage increase type of theory concerning price level advances. In any case, it appears that the Fed would prefer to use discount rate adjustments rather than a significant shift in open market policy to adjust for this change.

As mentioned before, it appears that the Federal Reserve has tended to support a significant term structure of interest rates. This is a measure of the difference between the levels of the long-term and the short-term rate of interest. This supposition seems to be upheld in

terms of the multipliers (Table (5-14)). It appears that the Fed initially reduces its level of purchases in response to a one percent increase in the level of the term structure. But for some reason it appears to over-compensate. It, therefore, spends the next few quarters trying to correct, by continually overreacting, for past mistakes. The multipliers for free reserves also reflect the decline in the level of OMO (a reduction in the provision of additional reserves).

The multipliers for a one percent change in the level of the short-term interest rate—as measured by the Treasury bill rate—are presented in Table (5-15). These multipliers contain some interesting conclusions. The reduction in the demand for each of the money supply components and for bank loans is by far the largest, in terms of the multipliers, during the current period. Obviously the lagged effects have at least some ameliorating effect on these levels in successive periods. As a result of this, the multiplier for free reserves is (except initially) positive. Open market operations move initially to "mop-up" some of these excess reserves and, thereafter, make only small, positive additions to bank reserves. The discount rate, as expected, initially follows the increase in the short-term rate; surprisingly, however, it follows without a lag. The effect of the sustained short-term rate increase erodes rather rapidly. After eight quarters, the discount rate appears to respond to other influences; perhaps it just considers the continued short-term rate increase as a given.

It also appears that the effect on income of this change is delayed. Actually, almost all of the initial income multiplier increase results from a positive, extremely large multiplier for inventory change

and a much smaller one for nondurable consumption. The trend of the income and C^{nd} multipliers, however, are quickly reversed. It is unexpected that the inventory change multipliers should continue to be positive. Also of interest are the rather small total and interim multipliers for the effects on the annual rate of change in prices. In terms of recent (late 1960's - early 1970's) experience, one might expect larger price multipliers than observed here.

The multipliers for an increase in the level of the long-term interest rate, Table (5-16), differ markedly from those of the short-term rate. With the exception of GNP and I^{nr}, it took almost one year for the multipliers of the other endogenous variables to reach their peaks. Apparently a unit change in the level of the long-term interest rate is acceptable to the monetary policy authorities and the economy as a whole; at least no immediate, negative reaction is observed. Whereas the short-term interest rate is often considered as a cost factor—the cost of capital, cost of holding liquid assets, and/or cost of operation of a business (all "negative" levels)—it appears that the long-term rate may frequently serve as a proxy for the level of potential investment return. If possible, this intuitive hypothesis seems to be borne out by the multiplier results.

It takes between four to six quarters for the multipliers of the money supply components and the change in bank loans to reach a peak. This is also reflected in the free reserve multiplier. These multipliers decay quite slowly. This would seem to indicate that the demand for these components could be relatively more interest-elastic than has been shown previously in this paper. This result, however, does not invalidate

the prior proposals that these components are interest-inelastic with respect to interest rate changes. It only implies that perhaps these components are not as interest-inelastic as previously observed. In terms of the monetary sector variables, it is again seen that the Fed does not seem inclined to alter OMO policy sufficiently to offset this interest rate rise. The multiplier effect on the discount rate is also quite interesting—the multipliers do not peak until the seventh quarter. Also, there exists at least a one quarter lag before any effect is felt at all.

As mentioned, the role of proxy for the expected level of investment return is well reflected in the multipliers of the real sector variables. The impact multipliers for income and nonresidential investment are large and are at their peak levels during the current period. This might be interpreted in one of two ways. Either this sizeable effect is misleading because of the potential developments in the lagged variables which have not yet had time to have their effect, or the magnitude of these multipliers at least partially substantiates the proxy role. Nondurable and durable consumption multipliers peak later. This reflects, at least to some degree, the continued advancement of income. The negative multipliers of residential investment can easily be explained. To the group of investors in this market, an advance in the long-term rate represents an increase in the cost of financing the purchase, construction, or selling of a house. As was the case with the short-term rate, the very small multipliers for the annual price change variable were quite unexpected.

Since balance of payments problems can be explained in terms of

either an unfavorable trade balance or an unfavorable international liquidity position, the negative multipliers for the major money supply component(s) and the lack of effect on the demand for coin and currency can be attributed to the latter case. It appears, however, that the negative effects of a continued balance of payments problem are soon dissipated and the existence of this problem is merely tolerated. Apparently, the demand for loans, as illustrated by the multiplier, declines early. But it seems that this demand soon becomes accustomed to the continuation of this problem and resumes a more normal increase. The early decline, in part at least, reflects the reduced availability of funds for capital investment because of the outflow of funds for international investment.

Open market operations, as expected, react to this problem by providing additional reserves to a market experiencing an outflow of funds. The large free reserve multiplier also reflects this. As usual, the Fed is seen to overreact in its provision of reserves through open market operations. And it spends the next several periods continually trying to compensate for this error. This is also reflected in the multipliers. The negative discount rate multipliers are generally unexpected. One would think that with market rates rising in an attempt to re-attract investment funds or to reflect an absence of loanable funds, the discount rate would follow suit. But the signs of the multipliers would indicate that perhaps the rate declined in an effort to increase the attractiveness of loans.

The multiplier effects on the real sector variables are understandably small. Although income continues to increase, the effect of the unit increase in the level of the balance of payments problem on

income is rather small. This reflects, perhaps, a general lack of stimulation in production. The negative multipliers of the price change variable are quite unexpected. If they had been significantly larger, they would have been very difficult to account for. One would normally expect prices to advance with continued payments problems. Apparently what the multiplier reflects is not a negative relationship, but one in which the effect of a unit change in the exogenous variable is substantially greater in the previous period than in the present period:

$$\frac{\partial CHP}{\partial B\text{-}P} < \frac{\partial CHP_{-1}}{\partial B\text{-}P} .$$

Although the power to alter the level of reserve requirements against demand and time deposits is one of the policy "tools" of the Federal Reserve, this tool was used so seldom during the period that there seemed to be no significant loss of generality—increased bias—if this variable was considered exogenous instead of endogenous (vis: Teigen, 1969). The multiplier effects on the real sector variables seem reasonable in sign; it is difficult to judge what would be reasonable in terms of magnitude. But the reactions in the monetary sector to a unit change in the change of required reserves seem to be a little less obvious. Apparently the effects of this change are lagged in their influence on the money supply and on the demand for loans. But the increase in required reserves causes an immediate reduction in free reserves. This seems to be compensated for by a small OMO action and by discount rate additions until the effect of this change is "normalized."

The multiplier effect of a unit increase in government expenditures (or in some other component, or group of components, of exogenous expenditures), Table (5-22), is reflected by an immediate and equal

increase in the level of income. In addition to this gain, the rise in consumption and investment expenditures resulting out of this enlarged level of income in the current period will also increment the multiplier on income to a level fifteen percent higher than the initially augmented level. This expansion of income should (and does for the most part) multiply the levels of the income components. An exception, however, is the case of residential investment. Apparently this factor is more responsive to interest rate changes which might arise because of an increased demand for a "fixed" availability of goods. Two other interesting points are revealed by the "real" sector multipliers. First, the sustained increment of a unit change in E^e is, apparently, quickly discounted (decayed) in terms of its effects on income growth. Second, the price multipliers resulting from this action are extremely small. If this rise in demand does, in actuality, increase the demand for a fixed stock of goods rather than providing just another source of demand for an oversupply of previously produced goods, then the bidding for the "scarce" goods should force the price level up. But this is not the case, according to the multipliers.

Again we observe in the monetary sector that the Fed takes virtually no open market action to offset the effects of this increase in E^e. It apparently allows the discount rate to make the adjustments to the declining multiplier on free reserves and the rising one on bank loans. The multipliers of this effect on the money supply are about as expected with one noteable exception—the multiplier on time deposits is twice that on demand deposits.

It seems that increases in permanent income (Table (5-23)) multiply

the level of demand for all the money supply components—plus loans—as well as for all the components of income. And it has very little effect on the price level. This reflects a hypothesis that the demand for any of these is almost totally immutable below some level, and that the level of demand is often thought to be related to some level of "normal" income. As this level rises, so should the demand for these variables.

An increase in the rate of capacity utilization, as expected, has much the same effect as an increase in the rate of worker productivity. There are, however, two exceptions to this generalization. The capacity rate change has little if any multiplier effect on price changes. This conclusion from the model may or may not be acceptable. If this rise brought into use machines which are otherwise considered marginal, one should expect the higher costs to be passed on in the form of price increases. If this productive machinery was not marginal, only idle, then the multiplier results would be more plausible. The other exception relates to the influence on consumption of the two changes. The improvement in productivity is more likely to be passed on to the worker in the form of salary increments than is the increased use of available capacity. Thus, for the former one should expect a larger multiplier effect on consumption—especially consumption of nondurables and services. For the latter, one should expect a larger multiplier for nonresidential investment—in plant and equipment. This is, in fact, the case.

CHAPTER VI

CONCLUSIONS

Initially the orientation of this thesis was to explain the alternative economic framework from which most of the leading authorities in the field draw their assumptions and, on the basis of which, reach vastly differing conclusions as to the direction and impact of monetary policy activities. To do this it was first necessary to lay a foundation which would explain the nature and role of the policy-making body, the methods and tools of its operation, and the most basic problems confronting its operation.

To accomplish this, the first section opened with an explanation of the organization and operations of the Federal Reserve and of its primary policy-making branch, the Federal Open Market Committee. Included also was a short history of the development of the policy tools and a rather abbreviated discussion of the lag estimation problem. This is a problem which often causes individuals to totally discredit monetary policy even though fiscal policy is subject to a quite similar type of lag. From this, the analysis moved to the central issue of this section.

There are basically two alternative theoretical frameworks for the analysis of economic developments. These approaches differ in many important aspects, especially with reference to the monetary side of economic analysis. This has led to quite divergent views with respect

to the level, impact, and residual effects of the current monetary policy position. The more prevalent neo-Keynesian tradition was contrasted with the newer "neo-Classical"—monetarist—approach. It was observed that most of the disagreements in interpretation and analysis resulted from each theory's emphasis on a different aspect of the problem to explain the same phenomena. The primary differences in the theoretical frameworks involve two important assumptions regarding: (1) the effects of the level, and changes in the level, of prices; and (2) how the real and the monetary sector variables react to changes either in the policy tools or in some other factors. The neo-Keynesian approach assumes constant prices since "real" and nominal quantities are equal. It emphasizes the substitution effects of a change in the relevant variables. The monetarist theory assumes that prices are determined within the system, usually by the level or changes in the level of the money supply. Thus, "real" and nominal value are not necessarily equal or equivalent. This approach emphasizes the income and wealth effects of a change in the relevant variables.

As a result of these divergent approaches, it becomes obvious why the analysis of economic change differs so greatly. The former theory uses interest rates to measure the effects of monetary policy since these rates are directly affected by a change in the nominal money supply. The latter approach defines interest rates as just another factor in determining "the" price level. The primary variable used to analyze the effectiveness of monetary policy is typically some monetary aggregate (money supply, change in the money supply, monetary base, etc.). Thus, not only the measures that they employ as indicators of effectiveness

and as targets at which to aim, but also their interpretation of the immediate, final, and total effects of some given monetary action can lead to widely-disparate theoretical conclusions.

There was no attempt in this analysis to draw specific conclusions with respect to the superiority or increased forecasting ability of one theoretical approach over another. The presentation of the structural frameworks as they relate to the monetary sector was necessary to justify each theory's selections of the appropriate indicators and targets of policy action. Nor do the developments in this paper provide an adequate basis for the comparison of theories. The primary policy variables of the monetarist approach—the monetary base and the money supply—are endogenous to the model. Therefore, a relatively meaningful analysis can be presented on their behalf. However, the principal policy variables in the "Keynesian" theory—the spectrum of market interest rates—are exogenous to the system. Since these factors are not on a similar basis, a comparison of the theories is not theoretically possible.

As a result of the lack of fiscal policy measures and because of the assumed exogeneity of governmental actions in the model, it was not possible to compare the effectiveness of fiscal versus monetary policy. To do this would first require making governmental income and expenditures endogenous. Then, as factors under governmental control, one would also need to make the tax rate schedules and possibly some budgetary measures endogenous. This would substantially increase the size of the model. But it would also increase the model's importance and relevance.

The remainder of the paper involved establishing some empirical basis from which to draw policy conclusions. Then these conclusions

were analyzed in light of the results that would be expected *a priori*. This analysis should provide a foundation from which the theoretical and empirical relevancy of the model can be judged.

Conclusions

The model contains two measures which are considered as indicators of monetary policy activity. The change in the level of free reserves is used as a very short-term indicator. It is available on a day-to-day (or an even more frequent) basis, and is a well-accepted operational variable. For the "longer" short-term indicator, the "adjusted" monetary base (UBR + CC) was used. Actually the rate of change in (UBR + CC) was used as a proxy for the "dynamic" operations in the open market. It measures the net effects of policy activities on the available supply of reserves and it is not biased by currency flows.

In the more intermediate term, the indicators are supposed to reflect the effects of given policy actions on various components of the monetary sector. The targets should reflect these effects on the components of the real sector. The indicators and targets employed in the model were changes in the money supply—demand deposits + coin and currency outstanding + time deposits—and the levels of several key market interest rates—primarily the short- and long-term interest rates on government securities. These rates, however, are considered exogenous. Therefore, they receive less analytical attention in the model. The goal proxies for the ultimate objectives were assumed to be the level and the change in the level of income, the rate of change in prices, the level of unemployment (or its reciprocal), a balance of international payments, and a desired relation between the long- and short-term

interest rates.

There are numerous interesting conclusions which have evolved from the estimation of the model and from the calculations of the elasticities and multipliers. Instead of reconstructing the full reasoning behind the explanation of these, it might be best to make a summary listing of the main conclusions. This list, however, is neither exhaustive (in fact it is quite selective), nor do the sequence in which the conclusions appear represent an ordering by importance.

(1) The demand for demand deposits appears to support a "Friedmonian"-type thesis that the demand for this major component of the "narrowly-defined" money supply is primarily a function of permanent income and the interest rates;

(2) The demand for time deposits function quite closely approximates those for the other money supply components. This might—and in the present case, did—lead to the inclusion of time deposits in the definition of "the" money supply. All appear basically to be functions of income (however defined), interest rates, and the lagged values of the dependent variable;

(3) In the 2SLS estimations, with the exception of the relationship between the yield on time deposits and the demand for these deposits, the relative importance of the effects of the interest rate terms on the demand for money was lessened in comparison to the OLSQ estimates. Thus, these components appear to be not as interest-responsive (possibly less interest-elastic) as originally estimated. The small short-run elasticities for these also reflect the reduced responsiveness;

(4) The multiplier effects on these money supply components,

however, reflect an opposite trend. This might indicate that although the short-run effects may not be sizeable, the long-term effects of a sustained increase in the interest rates are definitely important in determining the level of demand;

(5) It might seem incongruous that changes in free reserves are positively related to discount rate movements and negatively related to market interest rate changes. However, an increase in the discount rate could limit loan expansion (a use of available reserves) which would help preserve the current level of "free" reserves. But an increase in market interest rates—especially in the short-term rates—makes investment of "free" funds relatively more attractive;

(6) It was possible to relate open market operations to the levels of variables in each of the three major policy categories: indicators (change in free reserves, and the proxy for OMO—the "adjusted" monetary base); targets (the money supply which is endogenous and various interest rates which are exogenous); and the goal proxies (income and the current change in income, balance of payments problem proxy, and the term structure of interest rates). But we were not successful in including the rate of change in prices and the rate of unemployment;

(7) The multipliers for those policy variables which are included showed that they seldom have very significant effects on the movement of OMO. It is shown, though, that OMO are relatively responsive to income change, balance of payments problems and interest rate differentials. Apparently they are significantly less responsive to the rate of price change and to the unemployment level;

(8) This previous conclusion contradicts, in part, several

other people's findings (e.g., Dewald and Johnson, 1963; and Willes 1967-II) regarding the response function for open market operations of the Federal Reserve. These other studies typically give prominence to some combination of income and/or change in income, change in prices, and unemployment or its reciprocal. However, a careful reading of the Minutes of the FOMC over the period would give a different impression. They seem to respond to changes in income, interest rate levels and changes, balance of payments problems, and, less generally, to price changes. They seldom seem to respond to the level or rate of unemployment;

(9) From the multipliers it appears that the Fed makes use of discount rate changes rather than changes in the level of open market operations to offset variations in the levels of other variables. This is not expected a priori. In quarterly terms, the Federal Reserve uses OMO to react basically just to changes in the expected rate of income change and in the balance of payments situation. It uses or allows discount rate changes to react to changes in other variables such as loans, income, productivity, and the interest rates. Perhaps the prime reason for this result is the fact that this is a quarterly model. Day-to-day changes in OMO are hidden whereas the much more infrequent movements of the discount rate are emphasized. One should expect the results to be different if one had a shorter-term model;

(10) The Federal Reserve's reaction to an increased change in the level of income ($\Delta Y_t > \Delta Y_{t-1}$) seems to be to limit further expansion by holding down the growth in loans. This may be accomplished by discount rate increases and allowing "free" reserves to decline;

(11) The Fed overreacts to an increase in the expected rate of

change in income by initially increasing OMO too much. It then spends the next several quarters continually overreacting in an attempt to offset previous actions. But it appears that the ability to forecast this change permits them to allow banks a slightly "looser" free reserve position. The combination of these allows for an easing of the discount rate;

(12) Because the increase in balance of payments problems results in negative effects on the money supply components (although the magnitude of these effects declines quickly), the Fed is quick to use OMO to provide additional reserves. This is reflected also in the large free reserve multiplier. As usual, the Fed overreacts. This, at least in part, accounts for the rapid erosion of the negative effects;

(13) It appears that the Federal Reserve has tended to support a specific, though probably implicitly-determined, level or range of differences between the long- and short-term rates of interest. As long as the changes in the long-term rate are greater than those in the short-term rate, no matter whether the rates are rising or falling, the Fed seems to reduce its level of activity. But, as usual, it seems to overreact. It then spends several quarters (continuing to overreact) in an attempt to correct for previous mistakes. This action can be observed in both the multipliers for the long- and short-term interest rates and those for the term structure variables.

Possible Extensions

There are a multiplicity of extensions which might arise out of an econometric study of this sort. The most obvious of these is reestimation and respecification of the equations, making additional changes in

(or combining) variables or equations. This type of improvement, together with the reduction in the degree of aggregation, are the most widely recognized methods of improving a model. But there are many other ways. Most notably, one could establish a separate relationship for Government expenditures, thus distinguishing it from other exogenous expenditures. This might also be done for net exports and for services.

An important extension of this model would involve opening up new avenues of linkage between the variables of both sectors. Presently these sectors are related through income, loans, interest rates, and the "real" sector variables in the demand for loans equation (C^d and I^i). Further, one should improve the specification of the price change equation, and perhaps change it to a quarterly rate of price change. Finally, one should include more interest rate—yield—variables (e.g., yields on loans, Federal funds, CD's) and make most, if not all, of them endogenous. Thus, they could more correctly be used as target measures.

In addition to these extensions to the model itself, there are alternative tests which could be made of the model's specifications. One could estimate the system of equations as a recursive set and compare these analytical results with those which are available from the methods used here. One could also make both short- and long-term forecasts, simulating economic activity for a future period or time path (Goldberger, 1959). And one could also perform simulations by inducing parameter changes. In this way, the simulations would reveal the stability of both the parameter estimates and the multipliers. All of these test the quality and correctness of the specifications. Certainly a comparison of short- and long-run elasticities would be in order. This test would

determine the stability of these elasticities over time.

Finally, one might want to attempt to specify a utility function which would explain (predict) Federal Reserve reactions to a given level of change in any important economic variable. One might employ the results of this model in searching, from among an ordered set of utility functions specified for the Federal Reserve, for a reasonable, but realistically tentative, policy-oriented utility function. A successful specification of this function would make available a whole "Pandora's box" of relevant policy information. One prime example would be the "trade-offs" used by the Fed in its attempts to achieve and maintain some combination of ultimate economic objectives.

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APPENDICES

APPENDIX A

LISTING OF TEIGEN'S MODEL

$$\Delta D = 6.5723 + .0728Y - .0015(r_b \cdot Y) - .0065(r_{td} \cdot Y) - .2311D_{-1} - 8.7011s_1 - 5.0445s_2 - 3.486s_3$$

$R^2 = .948$ S.E. = 1.0239

$$\Delta\frac{C}{D} = .1995 + .000058(r_{td} \cdot Y) + .000005(r_b \cdot Y) - .0002Y - .0003Y_{p_{-1}} + .0076s_1 + .0117s_2 + .0007s_3$$

$R^2 = .737$ S.E. = .0035

$$\Delta T = -3.8905 + .0046(r_{td} \cdot Y) - .0039(r_1 \cdot Y) + .0148Y - .0270T_{-1} + 1.0292s_1 + 1.5044s_2 + .4068s_3$$

$R^2 = .751$ S.E. = .7426

$$\Delta\frac{D}{D^*} = .6609 + .0214r_b + .0106(r_b - r_d) - .6950\left(\frac{D}{D^*}\right)_{-1} + .0329s_4 + .0246s_5$$

$R^2 = .647$ S.E. = .0158

$$\Delta\left(\frac{CL}{D^*}\right) = -.0268 + .0094r_b + .2100\left(\frac{\Delta Y}{Y}_{-1}\right) - .0566\left(\frac{CL}{D^*}\right)_{-1} + .0543s_1 + .0199s_2 + .0243s_3$$

$R^2 = .630$ S.E. = .0069

$$(r_1 - r_b) = 1.2363 - .7014r_b - .0070Z_0 + .0526Z_1 + .0665Z_2 + .0474Z_3$$

$R^2 = .960$ S.E. = .1177

$$OMO = -.0034 + .3028\left(\frac{\Delta Y}{Y}_{-1}\right) - .5466(WDY) - .2206\left(\frac{\Delta P}{\bar{P}}\right) + .0022r_1 + .0035(B-P) - .0325\Delta k + .0161\Delta RT - .2995(OMO)_{-1}$$

$R^2 = .875$ S.E. = .0109

$$r_d = .1676 + .3358r_b + 6.3864(WDY) + .6253(r_d)_{-1}$$

$$R^2 = .948 \qquad S.E. = .3306$$

$$Y = C^{nd} + C^d + I^{nr} + I^r + \Delta I^i + E^e$$

$$C^{nd} = 14.2010 + .0830Y + .1376\Delta Y + 46.6237\left(\frac{\Delta P}{\bar{P}}\right) + .8579C^{nd}_{-1} - 32.3903s_1 - 10.7273s_2 - 15.3966s_3$$

$$R^2 = .998 \qquad S.E. = 1.8899$$

$$C^d = .7173 + .0232Y + .2058\Delta Y + 27.2709\left(\frac{\Delta P}{\bar{P}}\right) + .7081C^d_{-1} + 2.1366s_1 + .1502s_2 + 2.1763s_3$$

$$R^2 = .976 \qquad S.E. = 1.3909$$

$$I^{nr} = -5.6198 + .0233Y + .0148\Delta Y + 7.54(CAP)_{-1} + 1.025\Delta L + 14.34(CHP) + .7407I^{nr}_{-1} - .0986s_1I^{nr}_{-1} + .0793s_2I^{nr}_{-1} - .0252s_3I^{nr}_{-1}$$

$$R^2 = .993 \qquad S.E. = .6932$$

$$I^r = -46.6454 + .0360Y + .0253\Delta Y - .2691r_1 + .1057NHF - .0056V_{-1} + 22.4445\left(\frac{R}{X}\right) - .0004DP_{-1} + .4818I^r_{-1} - .1253s_1 + 5.0618s_2 + 5.2473s_3$$

$$R^2 = .957 \qquad S.E. = .8671$$

$$\Delta I^i = 12.7476 + .0822Y + .0091\Delta Y + 1.5560\Delta L + .3678\Delta UF - .7011^i + .2091\Delta I^i_{-1} + 19.703s_1 + 4.8266s_2 + 8.2486s_3$$

$$R^2 = .888 \qquad S.E. = 2.1213$$

$$CHP = .0008 + .1017(WTY) - .000(GAP) - .0003(B\text{-}P) + .9465(CHP)_{-1}$$

$$R^2 = .817 \qquad S.E. = .0044$$

LAGGED ENDOGENOUS VARIABLES CONTRIBUTION TO EACH OF THE REGRESSION EQUATIONS

NAME OF EQUATION	VARIABLE NAME	REGRES. COEFF.	T STATISTIC	VARIABLE NAME	REGRES. COEFF.	T STATISTIC	R2	DW	SE
CH DD	DD -1	0.00695	7.39275				0.07281	0.69695	0.92640
CH DD	CHDD-1	0.80520	11.21204				0.41469	1.69267	0.73605
CH DD	DD -1	0.00220	2.18129	CHDD-1	0.65848	16.78877	0.45405	1.58797	0.71624
CH CC	CC -1	0.00943	11.17165				0.27165	0.23902	0.22562
CH CC	CHCC-1	0.96755	27.22945				0.82719	2.34647	0.10989
CH CC	CC -1	0.00115	1.66944	CHCC-1	0.88768	14.96431	0.83420	2.25807	0.10845
CH TD	TD -1	0.02139	8.93767				0.09314	0.62797	2.16986
CH TD	CHTD-1	0.86115	13.77879				0.48141	2.03292	1.64086
CH TD	TD -1	0.00482	1.68009	CHTD-1	0.73077	7.37234	0.50268	1.88263	1.61899
CH FR	FR -1	-0.09400	-1.59934				0.03615	0.90939	0.18812
CH FR	CHFR-1	0.48025	4.59573				0.23919	1.66005	0.16714
CH FR	FR -1	-0.20100	-3.99475	CHFR-1	0.61932	6.15062	0.38733	1.89674	0.15112
CH L	L -1	0.02424	20.75620				0.58823	0.83135	1.41682
CH L	CH L-1	0.95798	23.55467				0.67034	2.45756	1.26770
CH L	L -1	0.00989	3.74782	CH L-1	0.59901	5.82962	0.72819	2.07936	1.15981
DMO	CMO -1	0.81735	11.09269				0.39330	2.67002	0.00569
DIS R	DIS -1	1.01708	109.52792				0.94706	1.06646	0.26568
NOND C	C ND-1	1.01540	1354.36255				0.99949	1.75848	1.95708
DUR C	C D -1	1.01694	262.01685				0.98979	2.08587	1.75858
RES FI	RESI-1	1.00641	176.93315				0.91472	1.00346	1.13239
NONR I	NRES-1	1.01964	360.42065				0.99515	1.25617	1.37578
CH INV	INV -1	0.08609	9.47781				0.17980	0.69112	4.53124
CH INV	CINV-1	0.85586	13.38091				0.47721	2.18614	3.61759
CH INV	INV -1	0.02899	2.70943	CINV-1	0.66106	7.00462	0.52954	2.00042	3.45767
ANCH P	CH P-1	1.02875	46.50710				0.92030	1.22362	0.00441

APPENDIX C

SOURCES OF DATA

Endogenous Variables

1. Monetary variables.

The following data are in billions of current dollars, seasonally adjusted. The data were monthly averages of daily values which were then averaged quarterly. Source: Federal Reserve Bank of St. Louis (from the Board of Governors of the Federal Reserve System).

$\Delta DD = DD_t - DD_{t-1}$ Demand deposits at all commercial banks.

$\Delta CC = CC_t - CC_{t-1}$ Coin and currency in the public's hands.

$\Delta TD = TD_t - TD_{t-1}$ Time deposits at all commercial banks.

$\Delta FR = FR_t - FR_{t-1} = (ER_t - MBB_t) - (ER_{t-1} - MBB_{t-1})$ = Free reserves.

ER = Excess reserves of member banks.
MBB = Member bank borrowings from the Federal Reserve.

$\Delta L = L_t - L_{t-1}$ Commercial and industrial loans at commercial banks.

$$OMO = \frac{\Delta(UBR + CC)}{(UBR + CC)_{-1}} = \frac{\Delta(TR - MBB + CC)}{(TR - MBB + CC)_{-1}}$$

Open Market Operations Proxy $= \dfrac{(TR - MBB + CC)_t - (TR - MBB + CC)_{t-1}}{(TR - MBB + CC)_{t-1}}$

TR = Total reserves of member banks.

r_d = Discount rate at the Federal Reserve Bank of New York. Quoted as percent per annum (3.5% = 3.50)

2. Real sector variables.

The following variables are in billions of current dollars, seasonally adjusted. The data are quarterly totals at annual rates. Source: Federal Reserve Bank of St. Louis (from the U. S. Department of Commerce).

Y = Gross national product = Income

C^{nd} = Consumption of nondurable goods.

C^{d} = Consumption of durable goods.

I^{r} = Fixed investment in residential structures.

I^{nr} = Fixed investment in nonresidential structures.

The following variables—Source: U.S. Department of Commerce, Business Statistics, 1967 edition; and Survey of Current Business (1967 through April, 1970).

ΔI^{i} = Change in nonfarm business inventory, seasonally adjusted in current dollars. It is in terms of quarterly totals at annual rates. $(I^{i}_{t}-I^{i}_{t-1})$

$CHP = \frac{CPI - CPI_{t-4}}{\overline{P}}$ = Annual rate of change in prices.

CPI = Consumer price index (1957-1959 = 100), a weighted aggregative monthly index, quarterly averaged.

$\overline{P}$ = Weighted average price series employing weights used by deLeeuw (1965) and Teigen (1969) to approximate a series of "permanent" income and prices.

$$\overline{P} = 0.114 \sum_{i=0}^{19} (0.9)^{i}(CPI)_{-1}$$

Exogenous Variables

1. Interest rates.

The following are quarterly averages quoted in terms of percent per annum (3.5% = 3.50). Source: Federal Reserve Bank of St. Louis (from the Board of Governors of the Federal Reserve System).

r_{b} = Treasury bill rate on new issues of 3-month bills. Averaged monthly rates.

r_{l} = Long-term government bond yields. Averaged monthly rates.

$TRM = (r_{l}-r_{b})$ = Term structure of interest rates.

r_{td} = Yield on time deposits. The rate for 1953-1960 is derived by interpolating an annual series of yield quotations from the Annual Reports of the Federal Deposit Insurance Corporation. The series since 1960 followed the new issue rate on six month CD's—Source: Federal Reserve Bank of St. Louis (from the Federal Reserve Bank of New York).

The following are the multiplicative forms of the interest rates—the rates multiplied by the level of income ($r \cdot Y$). These are the substitute earning assets into which money is considered to be easily transferable. The three broad groups are represented by the ($r_b \cdot Y$), ($r_{td} \cdot Y$), and ($r_l \cdot Y$).

$\Delta RT = RRR_{td_t} - RRR_{td_{t-1}}$ = Change in the required reserve ratio which member banks must apply against their time deposits.

RRR_{td} = Reserve requirement ratio against time deposits. Following the division of the broad classification "time deposits" and the establishing of differing reserve requirements (effective July 14, 1966), the ratio used was a weighted average based on the (approximate) dollar volume in each category.

2. $L = L_t$ = Commercial and industrial loans at commercial banks.

3. Real sector variables.

$\Delta Y = Y_t - Y_{t-1}$ = Quarterly change in income (Y).

$Y_{p_{-1}}$ = Permanent income (lagged one period). Calculated using the deLeeuw formula previously used to find $\bar{P}$.

$WDY = \dfrac{Y_{+1} - Y_{-3}}{\sum_{i=0}^{3} Y_{-i}}$ = A proxy for the expected annual rate of change in income in the next quarter (annual change in income "led" one period divided by a one-year moving total of income).

E^e = Exogenous expenditures = $Y - C^{nd} - C^d - I^r - I^{nr} - \Delta I^i$. Its main component is government expenditures, but it also includes net exports and changes in farm business inventories.

INV_{-1} = Level of all manufacturing inventories, book value, seasonally adjusted (quarterly averages of end-of-the-month data) in billions of current dollars. Source: U.S. Department of Commerce, Business Statistics, 1967 edition, and Survey of Current Business (1967-March, 1970).

$\Delta Prod$ = Productivity change. The annual series published by Jorgenson and Griliches (1967) was interpolated into a quarterly series using the formula $\Delta Prod = 0.79816 + 0.0045\ T$, where T is a quarterly measure of time (T in 1953-I = 33). And the values from 1965 through 1969 are projected on the basis of this regression equation. (year 1955 = 100).

CAP_{-1} = Rate of capacity utilization in the manufacturing, mining, and utilities sector (30 manufacturing, mining, and utilities industries). New series of the Wharton Index of Capacity Utilization, lagged one period. Provided by F. Gerard Adams,

Economic Research Unit of the Department of Economics of the University of Pennsylvania. In percentage terms (95.4).

B-P = Proxy for the balance of payments problem. Since the short-term interest rate is the most important in international liquidity and capital flows, it is used as the basis of this rate. It is multiplied times a dummy variable which equals zero (0) for the years 1953-1960 when the U.S. experienced few of these problems; and unity (1) for the ensuing years.