Ankara
October, 2014

THE EFFECTS OF EDUCATION AND MARITAL STATUS ON FEMALE WORKING LIFE EXPECTANCY IN TURKEY: AN APPLICATION OF MULTISTATE LIFE TABLE FOR 2009-2010

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A Master's Thesis
Submitted to the
Department of Demography
In Accordance with the Regulation of the Institute of Population Studies

This is to certify that we have read and examined this thesis and in our opinion it fulfills the requirements in scope and quality of a thesis for the degree of Master of Science in Demography.

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…/…/2014

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ACKNOWLEDGEMENTS

I would like to express my appreciation to my supervisor Assoc. Prof. Dr. Mehmet Ali Eryurt for his wisdom and guidance throughout this study.

I would also like to thank to Prof. Dr. İsmet Koç and Assoc. Prof. Dr. Ahmet Sinan Türkyılmaz for their valuable comments for this study.

I am grateful to all my professors in Institute of Population Studies at Hacettepe University since their lectures contributed a lot to my self-development. I am also grateful to all my friends in M.Sc. Program in Demography for enjoyable times that we spent together in the Institute.

Finally, I would like to express my gratitude to my father, mother and sister for their love, encouragement and full support.

SUMMARY

According to the results of Household Labor Force Survey conducted by TURKSTAT in 2012, female labor force participation rate in Turkey is 29.5%. International comparisons also reveal that female labor force participation rate is very low in Turkey (World Bank 2013). In addition, it is observed that labor force participation rates of women in Turkey show significant differences between education and marital status groups such that participation rate of married women is lower than never married and divorced women while participation rate of women into the labor force increases as educational attainment increases TURKSTAT 2013).

This thesis aims to address the structure of female labor force participation in Turkey by constructing multistate working life tables by educational attainment and marital status. Working life table is a technique which summarizes mortality and labor market experience of a hypothetical population so this technique is employed to estimate working life expectancy of women in Turkey and how working life expectancy changes by education and marital status. The data source used for these estimations is two waves of Income and Living Conditions Survey conducted by TURKSTAT in 2009-2010.

The findings suggest that an average Turkish woman at age 15 is expected to spend almost 73% of her remaining lifetime out of labor force. As expected, education has a positive impact on female working life expectancy such that being high educated increases active life expectancy of a woman at age 20 by almost 9 years. On the other hand, being married has a negative impact on active life expectancy of women such that a currently married woman at age 20 has 9.5 years shorter active life expectancy compared to a never married woman at the same age. When both of those variables are controlled, it is observed that the shortest working life expectancy belongs to low educated currently married women.

ÖZET

Türkiye İstatistik Kurumu tarafından 2012'de yapılan Hanehalkı İşgücü Anketi sonuçlarına göre Türkiye'de kadın işgücüne katılım oranı %29,5'tir. Bu oranla Türkiye'nin kadın işgücüne katılımı konusunda uluslararası karşılaştırmalarda geride kaldığı görülmektedir (Dünya Bankası 2013). Bunun yanı sıra, Türkiye'de kadın işgücüne katılım oranlarının farklı eğitim ve medeni durum sınıflandırmalarına göre değişkenlik gösterdiği görülmektedir. Eğitim seviyesi daha yüksek olan kadınların işgücüne katılımı daha fazla iken, evli kadınların, hiç evlenmemiş ve boşanmış kadınlara oranla daha düşük işgücüne katılım oranlarına sahip olduğu gözlenmektedir (TÜİK 2013).

Bu tez, Türkiye'de kadın işgücüne katılımının yapısal özelliklerini dikkate alarak, kadın işgücü arzını, eğitim ve medeni durum ayrımları temelinde kurulan çok durumlu yaşam tablosu tekniğiyle incelemeyi amaçlamaktadır. Çalışma yaşam tabloları, varsayımsal bir nüfusun ölümlülük ve işgücü piyasası deneyimlerini özetleyen tekniklerdir. Bu bağlamda bu teknik, Türkiye'de kadınların işgücü piyasasındaki ortalama yaşam beklentileri ve bu yaşam beklentilerinin eğitim ve medeni duruma göre nasıl değiştiğini incelemek adına bu tezde kullanılmaktadır. Veri kaynağı olarak TÜİK tarafından 2009-2010 yıllarında yapılmış panel bir çalışma olan Gelir ve Yaşam Koşulları Anketi'nin iki dalgası kullanılmıştır.

Sonuçlar göstermektedir ki, 15 yaşındaki ortalama bir Türk kadınının geri kalan hayatının %73'ünü işgücü dışında geçirmesi beklenmektedir. Beklendiği üzere, eğitim ile kadınların işgücündeki yaşam beklentisi arasında pozitif bir ilişki bulunmuştur; öyle ki, 20 yaşında az eğitimli bir kadının aynı yaştaki daha çok eğitimli bir kadına oranla ortalama olarak 9 yıl daha az işgücünde kalması beklenmektedir. Diğer taraftan, evli olmanın işgücündeki yaşam beklentisi üzerinde negatif bir etkisinin olduğu gözlemlenmiştir; öyle ki, 20 yaşında hiç evlenmemiş bir kadının aynı yaştaki evlenmiş bir kadına oranla ortalama 9.5 yıl daha fazla işgücünde kalması beklenmektedir. Her iki değişken de kontrol edildiğinde, en kısa işgücünde kalma süresinin az eğitimli evli kadınlara ait olduğu görülmektedir.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ABPRS	Address Based Population Registration System
EUROSTAT	European Community Statistical Office
HUIPS	Hacettepe University Institute of Population Studies
LFPR	Labor Force Participation Rate
TDHS	Turkey Demographic and Health Survey
TURKSTAT	Turkish Statistical Institute

CHAPTER 1
INTRODUCTION

According to the results of Household Labor Force Survey conducted by TURKSTAT in 2012, female labor force participation rate in Turkey is 29.5%. International comparisons reveal that female labor force participation rate is very low in Turkey (World Bank 2013). Such low levels of female labor force participation constitute a handicap for Turkish economy since this rate means that almost 70% of women at working ages in Turkey are not productive; in other words, they are economically dependent. This fact has adverse effects in terms of economic growth especially considering the demographic window of opportunity experienced by Turkey in recent years (Koç et al. 2010; Tansel 2012).

Female labor force participation in Turkey has been subjected to many studies so far to explain the dynamics behind these low rates. Studies conducted with a microeconomic perspective have showed that education and marital status are important determinants of female labor supply decision in Turkey. Education is expected to have a positive impact on female labor supply since as education increases, earning power of a woman in the market increases. On the other hand, being married might have a negative impact on female labor supply since marriage brings women responsibilities related to childcare and chores as well as an economic security which eases exit from the labor market. Statistics published by TURKSTAT also reveal that labor force participation of women increases as educational attainment increases and that labor force participation of currently married women is lower compared to never married and divorced women in Turkey (TURKSTAT 2013).

These facts constitute the main motivation to conduct such a study which analyzes female labor supply behavior in Turkey. The research questions aimed to be answered in this thesis are as follows.

- How long is a Turkish woman expected to be in labor force/out of labor force in her total lifetime on average?
- How is the average duration in labor market/out of labor market affected by educational attainment of a Turkish woman?
- How is the average duration in labor market/out of labor market affected by marital status of a Turkish woman?

- What is the combined effect of educational attainment and marital status on a Turkish woman's duration in labor market/out of labor market on average?
- How does previous labor force attachment affect a woman's duration in labor market?

To answer these questions, multistate working life tables by educational attainment and marital status are constructed for Turkish women. Life table methodology is preferred in the sense that average labor market and mortality experience of a population subject to study can be summarized through this technique; in other words, summary indicators called life expectancies produced by this technique give information about the average duration in a state so this technique is suitable to answer the research questions mentioned. Specifically, multistate methodology is preferred in this thesis since this method is the best among existing techniques to study on female labor supply behavior. In order to construct multistate working life tables, transitions between labor market states defined should be computed so a panel survey is needed to perform those estimations. In this respect, two waves of Income and Living Conditions Survey conducted by TURKSTAT in 2009-2010 are used to estimate age-specific transition rates by educational attainment and marital status. Transition rates are estimated through logit regression equations similar to a standard female labor force participation model. By controlling for education and marital status in those logit regressions, estimating transition rates and constructing working life tables by educational attainment and marital status will be possible. Considering the facts about the structure of female labor supply in Turkey, women's working life expectancy is expected to be found low and to be affected positively by education and negatively by being married.

As far as the author is aware, there are two studies on working life tables conducted for Turkey. One of those studies was conducted by Kurtuluş (1999) in which working life tables are constructed for Turkish males and females through conventional technique. The other study was performed by Özgören and Koç (2012) only for males again by using conventional technique. Thus, it is evident that there is a room for improvement in the empirical literature both on studies of working life tables and of multistate methodology. In this respect, this thesis is the first attempt to construct multistate working life tables for women in Turkey so contributes to the empirical literature with this unique feature.

This thesis consists of four further chapters which are designed as follows.

In Chapter 2, literature review is provided. In the first section of this chapter, a theoretical framework is provided to explain the characteristics of female labor force participation and structure of female labor force participation in Turkey is explained by emphasizing the role of education and marital status. In the second section, all existing life table methodologies are summarized with their advantages and disadvantages. In the third section, two methodologies used in construction of working life tables are explained in detail.

Chapter 3 focuses on data and methodology used in this thesis. In the first section of this chapter, Income and Living Conditions Survey which is the data source of this study is explained and descriptive statistics are provided. In the second section, methods used to estimate transition probabilities and to construct multistate working life tables are explained in detail.

Chapter 4 illustrates the estimation results for general multistate working life tables constructed as well as multistate working life tables constructed by education and marital status.

Finally, Chapter 5 concludes the study by providing a brief summary. Limitations and further possible extensions of this thesis are also provided in this chapter.

CHAPTER 2
LITERATURE REVIEW

2.1. WOMEN'S WORKING LIFE

This thesis examines the labor market experience of women in Turkey through a multistate life table analysis. As performed in many working life table studies which can be found in the literature, two labor market states are defined in this thesis, which are being economically active and inactive, i.e. being in the labor force and being out of the labor force, for multistate life table analysis. Due to this definition of states analyzed, labor force participation is the key element affecting working life expectancy of women. In this respect, factors affecting labor supply decision of women as well as current situation and determinants of female labor force participation in Turkey is explained in this section.

2.1.1. Theoretical Framework

Utility maximization is one of the core problems in neoclassical economics. According to neoclassical framework, rational agents try to maximize their utility and make their decisions in the direction of the solution of this problem in all spheres of economic life as well as in labor market. Under this framework, leisure is considered as a consumption good like all other goods and services in the market and rational agents are expected to maximize their utility by optimally allocating their time between leisure and working hours. This maximization problem is called labor-leisure choice and mathematically represented as

$$U_i = f(C_i, L_i)$$

subject to

$$L_i + H_i = 24$$

$$pC_i \leq R + w_i H_i$$

where U_i represents the utility of agent i from consuming consumption goods C and leisure time L subject to the time constraint where sum of leisure time L and working time H is equal to a full day and subject to income constraint where expenditure for all goods consumed (pC_i) cannot exceed the sum of earnings from labor supply ($w_i H_i$) and income from other sources (R). Under this framework, labor supply decision is determined by trade-off between demand for leisure time and demand for other goods which can be purchased by income earned. If demand for leisure dominates the decision of the agent, then the agent is expected to supply less hours of labor but if demand for other goods (i.e. demand for a higher income) dominates the decision of the agent, then the agent supplies more hours of labor.

Theoretically, this framework can be also applicable to analyze women's labor supply decision. However, Mincer (1962) argued that

> "The logical complement to leisure time is work broadly construed, whether it includes remunerative production in the market or work that is currently "not paid for". The latter includes various forms of investment in oneself, the production of goods and services for the home and the family. Educational activity is an essential and, indeed, the most important element in the productive life of young boys and girls. Work at home is still an activity to which women, on the average, devote the larger part of their married life. It is an exclusive occupation of many women, and of a vast majority when young children are present. It is, therefore, not sufficient to analyze labor force behavior of married women in terms of the demand for leisure (Mincer 1962)".

Thus, Mincer (1962) asserted that this dual choice framework ignores an important point that unpaid work such as chores and childcare is implicitly accounted in leisure time so such a framework cannot exactly reflects female labor supply decision considering that most of such unpaid works are performed by women when a family or household is taken as the unit of analysis. Considering married women in the core of his analysis, Mincer (1962) stated that labor supply decisions of women should be evaluated in familial context and proposed three-partite time division between housework, market work, and leisure for family members. Mincer (1962) argued that the demand for housework, paid work in the market, and leisure is determined by several variables such as family size and composition as well as relative prices of those activities; in other words, differential productivity of family members in those activities affects time spent to those different activities by different family members. Hence, by following the propositions of Mincer (1962), it might be concluded that women’s labor supply decision depends on their relative productivity in housework and market work which is mostly determined by education. However, it is also affected by other covariates determined in familial context which might be shaped under marriage.

By the theory of allocation of time, Becker (1965) elaborated the arguments proposed by Mincer (1962). According to Becker (1965), time is efficiently allocated between different tasks in a household similar to allocative efficiency in other economic resources. Becker (1965) asserted that allocative efficiency in time use is sustained if household members specialize in tasks and allocate their times to them which they have a comparative advantage on. If there is a change in comparative advantages (i.e. change in relative productivity of a household member in a task), then time spent to different activities is reallocated by household members (Becker 1965). Becker (1965) concluded that women have a comparative advantage on chores and childcare compared to men; in other words, women have less earning potential in labor market due to their relative inefficiency in market work. The sources of women’s having more productivity in housework might be gender-based discrimination against women and fertility experience which is a life-cycle event special to women which cause lower earnings potential for women in the market (Becker 1985).

In brief, considering married women in the core of analysis, the implication of this theoretical framework proposed by Mincer (1962) and Becker (1965) is that women’s labor supply decision relies on their relative productivity in housework and market work and family context. According to Mincer (1962) and Becker (1985), human capital achievement is one of the most important factors determining earning potential of women in labor market so it positively affects participation of women into labor force since the opportunity cost of time spent to housework in terms of forgone earnings increases as educational attainment increase. This theoretical framework also puts forward the importance of marital status in terms of labor market activity of women. Marital status brings differences for family/household context in which labor supply decision of women realizes such that being married brings responsibilities to women for chores and childcare so might function as a factor which causes a decline in women's labor market productivity as proposed by Mincer (1962) and Becker (1965, 1985).

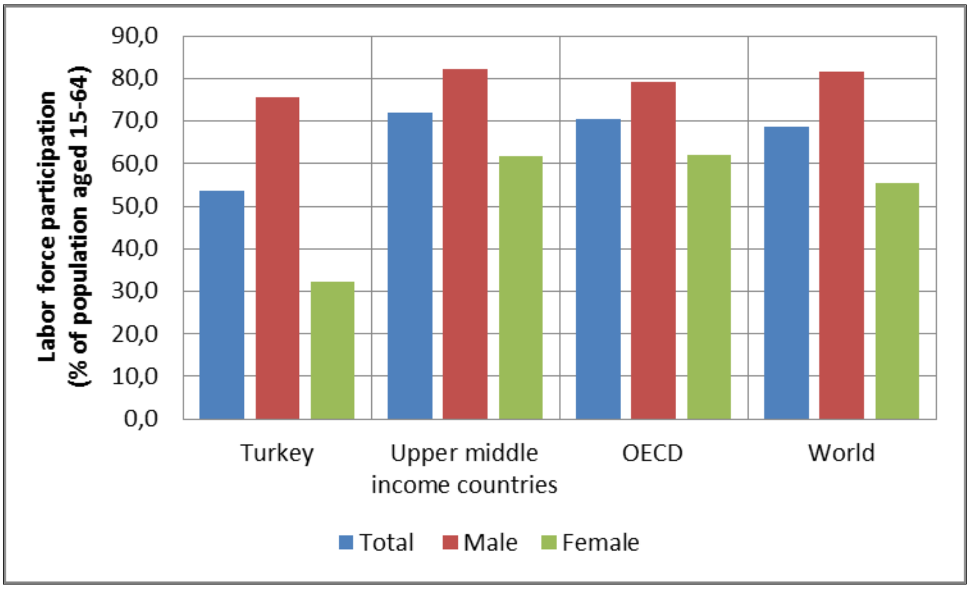
In the light of the information provided in this section, the theoretical framework proposed by Mincer (1962) and Becker (1965) forms the basis of analysis conducted in this thesis. Considering that this thesis aims to analyze women's labor supply behavior through multistate life table methodology, this theoretical framework is preferred over the neoclassical one since neoclassical framework evaluates labor supply decision as an individual labor-leisure choice so ignores the special characteristics of women's labor supply decision. However, the theory of allocation of time puts forward that women's labor supply behavior takes form on the basis of a trade-off between market and housework determined by demand for market and housework in the household context so this theory takes into account the features of women labor supply decision which might not be observed in case of males. As mentioned so far, the theoretical framework proposed by Mincer (1962) and Becker (1965) states that education and marital status are the important determinants of this trade-off which shapes the decision of women in terms of labor market activity and the data on female labor force participation rates in Turkey provides evidence for the applicability of this framework to the analysis conducted in this thesis as mentioned in the following section. Thus, this thesis aims to concentrate on these two variables among others by considering their importance in determination of female labor force participation so working life expectancy of females in Turkey.

2.1.2. Female Labor Force Participation in Turkey

As the theoretical framework proposed by Mincer (1962) and Becker (1965) suggested, educational attainment and marital status appear as the two most important factors determining female's labor supply decision; in this respect, current situation of female labor force participation in Turkey is examined in this section with a special emphasis on these two factors.

According to the results of Household Labor Force Survey conducted by TURKSTAT in 2012, overall labor force participation rate in Turkey is 49.96% while male labor force participation rate is 71.04% and female labor force participation rate is 29.50%. One of the striking features of Turkish labor market is very low female labor force participation compared to OECD countries, world average, and average of upper middle income countries where Turkey is classified by World Bank[1]. As presented in Figure 2.1, overall labor force participation rate in Turkey is lower than those groups of countries mentioned as well as world average. Although a small portion of this difference is attributable to male labor force participation rate's being lower, the main source of difference is female labor force participation rate.

Figure 2.1: Labor force participation rates in 2012



Source: World Bank, World Development Indicators, 2013

Data on labor force participation rates in Turkey published by TURKSTAT is available from 1988 onwards and the information obtained shows that female labor force participation rate in Turkey has been never at very high levels and exhibited a declining trend from 1988 onwards. In 1988, female labor force participation rate in Turkey was 34.26% and it declined to 23.29% in 2005 which is the year at which Turkey experienced its lowest female labor force participation rate (TURKSTAT 2013). After 2005, slight increases

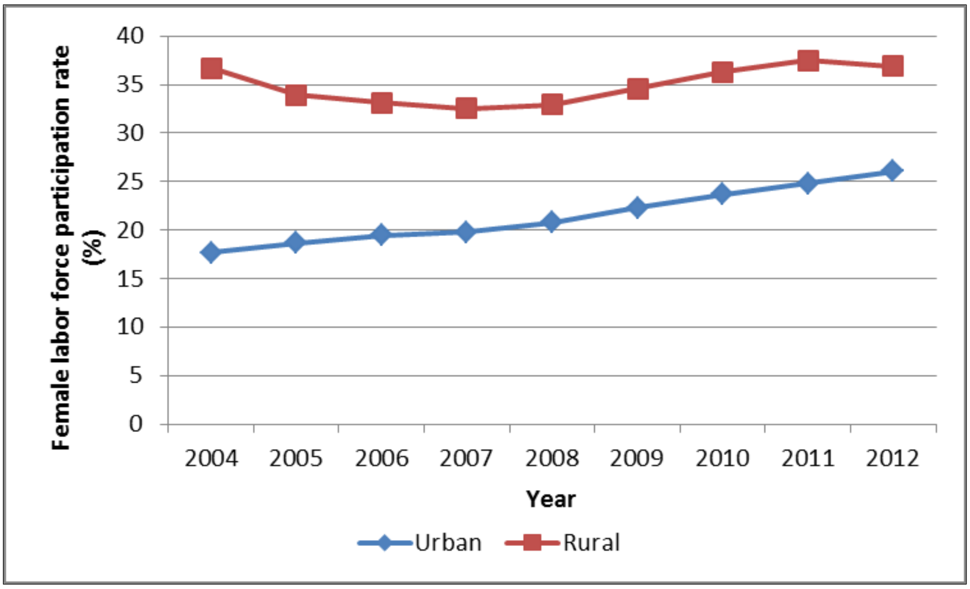
[1] Labor force participation rates in Turkey obtained from TURKSTAT and World Bank presented here are different since TURKSTAT calculates labor force participation rate as the percentage of population participating into labor force out of total population aged 15 and over while World Bank calculates those figures out of total population in 15-64 age group.

have been experienced and female labor force participation rate has reached to 29.50% in 2012 (TURKSTAT 2013).

It is observed that a significant portion of this increase in recent years has come from the increase in participation rates of urban women as presented in Figure 2.2 but this figure also reveals that participation rates in rural areas persistently remain higher compared to that of in urban areas. By using data of 2006 Household Labor Force Survey conducted by TURKSTAT and TDHS 2003 conducted by HIPS, Dayıoğlu and Kırdar (2010) showed that women living in rural areas have higher probability to participate into labor force compared to women in urban areas. The reason of this finding is that housework and market work might be more contradicting in urban areas than in rural areas (Ercan et al. 2010). For example, being married and having children might be reconciled with working in the farm in an extended family setting in rural areas. In addition, working in agricultural sector might not require higher educational attainment compared to manufacturing and services sectors which are more skill intensive compared to agriculture. Thus, those factors might lead to higher rates of participation into labor market for women living in rural areas. On the other hand, being low educated and being married might hinder participation of women into labor market in urban areas considering that urban economy is dominated by manufacturing and services sectors. Institutionalization of childcare is not sufficient (Tansel 2012) and earning potential of especially low educated women in the market in Turkey is very low in urban areas (Dayıoğlu and Kırdar 2010) so participating into labor force for women living in urban areas involves a cost in terms of houseworks and childcare which might be higher than the potential earnings available for those women in the market.

Briefly, it is observed that there are differences in labor force participation rates of women living in urban and rural areas and dynamics of labor force attachment differentiate by urban/rural settlements in Turkey. As mentioned, this thesis aims to measure working life expectancy of women in Turkey and by following the theoretical framework proposed by Mincer (1962) and Becker (1965), analysis in this thesis concentrate on differences in working life expectancy of Turkish women by educational attainment and marital status since these variables are accounted as important among other determinants considering the differences in labor market activity by those variables in Turkey and those are explained further in this section. However, in the light of the information provided so far, it should be noted that education and marital status might not be as important for women living in rural areas as for women in urban areas when analysis are extended further by including urban/rural differentiation. Nevertheless, the point of view of this thesis is producing representative results for Turkey on average in the sense that dissolution of agriculture and expansion of urban economy dominate the development process of Turkey which is currently under way. In this process, female labor force participation rates in urban areas have started to increase in recent years as presented in Figure 2.2 so concentrating on education and marital status might be more meaningful at this stage.

Figure 2.2: Female LFPR by urban/rural settlement

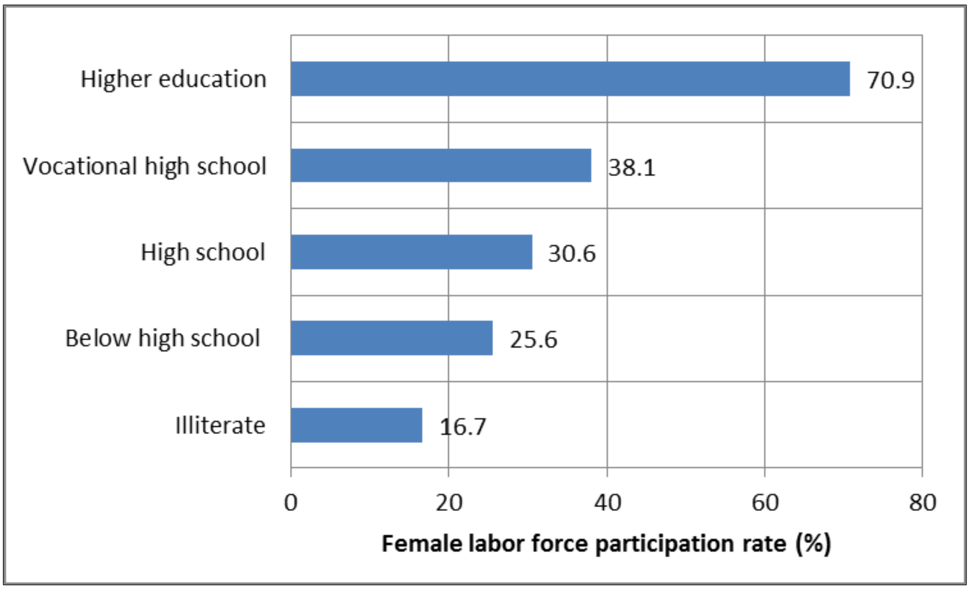


Source: TURKSTAT, Household Labor Force Surveys, 2004-2012

In this respect, from a macroeconomic perspective, there are several reasons underlying the current situation and evolution of female labor force participation in Turkey such as the economic development process that Turkey has experienced, sectoral shifts in the economy together with accelerating urbanization (i.e. dissolution of agriculture and rise of services sectors), skill-biased technological change, the structure of Turkey's economic growth (i.e. Turkey's economic growth's not producing adequate employment opportunities), problems related to the structure of labor market (i.e. extensity of informal sector), and institutional characteristics (i.e. traditional roles attributed to women, insufficiency of policies reconciling market work and housework and childcare for women) on which detailed discussions can be found in studies of Ercan (1999), Ercan et al. (2010), Dayıoğlu and Kırdar (2010), Taymaz (2010), Tansel (2002), Tansel (2012), Uraz et al.

(2010), State Planning Organization and World Bank (2009). Nevertheless, considering the scope of this thesis, those points are not discussed in detail and this section is devoted to specifically explain the differences in female labor force participation by educational attainment and marital status in Turkey.

Figure 2.3: Female LFPR by educational attainment in Turkey, 2012



Source: TURKSTAT, Household Labor Force Survey, 2012

Educational attainment appears as one of the most important factors determining female labor force participation in Turkey. As presented in Figure 2.3, female labor force participation rates exhibit significant differences by education such that female labor force participation rate in Turkey increases as educational attainment increases. By using data of 2006 Household Labor Force Survey conducted by TURKSTAT and TDHS 2003 conducted by HUIPS, Dayıoğlu and Kırdar (2010) showed that increase in educational attainment significantly increases the probability of women to participate into labor force. Uraz et al. (2010) also reached the same conclusion by analyzing data from TDHS 2003 through probit regression analysis. These findings are expected in the sense that education increases the earning potential in the market so women with higher human capital achievement participate into labor force more.

Nevertheless, educational attainment affects female labor force participation not only through increase in earning potential in the market but also in several ways. As mentioned later in this section, marriage and childbearing have negative effects on female labor force participation and education also indirectly affects female labor force participation through its effects on marriage age and fertility. According to the results of TDHS 2008 presented in Table 2.1, age at first marriage increases and fertility level of women declines as educational attainment increases. By using data of TDHS 2003, Kırdar et al. (2009) showed that extension of years of compulsory education in Turkey contributed to increase in marriage age of women such that at age 17, the probability of being married declines from 15.2% to 10%. On the other hand, another study conducted by Yaşıt (2007) by using data of censuses conducted by TURKSTAT and provincial censuses published by State Planning Organization between years 1980-2000 showed the negative relationship between fertility and education such that 1% decline in illiteracy rate of women leads to a decline in fertility level by 44% while 1% increase in high school graduation rate declines fertility by 15%. Hence, considering the negative impact of marriage and fertility on female labor force participation which is discussed below in detail, increase in educational attainment is also expected to positively affect female labor force participation through its negative effect on marriage age and fertility level.

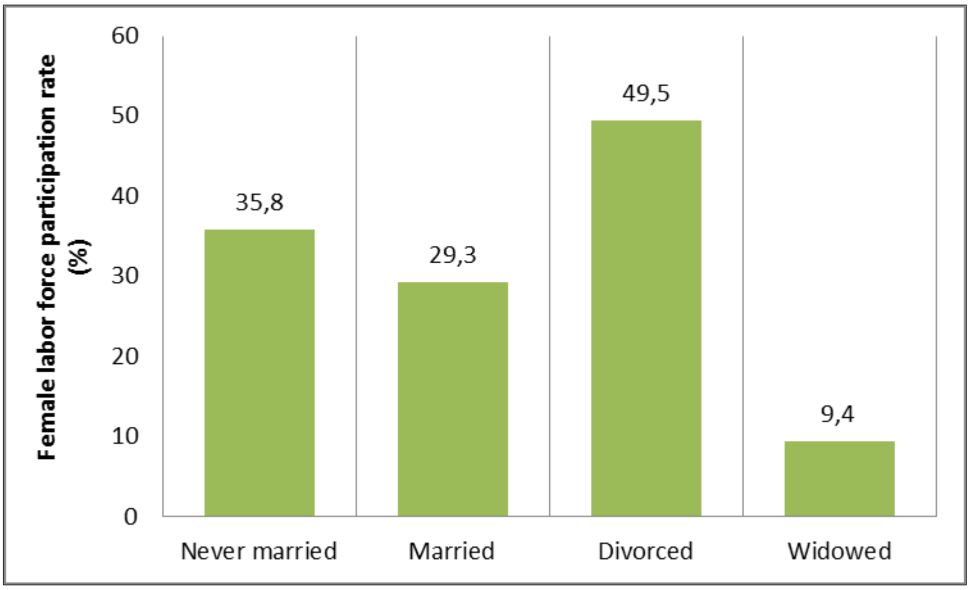
Table 2.1: Marriage age and fertility by educational attainment in Turkey, 2008

	Median age at first marriage	Total fertility rate
No education / not graduated from primary school	18.7	2.65
First level primary school	20.2	2.25
Second level primary school	21.4	1.30
High school and above	24.1	1.53

Source: HUIPS, TDHS 2008

As already mentioned above, marriage is also one of the most important factors determining women’s labor supply decision. Marriage is an important life cycle event for women since it brings important changes to the living context in which women make their decisions related to labor market activity as suggested by Mincer (1962) and Becker (1965). TURKSTAT Household Labor Force Survey conducted in 2012 shows that labor force participation among currently married women in Turkey is lower compared to never married and divorced women as presented in Figure 2.4.

Figure 2.4: Female LFPR by marital status in Turkey, 2012



Source: TURKSTAT, Household Labor Force Survey, 2012

According to the results of TDHS 2008, 29.8% women who are not currently working but working previously stated marriage as the main reason of quitting their last job and with this percentage ratio, marriage ranks first among other reasons of quitting job. This ratio is 21.5% for women who are currently working. Those figures reveal that marriage is an important reason of moving out of labor force; even it does not cause moving out of labor force totally, marriage seems as a reason of break in labor market activity of women. Such figures are actually expected in the sense that marriage brings women responsibilities related to childcare and chores. Marriage might be a proxy for fertility of women in Turkey in the sense that childbearing outside marriage is not a common practice in Turkey (Ergöçmen et al. 2009). Therefore, childcare might be an important reason of married women's not participating into market activity. According to the results of TDHS 2008, childcare ranks first among others as the reason of not working among married women with 32.1% and the weight of this reason is much higher among women aged 20-34. Results of the same survey also show that being housewife is the secondly ranked reason of not working among married women with 22.8%. Those figures might be attributed to gender-based division of labor in Turkey. According to Ercan et al. (2010) traditional roles of women are conflicting with working in paid jobs, especially in urban areas; thus, traditional division of labor in home might force women to move out of the labor force.

Responsibilities related to childcare and chores might be sufficient reasons to explain the difference between participation rates of never married and currently married women but those reasons might not be enough to explain the differential participation between married and divorced women since divorced women might also have similar responsibilities as married women. In this respect, household income might be another factor to explain the difference between participation rates of married and divorced women. In presence of childcare and chores, married women might move out of labor force easier than divorced women since their husbands undertake the role of breadwinning in a traditional setting; in other words, married women might have more economic security in terms of household income compared to divorced women. Findings of earlier studies provide evidence for this argument such that Dayıoğlu and Kırdar (2010) found that probability of especially low educated women to participate into labor force declines as household income increases and Uraz et al. (2010) also confirmed this finding. Thus, it might be concluded that divorce brings the role of breadwinning to women besides their traditional roles so they participate into labor force more. In addition, divorce might ease traditional oppressions related to working in the market. According to the results of TDHS 2008, 20.1% of married women are not currently working stated that they are not working due to the fact that their partners do not allow them to work in paid jobs but this ratio is 10.5% for formerly married women.

In the light of these information provided by earlier studies conducted on the determinants female labor force participation in Turkey and by surveys including data on women's labor market status, education and marriage seem as the most important determinants of female labor force participation and so women's working life expectancy among others. In this respect, differences between working life expectancy of women are analyzed in this thesis by emphasizing these two factors.

2.2. LIFE TABLE METHODOLOGY

Life table is one of the core devices used in demography to estimate average duration in a particular state. First life table was constructed by John Graunt in 1662 to analyze mortality rolls in London but after Graunt's original work, Edmond Halley elaborated the mathematical approach used by constructing a mortality table for Breslau in 1693 (Rowland 2003:267). Although life table technique was originally developed and is still used mainly to analyze the force of mortality and to estimate life expectancy (i.e. average duration as alive), the area of its use has expanded through time such that the technique is now employed in health and social sciences to estimate average duration in particular states subject to study such as disability-free life expectancy, length of married life, duration of contraception usage, length of school life, duration of residence, length of working life and so on as well as in projections of population size and characteristics (Kintner 2004:301).

Life tables represent experience of a cohort for a certain event and produce standard summary measures that are comparable across different population groups and at different points in time (Kintner 2004:301). In this respect, it is a favorable methodology to analyze differences between countries, population subgroups, and time periods for a certain event experienced by a population. There are several types of life tables depending on type of cohort followed, age detail included, and construction technique (Kintner 2004:301).

First categorization of life tables is based on the type of cohort followed. Depending on cohort type, life tables are classified as cohort (generation) or period (current) life tables. Cohort life tables follow the experience of a real cohort for a certain event. In this type of life tables, rates or probabilities of experiencing a particular event by a real cohort are used as inputs to construct life table. Obtaining those rates or probabilities requires data collected from a generation retrospectively or through follow-up of the same group of people in a long time period (Kintner 2004:301). Since such data sets might be difficult to obtain, usage of cohort life tables is very limited (Rowland 2003:269). Unlike cohort life tables, period life tables use data on a population group at a point in time to calculate input of life table so period life tables are much easier to construct. The basic assumption in a period life table is that people in different age groups in observed population at a point in time constitute a cohort to observe occurrence of a particular event; in other words, those people at different ages in a population observed form a synthetic cohort which might be considered as representative for an actual cohort. In this context, period life tables present experience of a hypothetical population, which provide a snapshot of current situation for a particular event subject to study based on the experience of a synthetic cohort (Kintner 2004:301; Rowland 2003:268). As mentioned, due to the easiness of construction, most of studies use period life tables as almost all of the studies presented in this section.

Second classification of life tables is based on the age detail included in the table. Depending on the type of age detail, life tables are classified as unabridged (complete) and abridged life tables. Unabridged life tables are constructed for single age groups while abridged life tables are constructed usually for 5- or 10-year age groups. Abridged life tables are more convenient to report compared to unabridged life tables so they provide a concise representation of the event experienced by a cohort (Newell 1988). In addition, usage of abridged life tables reduces the effect of problems related to reliability of age reporting (Newell 1988) so this type of life tables is preferred in many studies. Nevertheless, most of the studies on working life table presented in this thesis were constructed as unabridged life tables due to the assumption of single transition between states in a given age group. This assumption is explained further in following parts.

Finally, life tables are classified based on the construction technique used. Basically, life tables are categorized as prevalence and incidence-based life tables depending on the method applied (Hytti and Valaste 2009). In prevalence-based method, proportion of people experienced a particular event is used as input of life table which might be obtained from any cross sectional survey or census. On the other hand, incidence-based method aims to calculate rate or probability of transitions which are experienced by a group of people exposed to the risk of occurrence of any event. Thus, either a longitudinal data or data from repeated cross sectional surveys or from a cross sectional survey which includes retrospective questions is needed to calculate incidence of a certain event. Prevalence-based method is much more commonly used in the literature and conventional techniques were generally developed by using this methodology due to unavailability of longitudinal data sets in earlier times (Willekens 1980). However, as availability of data collected with a longitudinal perspective has increased through time, studies based on incidence-based methods have been started to appear in the literature.

Based on the usage of methods described above, classification of life tables depending on construction technique might be further elaborated. Kintner (2004:301) classified life tables under four main construction techniques which are conventional (single decrement) life tables, multiple decrement life tables, increment-decrement life tables, and multistate life tables. Single decrement life tables are mainly constructed through prevalence-based method while multiple decrement and increment-decrement life tables are possible to construct by using either prevalence- or incidence-based methods. On the other hand, multistate life tables generally require incidence-based methodology.

Development of life table technique from single decrement to multistate models also involves the process of estimations to become more elaborated and more representative for real life. As the usage area of life tables has expanded to health and social sciences, information provided by conventional single decrement models has not been enough to estimate volume of transition between several states and average duration in those states since conventional methodology defines only two states (i.e. alive and death) and allows only one transition to absorbing state. To overcome this limitation, life table technique has been further developed to take into account multiple exits and possibility of returns to previous state (Cambois et al. 1999). In this respect, this section is devoted to explain the evolution of life table methodology in terms of construction techniques. In following parts, single decrement, multiple decrement, increment-decrement, and multistate methods are explained by emphasizing areas of use, their advantages and limitations.

2.2.1. Single Decrement Life Table

Single decrement life table is the conventional technique to analyze force of mortality for a hypothetical population, first examples of which were published by Graunt in 1662 and Halley in 1693 (Rowland 2003:267). Such life tables are also called as mortality tables since they present information about mortality experience of a hypothetical cohort by using observed mortality experience of a real population subject to study. In this type of tables, two states are defined as alive and death. In this case, death is the absorbing state, return from which to previous state is not possible. Rates of transition to absorbing state (i.e. death) in different age groups are the main inputs of single decrement life table construction process[1].

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[1] Mortality is a continuous process which can occur at any point in time so mortality rate can be defined as

$$\mu(x) = \lim_{n \to 0} {}_n m_x$$

where $\mu(x)$ is mortality rate when age interval n in discrete time mortality rate ${}_n m_x$ goes to zero; in other words, n becomes infinitesimally small. This nature of the event actually requires presentation of mortality as a continuous process and other life table statistics can be derived by integration. Details of this procedure can be found in Preston et al. (2001:59-70) and Kintner (2004:336-338). However, this is not a commonly used notation since data is usually gathered for discrete time periods. Therefore, discrete time notation is preferred in this thesis.

Formulation of single decrement life table statistics is briefly summarized below but details about construction process can be found in any standard demography textbook such as Newell (1988:67-81), Rowland (2003:265-299), Siegel and Swanson (2004:301-324), and Preston et al. (2001:38-70). Here, basic construction procedure is defined based on use of data for discrete age intervals.

As mentioned earlier, the basic input of mortality table is death rates for different age groups in a population subject to study. To calculate observed death rates, size of population disaggregated by age and sex and number of deaths in each age group in a period (usually a year) are required, which can be obtained from censuses and vital registration systems. Then, observed death rate between ages x and $x+n$[1] is equal to

$$_nM_x = \frac{_nD_x}{_nP_x}$$

where $_nD_x$ is number of deaths between ages x and $x+n$ and $_nP_x$ is population size between ages x and $x+n$.

Although $_nM_x$ is the basic input of period life table, it is not directly used in construction process. Instead, $_nq_x$ is directly used which represents probability of death.

$$_nq_x = \frac{_nd_x}{l_x}$$

$_nd_x$ represents number of deaths between ages x and $x+n$ out of number of alive at age x which is represented by l_x. As implied by this formulation, $_nq_x$ is a probability since it is calculated by using population under risk of death at the beginning of age group. Thus, $_nq_x$ is different than $_nM_x$ since $_nM_x$ indicates prevalence rather than incidence due to the fact

[1] If $n=1$, then life table is an unabridged life table but if n is equal to a value other than 1 (usually 5 or 10), then life table becomes an abridged life table.

that it is calculated using mid-year values. Therefore, central observed death rates represented by ${}_nM_x$ are transformed to ${}_nq_x$ values by following formula[1]:

$$ {}_nq_x = \frac{2 * n * {}_nM_x}{2 + (n * {}_nM_x)} $$

After obtaining ${}_nq_x$ values and setting radix (i.e. l_x at age zero) as 1, 1000, or 100000 which are the standard commonly used values for radix, other life table statistics can be derived as follows:

$$ {}_nd_x = l_x * {}_nq_x \quad \text{or} \quad {}_nd_x = l_x - l_{x+n} $$

$$ l_{x+n} = l_x - {}_nd_x \quad \text{or} \quad l_{x+n} = l_x * {}_np_x $$

$$ {}_np_x = 1 - {}_nq_x $$

$$ {}_nL_x = n * (l_{x+n} + {}_na_x * {}_nd_x) $$

$$ T_x = \sum_{w=x}^{\infty} {}_nL_w $$

$$ e_x = \frac{T_x}{l_x} $$

where

${}_nd_x$: number of deaths between ages x and $x + n$

l_x: number of people alive out of radix at age x

[1] This formula is derived under the assumption that deaths are uniformly distributed across age interval. Details of proof can be found in Newell (1988:68-70). This is one of the mostly used conversion formula but there are other conversion methods especially for abridged life tables which are explained in detail in Kintner (2004:312-315).

${}_n p_x$: probability of remaining alive between ages x and $x+n$

${}_n L_x$: person years lived between ages x and $x+n$

${}_n a_x$: fraction of years lived in age interval x and $x+n$

T_x : total person years lived beyond age x

e_x : expectation of life at age x

${}_n L_x$ represents person years lived in the age interval as defined above; in other words, it represents average number of people alive between ages x and $x+n$. Another interpretation of ${}_n L_x$ is that it represents age distribution of stationary population[1]. As implied by its formulas, this statistics considers years lived by people remaining alive in following age group as well as years lived by people dying in the age group. More clearly, contribution of people remaining alive and dying in population size can be decomposed as follows:

$$ {}_n L_x = n * (\underbrace{l_{x+n}}_{\substack{\text{contribution} \\ \text{of people} \\ \text{remaining alive}}} + \underbrace{{}_n a_x * {}_n d_x}_{\substack{\text{contribution of} \\ \text{people dying}}}) $$

To calculate ${}_n L_x$ values by using this formula, ${}_n a_x$ values are required. As mentioned above, ${}_n a_x$ represents fraction of years lived by population in the age group of $(x, x+n)$. As described in Kintner (2004:308) and Preston et al. (2001:47-49), there are several ways of assigning those values and especially for very young and final open-ended

[1] Life table calculations are based on the key assumption that population is stationary; that is, it has a constant size, constant age structure, and is closed to migration (Rowland 2003:267-268; Preston et al. 2001:53-58; Newell 1988:120-121). This assumption proposed by Halley forms the basis of period life tables (Rowland 2003:268).

age groups in life table, use of those different methods is more appropriate[1]. Except those special age groups, assigning half of age interval (i.e. $n/2$) to ${}_n a_x$ is a commonly used technique. It is based on the assumption that deaths are uniformly distributed over the age interval so people dying in the age interval contributes to person years lived only by half of the age interval. Thus, this assumption leads to the following formula for ${}_n L_x$.

$${}_n L_x = \frac{n}{2} * (l_x + l_{x+n})$$

Summary measure of this procedure is e_x which represents life expectancy at age x as described earlier. This measure shows average expected years of life remaining after age x; in other words, it gives average duration of people as alive in the population observed. e_0 is called life expectancy at birth which is a special indicator reflecting health status and development of a country's population.

Today, mortality tables can be obtained for many countries. For instance, life expectancies at birth for different countries are published by Population Reference Bureau and United Nations every year. However, most of those life tables do not directly use the methodology described above. Due to problems related to availability and quality of the data, especially in developing countries, there are several methods developed to estimate life expectancies such as model life tables published by United Nations and Coale and Demeny and Brass' relational logit system (Newell 1988:130-166). Although, such a direct calculation is not used, the procedure is explained above since those statistics and formulas described are the basics of life table methodology such that they are used in other types of life tables with some modifications.

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[1] Possible formulas for first and last age groups are represented below, respectively (Rowland 2003:280-281).

$${}_1 L_0 = 0.3 * l_0 + 0.7 * l_1$$

$$L_{x+} = \frac{l_x}{M_{x+}}$$

where right subscript $x+$ denotes life table entries for final open-ended age interval.

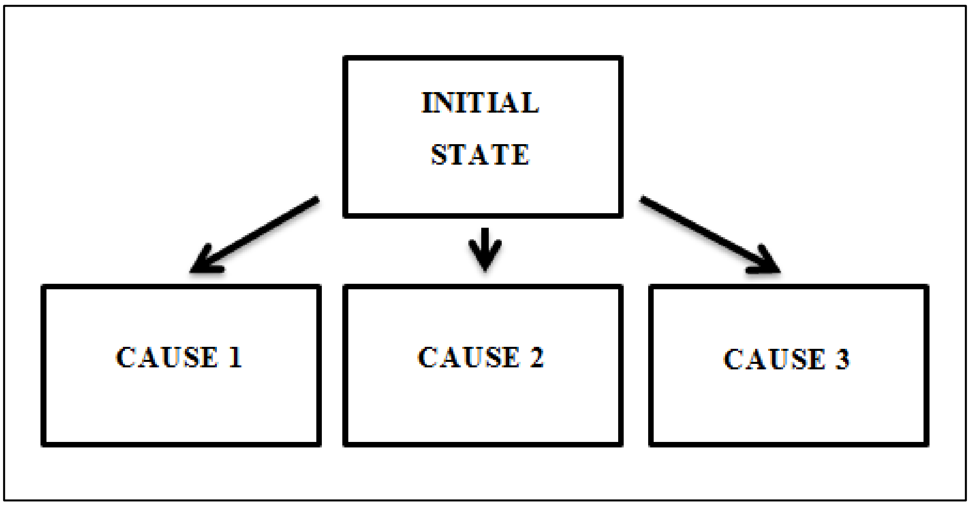
As mentioned above, conventional single decrement life tables aim to analyze force of mortality; in other words, to measure average duration as alive. However, as presented in Preston et al. (2001:65-68), this procedure can be used to analyze transitions between states other than alive and death such as transition from state of never married to first marriage, first migration from the place of birth, first birth, or first entry into labor market. Although single decrement life table is suitable to study events experienced for the first time and it seems that it has a wide application area from these examples, it has serious limitations. First of all, this type of tables allows defining only two states and one transition to absorbing state. Thus, it cannot take into account multiple causes of decrements at the same time. In addition, one of the two states defined in single decrement tables is absorbing state and only one transition is possible so there is no possibility to study returns to previous state. Considering events studied in health and social sciences, returns are possible in most of the study areas. Due to these limitations, single decrement life tables provide limited information and do not factually represent real life events. Thus, life table methodology has been developed further to overcome these limitations.

2.2.2. Multiple Decrement Life Table

As mentioned in previous section, single decrement life tables do not allow studying multiple causes of decrements at the same time. This limitation is coped with multiple decrement life tables which were initially developed by Jordan in 1952 to estimate duration in insured states like disablement or widowhood used by actuaries or insurance companies (Cambois et al. 1999). In his study, Jordan constructed a double decrement life table where morbidity and mortality are absorbing states so life expectancy calculated represented mean duration in state of being alive and healthy (Cambois et al. 1999).

The main difference between single decrement and multiple decrement life tables is that more than one absorbing states are defined in multiple decrement life tables as presented in Figure 2.5. Therefore, life expectancy measure produced at the end of construction procedure indicates mean duration in initial state free of risk to fall in one of the absorbing states (Cambois et al. 1999).

Figure 2.5: Logic of multiple decrement life table



Source: Author's diagram

These tables can be constructed by using either incidence-based or prevalence-based method (Kintner 2004:328). Construction procedure of multiple decrement life tables is very similar to that of single decrement life tables explained in previous section, i.e. only some modifications are needed in life table statistics to partition decrements between various absorbing states. When prevalence-based method is applied, multiple decrement life table turns into conditional life tables derived from single decrement life table (Kintner 2004:328). Inversely, addition of mutually exclusive life tables derived for each cause of decrement gives the conventional life table (Kintner 2004:328). The construction procedure is summarized below based on the information in textbooks of Preston et al. (2001:71-91) and Siegel and Swanson (2004:324-331)[1].

To construct a multiple decrement life table, one can start the procedure by obtaining rates of transition for each cause of decrement as in single decrement life table.

$$ {}_nM_x^i = \frac{{}_nD_x^i}{{}_nP_x} $$

[1] For details of application of prevalence-based method and formulas for life table statistics for multiple decrement procedure together with its examples, see textbooks of Preston et al. (2001:71-91) and Siegel and Swanson (2004:324-331).

where $i = 1, 2, 3...$ depending on number of absorbing states defined. Addition of those rates give rate of total transitions which is converted to the probability of exiting from initial state similar to probability of dying in single decrement table.

$$ {}_nM_x = \sum_i {}_nM_x^i $$

After ${}_nq_x$ values are obtained as defined in previous section, those age-specific probabilities of exiting from initial state can be partitioned into age-specific probabilities of exiting due to various causes.

$$ {}_nq_x^i = {}_nq_x * \frac{{}_nM_x^i}{{}_nM_x} $$

Considering the formula of ${}_nM_x^i$ and ${}_nM_x$,

$$ {}_nq_x^i = {}_nq_x * \frac{{}_nD_x^i}{{}_nD_x} $$

so $\frac{{}_nq_x^i}{{}_nq_x} = \frac{{}_nd_x^i}{{}_nd_x} = \frac{{}_nM_x^i}{{}_nM_x}$ where ${}_nd_x^i$ represents number of decrements due to cause $i = 1, 2, 3...$.

Proportion of number of decrements to all decrements is equal to the ratios of cause-specific death probabilities and observed death rates to conventional probability of dying and rate of mortality, respectively, since

$$ {}_nq_x^i = \frac{{}_nd_x^i}{l_x} $$

Then, entries for l_x^i which represent number of survivors who will eventually exit from the hypothetical cohort due to cause i can be computed through backward addition of

${}_n d_x^i$ values. In this way, l_x values are partitioned between several hypothetical populations which are expected to be exposed the risk of experiencing event i.

$$l_x^i = \sum_{w=x} {}_n d_w^i$$

$$l_{x+n}^i = l_x^i - {}_n d_x^i$$

Rest of the procedure is similar to the single decrement procedure. For each conditional table, ${}_n L_x^i$, T_x^i, and e_x^i values are calculated such that at the end of the procedure,

$$l_x = \sum_i l_x^i \quad \text{and} \quad {}_n L_x = \sum_i {}_n L_x^i$$

e_x^i can be interpreted as the mean duration of staying in initial state before exiting from the table when other causes of decrements are not controlled so e_x^i represents average expected time spent in initial state before moving out of hypothetical population due to one particular cause i. The measure of e_x is then calculated by weighting e_x^i values at each age group depending on incidence of the event observed in hypothetical population.

$$e_x = \sum \frac{l_x^i}{l_x} * e_x^i$$

Thus, e_x represents mean duration in initial state before falling from table due to all causes of decrements; in other words, it indicates life expectancy in initial state before experiencing any event defined in the study.

The methodology described above is actually a prevalence-based method. This method is called with the name of Sullivan (1971) who originally developed this procedure to estimate mortality and morbidity experience of a hypothetical population by a single indicator. Sullivan (1971) used a current abridged life table and modified it by applying prevalence ratios obtained as ratio of days spent in disability to days in a whole year. At the end of this procedure, Sullivan (1971) estimated disability-free life expectancy as 64.9 years in U.S. in mid-1960s while total life expectancy was 70.2 years so 5.3 years of expected disability was obtained as difference between total life expectancy and disability-free life expectancy at birth.

On the other hand, as mentioned earlier, multiple decrement life tables can be constructed also by using incidence-based method. For incidence-based method, flow data is required. One famous example of multiple decrement life table constructed using flow data is Katz Index of Independence in Activities of Daily Living (ADL). Katz et al. (1963, 1983) aimed to propose a method to calculate an index indicating disability-free life expectancy by using multiple decrement methodology with the data collected at regular intervals from elderly people on change in health status which is indicated by dependence on help in several daily life activities. Based on Massachusetts Health Care Panel Study, Katz et al. (1983) estimated disability-free life expectancy as 10 years for elderly people aged 65 living in Massachusetts in 1974.

Both of the methods developed by Sullivan (1971) and Katz (1963, 1983) are used in health sciences to estimate burden of disability throughout life cycle. Sullivan’s method is commonly applied not only in health sciences but also in other areas where life table analyses are performed since data requirements of this methodology is lower compared to incidence-based method (Cambois et al. 1999; Vogler-Ludwig 2009). In addition, it is easy to apply and provides robust results which allow international comparisons or comparisons between subgroups of a population (Cambois et al. 1999; Vogler-Ludwig 2009). One disadvantage of this methodology is that estimates produced might be biased if prevalence ratios do not remain stable over time; in other words, if there are huge fluctuations in prevalence between age cohorts (Cambois et al. 1999; Vogler-Ludwig 2009). In this respect, incidence-based method is preferable to overcome this limitation if flow data can be obtained.

As mentioned above, multiple decrement tables can be used to combine mortality and morbidity experience. Another common example of multiple decrement tables is cause-of-death tables in which death rates are partitioned between various causes of death (Kintner 2004:325). In addition, multiple decrement tables can be used in construction of nuptiality tables in which mortality and marriage experience of cohort of never married women or marriage dissolution experience of married women can be followed (Kintner 2004:324-325). One important advantage of this method over single decrement methodology is that producing estimates considering several states experienced is possible since more than one absorbing states can be defined in multiple decrement tables. The aforementioned events are also possible to study through a single decrement life table but estimates produced for these events can be adjusted by mortality in multiple decrement life tables. Despite of this advantage, multiple decrement life table methodology is also not realistic considering that many events subject to study in social and health sciences can be experienced more than once. Since except the initial state, all of the states defined in this methodology are absorbing states, there is no possibility to analyze returns to previous state (Cambois et al. 1999). In this respect, multiple decrement tables can be only suitable to study for irreversible events such as first marriage or first marriage dissolution, retirement, health problems like dementia, and first entry to and first exit from labor market (Cambois et al. 1999). However, in order to put more realism into analyses where returns are possible, other techniques which allow defining transient states should be considered.

2.2.3. Increment-Decrement Life Table

Increment-decrement life table is a special type of multiple decrement life table[1] which allows returns to previous state under some assumptions (Kintner 2004:331). Thus, it is a more convenient method to use in analyses of labor market, several health states, or nuptiality that involve events which might be experienced more than once compared to other methodologies described earlier.

In increment-decrement life tables, the main logic is to partition conventional life table into conditional tables for each state. In this method, conventional life table is usually

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[1] Actually, there is no consensus in categorization of increment-decrement life tables in the literature. Some studies use the classification of increment-decrement life table to refer multistate life tables (Willekens 1980; Cambois et al. 1999; Preston et al. 2001:256-272; Schoen 1975) while some other studies classify increment-decrement life tables as a separate group under multiple decrement life tables (Vogler-Ludwig 2009; Kintner 2004:331). Here, classification provided by Kintner (2004:331) is taken into account and increment-decrement life table is referred as a special type of multiple decrement life table.

divided into two conditional tables which reflect being in the state and not being in the state (Kintner 2004:331). As mentioned earlier, increment-decrement life tables can be constructed on the basis of either incidence or prevalence of the events defined (Kintner 2004:331). In absence of incidence information, this type of tables can be easily constructed by applying age-specific prevalence ratios to life table statistics.

The key assumption in construction of increment-decrement life tables is unimodality of age-specific prevalence ratio schedule (Vogler-Ludwig 2009; Kintner 2004:331). This type of life tables allows entries under the assumption of unimodality. Schedule of age-specific prevalence ratios for the event observed must be unimodal; that is, this schedule should include only one peak. The assumption in increment-decrement life tables is that entries can occur only up to a certain age at which age-specific prevalence ratio schedule reaches its maximum and exits are allowed after that modal age. To satisfy this condition, age-specific prevalence ratios before modal age are usually set as equal to the ratio reached at modal age. In this way, entries up to modal age are taken into account. The procedure after modal age is similar to multiple decrement life tables; that is, exits due to death and some other cause of decrement are allowed to be considered after modal age while exits before modal age can occur only due to death.

The procedure described above implies that not all possible entries and exits but only net entries and net exits from hypothetical population can be observed in increment-decrement life tables (Kintner 2004:331). The advantage of this type of tables over other methodologies mentioned so far is that additional information such as accession and separation rates and expectancy of life in each state can be obtained from these tables so increment-decrement life table is a commonly used technique especially in labor market analyses (Kintner 2004:331-332). On the other hand, unimodality assumption on which increment-decrement life table is based is the most important shortcoming of the technique. As mentioned, only net entries and net exits can be observed under this assumption so not all transitions between states (e.g. exits due to transition to out of state before modal age or entries into state after modal age) can be observed. Although the method brings more realism into analyses by partially allowing entries, unimodality is a very strict assumption to apply in many study areas. Due to this shortcoming of increment-decrement method, multistate models were developed (Vogler-Ludwig 2009).

As mentioned, this method is one of the techniques commonly used in construction of working life tables. Based on prevalence-based method, Wolfbein (1949) and Durand (1968) are among the first authors who applied the technique to estimate duration of activity in labor market. This application is called as conventional technique in construction of working life tables by Willekens (1980). Considering that working life table methodology constitutes the core of this thesis, details of increment-decrement life table construction are given in Section 2.3.1 in the context of working life table methodology.

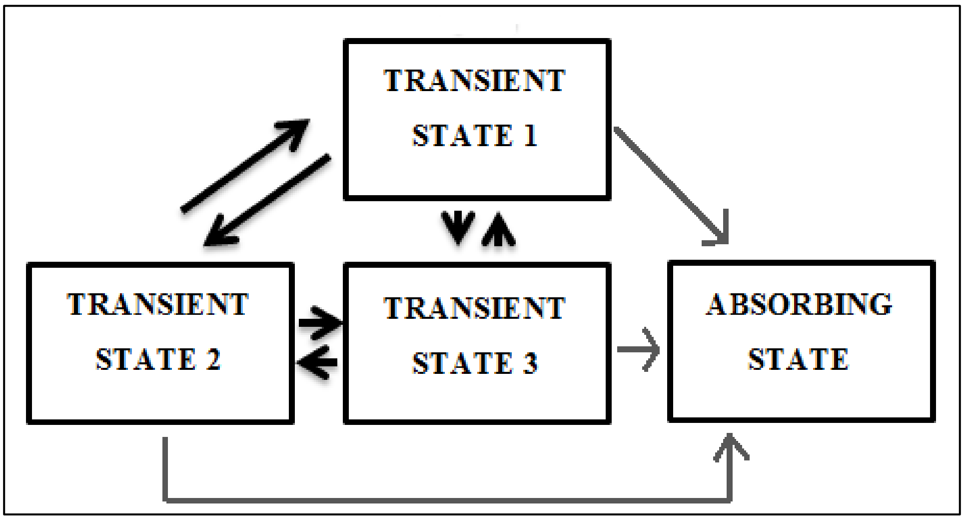
2.2.4. Multistate Life Table

As mentioned so far, life table methodologies described have several limitations. One of the shortcomings is that earlier methods only allow to study in a simple state space; that is, number of states which can be defined are limited (Palloni 2001:256). The other important shortcoming is that all destination states are absorbing; that is, return to previous state is not possible (Palloni 2001:256). Although this limitation has been tried to overcome with implementation of increment-decrement life tables, unimodality assumption hinders observation of all actual transitions between states. In this respect, multistate models constitute a major extension in life table methodology to overcome shortcomings of existing techniques (Kintner 2004:332).

Multistate methodology allows description of more complex state spaces as diagrammatically presented in Figure 2.6. Typically, there is one absorbing state (i.e. death) in this type of tables from which return to previous state is impossible. There might be several numbers of other states depending on the subject to study from which return to previous state is possible so they are called transient states.

Although some studies showed that prevalence-based methodology might be applicable by using several estimation techniques (Lynch and Brown 2010), multistate life tables are usually constructed based on incidence-based methodology. Basically, transition probabilities are required for construction procedure which might be obtained from cross sectional surveys which include retrospective questions about states occupied previously or from longitudinal surveys (Kintner 2004:332).

Figure 2.6: Logic of multistate life table



Source: Author's diagram

As presented in Table 2.2 for two possible transient states and one absorbing state, occurrence/exposure rates can be calculated when number of transitions between states and number of people preserving their states between time period x and $x+n$ are obtained from a proper data set. Then, those occurrence/exposure rates can be transformed to transition probabilities adjusted with mortality which are used as the input of multistate life table similar to the procedure defined in single decrement life table. However, estimation technique of transition probabilities is not limited with usage of occurrence/exposure rates, there are other possible techniques like estimation through regression analyses which are detailed in Section 2.3.2.

Table 2.2: Direction of transitions between three states

State at age x	**State at age $x+n$**		
	In state 1	***In state 2***	***Dead***
In state 1	No transitions	Transitions from state 1 to 2	Deaths when in state 1
In state 2	Transitions from state 2 to 1	No transitions	Deaths when in state 2

When those transition probabilities are obtained, they form a matrix called transition probability matrix such that

$$\mathbf{P(x)} = \begin{bmatrix} p_{11}(x) & p_{21}(x) \\ p_{12}(x) & p_{22}(x) \end{bmatrix}$$

where

$p_{11}(x)$: probability of remaining alive and in state 1 between ages x and $x+n$

$p_{12}(x)$: probability of remaining alive and transferring from state 1 to state 2 between ages x and $x+n$

$p_{21}(x)$: probability of remaining alive and transferring from state 2 to state 1 between ages x and $x+n$

$p_{22}(x)$: probability of remaining alive and in state 2 between ages x and $x+n$

After transition probability matrix $\mathbf{P(x)}$ is constructed, the rest of the procedure is basically as follows:

$$\mathbf{l(x+n) = P(x)l(x)}$$

$$\mathbf{L(x)} = \frac{n}{2}\left[\mathbf{l(x) + l(x+n)}\right]$$

$$\mathbf{T(x)} = \sum \mathbf{L(x)}$$

$$\mathbf{e(x) = T(x)}\left[\mathbf{l(x)}\right]^{-1}$$

where all life table statistics are the same as described in Section 2.2.1 with a slight difference which is all these statistics are now in vector or matrix form instead of scalars (Keyfitz and Caswell 2005:445) such that

$$\mathbf{l(x)} = \begin{bmatrix} l_1(x) \\ l_2(x) \end{bmatrix},\ \mathbf{L(x)} = \begin{bmatrix} L_1(x) \\ L_2(x) \end{bmatrix},\ \mathbf{T(x)} = \begin{bmatrix} T_1(x) \\ T_2(x) \end{bmatrix},\ \mathbf{e(x)} = \begin{bmatrix} e_1(x) \\ e_2(x) \end{bmatrix}$$

where column vector of **l(x)** includes entries which refer number of survivors in states 1 and 2 at age x, **L(x)** includes entries which reflect person years lived in each state between ages x and $x+n$, **T(x)** consists of entries which indicate total person years lived beyond age x, and finally, column vector **e(x)** represents average expected duration of life in each state at age x. Thus, after estimating transition probabilities, the rest of multistate life table construction procedure is nothing but an application of matrix algebra to single decrement life table method.

As mentioned earlier, single decrement, multiple decrement, and increment-decrement life table methods have several shortcomings which led to development of multistate methodology. While number of states which can be studied in a life table at the same time is limited in earlier methods, multistate life tables allow definition of higher number of states so studying on more complex state spaces is possible (Palloni 2001:256; Kintner 2004:332). In addition, those states defined should not be necessarily absorbing states; in other words, multistate life table methodology allows to define transient states so observing reverse flows between those states is possible (Palloni 2001:256; Kintner 2004:332). Due to use of incidence-based methodology, assumption of unimodality in increment-decrement life tables is no longer required (Cambois et al. 1999; Vogler-Ludwig 2009); that is, all flows between states are possible to observe so information provided by multistate life tables are richer compared to other methods. Furthermore, transition probabilities estimated through regression analyses can be used as input of multistate life tables so it is possible to take into account various covariates which are expected to affect transitions between states defined (Vogler-Ludwig 2009). Due to these features providing more dynamism and flexibility for analyses, multistate life tables have been increasingly used in a broad range of study areas, especially in which definition of events which can be experienced more than once is possible. Thus, this type of life tables is used in analyses of nuptiality (Schoen and Nelson 1974; Willekens et al. 1982; Schoen 1975), in analyses of health status (Lynch and Brown 2005; Lynch and Brown 2010; Land et al. 1994), in analyses of education (Land and Hough 1989), in analyses of change in voting behavior (Land et al. 1986), in analyses of pensions and annuities (Keyfitz and Rogers 1982), in analyses of family formation and dissolution

(Bongaarts 1987), in analyses of migration (Rogers 1995) as well as in retirement and labor force analyses (Hoem 1977; Willekens 1980; Schoen and Woodrow 1980; Smith 1982; Hayward and Grady 1990; Hayward et al. 1996; Warner et al. 2010).

Like all other methods described so far, multistate life table methodology has also some limitations but those limitations can be easily handled as availability of data increases and estimation techniques improve. One critique directed to multistate methodology is that it has larger data requirements. Since transition probabilities are required for construction process of multistate life tables, longitudinal surveys or cross sectional surveys including retrospective questions are needed so it is argued that one important shortcoming of multistate methodology is larger data requirements compared to other methods due to use of incidence-based methodology (Cambois et al. 1999; Vogler-Ludwig 2009). However, availability of panel surveys and surveys including event histories has increased in recent years so use of multistate method has increased in a wide range of areas as mentioned above in parallel to the developments in data collection. Also, estimation techniques have been continuously improving such that information obtained from cross sectional surveys can be simulated to obtain transition probabilities as one of its examples was already provided by Lynch and Brown (2005, 2010) so dependence on longitudinal data has not been a limitation anymore for use of multistate methodology.

Another critique directed to multistate method is that since high number of states can be defined in this methodology, calculations become more complex compared to other methodologies due to the fact that number of simulations increases as number of transient states increases (Cambois et al. 1999). It is also argued that complexity of methodology and requirement of sample surveys also lead to difficulties in usage of multistate life tables for international comparisons (Cambois et al. 1999). However, complexity of methodology is not a shortcoming in the sense that statistical software packages have been highly developed in recent years. There are even some ready-to-use codes available for researchers to construct multistate life tables (Palloni 2001:272). The critique about the difficulty in international comparison might have a point since sample surveys are used to derive transition probabilities required for multistate life table construction so definitions of events subject to study might not totally overlap in those sample surveys conducted across countries. However, this point can be eliminated if questionnaires can be standardized across countries by using common definitions. For example, EUROSTAT conducts such surveys and publish their micro data sets which allow comparison across many European countries (European Commission 2013) so if such standardized data sets are available, multistate life table methodology can be easily used in order to make international comparisons.

Another problem caused by usage of sample surveys might be that estimation results become vulnerable to stochastic variability (Vogler-Ludwig 2009). This might be even more problematic when multistate life tables are constructed for highly refined subpopulations especially if sample size is not large enough (Vogler-Ludwig 2009). To eliminate this problem, graduation techniques are employed (Vogler-Ludwig 2009) but it should be noted that usage of graduation techniques are not necessarily needed to sustain the stability of estimates. Current multistate methodology allows derivation of transition rates through regression analyses which provide already stable estimations of transition rates across age groups (Land et al. 1994). This method even provides the opportunity to control for the effects of multiple covariates on transition rates so stochastic variability is not a problem even when constructing multistate life table for population subgroups.

Finally, one further limitation of this methodology might be that transition probabilities used as the input of life table are usually estimated under Markovian assumption which puts forward that transition from one state to another only depends on the state currently occupied by the agent; in other words, the possible effects of duration in the current state or previous transition experiences are not taken into account. In this setting, transition probabilities used as input of multistate life tables are probabilities conditional on the state currently occupied by the agent. In multistate methodology, transition probabilities are usually computed under this assumption due to the convenience it provides in estimations but under this assumption, the effects of previous history and duration in states on further transitions are neglected (Cambois et al. 1999). This criticism has a point especially for multistate analyses relying on panel data which provide limited information about previous history of individuals compared to event history data sets. However, as event history data sets are available, it is possible to estimate transition rates by controlling several transitions in different state spaces at the same time considering sequences of events and duration in each state as already described in Hannan (1984). Thus, Markovian assumption is not required when multistate methodology is incorporated with event history analysis.

Although multistate methodology might have several shortcomings as described above, those limitations can be easily handled with further data collection and estimation techniques. Considering its advantages over other life table methods especially in studying more complex state spaces which involve backward transitions, multistate methodology seems the most appropriate method among existing life table techniques for construction of working life tables so in this thesis, multistate methodology is employed. In this respect, application of multistate method in the context of working life tables is mentioned further in Section 2.3.2 and details of construction technique is given in methodology section.

2.3. WORKING LIFE TABLE METHODOLOGY

Working life tables are the analytical tools which summarize labor market and mortality experience of a hypothetical population. In macroeconomics, working life tables are used to describe size and composition of labor supply, to study structural changes in labor force in terms of its composition and activity rates, and to estimate future size and composition of manpower for development planning (Durand 1968:1-6). Those tables are also used for insurance purposes to estimate liability claims, i.e. to estimate loss of earning potential in case of death when a person is active in labor (Willekens 1980).

In the literature, Wolfbein (1949) appears as the first author constructing a working life table and Wolfbein's technique has preserved its dominance in the literature until the end of 1970s when first multistate working life table was constructed by Hoem (1977). Both of the techniques dominate the literature on working life tables so this section is devoted to explain both methodologies in detail.

2.3.1. Conventional Working Life Table

As mentioned, Wolfbein (1949) is accounted as the pioneer of working life tables. Wolfbein (1949) aimed to estimate duration of active life for U.S. males by using labor force data in 1940 and mortality data in 1939-1941 through an increment-decrement[1] working life table and this attempt is now considered in the literature as the basis of conventional technique to construct working life tables. Since its first presentation by Wolfbein (1949), the technique has been used almost without any change and the details of formulation can be found below as well as in Wolfbein (1949), Willekens (1980), Hytti and Valaste (2009), Vogler-Ludwig (2009), and Özgören and Koç (2012).

To construct a conventional working life table age-specific mortality and labor force participation rates are needed. Since age-specific labor force participation rates are obtained from stock data (i.e. they represent prevalence of labor market activity), this technique is based on prevalence-based methodology and called also as prevalence life table in some studies (e.g. Vogler-Ludwig 2009). When the required data is obtained, the procedure starts with construction of a single decrement life table using age-specific mortality rates as the input of life table. Then, life table statistics are basically partitioned into two groups for labor market states defined as active if the person is in labor force and inactive if the person is out of labor force in accordance with age-specific labor force participation rates as follows:

$$ {}_nL_x^w = {}_nL_x * {}_nw_x $$

$$ l_x^w = l_x * {}_nw_x $$

where ${}_nw_x$ refers to labor force participation rate between ages x and $x+n$, ${}_nL_x^w$ represents size of stationary population in labor force between ages x and $x+n$, and l_x^w is number of survivors out of radix who are economically active.

As mentioned in Section 2.2.3, the key assumption to construct an increment-decrement life table is unimodality of age-specific prevalence rates for the event subject to

[1] As mentioned earlier, increment-decrement life table refers to multistate life table in some studies while it refers to a special type of multiple decrement technique in others. In this thesis, increment-decrement life table is defined as a special type of multiple decrement life tables by following the classification in Kintner (2004:331). Although Wolfbein (1949) did not classify his life table as increment-decrement, it is classified as an increment-decrement life table in this thesis in accordance with the categorization provided in Section 2.2.

study. Through this assumption, entries are partially allowed up to the age where maximum rate is attained. In case of working life table, schedule of labor force participation rates ($_n w_x$) should be unimodal, i.e. the schedule should reach a single maximum rate at some point to sustain net entries into the labor force up to a certain age where labor force participation rate peaks. By applying this maximum rate to the age groups below the age group which has the maximum rate of labor force activity; in other words, by changing age-specific rates experienced below modal age with the rate attained at modal age, net entries can be considered in life table as follows:

$$_n L_x^{w*} = {}_n L_x * {}_n w_x^*$$

$$l_x^{w*} = l_x * {}_n w_w^*$$

where $_n w_x^*$ is the maximum labor force participation attained at certain age group $(x, x+n)$, $_n L_x^{w*}$ represents hypothetical labor force in stationary population between ages x and $x+n$ if participation rate at modal age is attained by people in age groups below modal age, and l_x^{w*} is number of survivors in labor force under the maximum participation rate for age groups below modal age.

To calculate working life expectancy at the end of the procedure, one needs to total size of stationary population beyond age x which is similar to the process in single decrement life table as follows:

$$T_x^w = \sum nL_x^w$$

$$T_x^{w*} = \sum {}_n L_x^{w*}$$

where T_x^w represent total size of hypothetical labor force while T_x^{w*} indicates total size of labor supply for age groups under modal age where maximum participation rate is applied. Then working life expectancy is equal to

$$e_x^w = \frac{T_x^{w*}}{l_x^{w*}} \ for \ x < modal \ age$$

$$e_x^w = \frac{T_x^w}{l_x^w} \ for \ x \geq modal \ age$$

and average duration in inactivity is equal to the difference between life expectancy obtained at the end of single decrement procedure and working life expectancy such that

$$e_x^{nw} = e_x - e_x^w$$

As mentioned previously, compared to single decrement and multiple decrement life tables, increment-decrement life tables provide further information on accession and separation rates. Net accession and net separation rates are calculated as follows:

$${}_nA_x = \frac{l_{x+n}^w - l_x^w + (l_x^w * {}_nQ_x)}{{}_nL_x}$$

$${}_nQ_x = \frac{l_x - l_{x+n}}{{}_nL_x}$$

$${}_nQ_x^s = \frac{l_x^w - l_{x+n}^w}{{}_nL_x^w}$$

$${}_nQ_x^d = \frac{{}_nQ_x * (2 - {}_nQ_x^s)}{2 - {}_nQ_x}$$

$${}_nQ_x^r = {}_nQ_x^s - {}_nQ_x^d$$

where

${}_nA_x$: rate of net accession to the labor force or probability of being in the labor force within the next age interval (for age groups before modal age)

${}_nQ_x$: rate of mortality (central death rate)

${}_nQ_x^s$: rate of separation from the life table labor force due to all causes (i.e. due to both mortality and retirement)

${}_nQ_x^d$: rate of separation from the life table labor force due to only death

${}_nQ_x^r$: rate of separation from the life table labor force due to only retirement (for age groups after modal age)

By applying this method, Wolfbein (1949) estimated working life expectancy of males in U.S. in 1940 as 46.6 years and duration in inactivity as 5.6 years at age 14. Another study which employed this technique was conducted by Durand (1968) again for males in U.S. in 1940 by using the same data sources as Wolfbein (1949) but Durand (1968) also performed separate estimations for white and nonwhite males. Durand (1968:261) estimated that working life expectancy at age 25 is 35.4 years and duration in inactivity is 7.1 years for all males while working life expectancy of white males is almost 6 years more than that of nonwhite males.

This technique was also employed by Kpedekpo (1969) to estimate working life expectancy of females in Ghana by using 1960 Ghana Population Census. Kpedekpo (1969) estimated that working life expectancy of females at age 15 is 39.5 years and average duration in inactivity is 1.87 years in Ghana in 1960. According to results provided by Kpedekpo (1969), mortality is the most important cause of dropping out of labor force in Ghana in 1960 such that 78.2% of women left labor force due to death while only 21.8% of women moved out of labor force due to retirement.

Since the technique developed by Wolfbein (1949) is easy to apply and requires small amount of data compared to multistate methodology, it is still used in studies aiming to perform international comparisons. One of such studies was conducted by Hytti and Valaste (2009) to compare working life expectancies in 27 European Union countries and the authors found that the longest working life expectancy in 2005 belongs to Denmark with 39 years while the lowest working life expectancy was observed in Malta with 28.1 years. Hytti and Valaste (2009) also estimated working life expectancies for women and men separately and they found that the longest working life expectancy for men is in Denmark, Netherlands, Cyprus and UK with about 40 years at age 15 while the longest working life expectancy for women belongs to the countries Denmark and Sweden with 37 years. Another similar study was conducted by Vogler-Ludwig (2009) again for 27 European Union countries for time period 2000-2007. Vogler-Ludwig (2009) estimated that average duration in both active and inactive states increased in Europe from 2000 to 2007. According to the results of this study, overall working life expectancy in Europe was 34.2 years and duration in inactivity was 32.2 years while women had a shorter working life compared to men (Vogler-Ludwig 2009).

As far as the author is aware, there are two studies on working life tables conducted for Turkey and conventional methodology was used in both of them. One of those belongs to Kurtuluş (1999) who estimated working life expectancy for males and females in Turkey for years 1975, 1980, 1985, and 1990 and provided a comparison of working life expectancies in Turkey with that of European Union countries. Kurtuluş (1999) estimated that working life expectancy of men at age 35-39 in Turkey decreased from 31.4 to 27.2 years from 1975 to 1990 while the author mentioned that female labor force participation in Turkey follows a non-unimodal pattern such that Turkish women leave labor force at ages 20-39 and return back to the labor market at ages 40-49.

The other study for Turkey was conducted by Özgören and Koç (2012) only for Turkish males for the years 1980, 1990, and 2000 by considering urban/rural differentiation. By using data of 1980 Turkish Population Census for 1980 and data of Household Labor Force Surveys conducted by TURKSTAT for 1990 and 2000, the authors estimated working life expectancy of males at age 15 living in rural areas was 47.9 years while it was 40.8 years for males living in urban areas in 2000. Özgören and Koç (2012) found that average duration in activity for urban males in Turkey decreased while it increased for rural males from 1980 to 2000. According to the authors, separation from labor force due to retirement is higher compared to separation due to death among urban males and the extent of it increased from 1980 to 2000 which might be an indicator of old age dependency in urban areas in Turkey (Özgören and Koç 2012). On the other hand, death seems to be a more important factor of separation from labor force among rural males compared to retirement but the authors mentioned that separation due to retirement also increased by 2000 in rural areas (Özgören and Koç 2012).

As could be seen, application of the conventional technique is very straightforward and requires small amount of data compared to multistate method which might be an advantage especially when making international comparisons. In addition, it provides extra information on accession and separation rates which cannot be obtained through application of single decrement and multiple decrement methods. However, the assumptions which the technique relies on are very restrictive and constitute the major limitations of this methodology. First of all, since construction of increment-decrement life table starts with construction of a single decrement mortality table, a single schedule of age-specific mortality rates are applied to the hypothetical population irrespective of labor market status; in other words, same mortality rates are implicitly assumed for both active and inactive population (Willekens 1980; Cambois et al. 1999). However, this assumption is not realistic in the sense that literature indicates mortality rates can differ by employment status. For instance, Cai and Kalb (2006) showed that labor force participation has a negative impact on younger males' health status while Rogot et al. (1992) estimated that people in labor force live more than people outside of labor force on average. Thus, although there is no consensus on the effect of labor market activity on health status and life expectancy in the literature, it is evident that the assumption of same mortality rates regardless of labor market status can be questioned.

Furthermore, as mentioned earlier, unimodality is the key assumption of increment-decrement technique. With this assumption, entries to labor force are allowed partially up to modal age; that is, no entry is possible after modal age (Willekens 1980; Özgören and Koç 2012). Another implication of this assumption is that decrements due to causes other than death are not allowed before modal age (Willekens 1980; Özgören and Koç 2012). To satisfy this assumption, all age-specific labor force participation rates before modal age are artificially set as equal to the participation rate at modal age. Since participation rates before modal age are constructed in this way, all transitions between states in all age groups cannot be exactly observed; that is, only net accessions and separations can be calculated for only ages before modal age and after modal age, respectively. Thus, entries after modal age and exits before modal age are ignored in this technique which can create a bias in estimations. In addition, artificially pushing up participation rates before modal age causes higher values for person years estimated which leads to an upward bias in working life expectancies calculated at the end of the procedure (Cambois et al. 1999).

In spite of its limitations, increment-decrement life tables can be constructed for males since unimodality assumption is usually satisfied when labor force participation schedule of males is subject to study (Willekens 1980; Cambois et al. 1999). However, increment-decrement technique is not suitable for women under unimodality assumption since age-specific labor force participation rates of women usually exhibit a more irregular pattern compared to men due to the fact that labor market activity of women are more affected by life cycle events such as marriage, childbearing, widowhood, and divorce (Willekens 1980). In this respect, increment-decrement working life table is not a favorable methodology to estimate working life expectancies of women.

2.3.2. Multistate Working Life Table

First multistate working life table is constructed by Hoem (1977) by using data of Danish Labor Force Panel Survey for 1972-1974. Hoem (1977) presented his study as a new method of constructing working life tables which does not extensively rely on restrictive assumptions such as unimodality and which is based on the theory of Markov chains with continuous time and uses gross labor force flows instead of stock data. Considering the conventional technique, this new method can be accounted as a major extension in the life table literature. Since its first presentation by Hoem (1977) in the context of working life analyses, the technique has been developed significantly as described in this section.

This new method of constructing working life table was developed further by Willekens (1980). Willekens (1980) further elaborated mathematical representation of the technique based on the principles developed by Rogers (1975). Willekens (1980) tested the formulations by applying them to the same data set used by Hoem (1977) and obtained similar transition probabilities. For males in Denmark for the period 1972-1974, Willekens (1980) estimated average duration in active and inactive states as 42 and 10.6 years, respectively. Since simulations can be repeated as many as the number of states defined in multistate life tables, it is possible to estimate state-based durations. Willekens (1980) also presented estimations on state-based working life expectancies such that the author found expected duration in activity by almost one year longer for persons aged 17 who are initially active than those who are initially inactive.

Another study on multistate working life table was conducted by Schoen and Woodrow (1980). The authors estimated working life expectancies for both males and females in U.S. by using data from Current Population Survey conducted in 1972 and 1973. The authors estimated that active life expectancy was 39.44 years and 24.14 years for men and women, respectively, at that time. The average duration in inactivity, on the other hand, was estimated as 14.83 years for men and 37.59 years for women. Schoen and Woodrow (1980) used the same technique as employed by Willekens (1980) but the originality of this study is that as far as the author is aware, Schoen and Woodrow (1980) are the first authors who used retrospective data to estimate transition probabilities by benefitting from the retrospective questions about labor market status in 1973 Current Population Survey. Schoen and Woodrow (1980) estimated working life expectancies also through conventional technique and they found that the results obtained from conventional life table is higher than that of multistate table so those findings provide evidence also for upward bias created by unimodality assumption.

Following those studies, multistate working life table technique was started to be used to estimate working life expectancies by U.S. Bureau of Labor Statistics. Two successive reports were published which were prepared by Smith (1982, 1986). In the first report, Smith (1982) updated working life estimates for men and women in U.S. in 1970 and 1977 by using multistate technique and the author found that active life expectancy at birth for males was 37.9 years and 27.5 years for females in U.S in 1977. In the second report, Smith (1986) repeated the analyses for population subgroups disaggregated by education and race. By estimating transition probabilities between labor market states in separate race and education groups from the data of Current Population Survey, Smith (1986) estimated higher working life expectancy for whites compared to nonwhites and found that increase in education status increases working life expectancy for both males and females. This study is one of the earlier studies conducted for population subgroups through multistate methodology. The main shortcoming of this study is that estimates could not be conducted for population subgroups by controlling race and education at the same time. Smith (1986) asserted that this is due to the fact that sample sizes become very small which hinders accurate estimations of transition probabilities if population is partitioned further into more subgroups. Nevertheless, this limitation is eliminated in more recent studies by incorporating regression analysis to multistate methodology to estimate transition probabilities which allows controlling several variables at the same time.

One of such studies was conducted by Hayward and Grady (1990). The authors constructed multistate working life table for older males aged 55 and over in U.S. by using event history data from National Longitudinal Survey of Mature Males conducted between years 1966-1983. Hayward and Grady (1990) defined four states in their study as in labor force, retirement, disability and death and the authors estimated that average duration in labor force is 8.69 years, 11.6 years in retirement, and 0.88 years in disability for males at age 55. The specialty of the study is that Hayward and Grady (1990) followed the labor market experience of an actual cohort of older males over a 17-year period by benefitting from the longitudinal data used so the multistate table constructed is a cohort life table. In addition, since data used by the authors provides event histories over a long period, Hayward and Grady (1990) estimated probabilities of transitions between states by using multivariate hazard models where occupation, class of workers, education, race, marital status, and region and urban/rural residence were controlled at the same time. The authors found that expected duration in those states defined exhibits variations for each group of covariates controlled. In this respect, Hayward and Grady (1990) eliminated the difficulty in estimating transition probabilities directly from data for highly refined subgroups due to small sample sizes experienced by Smith (1986) by employing multivariate hazard models.

Similar to the study of Hayward and Grady (1990), Land et al. (1994) also estimated transition probabilities through regression analysis to construct multistate life table for estimating disability free life expectancies. Although Land et al. (1994) did not construct a working life table, this study is worth to mention here in the sense that Land et al. (1994) estimated transition probabilities by relying on Markov panel regression models. In this study, the authors estimated transition probabilities through logit regression analysis by controlling several covariates such as gender, race, and education. By using data from the survey of Established Populations for Epidemiological Studies of the Elderly conducted by Duke University, Land et al. (1994) estimated that total and healthy life expectancy at age 65 were higher for women than men in U.S. in 1986-1987 while blacks and lower educated people had lower healthy life expectancy compared to whites and higher educated people, respectively. The study of Land et al. (1994) is an important example in the literature which uses panel data to estimate transition probabilities. Since panel data has several waves, it may provide limited number of observations about the previous experiences of people compared to event history data; thus, controlling for duration dependence or time variant covariates is not possible when estimating transition probabilities using panel data. Markov property comes to the fore at this stage which assumes that all history of a person's experiences is represented by the current state which is occupied by that person; in other words, probability of transition to a further state depends only on the state occupied currently (Hoem 1977; Willekens 1980; Schoen and Woodrow 1980; Land et al 1994). This assumption provides easiness to construct period multistate life tables by using panel data considering that event history surveys are less available compared to panel surveys.

Millimet et al. (2003) also proposed an econometric method similar to that of Land et al. (1994). The authors aimed to update the methodology used by Smith (1986) by controlling several covariates at the same time and estimated transition probabilities by performing logit regressions which include age, race, marital status, occupation, and number of children as explanatory variables by using pooled sample of Current Population Surveys conducted between years 1992-2000. The difference of the method proposed by Millimet et al. (2003) from Land et al. (1994) is that Millimet et al. (2003) predicted labor market transition probabilities of each individual in the sample based on their individual characteristics, and then took the mean of transition probabilities by grouping the sample in accordance with age. Thus, the method used by Millimet et al. (2003) has a limitation in the sense that mean transition probabilities for age groups are vulnerable to stochastic variation in the sample used so the authors applied smoothing with 9-year lag moving average to eliminate this stochastic variation. As mentioned earlier, transition probabilities are the main input of multistate life tables and they are calculated from sample data so graduation techniques have been used by the authors such as Hoem (1977), Willekens (1980), Schoen and Woodrow (1980) to eliminate irregularities in probability schedule due to sample. However, integration of regression analysis in multistate methodology removes the necessity of applying graduation techniques since regression analysis already gives smoothed estimates of transition probabilities (Land et al. 1994) if estimated coefficients are directly used as in Land et al. (1994) instead of the method applied by Millimet et al. (2003).

As implied already in this section, technique of construction of life table statistics in multistate life tables has not changed so much from its first appearance in the study of Hoem

(1977) but multistate methodology has significantly developed in the direction of how to estimate transition probabilities. Hence, it is observed that estimation technique of transition probabilities differ across all studies mentioned so far in this section. One final example of the issue is provided by Lynch and Brown (2010). Although this study was not conducted to construct a multistate working life table, it is worth to mention here in the sense that the method proposed by Lynch and Brown (2010) extends Sullivan's method to construct a multistate life table; in other words, this method allows use of prevalence ratios computed from a cross sectional survey to calculate transition probabilities and to obtain multistate life tables at the end. By using National Health Interview Survey (NHIS) and vital statistics in U.S. in 2002, Lynch and Brown (2010) estimated healthy life expectancy for various subgroups of population with the following method. Based on the data in NHIS survey, the authors estimated bivariate regressions to determine the magnitude of the effect of the covariates on prevalence ratios for each state defined. After that, Lynch and Brown (2010) generated several number of samples based on those parameters through the technique called "*Gibbs sampling*" which is actually a Markov Chain Monte Carlo algorithm to produce samples from a multivariate probability distribution when direct sampling is not feasible. Then, Lynch and Brown (2010) used those samples produced for each covariate profile like a panel to estimate transition probabilities between states and formed multistate life tables based on those probabilities. This technique is very new and as far as the author is aware, application of it is not very common for now in life table analyses but this method proposed by Lynch and Brown (2010) constitutes a major extension for multistate life table analyses in the sense that it removes the reliance on panel or event history data sets.

As mentioned so far, multistate life table technique has several advantages over other methods. It allows studying on transitions between many states at the same time and provides more information about actual number of transitions rather than net rates of transitions due to the fact that it does not rely on unimodality assumption. Thus, multistate life table methodology is more suitable to study on labor market experiences of women. Although transition probabilities required for multistate process are derived from sample surveys so are vulnerable to irregularities due to sample structure, this limitation can be handled with smoothing techniques; even smoothing techniques are not needed as described above when transition probabilities are estimated through regression analysis. Use of regression analysis has another advantage since possible covariates can be controlled in regression equations which are expected to affect the rate of transitions. Although the ideal process to construct a multistate working life table is to use data from a survey including working histories of individuals by controlling duration dependence and time variant covariates, reliable estimates can be obtained from period multistate life tables by using two or more waves of panel data sets under Markovian assumption. In this respect, multistate life table methodology is preferred in this thesis to estimate working life expectancies of women in Turkey and how those expectancies change by marital status and education considering the advantages and suitability of the technique for analysis in this thesis. The mathematical presentation of the multistate life table technique employed in this thesis, thus, is given in the methodology section.

CHAPTER 3
DATA AND METHODOLOGY

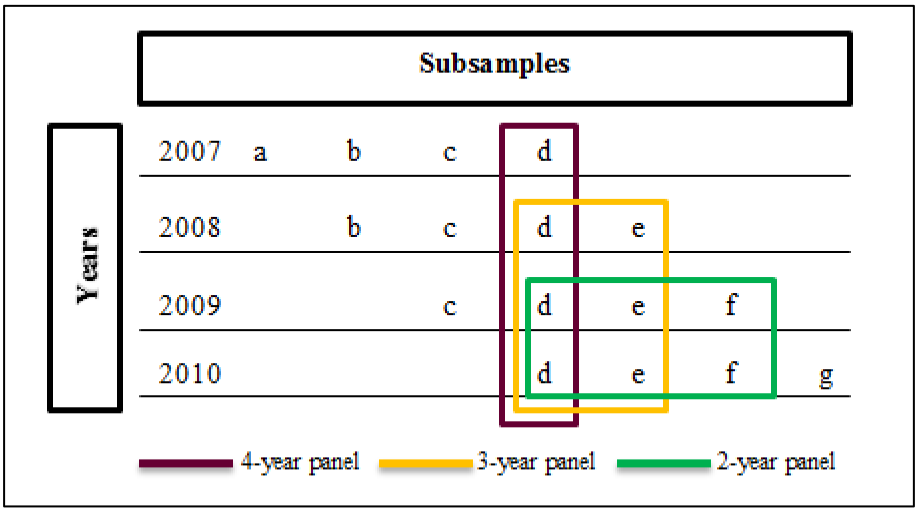
3.1. DATA

In this thesis, data of Income and Living Conditions Survey conducted by TURKSTAT is used. As mentioned earlier, multistate life table methodology requires estimation of transition probabilities between states subject to study so longitudinal data is needed for multistate life table estimations. Since Income and Living Conditions Survey is a four-year panel survey including necessary information for this study, this data source is preferred to be used.

The aim of Income and Living Conditions Survey is to gather information on the current situation and evolution of income distribution across households and individuals in Turkey. In the European Union Harmonization Process, TURKSTAT started to conduct this survey in 2006 in order to produce comparable indicators with European Union countries for income distribution, relative poverty, living conditions, and social exclusion. In this respect, the survey is designed to collect data from households and individuals on dwelling, economic conditions, social exclusion, property ownership, education, demographic characteristics, health, labor market, and income status.

All non-institutional population living in Republic of Turkey is covered in the survey. A multistage, stratified, cluster sampling is used where the sampling unit is the household. The survey is conducted every year and designed to produce both cross sectional and panel data. Panel structure of the survey is designed as a rotating panel including four subsamples and 25% of the panel sample is replaced by another subsample every year as represented by Figure 3.1. Four subsamples drawn in each year constitute the sample of cross sectional survey while one subsample is selected for the panel to follow up for four waves. Data gathered from subsamples added in each year is also published as three-year and two-year panels with appropriate weights calculated from 2010 population projections revised in accordance with ABPRS results.

Figure 3.1: Rotation of panel sample in Income and Living Conditions Survey



Source: TURKSTAT, Income and Living Conditions Survey, 2007-2010

Income and Living Conditions Survey is conducted through computer assisted personal interview (CAPI) system and consists of five questionnaires including the following information:

- Household Registration Form: Information regarding access to the address, availability of household, and acceptance of participation to the survey.
- Individual Registration Form: Information regarding basic demographic characteristics of all individuals living in the household.
- Household and Individual Follow-Up Form: Used in follow-ups to record information related to availability of household and individuals and reasons of inaccessibility.
- Household Questionnaire: Information regarding household's dwelling, property ownership, financial situation, expenses and total income, and status in terms of meeting basic needs.
- Individual Questionnaire: Information gathered from individuals aged 15 and over living in the household related to their educational status, labor market activity, marital status, health status, and income.

In this thesis, transition probabilities between labor market statuses are calculated for a period of one year so two-year panel of Income and Living Conditions Survey for years 2009-2010 are used. For analysis conducted in this study, data obtained from individuals on age, sex, education, and marital status is required. Information regarding age and sex is available in the data set obtained from Individual Registration Form while data on education and marital status is available in the data set obtained from Individual Questionnaire. Thus, these two data sets are merged first by using unique identifiers for household, individual, and year of the survey. As mentioned earlier, Income and Living Conditions Survey is a four-year panel survey so this merged data file originally contains observations from 2007 to 2010. Since one-year transition probabilities are calculated from 2009 to 2010, two-year panel of the survey is used by dropping observations belonging to 2007 and 2008. After dropping those observations, 71213 observations gathered from 9555 households remain in the data file. As mentioned, data obtained from Individual Registration Form and Individual Questionnaire is merged to collect all variables needed in a single data file but it should be again noted that Individual Registration Form includes information on all individuals living in the household while Individual Questionnaire gathers data from individuals aged 15 and over in the household; hence, almost 31% of the observations (21892 observations) are not matched one-to-one. After deleting those observations, 49321 observations remain in the data file, 23778 of which belong to males and 25543 belong to females collected in years 2009-2010. Since this thesis aims to construct multistate working life tables for females, observations belonging to males are also dropped out from the data file. Since transition probabilities of women between labor market states are calculated from this data file, two observations in each wave for a woman should be available in the data set. After checking the availability of two observations for each woman, it is observed that almost 8% of women (2019 observations) are not available in one of the waves, which occurs due to two reasons. One reason is attrition problem; that is, data on some of the women is not available in 2010 while it is available in 2009. The other reason is rotation in panel; that is, data on some of the women is not collected in 2009 since they enter to the panel in 2010. Finally, 23524 observations remain in the data file, which represent data collected in 2009 and 2010 from 11762 women. Thus, the sample used in this study consists of 11762 observations.

In this thesis, multistate working life tables are conducted for women based on two labor market states: being active (being in the labor force) and being inactive (being out of labor force). Therefore, transition probabilities between these two states from year 2009 to 2010 should be estimated. Nevertheless, there is not any direct variable indicating labor market status of women in the data file. Therefore, two new variables indicating labor force participation of women in 2009 and in 2010 are defined as follows. According to

TURKSTAT definitions, labor force includes people aged 15 and over who are employed or unemployed. Women are assigned as employed if they have any paid job in the reference week (i.e. the week before the survey date). On the other hand, they are assigned as unemployed if they do not have any paid job in the reference week but they are searching for job during the last three months before the survey date and are available to start work within two weeks if they would find a job. Women who are satisfying these conditions are accounted as in labor force but if they cannot be categorized either employed or unemployed, then they are accounted as out of labor force. In this way, labor force status variable is defined for both years 2009 and 2010 to estimate transition probabilities.

In this thesis, separate multistate life tables are also constructed to observe the effects of education and marital status on female working life expectancy. Therefore, education and marital status variables available in the data set are recoded to define suitable variables for analysis. In the data set obtained from Individual Questionnaire, educational attainment represents the level of school where the respondent lastly graduated and coded by following this classification:

- “0” for illiterate
- “1” for literate but not graduated from any school
- “2” for first level primary school
- “3” for secondary school, vocational secondary school, or second level primary school
- “4” for high school
- “5” for vocational high school
- “6” for college, university, or higher degree

Educational attainment variable is recoded in the data file by classifying it under two main categories called “low-educated” which represents women who have a degree below high school and “high-educated” which indicates women who have a degree from high school or above. Similar to education variable, variable on marital status is also defined in the same questionnaire as follows:

- “1” for never married
- “2” for married
- “3” for separately living from her partner
- “4” for widowed

- “5” for divorced

and this variable is recoded by renaming the group of married women as currently married and grouping women who are separately living from their partner, widowed and divorced under one category called “formerly married”.

Another variable is also generated for women in the data file to represent their age in year 2009 since the age in 2009 is accounted as the beginning of age interval on which multistate life tables are constructed. After generating age variable, construction of the data file is completed, which consists of 11762 women as mentioned above. Analyses are carried out by using a statistical package program called STATA 12. Descriptive statistics for the characteristics of women are presented below.

Table 3.1: Summary statistics for variables*

	Mean	Median	Standard deviation	Minimum	Maximum
Labor force status in 2009	0.31	0	0.46	0	1
Labor force status in 2010	0.31	0	0.46	0	1
Marital status	2.10	2	0.91	1	5
Educational attainment	2.24	2	1.69	0	6
Age	40.69	38	16.96	15	98

Source: Author’s calculations
** Weighted by using analytical weights defined by STATA such that weights are inversely proportional to the variance of observation.*

Basic descriptive statistics for the variables are provided in Table 3.1. Since labor force status is defined as a binary variable, mean value indicates the proportion of women participating into labor force and participation is around 31% in both of the years. Mean value of marital status is around “2” which indicates the status of being currently married. Such a mean value for marital status is expected since most of women in the sample are married as shown in Table 3.2. Mean value of educational attainment is also around “2” which indicates that women in Turkey have a primary school degree on average. Age variable in the data set indicates single-year ages, not age groups. Although percentage distribution of women by age groups is given in Table 3.2 in order to ease the tabulation, single-year ages are used in construction of multistate working life tables. As presented in

Table 3.1, age takes values between 15 and 98 and mean age of women is around 41 years while median age is around 38.

Table 3.2: Frequencies and percentage distribution of the sample

	Not weighted	***Weighted****		***Not weighted***	***Weighted***
Labor force status in 2009			**Labor force status in 2010**		
Inactive	8,108	7,844	*Inactive*	8,172	7,868
	68.93	69.24		69.48	69.45
Active	3,654	3,485	*Active*	3,590	3,461
	31.07	30.76		30.52	30.55
Marital status**			**Age group**		
Never married	2,167	2,104	*15-19*	1,030	926
	18.47	18.61		8.76	8.17
Married	8,092	7,713	*20-24*	1,221	1101
	68.96	68.22		10.38	9.72
Separate	0	0	*25-29*	1,317	1194
	0.00	0.00		11.2	10.54
Widowed	1,196	1,190	*30-34*	1,262	1202
	10.19	10.53		10.73	10.61
Divorced	280	298	*35-39*	1,254	1244
	2.39	2.64		10.66	10.98
Educational attainment			*40-44*	1,037	1053
Illiterate	2,578	2,246		8.82	9.29
	21.92	19.83	*45-49*	1,128	1121
Literate but no school	1,205	1,067		9.59	9.9
	10.24	9.42	*50-54*	880	888
First level primary	4,196	4,220		7.48	7.84
	35.67	37.25	*55-59*	729	730
Secondary school	1,471	1,423		6.2	6.44
	12.51	12.57	*60-64*	565	547
High school	1,006	1,045		4.80	4.83
	8.55	9.22	*65-69*	445	446
Vocational high school	562	573		3.78	3.94
	4.78	5.06	*70-74*	372	391
Higher education	744	755		3.16	3.45
	6.33	6.66	*75+*	522	486
				4.44	4.29

Source: Author's calculations
**Analytical weights are used as defined in the notes of Table 3.1.*
***Marital status of 27 women is missing in the data file so percentage distribution of women by marital status is computed by dropping those 27 observations (i.e. computed out of 11,735 observations instead of 11,762).*

Table 3.2 presents percentage distribution of women across categories of variables. Weighted results show that labor force participation of women is around 31% as mentioned earlier. On the other hand, it is observed that 68% of women are currently married while 19% are never married and 13% are formerly married which is the variable constructed by evaluating widowed and divorced women in a single variable. Characteristics of divorced and widowed women are very different in terms of labor force participation. Since widowed women might be expected to be at older ages, their labor force participation is expected to be low while labor force participation of divorced women is expected to be higher compared to married women; therefore, such a categorization might produce unexpected results in terms working life expectancy of formerly married women. Nevertheless, such a categorization is preferred considering the limited number of observations in those categories in the sample. It is also observed that 37% of women have graduated from first level primary school which is the mean level of educational attainment as mentioned above. Considering new categorization of education variable performed in this study as “low-educated” and “high-educated”, it is observed from the data that 79% of women have an educational attainment below high school degree while 21% of them have a degree at high school level or above. As a last point, percentage distribution of women by age groups reveals that almost 50% of women are below age 39.

Frequencies and percentage distributions of women based on their labor force statuses by marital status, educational attainment, and age are presented in Table 3.3. According to those distributions in the sample, labor force participation of never married women are higher compared to currently married women as expected. The lowest participation rate belongs to formerly married women which covers both widowed and divorced women. As mentioned earlier, widowed women are expected to concentrate at older ages and another cross tabulation of marital status by age also reveals this fact that widowed women concentrate in ages of 50 and above. At those ages, labor force participation is expected to be low as already presented in Table 3.3. Therefore, such a rate for formerly married women is expected considering that number of observations for widowed women dominates this category. Cross tabulation of labor force status by educational attainment also confirms expectations such that high educated women have higher participation rate compared to low educated ones.

Table 3.3: Cross tabulations of labor force status by marital status, educational attainment, and age (frequencies and percentage distributions)*

	Labor force status in 2010		
	Inactive	***Active***	***Total***
Marital status			
Never married	1,321	846	2,167
	60.96	39.04	100.00
Currently married	5,636	2,456	8,092
	69.65	30.35	100.00
Formerly married	1,198	278	1,476
	81.17	18.83	100.00
Educational attainment			
Low educated	6,936	2,514	9,450
	73.40	26.60	100.00
High educated	1,236	1,076	2,312
	53.46	46.54	100.00
Age group			
15-19	993	300	1,293
	76.80	23.20	100.00
20-24	700	493	1,193
	58.68	41.32	100.00
25-29	832	520	1,352
	61.54	38.46	100.00
30-34	780	473	1,253
	62.25	37.75	100.00
35-39	713	490	1,203
	59.27	40.73	100.00
40-44	696	384	1,080
	64.44	35.56	100.00
45-49	701	351	1,052
	66.63	33.37	100.00
50-54	607	267	874
	69.45	30.55	100.00
55-59	543	148	691
	78.58	21.42	100.00
60-64	431	82	513
	84.02	15.98	100.00
65-69	411	45	456
	90.13	9.87	100.00
70-74	318	25	343
	92.71	7.29	100.00
75+	447	12	459
	97.39	2.61	100.00

Source: Author's calculations
** Unweighted distributions in the sample are presented.*

Table 3.4: Cross tabulations of education attainment and marital status by age

	Educational attainment		Marital status		
Age	***High educated***	***Low educated***	***Never married***	***Currently married***	***Formerly married***
15-19	278 21.50	1,015 78.50	1,076 83.28	212 16.41	4 0.31
20-24	491 41.16	702 58.84	522 43.87	658 55.29	10 0.84
25-29	457 33.80	895 66.20	253 18.73	1,056 78.16	42 3.11
30-34	319 25.46	934 74.54	112 8.95	1,090 87.13	49 3.92
35-39	236 19.62	967 80.38	83 6.93	1,053 87.97	61 5.09
40-44	184 17.04	896 82.96	54 5.01	940 87.20	84 7.79
45-49	151 14.35	901 85.65	32 3.05	921 87.88	95 9.07
50-54	95 10.87	779 89.13	17 1.95	720 82.66	134 15.38
55-59	44 6.37	647 93.63	6 0.87	540 78.26	144 20.87
60-64	25 4.87	488 95.13	7 1.37	366 71.76	137 26.86
65-69	12 2.63	444 97.37	2 0.44	252 55.26	202 44.30
70-74	9 2.62	334 97.38	0 0.00	154 45.03	188 54.97
75+	11 2.40	448 97.60	3 0.65	130 28.32	326 71.02
Total	2,312 19.66	9,450 80.34	2,167 18.47	8,092 68.96	1476 12.58

Source: Author's calculations
Unweighted distributions in the sample are presented.

Row percentages are represented in each cell for the corresponding frequencies.

Marital status of 27 women is missing in the data file so percentage distribution of women by marital status is computed by dropping those 27 observations (i.e. computed out of 11,735 observations instead of 11,762).

Table 3.5: Cross tabulation of marital status by educational attainment

	Never married	*Married*	*Widowed*	*Divorced*	*Total*
High educated	824	1,348	44	90	2,306
	35.73	58.46	1.91	3.90	100
Low educated	1,343	6,744	1,152	190	9,429
	14.24	71.52	12.22	2.02	100
Total	2,167	8,092	1,196	280	11,735
	18.47	68.96	10.19	2.39	100

Source: Author's calculations
Unweighted distributions in the sample are presented.

Row percentages are represented in each cell for the corresponding frequencies.

Marital status of 27 women is missing in the data file so percentage distribution of women by marital status is computed by dropping those 27 observations (i.e. computed out of 11,735 observations instead of 11,762).

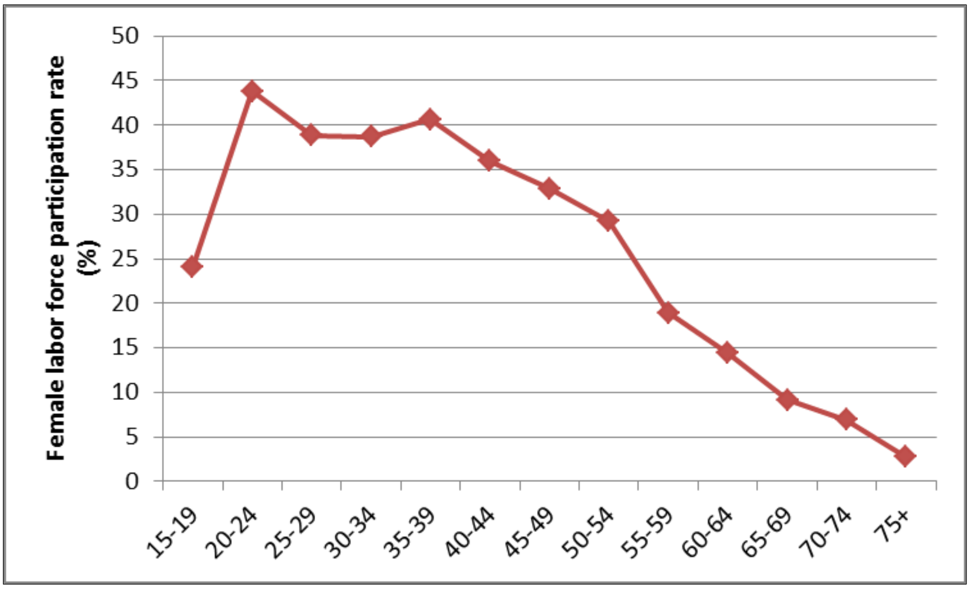
Table 3.4 and Table 3.5 provides cross tabulations of explanatory variables used in the analyses of this study. In Table 3.4, frequencies and percentage distributions of women in each age group are presented by education and marital status. It is observed that percentage of women with high education by age group follows an inverse U-shape distribution; that is, it is lower in 15-19 age group and in older age groups compared to the age group of 20-29. Those figures are expected in the sense that high education in this study is defined as being graduated from high school or above so minimum ages to be considered as high educated are 18-19 under Turkish education system; thus, proportion of high educated women in 15-19 age group is lower. Additionally, the highest proportion of high educated women is observed in 20-24 age group and it starts to decline after that age group which might be interpreted that younger cohorts have higher educational attainment compared to older cohorts of women as expected.

On the other hand, Table 3.4 presents that proportion of never married women declines and that of currently married women increases as age increases. When evaluated together, those two figures reflect the extensity of marriage among women in Turkey. In addition, Table 3.4 reveals that proportion of formerly married women in each age group increases as age increases. Considering that formerly married group consists of widowed and divorced women, it is expected to observe such figures. However, it should be again noted that number of observations belonging to divorced women is very low in the sample so this category is dominated by widowed women and this fact is demonstrated by the figures. For instance, 71% of women at 75 or older ages are in formerly married category. When this percentage is decomposed between widowed and divorced women, it is observed that 70.15% points of this proportion belongs to widowed women so it could be said that widowed women are concentrated at older ages as mentioned earlier in this section. Unlike widowed women, divorced women are expected to concentrate at middle ages which is also demonstrated by the data. For example, 7.8% of women in 40-44 age group is in formerly married category and 4.45% points of it belongs to divorced women which is the highest rate for divorced women attained among other age groups.

Table 3.5 provides frequencies and percentage distributions of women in each marital status category by education. As mentioned in Section 2.1.2, age at marriage increases as educational attainment of women increases and the figures provided in Table 3.5 provides evidence for this statement. As presented, proportion of never married women is higher in high educated category compared to the proportion of never married women in low educated category. However, those figures should be considered together by age distributions provided in Table 3.4. Considering that high educated women are concentrated at younger age groups and proportion of never married women decreases as age increases, those figures might also involve an age effect. On the other hand, it is observed that proportion of widowed women in low educated category is higher compared to high educated category. The effect of age is also visible here since widowed women are concentrated at older ages and in those age groups, lower educational attainment is observed. As a last point, it is observed that proportion of divorced women is higher in high educated category relative to low educated category. This figure might be interpreted as that high educated women tend to participate into labor force more as presented in Table 3.3 and the economic security provided by being active in labor market might increase the probability of divorce among high educated women.

Finally, a point should be emphasized considering the methodology used in this thesis. As presented in Table 3.3, it is observed that labor force participation first increases, and then decreases by age. Age-specific rates in the sample indicates that labor market participation reaches its peak in 20-24 age group, and then movements out of labor force accelerate in the age group of 25-34. However, women return back to labor market in 35-39 age group, and after this age group, a declining trend decisively establishes in labor force participation rate as age increases. Figure 3.2 presents age-specific female labor force participation rates computed by applying analytical weights to the sample and as can be seen, age-specific labor force participation schedule of women follows an M-shaped distribution rather than a regular inverse U-shaped distribution. Thus, it is also confirmed that unimodality assumption is not applicable for women under such a labor force participation schedule so multistate methodology is more suitable to analyze working life expectancies of women compared to increment-decrement methodology.

Figure 3.2: Age-specific labor force participation rates of women in 2010



Source: Author's calculations

In addition to the two-wave panel data of Income and Living Conditions Survey in 2009-2010, female infant mortality rate in 2009 which is 0.013 obtained from TURKSTAT is also used to estimate age-specific mortality rates of women by constructing a single-decrement life table. By using STATA 12 and Microsoft Word Excel 2010, data described so far is analyzed and multistate working life tables for women in Turkey are constructed by following the methodology described in the next section.

3.2. METHODOLOGY

The aim of this thesis is to estimate working life expectancies of women in Turkey and how those working life expectancies differentiate by educational attainment and marital status which are addressed as the two important factors affecting female labor supply decision in the literature. In order to perform these analyses, female working life tables should be constructed and there are several methods to construct those life tables as already described in Section 2.2 and Section 2.3. Among those methods, multistate life table technique comes to the fore due to its several advantages over other methods. First of all, multistate life tables allow estimating transition probabilities through regression analysis which provides the chance to control several covariates. In addition, multistate life table method allows observing all transitions between states across age groups; in other words, it does not require unimodality. Therefore, it is more suitable to make analyses for women's labor market experience. In this respect, multistate life table technique is preferred in this study mainly due to these two advantages and the details of the procedure is described in following sections.

3.2.1. Estimating Transition Probabilities

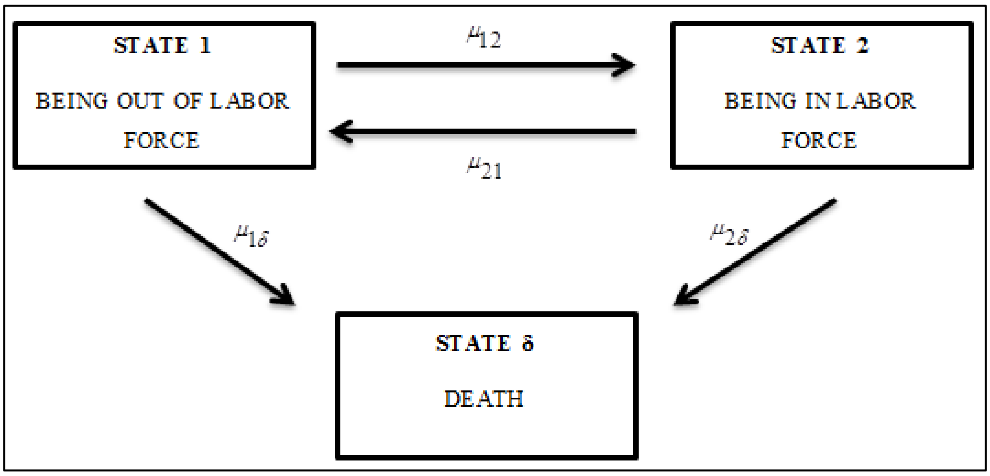
Multistate working life tables are the life tables summarizing mortality and labor market experience of a hypothetical population. In most of the studies in the literature, states which transitions occur in between in such a setting are described as being in the labor force, not being in the labor force, and death. In this study also, such a state space is used as presented in Figure 3.3. State 1 and State 2 are transient states which refer to states of not being in the labor force and being in the labor force, respectively while State δ is defined as the absorbing state indicating the state of being death. Between transient states, bidirectional transitions are possible but transition to death is a unidirectional process where

μ_{12}: transition rate from out of labor force (inactivity) to labor force (activity)

μ_{21}: transition rate from labor force (activity) to out of labor force (inactivity)

$\mu_{i\delta}$: transition from either state to death where $i = 1, 2$

Figure 3.3: State space defined in this study



Source: Author's diagram

The main issue in construction of a multistate life table is to estimate those transition rates for each age group and transform them to transition probabilities. These transition rates can be either directly calculated from data in the form of occurrence/exposure rates (Schoen and Woodrow 1980) or can be estimated by using regression analysis (Land et al. 1994; Millimet et al. 2003).

First of all, mortality rates (i.e. transition rates to death from each state) should be obtained. It is also possible to compute mortality rates from the data set used and such a technique is used especially in health status life tables where data on transitions to death are available (Land et al. 1994). In the context of this study, Income and Living Conditions Survey also involves information about transitions to death by recording people who move out of the household followed in subsequent waves due to death. Nevertheless, using this data set to compute mortality rates is not suitable in the sense that only people aged 13 and over are followed in subsequent waves so force of mortality before age of 13 cannot be observed. This might cause an overestimation of number of people alive at age 15 which is the start of working life tables in this study. Therefore, age-specific mortality rates are estimated in this study through a single decrement life table like in Schoen and Woodrow (1980).

According to Toros (2000), data on vital events in Turkey does not allow construction of single decrement life table directly. Instead, indirect techniques are used, one of which is using a model life table. Toros (2000) stated that Coale-Demeny West model life table is more suitable for mortality pattern observed in Turkey as indicated by index of similarity. To estimate age-specific mortality rates of Turkish women through Coale-Demeny West model life table, female infant mortality rate is needed, which is obtained from the vital statistics published by TURKSTAT as 13‰ in 2009. By entering this rate to a software package called MORTPAK Version 4.0, age-specific mortality rates are calculated for five-year age groups but multistate working life tables in this study are constructed as unabridged life tables. Therefore, mortality rates obtained for five-year age groups are again entered to MORTPAK Version 4.0 to convert the rates into single-year mortality rates so $\mu_{i\delta}$ s ($i = 1, 2$) for single-year age groups are equal to those single-year mortality rates. As mentioned earlier, mortality rates of inactive and active population are assumed as equal to construct increment-decrement life tables. Although such an assumption is not required in multistate technique, mortality rates for those population groups are assumed as equal in this study since deaths disaggregated by working status published by TURKSTAT might not be also reliable to estimate separate mortality rates by labor force status due to the reasons indicated by Toros (2000).

The second step is to estimate transition probabilities between transient states. Transition probabilities between inactive and active states are estimated in this study by using both of the methods mentioned, i.e. by using direct estimation based on occurrence/exposure rates from the data and by using regression analysis. For this procedure, two-year panel of Income and Living Conditions Survey conducted in 2009-2010 is used as described in Section 3.1.

The first method used is direct estimation from the data. This procedure gives age-specific occurrence/exposure rates such that

$$\mu_{ij}(x) = \frac{D_{ij}(x)}{P_i(x)}$$

$\mu_{ij}(x)$ indicates transition (occurrence/exposure) rate from state i to j between ages x and $x+n$, $D_{ij}(x)$ is number of transitions (i.e. occurrences) from state i to j between ages x and $x+n$, and $P_i(x)$ is size of population in state i at age x which is exposed to the risk of transition to state j. Transition probabilities estimated through this method is used as the input of only a general multistate life table covering all women since this method has some limitations. First of all, it should be noted that these occurrence/exposure rates are calculated from a sample so schedule of those age-specific rates is vulnerable to stochastic variability in the sample. Thus, graduation (smoothing) techniques are employed to eliminate this limitation (Hoem 1977; Willekens 1980; Schoen and Woodrow 1980; Land et al. 1994). In this study also, age-specific occurrence/exposure rates are smoothed by using 9-lag moving average as already performed in similar studies in the literature[1]. As another alternative, Land et al. (1994) also suggested that smoothed transition rates can be obtained by using regression analysis. Another limitation of direct estimation technique is that it does not allow constructing multistate life tables for highly refined subgroups in a population when sample size is limited (Smith 1986). The study of Smith (1986) is an example of this limitation. Smith (1986) stated that controlling race and education at the same time is not possible in her study since the degree of stochastic variability increases and the reliability of estimates declines when sample is partitioned into many groups to estimate group-specific transition rates by controlling several covariates at the same time. Millimet et al. (2003) suggested regression analysis as an alternative method to overcome this limitation also since regression analysis allows controlling several covariates at the same time without dividing the sample further into several subgroups; in other words, by preserving the sample size in the estimation process. In this respect, regression analysis is also used in this thesis to estimate smoothed transition rates since one of the aims of this study is to observe differences in female working life expectancy by education and marital status.

Estimations of transition rates through regression analysis are performed in this study by following a similar methodology applied by Land et al. (1994) and Millimet et al. (2003). In this method, event subject to study is defined as a binary variable which takes “0” for not being in the state and “1” for being in the state. In the context of this study, women who are not in the labor force are assigned as “0” while women who are in the labor force are

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[1] Optimal number of lags can be found by using the command *varsoc i*n STATA 12. For μ_{12}, optimal lag is found as 8 while it is 11 for μ_{21}. In order to preserve consistency in estimates, a fixed number of lags is decided to be applied for both rates and it is determined as 9 by following the studies which can be found in the literature such as Willekens (1980), Schoen and Woodrow (1980), and Millimet et al. (2003).

assigned as “1”. Then, logit estimations are performed in a similar way of estimating standard female labor force participation model (Millimet et al. 2003). Four models estimated are presented below:

$$LFSTATUS_{2010_i} = \alpha_0 + \alpha_1 AGE_i + \alpha_2 AGE_i^2 + \varepsilon_i \quad (1)$$

$$LFSTATUS_{2010_i} = \beta_0 + \beta_1 AGE_i + \beta_2 AGE_i^2 + \beta_3 HIGHEDUC_i + \epsilon_i \quad (2)$$

$$LFSTATUS_{2010_i} = \gamma_0 + \gamma_1 AGE_i + \gamma_2 AGE_i^2 + \gamma_3 CMARRIED_i + \gamma_4 FMARRIED_i + \xi_i \quad (3)$$

$$LFSTATUS_{2010_i} = \theta_0 + \theta_1 AGE_i + \theta_2 AGE_i^2 + \theta_3 CMARRIED_i + \theta_4 FMARRIED_i + \theta_5 HIGHEDUC_i + \xi_i \quad (4)$$

where

$LFSTATUS_{2010_i}$: a dummy variable indicating labor force status of woman i in 2010 which takes “1” if woman i is in labor force

AGE_i : single-year age of woman i in 2009

$HIGHEDUC_i$: a dummy variable which takes “1” if woman i graduated from high school or attained a degree above it (the counterpart of this variable is a dummy called $LOWEDUC_i$ which takes “1” if woman i has educational attainment below high school)

$CMARRIED_i$: a dummy variable which takes “1” if woman i is currently married

$FMARRIED_i$: a dummy variable which takes “1” if woman i is currently divorced, widowed, or living separately from her partner (the counterpart of this dummy set containing $CMARRIED_i$ and $FMARRIED_i$ is $NMARRIED_i$ which takes “1” if woman i is never married)

The dependent variable, labor force status, is regressed on explanatory variables age, marital status, and educational attainment. In Equation 1, only age is controlled to observe its effect on transitions between labor market states. Coefficients obtained from this regression are used to estimate age-specific transition rates that are the input of a general multistate life table covering all women irrespective of their marital status and education which is an alternative to construct multistate life table with transition rates directly estimated from the data since this method directly gives smoothed transition rates without any need to perform graduation techniques. Nevertheless, age is included in all other regression equations since age-specific transition rates are also required in construction of multistate life tables for women by their marital status and education. In Equation 2, beside age, only education is controlled to observe its effect on transition rates separately while the same procedure is repeated for marital status in Equation 3. Finally, all explanatory variables are controlled simultaneously in Equation 4 to obtain smoothed transition rates required for construction of multistate life tables for each subgroup.

As described in Section 3.1, age-specific female labor force participation schedule first increases and then declines as age increases. This fact is taken into consideration by including age variable into regression equations in a quadratic form. In this respect, the coefficients of AGE_i and AGE_i^2 are expected to have positive and negative signs, respectively. As also mentioned in Section 3.1, women divided into two groups as low-educated and high-educated in terms of their educational attainment while they are partitioned into three groups in terms of their marital status which are never married, currently married, and formerly married in order to control the effects of those characteristics on working life expectancy of women. Thus, two dummy sets are defined for education and marital status variables. Since all dummies cannot be included in regression equation at the same time due to the problem of multicollinearity, one group in each dummy set is defined as the base group. The base group is low educated women for educational attainment dummy set while it is never married women in marital status dummy set. Therefore, the coefficient of $HIGHEDUC_i$ indicates how high educated women differentially participate into labor force relative to low educated women and is expected to be positive. Similarly, the coefficients of $CMARRIED_i$ and $FMARRIED_i$ refer to how currently married and formerly married women differentially participate into labor force compared to never married women and are expected to be negative and positive, respectively.

As applied in Land et al. (1994) and Millimet et al. (2003), those regression equations are estimated separately for women who are initially active and inactive. Since two waves of

Income and Living Conditions Survey conducted in 2009-2010 are used, information on labor force status of women at initial time period which is 2009 in this study is already defined in the data file as described in Section 3.1. By grouping women by their initial labor market status in 2009, the regression equations are first estimated for initially inactive women to obtain rates of transition from inactive to active status and then, for initially active women to estimate rates of transition from active to inactive status.

As mentioned earlier, logit estimation procedure is employed in regression analysis due to following reasons. The dependent variable in the models is a dichotomous variable such that

$$LFSTATUS_{2010_i} = \begin{cases} 1 & if\ woman\ i\ is\ in\ labor\ force \\ 0 & if\ woman\ i\ is\ out\ of\ labor\ force \end{cases}$$

It is possible to estimate such a model with ordinary least squares (OLS) in the form of linear probability models but OLS might produce predicted values lying outside of the interval $(0,1)$ with large prediction errors (Maddala 2001:319; Gujarati 2004:593). Therefore, an alternative approach is used in such cases, which transforms the binary variable to a continuous one through a probability function so the model is transformed into

$$LFSTATUS^*_{2010_i} = \varphi_{0i} + \sum_{k=1}^{K} \varphi_{ki} Z_{ki} + \varepsilon_i$$

where $LFSTATUS^*_{2010_i}$ is a latent variable which shows the probability of labor force attachment in $(0,1)$ range. While $LFSTATUS^*_{2010_i}$ is changing in $(0,1)$ range, Z_k which represents the set of explanatory variables in the model can take any value in range of $(-\infty, +\infty)$. This implies that a linear relationship between dependent and independent variables cannot be assumed so OLS procedure cannot be used anymore; thus, maximum likelihood estimation is employed (Gujarati 2004:595).

$$L = \prod_{Event=1} \tau_i \prod_{Event=0} (1-\tau_i)$$

where likelihood function L which is subject to maximization is equal to multiplication of probabilities that event occurs (τ_i) and that event does not occur $(1-\tau_i)$. Depending on the assumption on distribution of error terms, this equation can be estimated through either logit procedure if error terms are assumed to have a logistic distribution or probit procedure if error terms are assumed to have a normal distribution (Maddala 2001:323; Gujarati 2004:595). None of these procedures theoretically has an advantage over another but logit procedure is preferred in many studies due to its mathematical simplicity (Gujarati 2004:614). Logit model is general represented in one the forms below:

$$\ln\left(\frac{\tau_i}{1-\tau_i}\right) = \varphi_{0i} + \sum_{k=1}^{K} \varphi_{ki} Z_{ki} + \varepsilon_i$$

$$\frac{\tau i}{1-\tau i} = e^{(\varphi_{0i} + \sum_{k=1}^{K} \varphi_{ki} Z_{ki} + \varepsilon_i)}$$

where $\frac{\tau_i}{1-\tau_i}$ is called odds ratio which indicates how strongly experiencing the event subject to study is associated with not experiencing the event. Logistic distribution assumption underlying this process forms the basis of exponential transition rate models. These models are the basic models used in event history analysis to estimate transition rates by controlling a set of covariates under the assumption that duration in a state is described by an exponential distribution (Blossfeld et al. 2007:87). In this setting, the likelihood function becomes

$$L = \prod r_{ij} \prod G(t)$$

where r_{ij} is time constant transition rate from state i to j dependent on several covariates which indicates the probability of experiencing the event while $G(t)$ represents the survivorship function through time which indicates the probability of not experiencing the event (Blossfeld et al. 2007:90). Through the optimization of likelihood function, transition rates can be estimated as an exponential function of covariates controlled such that

$$\hat{r}_{ij} = e^{(\hat{\varphi}_0 + \sum_{k=1}^{K} \hat{\varphi}_k Z_k)}$$

(Blossfeld et al. 2007:88) which is also used in estimation of age-specific transition rates to construct a multistate life table (Land et al. 1994). Thus, logit estimation procedure is preferred in this thesis and age-specific transition rates from inactivity to activity and from activity to inactivity are estimated, respectively, as follows:

$$\mu_{12}(x) = e^{(\hat{a}_0 + \hat{a}_1 AGE_i + \hat{a}_2 AGE_i^2)} \quad (5)$$

$$\mu_{21}(x) = e^{\left[-(\hat{\alpha}_0 + \hat{\alpha}_1 AGE_i + \hat{\alpha}_2 AGE_i^2)\right]} \quad (6)$$

Equation 5 is constructed by using estimated parameters from Equation 1 for initially inactive women while Equation 6 is constructed also from Equation 1 but estimated for initially active women. Predicted values in Equations 1-4 indicate the log odds ratio in favor of participating into labor force; thus, predicted values for initially active women indicates the probability of women who are active remaining active in labor market. In this respect, predicted values for initially active women are multiplied with a minus to estimate rate of transitions to out of labor market as described in Keyfitz and Caswell (2005:458). By using the predicted values from Equations 1-4, transition rates are calculated in this way for each subgroup of a population consisting of women defined in this study in terms of educational attainment and marital status. Since age in single years is included in regressions, time period in life table (i.e. from age 15 to 75) in which transitions occur is split into single-year age intervals. Hence, transition rates estimated are age-specific rates which implies that the model applied here is like piecewise exponential transition models where transition rate is constant in an age interval but changes across age intervals (Land et al. 1994).

Estimations of transition rates performed through the methods described above rely on several assumptions. First of all, multistate working life tables constructed in this thesis are unabridged life tables like most of the studies in the literature. This is due to the assumption that only one interstate passage is possible in a given age interval (Willekens 1980). This assumption is justified by the definition of transition rates in terms of observed probabilities in the sample such that

$$\mu_{ij}(x) = \lim_{\Delta x \to 0} \frac{p_{ij}(x, x+\Delta x)}{\Delta x}$$

where $\mu_{ij}(x)$ is transition rate from state i to j in the period of $(x, x+\Delta x)$ and $p_{ij}(x, x+\Delta x)$ is the observed transition probability in the sample (Land et al. 1994). $\mu_{ij}(x)$ is called instantaneous rate of transition in the literature due to its relationship with observed probabilities provided above since $\mu_{ij}(x)$ is actually equal to probability of transition between states i and j when time interval Δx goes to zero; in other words, when the interval becomes infinitesimally small. In this respect, reducing age interval as much as possible might be preferred in order to ensure the approximation between transition rates and probabilities. Although Land et al. (1994) stated that using 5-year age groups might decrease the stochastic variability when calculating transition rates directly from the data, many studies prefer to construct multistate life tables as unabridged since a 5-year interval is long enough to rule out this assumption. Another assumption which those estimations relies on is the Markovian assumption that transition probabilities are independent of previous states occupied; in other words, further transitions only depend on the state currently occupied by the agent (Willekens 1980). Beside the fact that this assumption brings simplicity to estimations, such an assumption is also required when estimating transition rates from panel data which includes limited information on agents' previous experiences compared to event history data sets. Finally, closed population system in single decrement life tables is also preserved in multistate life tables by assuming that rates of transitions from one state to other possible destination states in each age interval sum up to 1 such that

$$\mu_{11}(x) + \mu_{12}(\mathrm{x}) + \mu_{1\delta}(x) = 1$$

$$\mu_{21}(x) + \mu_{22}(x) + \mu_{2\delta}(x) = 1$$

where $\mu_{11}(x)$ and $\mu_{22}(x)$ indicate the rate of remaining inactive and active states, respectively. In this respect, multistate life tables can be also accounted as stationary population models (Willekens 1980).

The final point in this discussion is to transform estimated rates into probabilities of transitions. As mentioned in Section 2.2.4, multistate life table construction requires a **P(x)** matrix whose entries are transition probabilities between states. Rogers and Ledent (1976) proved that an **M(x)** matrix constructed from estimated transition rates can be approximated to **P(x)** matrix by following formula:

$$\mathbf{P(x)} = \begin{bmatrix} p_{11}(x) & p_{21}(x) \\ p_{12}(x) & p_{22}(x) \end{bmatrix} = \left[\mathbf{I} + \frac{h}{2}\mathbf{M(x)}\right]^{-1} \left[\mathbf{I} - \frac{h}{2}\mathbf{M(x)}\right] \tag{7}$$

where h is equal to age interval (i.e. $h = 1$ in this thesis), $\mathbf{I}$ is identity matrix such that $\mathbf{I} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and **M(x)** is derived as follows (Keyfitz and Caswell 2005:448; Willekens 1980; Rogers 1995:96):

$$\mathbf{M(x)} = \begin{bmatrix} \mu_{12}(x) + \mu_{1\delta}(x) & -\mu_{21}(x) \\ -\mu_{12}(x) & \mu_{21}(x) + \mu_{2\delta}(x) \end{bmatrix} \tag{8}$$

After computing transition rate matrix **M(x)** and transition probability matrix **P(x)**, derivation of other life table statistics is straightforward as explained in the following section.

3.2.2. Construction of Multistate Life Table

Based on the construction technique described in studies of Willekens (1980), Rogers (1995:81-110), and Keyfitz and Caswell (2005:444-460), multistate life tables in this thesis are constructed as follows. Usual procedure in life table construction starts by setting a radix. In this study, radix is set to 100000 which is the number of people born into the hypothetical population subject to study. Since data on labor force status is available for individuals aged 15 and over in Income and Living Conditions Survey which is the legal minimum age for working in Turkey, multistate working life tables in this thesis start from age 15. Hence, it is assumed that no one experiences a labor market transition under that age so up to age 15, decrements occur only due to death by applying mortality rates estimated through a single decrement life table as mentioned in previous section.

All survivors at age 15 who are accounted as inactive at the beginning of life table are then exposed to the risk of experiencing labor market transitions. Number of transitions between inactive and active statuses is calculated by applying transition probabilities to number of survivors in each state at each age as follows:

$$d_{11}(x) = l_1(x) * p_{11}(x) \tag{9}$$

$$d_{12}(x) = l_1(x) * p_{12}(x) \tag{10}$$

$$d_{21}(x) = l_2(x) * p_{21}(x) \tag{11}$$

$$d_{22}(x) = l_2(x) * p_{22}(x) \tag{12}$$

where

$d_{11}(x)$: number of people remaining in inactivity between ages x and $x+1$ out of $l_1(x)$

$d_{12}(x)$: number of transitions from inactivity to activity between ages x and $x+1$ out of $l_1(x)$

$d_{21}(x)$: number of transitions from activity to inactivity between ages x and $x+1$ out of $l_2(x)$

$d_{22}(x)$: number of people remaining in activity between ages x and $x+1$ out of $l_2(x)$

and $p_{11}(x)$, $p_{12}(x)$, $p_{21}(x)$, $p_{22}(x)$ are the entries of transition probability matrix as described earlier, while $l_1(x)$ and $l_2(x)$ are number of survivors in inactive and active statuses at age x, respectively.

Then number of survivors in each state at the beginning of following age group is equal to

$$\mathbf{l(x+1)} = \begin{bmatrix} l_1(x+1) \\ l_2(x+1) \end{bmatrix} = \begin{bmatrix} (p_{11}(x) * l_1(x)) + (p_{21}(x) * l_2(x)) \\ (p_{12}(x) * l_1(x)) + (p_{22}(x) * l_2(x)) \end{bmatrix} = \mathbf{P(x) * l(x)} \tag{13}$$

so

$$l_1(x+1) = d_{11}(x) + \mathrm{d}_{21}(\mathrm{x}) \tag{14}$$

$$l_2(x+1) = d_{12}(x) + d_{22}(x) \tag{15}$$

$$l^{Total}(x+1) = l_1(x+1) + l_2(x+1) \tag{16}$$

where $l^{Total}(x+1)$ is equal to total number of survivors out of initial size of hypothetical population (i.e. out of 100000) irrespective of labor market status.

Beside transitions between labor market states, transitions from inactive and active states to death also occur simultaneously since mortality rates are incorporated into labor market transition rates when constructing **M(x)** matrix. Number of deaths from both states is obtained like residual as follows:

$$d_{1\delta}(x) = l_1(x) - \left[d_{11}(x) + d_{12}(x)\right] \tag{17}$$

$$d_{2\delta}(x) = l_2(x) - \left[d_{21}(x) + d_{22}(x)\right] \tag{18}$$

$$d_{\delta}^{Total}(x) = d_{1\delta}(x) + \mathrm{d}_{2\delta}(\mathrm{x}) \tag{19}$$

The next step is to compute person years lived in each age interval which refers to **L(x)** matrix. In addition to the assumptions related to estimation of transition probabilities listed in previous section, one further assumption is required to compute **L(x)** matrix in a simple way. By assuming that labor market transitions and deaths are uniformly distributed in a given age interval, a linear approximation can be used to obtain **L(x)** matrix such that

$$\mathbf{L(x)} = \begin{bmatrix} L_1(x) \\ L_2(x) \end{bmatrix} = \frac{1}{2} * \begin{bmatrix} l_1(x) + l_1(x+1) \\ l_2(x) + l_2(x+1) \end{bmatrix} = \frac{1}{2} * \left[\mathbf{l(x) + l(x+1)}\right] \tag{20}$$

where $L_1(x)$ and $L_2(x)$ represent person years lived in inactive and active statuses between ages x and $x+1$, respectively; in other words, size of stationary population in inactive and active states, respectively. Willekens (1980) calculated fraction of person years lived in a given age interval instead of computing person years lived in order to directly compute population-based life expectancies in each state. By following the method used by Willekens (1980), fraction of years spent in each state in an age interval is computed in this thesis as follows:

$$L_1(x) = \frac{1}{2} * \frac{l_1(x) + l_1(x+1)}{l^{Total}(y)} \tag{21}$$

$$L_2(x) = \frac{1}{2} * \frac{l_2(x) + l_2(x+1)}{l^{Total}(y)} \tag{22}$$

where $l^{Total}(y)$ is total number of survivors at age y which refers to minimum age of labor market entry (i.e. $y = 15$ in this study). Fraction of years spent in an age interval in each state reflects years spent per unit working age cohort since $l^{Total}(y)$ appears in the denominator of the formula.

The last age group is not an open age group in multistate working life tables like in other types of life tables. As mentioned earlier, to preserve stationary population assumption in multistate life tables, sum of transition rates from one state to each destination state should be equal to one. Last age group's being open-ended implies that everyone eventually dies so mortality rate is equal to one. Under such a setting, sum of transition rates might exceed one considering that there might be several transitions between labor market states in final age group so multistate life table does not represent a closed population. Thus, the final age group in multistate life tables is not open-ended like presented by Willekens (1980) and Schoen and Woodrow (1980). In this study also, the final age group is not open-ended; it is set to 74 representing $(74, 75)$ age interval which might be considered as the last age of being in the labor force in the life table. It might be thought that multistate working life tables would be constructed for $15-65$ age group which conventionally represents the working age population in the literature. However, setting the age of 65 might cause a more severe underestimation problem in total life expectancy due to the following reason. As explained earlier, a break point for the hypothetical cohort should be set in multistate life tables and sum of transition rates should be equal to one in this last age group set as break point in order to preserve stationary population assumption. This implies that person years lived by the persons in hypothetical cohort after this final age group cannot be taken into account so this might cause underestimation of total life expectancy in multistate life tables. Thus, setting the final age as 65 causes a more severe downward bias in total life expectancy compared to the age group of $(74, 75)$ so setting the break point at an older age as much as possible might eliminates this problem. Therefore, the choice of final age group in this study is decided considering the above-mentioned fact. After setting the final age group, fraction of years spent in labor market states in that age group is calculated as follows:

$$\mathbf{L}(74) = \begin{bmatrix} L_1(74) \\ L_2(74) \end{bmatrix} = \frac{1}{l^{Total}(y)} * \left\{ \left[\mathbf{P}(74)\right]^{-1} * \mathbf{l}(74) \right\} \tag{23}$$

where $\left[\mathbf{P}(74)\right]^{-1}$ is the inverse of transition probability matrix at age 74 while $\mathbf{l}(74)$ is the column vector showing number of survivors in inactive and active states at age 74.

By recursively adding fraction of years spent in each state from the last age group to the first, total number of years spent in each state is calculated which is equal to life expectancy or average duration in each state after a slight modification such that

$$\mathbf{e(x)} = \begin{bmatrix} e_1(x) \\ e_2(x) \end{bmatrix} = \frac{1}{\hat{l}^{Total}(x)} \begin{bmatrix} \sum_{x=15}^{74} L_1(x) \\ \sum_{x=15}^{74} L_2(x) \end{bmatrix} = \frac{1}{\hat{l}^{Total}(x)} \sum_{x=15}^{74} \mathbf{L(x)} \tag{24}$$

where $\hat{l}^{Total}(x) = \dfrac{l^{Total}(x)}{l^{Total}(y)}$. As mentioned earlier, $y = 15$ which indicates the minimum age of hypothetical working age population so $\hat{l}^{Total}(x)$ indicates the fraction of years spent as alive in hypothetical working age population. $e_1(x)$ indicates the fraction of years spent in inactivity out of total working life time while $e_2(x)$ indicates the fraction of years spent in activity. Sum of those measures gives the total life expectancy beyond age x. These measures are called population based measures in the literature (Willekens 1980) but they are actually working population based measures since fraction of years spent so life expectancies at the end of the procedure is calculated out of number of survivors at age 15 in total hypothetical population. If life expectancies per unit cohort born are required to be computed to estimate average duration in a state in total life time from age zero onwards, these measures should be corrected by multiplying them with $l^{Total}(y) / 100000$ which indicates the proportion of survivors in the life table.

One reason of calling these measures as population based measures is that they do not provide information on state based expectancies of life in each state; they just give information on which fraction of total working lifetime is expected to be spent in a given state irrespective of labor market status. However, being initially active or inactive at the beginning of an age interval is expected to affect average duration in a state since the subsequent transition depends on the current state occupied due to Markovian assumption. Thus, calculating labor force based or state based expectancies gives additional information on how expected duration in a state changes depending on the state occupied. Following the method used by Willekens (1980), fraction of years spent in each age group in each state is partitioned into fraction of years spent by people preserving their states and transferring to another state to perform this calculation as follow:

$$L_{11}(x) = \frac{1}{2} * \frac{l_1(x) + d_{11}(x)}{l_1(\mathrm{x})} \tag{25}$$

$$L_{12}(x) = \frac{1}{2} * \frac{d_{12}(x)}{l_1(\mathrm{x})} \tag{26}$$

$$L_{21}(x) = \frac{1}{2} * \frac{d_{21}(x)}{l_2(\mathrm{x})} \tag{27}$$

$$L_{22}(x) = \frac{1}{2} * \frac{l_2(x) + d_{22}(x)}{l_2(\mathrm{x})} \tag{28}$$

where

$L_{11}(x)$: fraction of years spent in inactivity by people who are already inactive in the age interval and remaining inactive up to the following age group

$L_{12}(x)$: fraction of years spent in inactivity by people who transfer into active state in the age interval

$L_{21}(x)$: fraction of years spent in activity by people who transfer into inactive state in the age interval

$L_{22}(x)$: fraction of years spent in activity by people who are already active and remaining active up to the following age group.

Then, state based life expectancies are calculated by following formula:

$$\mathbf{e(x) = L(x) + e(x+1) * P(x)} \tag{29}$$

where $\mathbf{e(x)}$ and $\mathbf{L(x)}$ are 2×2 matrices instead of column vectors indicating state based measures such that

$$\mathbf{e(x)} = \begin{bmatrix} e_{11}(x) & e_{21}(x) \\ e_{12}(x) & e_{22}(x) \end{bmatrix} \text{ and } \mathbf{L(x)} = \begin{bmatrix} L_{11}(x) & L_{21}(x) \\ L_{12}(x) & L_{22}(x) \end{bmatrix}$$

where

$e_{11}(x)$: expected duration in inactivity by a person who is already inactive at age x

$e_{12}(x)$: expected duration in activity by a person who is already inactive at age x

$e_{21}(x)$: expected duration in inactivity by a person who is already active at age x

$e_{22}(x)$: expected duration in activity by a person who is already active at age x

By employing the methodology described from Equation 1 to 29, transition rates are estimated and multistate working life tables are constructed for women in Turkey. Through this methodology, two general life tables are constructed using transition rates estimated directly from data and estimated through regression analysis. Then, multistate working life tables for women are constructed depending on the educational attainment and marital status; thus, two life tables are constructed for low educated and high educated women while three of them are estimated for never married, currently married, and formerly married women.

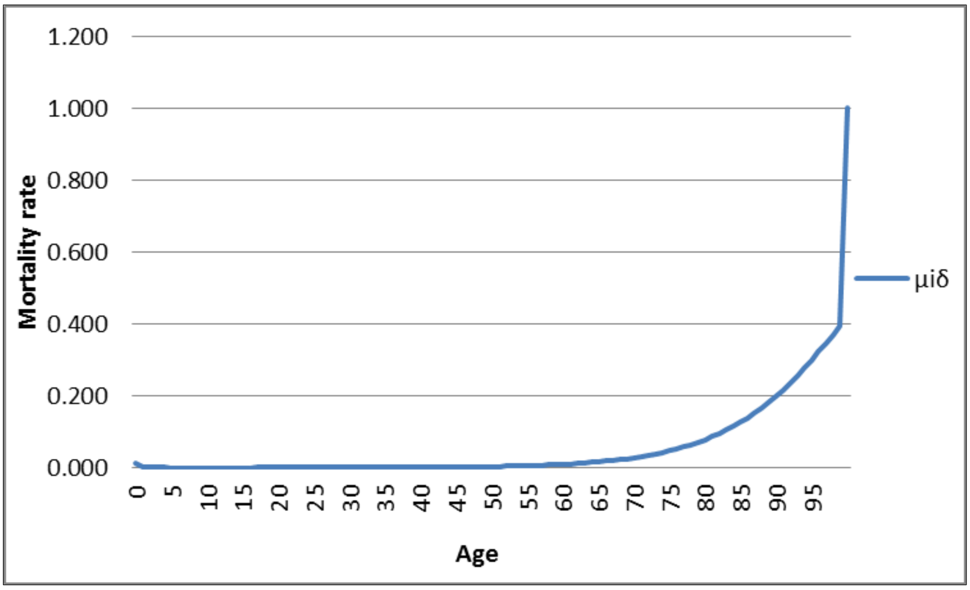
Finally, by controlling all variables at the same time, six life tables are constructed for each education and marital status group so 13 life tables are constructed in total the results of which are presented in the next section.

CHAPTER 4
ESTIMATION RESULTS

4.1. GENERAL WORKING LIFE TABLES

As explained in Section 3.2.1, multistate life table construction process starts with a single decrement life table in order to estimate age-specific mortality rates. By taking female infant mortality rate in 2009 as 13‰ published by TURKSTAT, age-specific mortality rates for Turkish women are estimated in MORTPAK Version 4.0 through Coale-Demeny West model life table. The results of single decrement life table are provided in Table A.1 and age-specific mortality rate schedule is given in Figure 4.1. Those mortality rates are equal to transition rate to death (i.e. $\mu_{i\delta}(x) \quad i=1,2$) which is used as an input of all multistate working life tables conducted in this study as well as general multistate working life tables whose results are provided in this section.

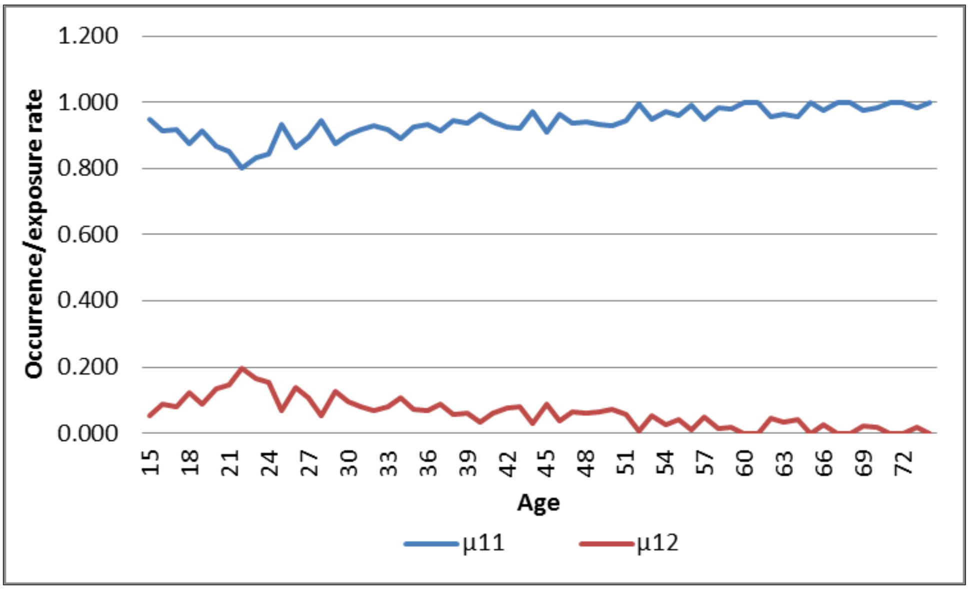
Figure 4.1: Age-specific mortality rates



Source: Author's calculations

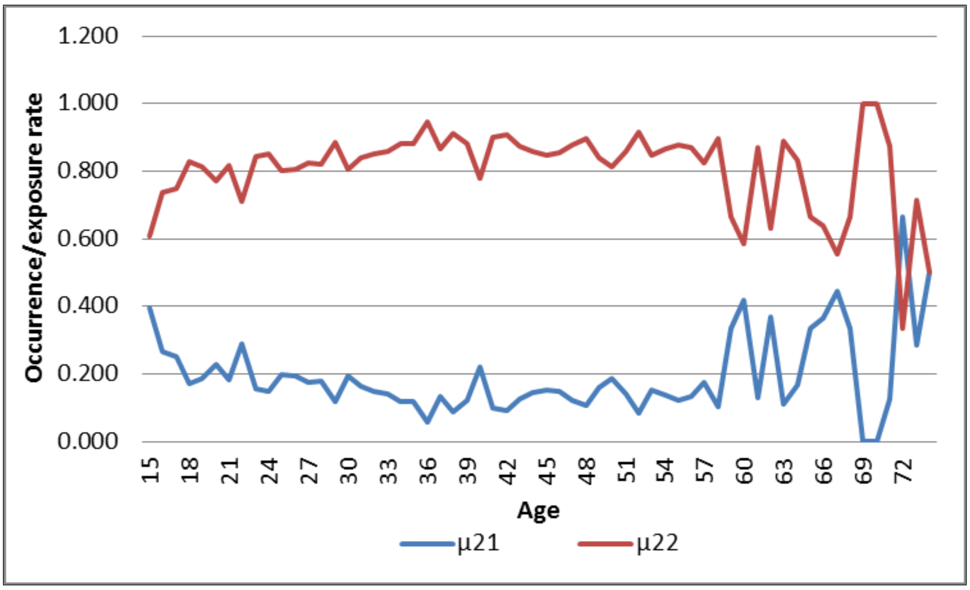
As mentioned in Section 3.2.1, one of the ways to estimate transition rates between states subject to study is direct estimation from the data in the form of occurrence/exposure rates. This method is used first in this thesis to construct a general multistate working life table for Turkish women irrespective of their marital status and educational attainment. Occurrence/exposure rates for women who are initially inactive and active are presented in Table A.2. as well as in Figure 4.2 and Figure 4.3, respectively.

Figure 4.2: Age-specific occurrence/exposure rates for inactive women



Source: Author's calculations

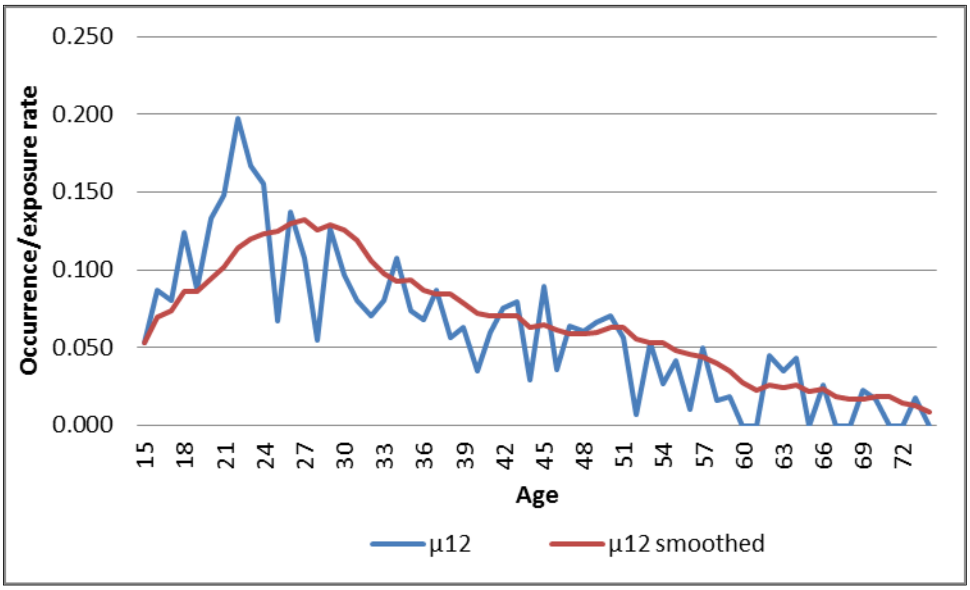
Figure 4.3: Age-specific occurrence/exposure rates for active women



Source: Author's calculations

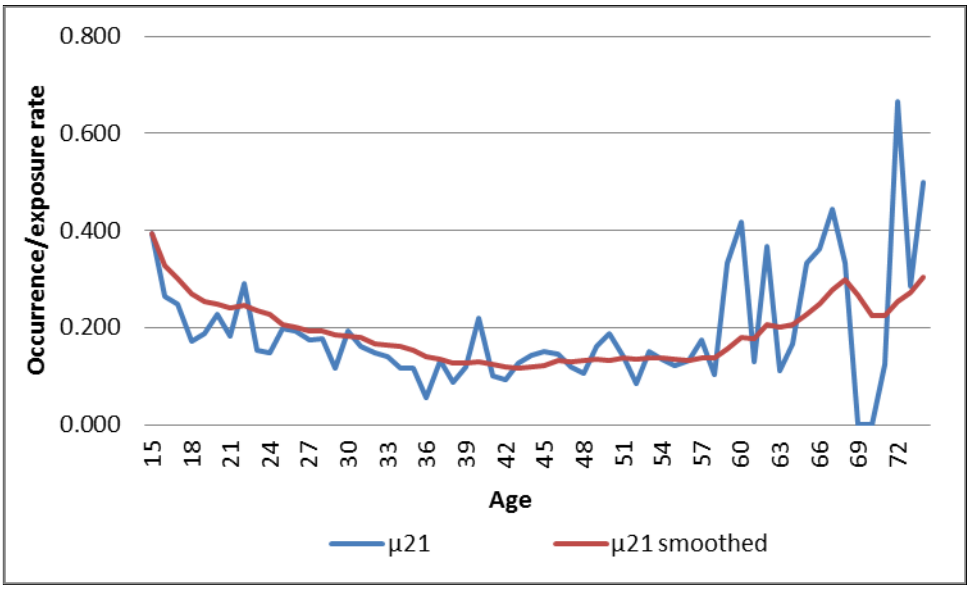
$\mu_{11}(x)$ which is the rate of remaining inactive for women who are already inactive is very high compared to $\mu_{12}(x)$ which is the rate of transition from inactivity to activity for women who are already inactive. It is observed that from mid-20s onwards, a declining trend in $\mu_{12}(x)$ establishes which means that labor force participations of women start to decline from mid-20s onwards. On the other hand, it is observed that $\mu_{22}(x)$ which is the rate of remaining in labor force for women who are initially active is very high compared to $\mu_{21}(x)$ which is the rate of transition from activity to inactivity for initially active women. Thus, those rates can be interpreted as that active women remain more attached to the labor market. A decisive increasing trend in exit rate (i.e. $\mu_{21}(x)$) for women in labor market establishes at the end of 50s. Nevertheless, those raw rates calculated directly from the data do not allow correctly interpreting labor market trends since those rates are vulnerable to stochastic variability due to sample as already indicated by the irregular schedules provided in Figure 4.2 and especially in Figure 4.3.

Figure 4.4: Smoothed accession rates



Source: Author's calculations

Figure 4.5: Smoothed exit rates



Source: Author's calculations

As mentioned in Section 3.2.1, graduation methods are used to eliminate the stochastic variability problem when transition rates are directly calculated from the data. In this thesis also, transition rates are smoothed by using 9-lag moving average and smoothed rates are provided in Table A.2. as well as in Figure 4.4 and Figure 4.5. As presented in Figure 4.4, inactive women's rate of accession to labor market increases between ages 15-30 and after that, the schedule exhibits a declining trend. Such a trend in labor market accession is expected in the sense that female labor force participation in Turkey reaches its highest values in the age group of 20-39. Nevertheless, bimodality of women's accession to labor market does not appear in this schedule. On the other hand, Figure 4.5 shows that age-specific exit rate schedule exhibits a smooth U-shape; that is, exit rates of active women are higher at the edges of the age distribution. Acceleration of exit rates at older ages is actually expected due to retirement. However, exit rates' being higher at younger ages might be also expected due to the fact that women participating into labor force at very young ages might have a lower educational attainment so number of drop-outs from labor market might be higher at those ages.

As mentioned in Section 3.2.1, another method to estimate transition rates is regression analysis. This procedure is also applied in this thesis so only age is included as a covariate into the female labor force participation model as presented in Equation 1 in order to estimate the effect of age on transitions separately so to construct a general multistate working life table for women in Turkey. Estimation results of the model provided in Equation 1 is as follows:

Table 4.1: Estimation results for Equation 1

	For inactive women in 2009		For active women in 2009	
	Coefficient	***exp*** $(\hat{a}_i)$	***Coefficient***	***exp*** $(\hat{a}_i)$
Age	0.04458** (-0.01775)	1.04559	0.10834* (0.01773)	1.11443
Age squared	-0.00112* (0.00024)	0.99888	-0.00132* (0.00021)	0.99868
Constant	-2.46629 (0.30173)	0.08490	-0.29950 (0.33530)	0.74119
Number of observations	7814		3515	
Pseudo R^2	0.0620		0.0132	

Source: Author's calculations

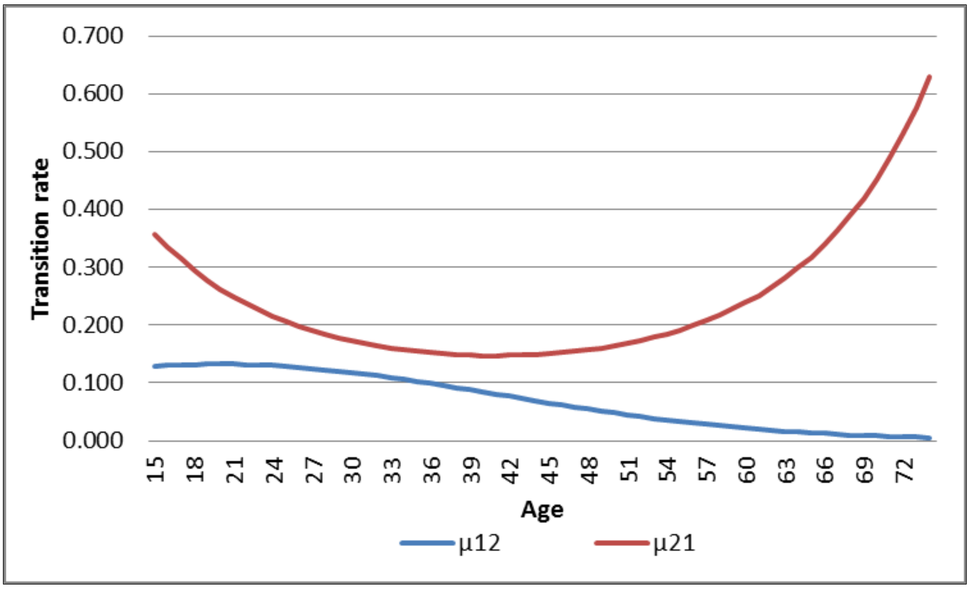
Notes: The dependent variables is a dummy indicating labor force participation of women in 2010.

*, **, *** *denote 1%, 5%, and 10% significance level, respectively.*

Robust standard errors are presented in parentheses.

The results provided in Table 4.1 confirm the quadratic distribution of age-specific female labor supply schedule since coefficients of age and age squared have significant positive and negative signs, respectively, as expected meaning that female labor supply increases first as age increases, then decreases. In terms of the impact of those variables on transition rates, the coefficients are interpreted such that if $exp(\hat{\alpha}_i) < 1$, then transition is depressed by the variable but if $exp(\hat{\alpha}_i) > 1$, then transition is amplified by the variable (Land et al. 1994). Thus, rate of transition from inactivity to activity is amplified by age and depressed by age squared meaning that $\mu_{12}(x)$ is expected to exhibit a similar distribution to inverse U-shape while $\mu_{21}(x)$ is expected to follow a similar distribution to U-shape as presented in Figure 4.6. Schedules presented in Figure 4.6 follow a more regular pattern compared to the schedules derived directly from the data so as suggested by Land et al. (1994), transition rates estimated from regressions are not required to be applied graduation techniques since those rates are already smoothed rates. All age-specific transition rates estimated based on those coefficients are provided in Table A.3.

Figure 4.6: Transition rates estimated from Equation 1



Source: Author's calculation

Results of general multistate working life table constructed based on only age-specific transition rates estimated directly from the data for Turkish women irrespective of educational attainment and marital status are provided in Appendix in Table A.2 while results of the working life table constructed through transition rates estimated from regression analysis are provided in Table A.3. Summary indicators on population based and state based working life expectancies are provided in Table 4.2 and Table 4.3, respectively.

As mentioned in Section 3.2.2, the measure called population based working life expectancy in the literature actually refers to working age population based life expectancy since sum of fraction of years spent in each state is corrected by probabilities of survival from the minimum age working life table starts (i.e. here age 15). On the other hand, those life expectancies are also corrected by probability of survival from birth up to age 15 to present average durations out of whole lifetime. In this respect, those life expectancies are called as working age population based and population based life expectancies in this study in order to express the differentiation between them in a more clear way.

Table 4.2: Population based life expectancies from general working life tables

	Based on transition rates estimated directly from the data				*Based on transition rates estimated from Equation 1*				*Total life expectancy*	
	Working age population based		*Population based*		*Working age population based*		*Population based*		*Working age population based*	*Population based*
Age	e_1	e_2	e_1	e_2	e_1	e_2	e_1	e_2	e^{Total}	e^{Total}
15	40.81	15.43	40.12	15.17	41.67	14.57	40.97	14.32	56.23	55.29
20	36.36	14.95	35.75	14.70	37.60	13.71	36.97	13.48	51.31	50.45
25	32.67	13.74	32.13	13.51	34.25	12.16	33.68	11.96	46.41	45.64
30	29.50	12.03	29.01	11.83	31.20	10.34	30.68	10.16	41.53	40.84
35	26.53	10.14	26.09	9.97	28.29	8.38	27.81	8.24	36.67	36.06
40	23.56	8.28	23.17	8.14	25.40	6.43	24.98	6.33	31.84	31.31
45	20.61	6.45	20.27	6.34	22.45	4.61	22.08	4.53	27.06	26.61
50	17.61	4.76	17.32	4.68	19.34	3.03	19.02	2.98	22.37	22.00
55	14.57	3.22	14.32	3.17	16.01	1.77	15.75	1.74	17.79	17.49
60	11.46	1.87	11.26	1.84	12.44	0.89	12.24	0.87	13.33	13.11
65	8.06	0.93	7.93	0.92	8.63	0.36	8.49	0.35	9.00	8.84
70	4.30	0.38	4.22	0.38	4.57	0.11	4.50	0.10	4.68	4.60

Source: Author's calculations

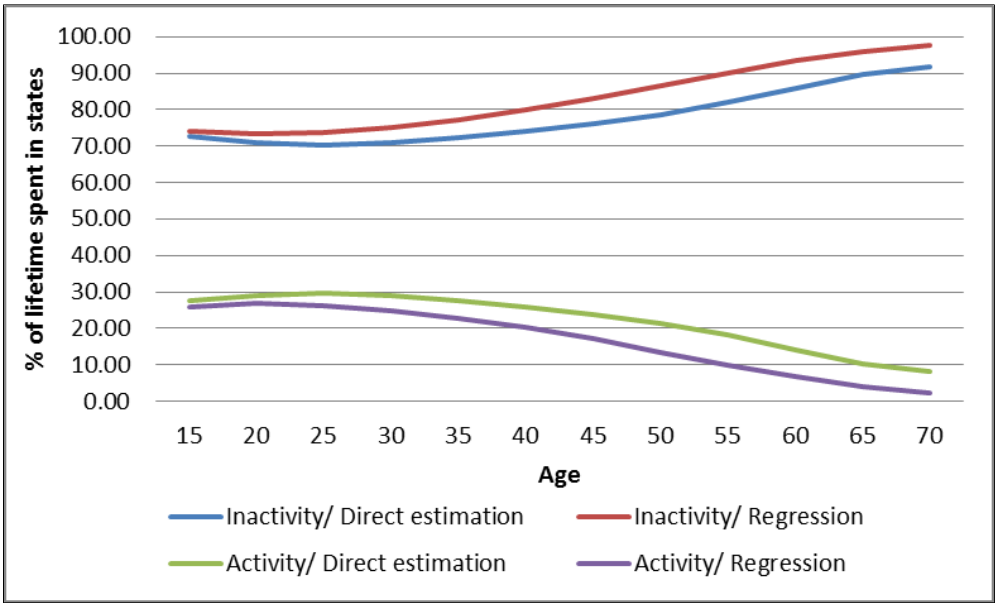
Table 4.3: State based life expectancies from general working life tables

	Based on transition rates estimated directly from the data				*Based on transition rates estimated from Equation 1*				
	Inactive		*Active*		*Inactive*		*Active*		*Total*
Age	e_1	e_2	e_1	e_2	e_1	e_2	e_1	e_2	e^{Total}
20	36.88	14.38	33.96	17.31	38.31	12.96	35.57	15.69	51.27
25	33.62	12.75	30.43	15.94	35.34	11.03	32.11	14.26	46.37
30	30.90	10.59	27.16	14.33	32.60	8.89	28.89	12.60	41.49
35	28.26	8.36	23.65	12.98	29.91	6.72	25.77	10.85	36.63
40	25.50	6.30	20.38	11.41	27.09	4.70	22.65	9.14	31.80
45	22.46	4.56	17.39	9.63	24.01	3.01	19.48	7.54	27.02
50	19.24	3.09	14.30	8.02	20.59	1.73	16.25	6.08	22.32
55	16.01	1.73	11.22	6.52	16.85	0.89	12.96	4.78	17.74
60	12.47	0.82	8.44	4.84	12.88	0.40	9.63	3.65	13.28
65	8.56	0.39	5.32	3.62	8.79	0.15	6.26	2.68	8.94
70	4.50	0.13	1.82	2.80	4.59	0.04	2.80	1.83	4.62

Source: Author's calculations

The estimates of total life expectancy from multistate life tables constructed by using transition rates estimated directly from the data and from the regression equation (i.e. Equation 1) are the same but estimates on active and inactive life expectancies change depending on the source of transition rates computed as presented in Table 4.2. Working age population based measures derived from multistate life table constructed by using transition rates estimated directly from the data reveal that women at age 15 expect to live 56.23 years from age 15 onwards and 40.81 years of that time period is expected to spent in inactivity while 15.43 years are expected to spent in activity on average. On the other hand, population based measures reflect duration in a state expected at birth so those figures reveal that an average woman in Turkey is expected to stay in inactivity for 40.12 years and in activity for 15.17 years at birth on average. Those figures are interpreted as that women at age 15 living in Turkey in 2009-2010 spend almost 73% of their potential working lifetime between ages 15-74 in inactivity while they spend almost 27% of their potential working lifetime in activity on average. Percentages of remaining lifetime spent in each state by age are presented in Figure 4.7. Those schedules estimated from multistate life table constructed through direct estimation of transition rates from the data reveal that percentage of remaining lifetime spent in activity increases up to mid-20s and remains stable between ages 25-30 and after 30, it starts to decline while percentage distribution of remaining lifetime in inactivity follows exactly the opposite pattern.

Figure 4.7: Percentage of remaining lifetime spent in each labor market state



Source: Author's calculations

On the other hand, working age population based measures derived from multistate life table constructed by using transition rates estimated through regression analysis also give similar values for durations in active and inactive states but duration in inactivity (activity) is higher (lower) by almost one year compared to the former method. According to the results of multistate life table constructed by using transition rates estimated through regression analysis, an average woman at age 15 expects to be out of labor force for 41.67 years and be in labor force 14.57 years in her remaining lifetime so almost 76% of her potential working lifetime is expected to spent in inactivity while only 26% of it is expected to spent in activity. As presented in Figure 4.7, percentages of remaining lifetime spent in activity (inactivity) estimated through this method slightly increases (decreases) up to 20s, remain stable around ages 20-25, and then, starts to decline (rise).

Another indicator produced from multistate life tables is state based life expectancies which indicate how average duration in each state changes by initial state occupied. State based expectancies are not calculated for age 15 since everyone starts working life as inactive at age 15 when constructing working life table. Working life table constructed by using transition rates estimated directly from data shows that a woman who is initially inactive at age 20 is expected to spend 36.88 years in inactivity and 14.38 years in activity on average. For an initially active woman at age 20, these measures are estimated as 33.96 and 17.31 years, respectively. On the other hand, estimates on state based expectancies in inactivity (activity) from general working life table constructed by using transition rates estimated through regression analysis are again higher (lower) compared to the former methodology. In any case, working life expectancy for initially active women is higher compared to that of initially inactive women and the impact of initial state on state based expectancies rises first as age increases, and then declines. Based on multistate life table constructed through transition rates estimated by using logit regression, for instance, the difference between active life expectancy for women who are initially active and inactive is 2.73 at age 20, 4.53 at age 45, and 3.61 at age 60. These figures reveal that once a woman participates into labor force, her labor force attachment increases; in other words, her active life expectancy increases and the importance of labor force attachment significantly appears at middle or late-middle ages. Such a finding is expected in the sense that a woman who does not have any working experience for longer and longer years experiences more difficulty in entering into the labor market compared to a younger woman who has a relatively shorter duration in inactivity or compared to a woman who has already some working experience for several years.

In brief, results of general multistate working life tables constructed in this thesis show that more than 70% of working lifetime of an average woman at age 15 in Turkey is expected to spend out of labor force. Such a finding is expected considering the low female labor force participation rate in Turkey. The two different methods applied to construct those tables produce slightly different results as already presented in Table 4.2 and Table 4.3. Also, Figure 4.7 clearly reveals the difference between the estimates produced by those methods such that estimated percentage of remaining lifetime spent in activity (inactivity) is lower (higher) in regression-based method compared to the method involving direct estimation of transition rates from the data and difference between them increases as age increases. This might be due to the fact that transition rates are smoothed by using moving average when direct estimation is used; that is, smoothing relies on the pattern observed in the age-specific transition rate schedule while transition rates are estimated through logit regressions by using sample weights in regression-based method; that is, smoothing relies on the patterns observed in population due to use of weights. Hence, it might be concluded that the latter method is more representative and more reliable to make inferences for population subject to study.

4.2. WORKING LIFE TABLES BY EDUCATIONAL ATTAINMENT

As mentioned in Section 2.1, educational attainment appears as an important determinant of female labor force participation in the literature so one of the aims of this thesis is to observe how differential educational attainment affects working life expectancies of women in Turkey by constructing multistate working life tables for each education group. In order to construct those tables, effect of educational attainment on rates of transitions between labor market states should be estimated. Those transition rates can be also estimated directly from the data as already performed in construction of one of the general working life tables in previous section. However, applying such a method means dividing the sample further by educational attainment besides labor market status which causes a decline in sample size in each subgroup. Thus, age-specific occurrence/exposure rate schedule is more vulnerable to stochastic variability and even if graduation techniques are applied, multistate life table statistics might be exposed to the risk of overestimation or underestimation under such a setting as observed in previous section. In this respect, regression-based method is preferred to estimate transition rates for each education group instead of direct estimation from the data since regression-based method provides easiness to estimate smoothed transition rates by controlling several covariates while preserving sample size.

In order to construct multistate working life tables for women living in Turkey in 2009-2010 by educational attainment, age-specific transition rates by each education group is computed by using the estimated coefficients in Equation 2 presented in Section 3.2.1. The estimation results for this logit regression equation are provided in Table 4.4.

Table 4.4: Estimation results for Equation 2

	For inactive women in 2009		For active women in 2009	
	Coefficient	$\exp(\hat{\beta}_i)$	***Coefficient***	$\exp(\hat{\beta}_i)$
Age	0.04493** (0.01796)	1.04595	0.10991* (0.01748)	1.11618
Age squared	-0.00109* (0.00024)	0.99891	-0.00130* (0.00021)	0.99870
High-educated	0.49565* (0.11048)	1.64156	0.36750* (0.11859)	1.44412
Constant	-2.63422* (0.30594)	0.07178	-0.50391 (0.33372)	0.60416
Number of observation	7814		3515	
Pseudo R^2	0.0676		0.0170	

Source: Author's calculations

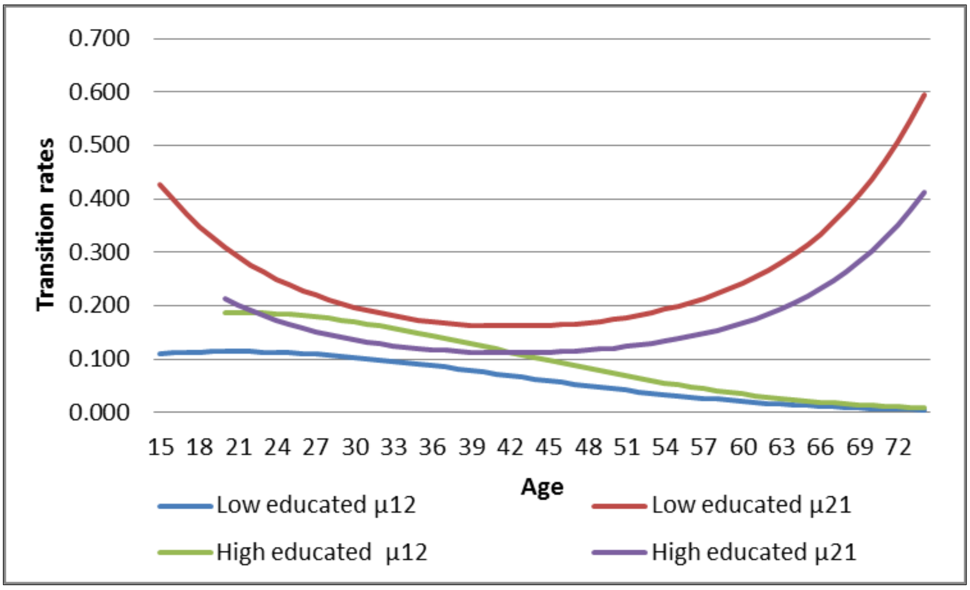
Notes: The dependent variables is a dummy indicating labor force participation of women in 2010.

, **, * denote 1%, 5%, and 10% significance level, respectively.*

Robust standard errors are presented in parentheses.

As already found in previous analysis, quadratic distribution of female labor supply schedule by age is again confirmed here since age and age squared have significant positive and negative coefficients, respectively. As indicated in Section 3.1 and Section 3.2.1, the variable called high-educated is a dummy variable taking "1" for women who have high school degree or above and its counterpart is another dummy taking "1" for women who have an educational attainment less than high school degree. Since both of those dummies cannot be introduced into the equation at the same time due to multicollinearity problem, low educated women are assigned as base group. Thus, coefficients of the variable called high-educated reflect position of high educated women relative to low educated women in terms of labor force participation. In both equations estimated for initially inactive and active women, coefficient of high-educated is positive and significant meaning that high educated women have higher probability of participating into labor force compared to low educated women as expected. $exp(\hat{\beta}_i)$ values computed from those coefficients are higher than one indicating that transition from inactivity to activity (i.e. μ_{12}) is amplified by higher education. In other words, probability of transition from activity to inactivity (i.e. μ_{21}) is depressed as educational attainment increases.

Figure 4.8: Transition rates estimated from Equation 2



Source: Author's calculations

Transition rates computed using estimated coefficients from Equation 2 are presented in Figure 4.8. Transition rates are estimated for higher educated women from age 20 onwards considering that graduation from high school which is the lowest degree in this education group most probably occurs at the end of teen ages. As expected, transition rate from inactivity to activity is higher for higher educated women than for lower educated women in all age groups except very old ages. On the other hand, transition rate from activity to inactivity is lower for high educated women relative to low educated women in all age groups as expected.

Results of multistate working life tables estimated based on those transition rates are provided in Table A.4 which presents results for low educated women and in Table A.5 which shows results for high educated women. Summary indicators of those tables are presented in Table 4.5 and in Table 4.6.

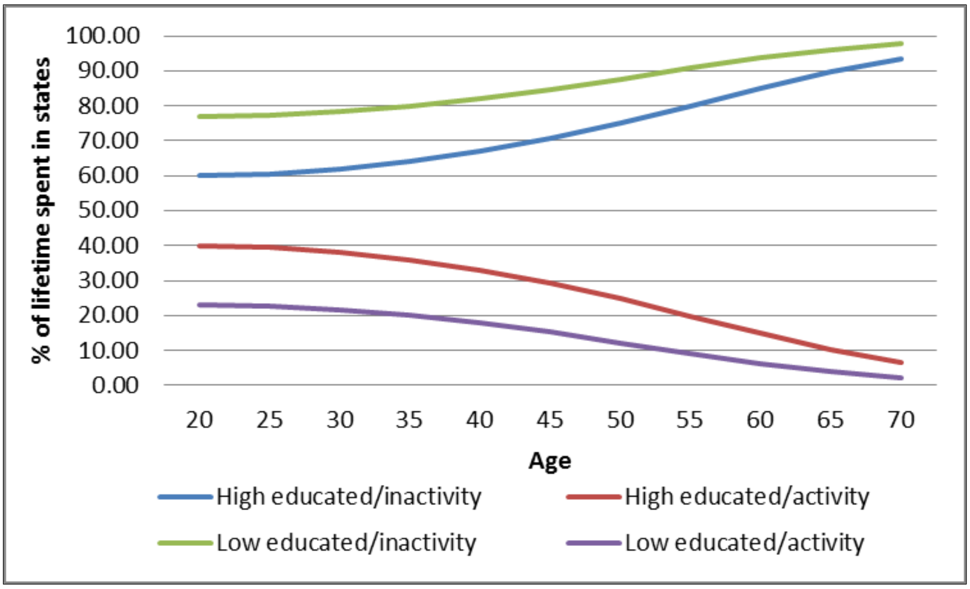
Table 4.5: Population based life expectancies from working life tables by education

	High Educated				*Low Educated*				*Total life expectancy*	
	Working age population based		*Population based*		*Working age population based*		*Population based*		*Working age population based*	*Population based*
Age	e_1	e_2	e_1	e_2	e_1	e_2	e_1	e_2	e^{Total}	e^{Total}
15					43.74	12.50	43.00	12.29	56.23	55.29
20	30.80	20.52	30.28	20.17	39.51	11.80	38.85	11.60	51.31	50.45
25	28.06	18.35	27.59	18.04	35.88	10.53	35.28	10.36	46.41	45.64
30	25.69	15.85	25.26	15.58	32.51	9.02	31.97	8.87	41.53	40.84
35	23.49	13.18	23.10	12.96	29.30	7.37	28.81	7.25	36.67	36.06
40	21.36	10.48	21.00	10.31	26.14	5.70	25.70	5.61	31.84	31.31
45	19.16	7.90	18.84	7.77	22.94	4.12	22.56	4.05	27.06	26.61
50	16.82	5.55	16.54	5.46	19.63	2.74	19.30	2.69	22.37	22.00
55	14.24	3.55	14.00	3.49	16.16	1.63	15.89	1.60	17.79	17.49
60	11.34	1.99	11.15	1.96	12.49	0.84	12.28	0.82	13.33	13.11
65	8.07	0.93	7.93	0.91	8.64	0.35	8.50	0.35	9.00	8.84
70	4.37	0.31	4.30	0.30	4.57	0.11	4.49	0.11	4.68	4.60

Source: Author's calculations

Table 4.5 presents population based life expectancies. As mentioned, life expectancies below age 20 are not calculated for high educated women considering the age at which a woman can graduate from high school. According to those estimates, expected duration in inactivity is higher for a low educated woman than for a high educated woman at age 20 by almost 9 years; in other words, a high educated woman at age 20 is expected to have an active life expectancy by 9 years more than a low educated woman. A high educated woman at age 20 is expected to spend almost 40% of her remaining lifetime in labor market while this ratio is 23% for a low educated woman at the same age on average. It is observed that working life expectancies for high educated women are higher than low educated women in all age groups but the difference is more visible at early ages since percentage of average lifetime spent in activity decreases as age increases as presented in Figure 4.9.

Figure 4.9: Percentage of remaining lifetime spent in each labor market state by education



Source: Author's calculations

Table 4.6: State based life expectancies from working life tables by education

	Low educated				*High educated*				
	Inactive		*Active*		*Inactive*		*Active*		*Total*
Age	e_1	e_2	e_1	e_2	e_1	e_2	e_1	e_2	e^{Total}
20	40.04	11.22	37.48	13.79	31.79	19.48	29.13	22.13	51.27
25	36.73	9.64	33.64	12.73	29.52	16.85	26.45	19.92	46.37
30	33.64	7.85	30.06	11.43	27.54	13.95	24.01	17.48	41.49
35	30.63	6.00	26.62	10.01	25.69	10.94	21.66	14.97	36.63
40	27.55	4.25	23.23	8.56	23.79	8.01	19.27	12.53	31.80
45	24.26	2.76	19.85	7.17	21.64	5.38	16.76	10.26	27.02
50	20.70	1.63	16.45	5.87	19.05	3.27	14.10	8.23	22.32
55	16.88	0.86	13.04	4.70	15.97	1.77	11.29	6.45	17.74
60	12.89	0.40	9.64	3.64	12.46	0.83	8.36	4.92	13.28
65	8.79	0.15	6.23	2.72	8.63	0.32	5.34	3.61	8.94
70	4.58	0.04	2.75	1.88	4.55	0.08	2.25	2.37	4.62

Source: Author's calculations

Table 4.6 presents state based life expectancies obtained from multistate working life tables by educational attainment. Similar to the results provided in previous section, it is observed that initially active women have higher working life expectancy compared to initially inactive women in both education categories. Thus, it might be concluded that labor force attachment is important for a woman to have longer years of active life irrespective of educational attainment.

In brief, it is observed that women with higher level of education have longer active life expectancy compared to women who have lower educational attainment. Such a result is expected in the sense that education is one of the most important determinants of female labor force participation. As estimation results of Equation 2 indicate, higher educational attainment increases the probability of women to participate in to labor force; thus, it has a positive impact on working life expectancy of women.

4.3. WORKING LIFE TABLES BY MARITAL STATUS

As mentioned in Section 2.1, marital status appears as another most important determinant of female labor supply decision. In this respect, one of the aims of this thesis is to measure the impact of marital status on female working life expectancy in Turkey. Transition rates for each marital status group are also estimated by using regression-based method instead of direct computation from the data due to the reasons mentioned in previous section.

In order to construct multistate working life tables for women living in Turkey in 2009-2010 by marital status, transition rates are computed from the coefficients estimated in Equation 3 which involves marital status variables as covariates. The estimation results for the logit regression equation provided in Equation 3 in Section 3.2.1 are presented in Table 4.7.

As mentioned earlier, marital status variable is defined as a dummy set for never married, currently married, and formerly married women. Since all dummy variables in the set cannot be included to the regression equation due to multicollinearity problem, never married women are selected as the base group so coefficients of variables called currently married and formerly married reflect the position of those women relative to never married women in terms of labor force participation.

Table 4.7: Estimation results for Equation 3

	For inactive women in 2009		***For active women in 2009***	
	Coefficient	$exp(\hat{\gamma}_i)$	***Coefficient***	$exp(\hat{\gamma}_i)$
Age	0.09201* (0.02345)	1.09637	0.13864* (0.02120)	1.14871
Age squared	-0.00168* (0.00032)	0.99832	-0.00160* (0.00024)	0.99840
Currently married	-0.49110* (0.14853)	0.61195	-0.44409* (0.15751)	0.64141
Formerly married	0.04522 (0.26534)	1.04626	-0.54487** (0.23049)	0.57992
Constant	-2.99286* (0.34646)	0.05014	-0.64305*** (0.36211)	0.52569
Number of observations	7814		3515	
Pseudo R^2	0.0667		0.0168	

Source: Author's calculations

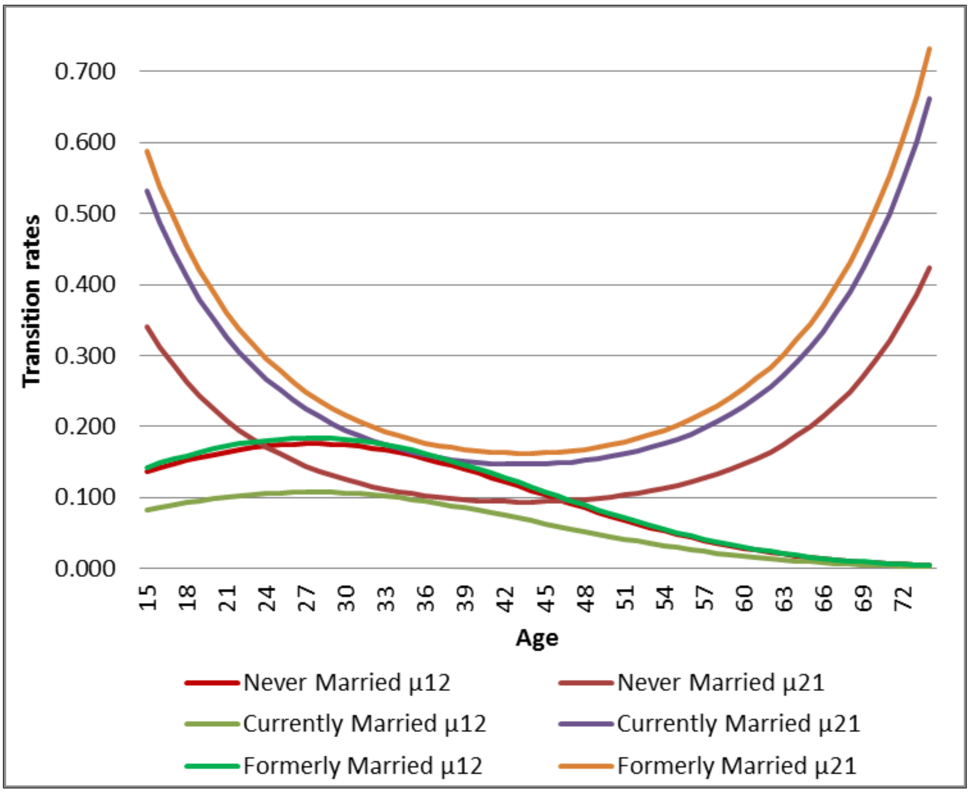
Notes: The dependent variables is a dummy indicating labor force participation of women in 2010.

*, **, *** *denote 1%, 5%, and 10% significance level, respectively.*

Robust standard errors are presented in parentheses.

The results provided in Table 4.7 reveal that marriage has a negative impact on female labor supply. As expected, the coefficient of variable called currently married is significant and negative in both equations estimated and $exp(\hat{\gamma}_i)$ values for those coefficients are lower than one meaning that being married decreases the probability of a woman to participate into labor force compared to never married women. On the other hand, being formerly married has a positive coefficient but it is insignificant. Actually, it is expected that being divorced increases the probability of a woman to participate into labor force but being widowed might not have such a direct effect on female labor supply considering that widowed women concentrate in old ages at which labor force participation declines. As mentioned in section 3.1, number of observations for divorced women is very low in the data set used so the group of formerly married women is constructed by classifying women who are divorced, widowed and living separately from their partner in one category. Such a definition might be the reason of this insignificant coefficient found in regression constructed for initially inactive women. On the other hand, in regression equation estimated for initially active women, the coefficient of being formerly married is found as negative and significant at 5% significance level. Again, such a finding might be due to the definition of formerly married group. As mentioned in Section 3.1, number of widowed women is high compared to divorced women in the sample so the group of formerly married is dominated by widowed women who have a tendency to drop out of labor force due to their ages. Categorization of divorced and widowed women who have different labor supply behaviors in one group might cause such ambiguous coefficients.

Figure 4.10: Transition rates estimated from Equation 3



Source: Author's calculations

Transition rates estimated from Equation 3 for each marital status group are presented in Figure 4.10. Those rates also reflect the coefficients estimated in the sense that a significant difference does not appear between accession rates of never married and formerly married women. However, accession rate of currently married women is significantly lower than that of other groups. Furthermore, never married women have the lowest exit rates in all age groups. However, it is observed that exit rate of formerly married women is slightly higher than the exit rate of currently married women which reflect the significant negative coefficient of variable called formerly married in Equation 3 estimated for initially active women. As mentioned, this slightly higher rate of exit observed among formerly married women compared to currently married women is the result of number of widowed women's being higher in the not married group.

Table 4.8: Working age population based life expectancies from working life tables by marital status

	Never married		*Currently married*		*Formerly married*		*Total*
Age	e_1	e_2	e_1	e_2	e_1	e_2	e^{Total}
15	33.73	22.51	43.68	12.56	39.48	16.75	56.23
20	29.75	21.56	39.27	12.04	35.35	15.96	51.31
25	26.76	19.66	35.41	11.00	31.94	14.47	46.41
30	24.30	17.23	31.93	9.61	28.97	12.56	41.53
35	22.19	14.49	28.71	7.96	26.31	10.36	36.67
40	20.24	11.60	25.65	6.19	23.78	8.06	31.84
45	18.30	8.76	22.61	4.45	21.25	5.81	27.06
50	16.24	6.13	19.47	2.90	18.56	3.81	22.37
55	13.92	3.87	16.13	1.66	15.59	2.19	17.79
60	11.23	2.10	12.54	0.79	12.28	1.05	13.33
65	8.08	0.91	8.70	0.29	8.60	0.39	9.00
70	4.41	0.27	4.61	0.07	4.58	0.10	4.68

Source: Author's calculations

In Table 4.8, only working age population based life expectancies are provided to ease the presentation of the table here but the whole results of working life tables by marital status are provided in Table A.6 for never married women, in Table A.7 for currently married women, and in Table A.8 for formerly married women. According to results provided in Table 4.8, never married women have the longest working life expectancy at all ages. Never married women at age 15 are expected to remain in labor force by almost 10 years more than currently married women at age 15. On the other hand, a formerly married woman at age 40 is expected to be in the labor force by 3.5 years less than a never married women at the same age and by almost 2 years more than a currently married woman at the same age.

State based life expectancies are presented in Table 4.9. These results also show that working life expectancy of currently married women is lower than never married and formerly married women. In addition, it is again observed that initially active women have higher active life expectancy than initially inactive women irrespective of marital status.

Table 4.9: State based life expectancies from working life tables by marital status

	Never married				***Currently married***				***Formerly married***				***Total***
	Inactive		*Active*		*Inactive*		*Active*		*Inactive*		*Active*		
Age	e_1	e_2	e_1	e_2	e_1	e_2	e_1	e_2	e_1	e_2	e_1	e_2	e^{Total}
20	30.60	20.66	27.84	23.43	39.65	11.62	37.21	14.06	35.79	15.47	33.89	17.37	51.27
25	28.16	18.21	24.98	21.39	36.14	10.23	33.09	13.28	32.71	13.66	30.42	15.95	46.37
30	26.20	15.29	22.59	18.90	33.02	8.47	29.42	12.07	30.06	11.43	27.40	14.09	41.49
35	24.57	12.06	20.41	16.22	30.13	6.50	26.02	10.61	27.69	8.94	24.63	11.99	36.63
40	23.03	8.76	18.25	13.54	27.25	4.55	22.74	9.05	25.37	6.42	21.92	9.88	31.80
45	21.29	5.72	15.98	11.04	24.17	2.85	19.49	7.53	22.87	4.15	19.11	7.91	27.02
50	19.04	3.28	13.53	8.79	20.75	1.57	16.21	6.11	19.97	2.35	16.14	6.18	22.32
55	16.12	1.62	10.90	6.84	16.99	0.75	12.92	4.82	16.59	1.15	13.02	4.72	17.74
60	12.61	0.67	8.13	5.15	12.98	0.31	9.61	3.67	12.81	0.48	9.78	3.51	13.28
65	8.72	0.22	5.24	3.71	8.84	0.10	6.27	2.67	8.78	0.16	6.44	2.51	8.94
70	4.58	0.05	2.24	2.38	4.60	0.02	2.83	1.79	4.59	0.04	2.95	1.67	4.62

Source: Author's calculations

In brief, it is found that marriage has a negative impact on duration in labor market. Such a finding is expected since marriage brings women several responsibilities such as childcare and chores so it is expected to decline the probability of a woman to participate into labor force as already mentioned in Section 2.1.1. Such a finding is in line with relatively low female labor force participation rate among married women observed in Turkey. Interestingly, working life expectancy of formerly married women is found longer than currently married women. Actually, such a result is expected if the group of formerly married women consists of divorced women. However, as already mentioned, formerly married group also consists of widowed women; thus, estimated coefficients in Equation 3 give ambiguous results. The reason of finding such a result might be that accession rates estimated for formerly married women are higher compared to currently married women. Nevertheless, it should be noted that estimated coefficient for formerly married women used in computation of accession rates of them is found insignificant. In this respect, results for formerly married women should be examined with caution considering the insignificancy of the coefficient and the definition of formerly married group.

4.4. WORKING LIFE TABLES BY EDUCATION AND MARRIAGE

As mentioned earlier, one of the advantages of regression-based method used to estimate transition rates is that it allows controlling several covariates at the same time and constructing multistate life tables for highly refined population subgroups. In this respect, six multistate working life tables are constructed in this thesis for the following subgroups of population defined by marital status and educational attainment.

- Low educated never married women
- Low educated currently married women
- Low educated formerly married women
- High educated never married women
- High educated currently married women
- High educated formerly married women

Table 4.10: Estimation results for Equation 4

	For inactive women in 2009		***For active women in 2009***	
	Coefficient	***exp (θ_i)***	***Coefficient***	***exp (θ_i)***
Age	0.085704* (0.023332)	1.089484	0.134789* (0.021148)	1.144295
Age squared	-0.00158* (0.000313)	0.998417	-0.00153* (0.000244)	0.998474
Currently married	-0.41494* (0.145174)	0.660378	-0.37035** (0.161931)	0.690491
Formerly married	0.105326 (0.265467)	1.111073	-0.49004** (0.231327)	0.612599
High educated	0.453935* (0.109094)	1.574496	0.314716* (0.119957)	1.36987
Constant	-3.07485* (0.349098)	0.046196	-0.75759** (0.35786)	0.468795
Number of observations	7814		3515	
Pseudo R^2	0.0713		0.0194	

Source: Author's calculations

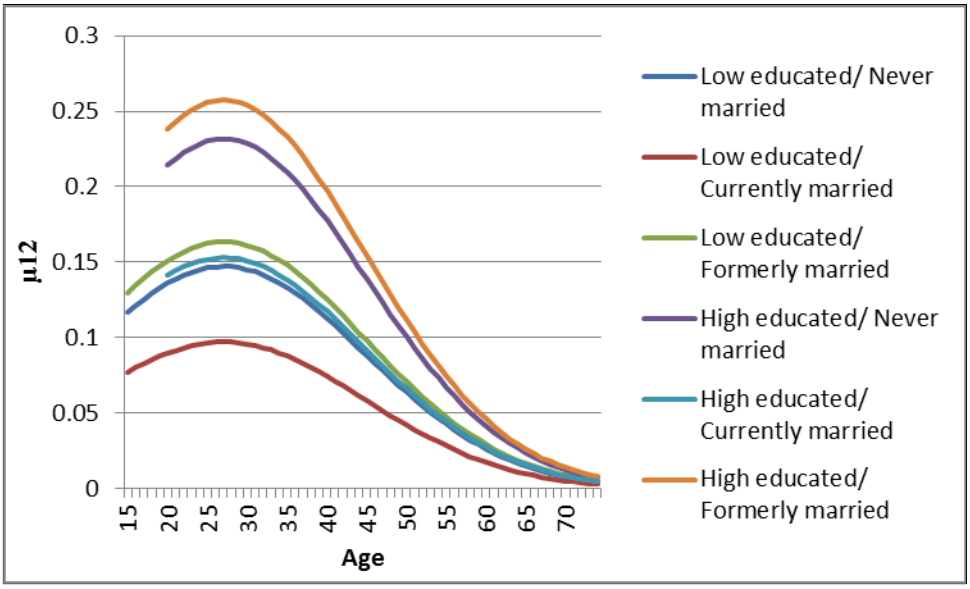
Notes: The dependent variables is a dummy indicating labor force participation of women in 2010.

, **, * denote 1%, 5%, and 10% significance level, respectively.*

Robust standard errors are presented in parentheses.

In order to estimate transition rates by controlling the effects of education and marital status at the same time, Equation 4 mentioned in Section 3.2.1 is estimated and results are provided in Table 4.10. Similar to the estimation results of Equation 2 and Equation 3, being married has a negative impact on probability of a woman to participate into labor force while education has a positive impact. The coefficient of being formerly married is found positive but insignificant in estimations conducted for initially inactive women while it is found negative and significant at 5% significance level in estimations conducted for initially active women. As mentioned in previous section, the definition of formerly married group might result in such ambiguous results for the effect being formerly married on female labor force participation.

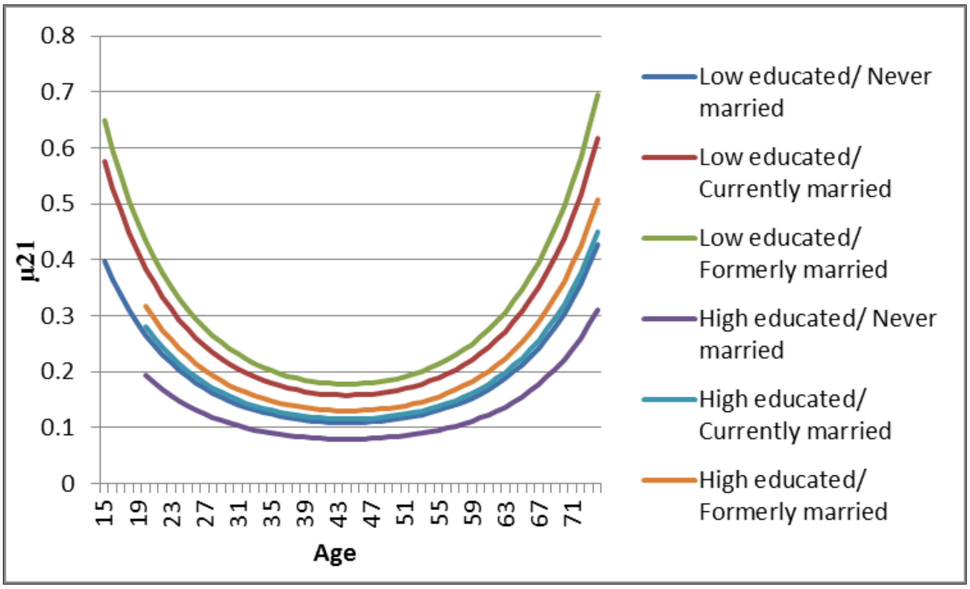
Figure 4.11: Rates of transition from inactivity to activity by education and marital status



Source: Author's calculations

Based on these estimated coefficients, rates of transition from inactivity to activity are provided in Figure 4.11. Low educated currently married women have the lowest transition rate as expected since this group of women is the most disadvantageous group in terms of labor force participation considering the negative impacts of being low educated and being married. On the other hand, high educated formerly married women have the highest transition rate and this result is also expected considering positive coefficients found for these variables in Equation 4 estimated for initially inactive women. Interestingly, it is observed that transition of high educated currently married women to labor market is lower than that of low educated formerly married women. Considering the coefficients found for the variables called married and high educated, this result might be interpreted as negative impact of marriage neutralizes the positive impact of being high educated in terms of labor supply decision.

Figure 4.12: Rates of transition from activity to inactivity by education and marital status



Source: Author's calculations

Figure 4.12 presents rates of transition from activity to inactivity estimated for each subgroup. As expected, high educated never married women have the lowest exit rate since this group of women is not exposed to the negative impacts of being married and low educated in terms of labor market activity. On the other hand, low educated formerly married women have the highest exit rate as a result of negative significant coefficient found for the variable called formerly married in Equation 4 estimated for initially active women. Observing the highest exit rate for this group is expected considering the domination of widowed women who are relatively at old ages in the formerly married group. This effect is also visible in exit rates of high educated formerly married women.

Whole results of multistate working life tables estimated for each subgroup listed earlier are provided in Table A.9 - Table A.14. In order to ease the tabulation, only working age population based life expectancies computed for each subgroup are presented in Table 4.11.

Table 4.11: Working age population based life expectancies from working life tables by education and marital status

	Low educated						*High educated*						*Total*
	Never married		*Currently married*		*Formerly married*		*Never married*		*Currently married*		*Formerly married*		
Age	e_1	e_2	e_1	e_2	e_1	e_2	e_1	e_2	e_1	e_2	e_1	e_2	e^{Total}
15	37.2	19.0	45.1	11.2	41.4	14.8							56.2
20	33.1	18.2	40.6	10.7	37.2	14.1	24.4	26.9	33.3	18.0	29.2	22.2	51.3
25	29.7	16.7	36.6	9.8	33.6	12.8	22.0	24.4	30.0	16.5	26.4	20.1	46.4
30	26.9	14.6	33.0	8.6	30.4	11.2	20.0	21.5	27.1	14.4	24.0	17.5	41.5
35	24.3	12.3	29.5	7.1	27.4	9.2	18.4	18.2	24.5	12.1	22.0	14.6	36.7
40	22.0	9.9	26.3	5.6	24.6	7.2	17.0	14.9	22.2	9.7	20.2	11.7	31.8
45	19.6	7.4	23.0	4.0	21.9	5.2	15.5	11.5	19.8	7.2	18.3	8.8	27.1
50	17.2	5.2	19.7	2.7	18.9	3.4	14.0	8.4	17.4	5.0	16.3	6.1	22.4
55	14.6	3.2	16.2	1.5	15.8	2.0	12.2	5.6	14.7	3.1	14.0	3.8	17.8
60	11.6	1.7	12.6	0.8	12.4	1.0	10.0	3.3	11.7	1.7	11.3	2.1	13.3
65	8.2	0.8	8.7	0.3	8.6	0.4	7.4	1.6	8.3	0.7	8.1	0.9	9.0
70	4.4	0.2	4.6	0.1	4.6	0.1	4.1	0.6	4.5	0.2	4.4	0.3	4.7

Source: Author's calculations

The results provided in Table 4.11 reveal that low educated currently married women have the shortest active life expectancy while high educated never married women have the longest compared to other subgroups. Such results are expected considering the positive impact of education and the negative impact of marriage on female labor force participation. According to those results, a low educated currently married woman at age 20 spends 79% of her remaining lifetime in inactivity while it is 48% for a high educated never married woman.

Once more, those results indicate the positive impact of education and negative impact of being married on female labor force attachment. The multistate working life tables constructed for each of those subgroups show the combined impact of those variables on female working life expectancy and the results are in line with the expectations. Nevertheless, it should be again noted that average durations in each state computed for formerly married women should be examined with caution considering the definition of the group and the ambiguous effect of this variable observed in estimation results of Equation 4.

CHAPTER 5
CONCLUSION AND DISCUSSION

As already mentioned in Section 2.1.2, female labor force participation in Turkey is very low compared to OECD countries and countries in upper middle income group where Turkey is classified by World Bank (World Bank 2013) with a rate of 29.50% in 2012 according to the results of Household Labor Force Survey conducted by TURKSTAT in 2012. In addition, similar to the evidence provided in the literature, female labor force participation rates in Turkey exhibit significant differences across education and marital status groups as presented in Section 2.1.2. These facts are the main motivation of this thesis which aims to analyze female labor supply behavior in Turkey through multistate working life table methodology.

Considering the aim of this thesis, multistate working life tables for women in Turkey are constructed by educational attainment and marital status groups by using the data of Income and Living Conditions Survey which is a panel survey conducted by TURKSTAT in 2009-2010. The results provided in Chapter 4 reveal that

- Based on the estimates of general multistate working life tables, an average woman in Turkey at age 15 is expected to be in labor force around 15 years; that is, an average Turkish woman at age 15 is expected to spend 27% (i.e. 15 years out of 56 years which is the total life expectancy estimated at age 15) of her remaining lifetime as active. Since labor market states are defined as being in and out of labor force, female labor force participation rates are important in terms of working life expectancy and considering that female labor force participation rate is very low in Turkey, such a short result for active life expectancy is expected.
- Based on the estimates of multistate working life tables constructed by educational attainment, an average low educated woman in Turkey at age 20 is expected to be in labor force around 12 years while it is around 21 years for a high educated woman at the same age; that is, being high educated increases working life expectancy by almost 9 years. These results confirm that women who have higher educational attainment have a tendency to be more attached to labor force since education increases the earning power of them in the

market; thus, it is observed that education has a positive impact on active life expectancy as expected.

- Based on the estimates of multistate working life tables constructed by marital status, an average currently married woman in Turkey at age 15 is expected to be in labor force around 13 years while an average never married woman at the same age is expected to be in labor force for 23 years. It is also observed that working life expectancies of formerly married women are higher than currently married women but lower than never married women at all ages. As mentioned in Section 2.1.1, marriage is expected to bring responsibilities to women related to childcare and chores and additionally, provides an economic security for women. In this respect, those findings are in line with the expectations.
- Through multistate working life tables constructed by controlling educational attainment and marital status at the same time, combined effects of those two variables on female working life expectancy are also revealed in this study. According to the results provided in Section 4.4, the longest working life expectancy belongs to high educated never married women while the shortest working life expectancy is observed in the group of low educated currently married women as expected. The difference of active life expectancy at age 20 between these groups of women is about 16 years which reflect the combined effect of educational attainment and marital status.
- State based working life expectancies show that initially active women have longer working life expectancy compared to initially inactive women at all ages irrespective of marital status and educational attainment. This result reveals that women who already have a labor force attachment is expected to stay in labor force for longer years most probably by benefitting the advantage of having work experience.

When compared to the theoretical framework proposed by Mincer (1962) and Becker (1965) and to the descriptive statistics provided in Section 2.1.2 related to the structure of female labor force participation in Turkey, the findings of this study are in line with the expectations such that positive impact of higher education and negative impact of being married on female labor supply behavior is confirmed by working life expectancies computed through multistate working life tables.

Those results have several policy implications. Firstly, it is evident that higher education is an important determinant of female labor force participation as well as women's working life expectancy. In this respect, women's education, especially women's access to higher education, should be addressed in education policies implemented by the state. Furthermore, it is found that being married has a negative impact on female working life expectancy. This is mostly due to the fact that fertility is strongly related with marriage in Turkey (Ergöçmen et al. 2009) and traditional division of labor is persistent in Turkish families so childcare and chores are accounted as the main responsibilities of women (Ercan et al. 2010). Besides, childcare is not sufficiently institutionalized in Turkey (Tansel 2012) so those factors increase the opportunity cost of working in the market in terms of working in home especially for low educated urban women. In order to remove these barriers, a possible policy implementation might be that access to childcare facilities by mothers should be supported not only by public but also by private sector. Nevertheless, gender based discrimination both in home and in labor market cannot be easily removed with policies implemented in the short run but education might be also important in the long run in elimination of those traditional views which negatively affect women's working life.

In terms of analysis carried out, this thesis has several limitations. First of all, the estimations provided for formerly married women should be examined with caution as mentioned earlier. As mentioned in Section 3.1, the group of formerly married women is constructed by classifying women who are widowed and divorced. It is observed that number of observations belonging to widowed women is higher compared to divorced women in the data. As already mentioned in Section 3.1, it is expected that such a definition might result in ambiguous results related to the effect of being formerly married on labor supply behavior since labor force participations of those groups of women are very different than each other. Widowed women concentrate at older ages at which tendency of exit from labor market increases while divorced women are relatively at younger ages so might participate into labor force more. This concern becomes visible in estimation results of Equation 3 and Equation 4. In regression equations estimated for initially inactive women, coefficient of the variable called formerly married is positive but insignificant while it is negative and significant in estimations conducted for initially active women. If the group consisted of only divorced women, then working life expectancies computed for this group would be meaningful but under these conditions, making reliable interpretations based on those findings for formerly married women does not seem possible. In this respect, this is a limitation of this study related to estimations.

Furthermore, as mentioned in Section 2.1.2, characteristics of female labor force participation in Turkey exhibit differences by rural/urban settlement due to the sectoral allocation of economies in rural and urban areas. The impact of sectoral allocation is also visible when regional female labor force participation rates are taken into account. For instance, female labor force participation rate in 2012 is 28.6% and 30.3% in İstanbul and East Marmara regions, respectively, where manufacturing and services sectors dominate the economy while this rate is 43.1% in East Black Sea region where agriculture is the main economic activity (TURKSTAT 2013). However, this thesis concentrates on two factors which are education and marital status but as mentioned so far, those variables might not be as important for women living in rural areas as for women living in urban areas considering that agriculture is the main economic activity in rural areas and it is much more easy to reconcile working in farm with working in home in agricultural sector compared to other sectors dominating urban economies such as manufacturing and services. If the analyses carried out in this study were extended further by including urban/rural and regional settlement dimensions, working life expectancy would be most probably observed higher for women living in rural areas and living in regions where agriculture is the main economic activity and the magnitude of impacts of education and marital status would be lower than the magnitude observed in this thesis. In this respect, this point constitutes an important limitation. Performing the analyses in this study by including rural/urban and regional settlement dimensions might be, therefore, a promising extension of this study.

As mentioned in Section 2.2 and Section 2.3, multistate life table methodology is the best technique among the existing methods so multistate methodology is preferred in this study due to mainly two reasons. First of all, the aim of this study is to analyze female labor supply behavior in Turkey through life table technique so there are actually two alternative methods in order to perform these analyses. One alternative is conventional working life tables based on increment-decrement methodology which requires unimodality assumption; that is, female labor supply schedule should follow a regular distribution with a single peak. Nevertheless, female labor supply behavior does not follow such a regular distribution; instead, it exhibits bimodality as already observed in Turkey provided in Figure 3.2. In this method, only net entries and net exits can be observed due to unimodality assumption and working life expectancies can be overestimated due to artificially changing labor force participation rates in age groups under modal age. However, in multistate methodology, such an assumption is not required and all entries and exits can be observed; in this respect, this method is preferred since it is more suitable to study on women's labor supply behavior. The second reason is that multistate methodology allows estimating transition rates through regression analysis. Regression analysis provides smoothed transition rates and also allows controlling several covariates which are expected to affect transition rates. Since one of the aims of this thesis is to analyze changes in female working life expectancy by education and marital status, using regression analysis is advantageous to estimate transition rates by controlling for education and marital status.

Although multistate methodology is preferred in this study due to its advantages mentioned earlier, this method also has several limitations. As mentioned in Section 3.2.1, this method relies on stationary population assumption like all other life tables. To satisfy this assumption, sum of rates of transitions from one state to other possible destination states should be equal to one. In this respect, final age group in working life tables cannot be defined as an open-ended age group since if it were defined as open-ended, then sum of transition rates would exceed one due to the fact that everyone in the hypothetical population is expected to eventually exit from labor market and die. Therefore, the final age group in this study represents the age group of 74-75 which might be accounted as the final age to enter to the labor market. Defining final age group as mentioned might cause a problem of underestimation of total life expectancy. As can be seen in all of multistate working life tables presented in this study, total life expectancy at age 15 is found as around 56 years while it is estimated around 62 years in single decrement life table constructed through Coale-Demeny West model life table presented in Table A.1 so it is concluded that multistate working life tables provided in this study underestimate total life expectancy and the reason might be that years expected to be lived by a person after age 75 are not accounted in multistate life tables since the final age group is defined as 74-75.

Another limitation of the method applied is that transition rates estimated rely on Markovian assumption; that is, it is accepted that transition between labor market states only depends on the current labor market state occupied by the agent. Under this assumption, the impacts of duration in inactive or active states and previous labor market experiences of individuals on further labor market transitions are not taken into account. However, those impacts are important as follows. For instance, a woman who is out of labor force for 15 years might have a lower probability of transition to labor market compared to a woman who is out of labor force for 5 years due to skill erosion or limited labor market experience. Another example might be that a woman who is out of labor force for 15 years but has a working experience before that time period might has a higher probability of transition to labor market compared to a woman who is out of labor force for 15 years but has no working experience before this time period. However, under the Markovian assumption, age-specific conditional probabilities in a given age interval are computed by taking only the state occupied at the beginning of age group so none of those factors mentioned above is considered. Technically speaking, ignoring the existence of duration dependence or time-variant covariates affecting labor market transitions constitutes a limitation in the sense that change in the covariates controlled through time or duration in one state might have significant impacts on transition to other destination states. Actually, this limitation is not related to multistate methodology but it is imposed by the structure of the data used as mentioned in Section 3.2.1. When using panel data to estimate transition rates, such an assumption is required since information about the history of an agent in a panel survey is limited compared to an event history data set. When those estimations provided in this study are replicated by using an event history data set, Markov assumption is eliminated and more reliable estimates which take duration dependence or time-variant covariates into account can be produced. In this respect, this limitation of the study actually constitutes a way of extension for further studies.

Despite of its limitations, this thesis constitutes the first attempt to construct multistate working life tables for Turkish women so it addresses a gap in the empirical literature. As mentioned above, this study can be extended further by including settlement dimension and using event history data sets to analyze labor market transitions and working life expectancies of women. Beside labor market analysis, there is a room for improvement in the empirical literature considering the wide range of application areas of multistate methodology.

REFERENCES

BECKER, Gary S. "A Theory of the Allocation of Time." *The Economic Journal,* 75, 299, 1965: 493-517.

—. "Human Capital, Effort, and the Sexual Division of Labor." *Journal of Labor Economics,* 3, 1, 1985: 33-58.

BLOSSFELD, H.P., K.GOLSCH and G.ROHWER. *Event History Analysis with Stata*. Mahwah: Lawrence Erlbaum Associates, Publishers, 2007.

BONGAARTS, John. "The projection of family composition over the life course with family status life tables." BONGAARTS, J., T.K. BURCH and K.W. WACHTER. *Family Demography: Methods and Their Applications*. Oxford: Clarendon Press, 1987: 189-212.

CAI, L. and G.KALB. "Health Status and Labour Force Participation: Evidence from Australia." *Health Economics,* 15, 3, 2006: 241-261.

CAMBOIS, E., J.M. ROBINE and N. BROUARD. "Life Expectancies Applied to Specific Statuses: a History of the Indicators and the Methods of Calculation." *Population: An English Selection,* 11, 1999: 7-34.

DAYIOĞLU, M. and M.G.KIRDAR. *Determinants of and Trends in Labor Force Participation of Women in Turkey*. Ankara: State Planning Organization and World Bank, 2010.

DURAND, John D. *The Labor Force in the United States 1890-1960*. New York: Gordon and Breach Science Publishers, 1968.

ERCAN, H., A. HOŞGÖR GÜNDÜZ and Ö.YILMAZ. *Factors That Affect Women's Labour Force Participation and Suggestions for Provincial Employment and Vocational Education Boards: Ankara, Gaziantep, And Konya*. Ankara: ILO, 2010.

ERCAN, Hakan. "The Structure of Turkish Labor Markets." *Turkey's Window of Opportunity: Demographic Transition Process and its Consequences*. İstanbul: TÜSİAD, 1999: 103-129.

ERGÖÇMEN, B., M.A.ERYURT and T.ADALI. "Other Proximate Determinants of Fertility." *Turkey Demographic and Health Survey 2008*. Ankara: Hacettepe University Institute of Population Studies, 2009: 108-113.

European Commission. *Eurostat Statistics*. 15 12 2013. Online. 16 12 2013.

GUJARATI, Damodar N. *Basic Econometrics*. 4th. New York: The McGraw-Hill Companies, 2004.

Hacettepe University Institute of Population Studies. *Turkey Demographic and Health Survey 2008*. Ankara: Hacettepe University Institute of Population Studies, 2009.

HANNAN, Michael T. "Multistate Demography and Event History Analysis." DIEKMANN, A. and P. MITTER. *Stochastic Modelling of Social Processes*. Orlando: Academic Press, 1984: 39-88.

HAYWARD, M.D. and W.R. GRADY. "Work and Retirement Among a Cohort of Older Men in the United States, 1966-1983." *Demography,* 27, 3, 1990: 337-356.

HAYWARD, M.D., S.FRIEDMAN and H.CHEN. "Race Inequities in Men's Retirement." *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences,* 51, 1, 1996: 1-10.

HOEM, Jan M. "A Markov chain model of working life tables." *Scandinavian Actuarial Journal,* 1977, 1, 1977: 1-20.

HYTTI, H. and M. VALASTE. "The average length of working life in the European Union." *Kela/Fpa Online Working Papers 1/2009,* 2009.

KATZ, S., et al. "Active Life Expectancy." *The New England Journal of Medicine,* 309, 20, 1983: 1218-1224.

—. "Studies of Illnes in the Aged The Index of ADL: A Standardized Measure Biological and Psychosocial Function." *JAMA,* 12, 1963: 914-919.

KEYFITZ, N. and A. ROGERS. "Simplified Multiple Contingency Calculations." *The Journal of Risk and Insurance,* 49, 1, 1982: 59-72.

KEYFITZ, N. and H.CASWELL. *Applied Mathematical Demography*. 3rd. New York: Springer, 2005.

KINTNER, Hallie J. "Chapter 13: The Life Table." SIEGEL, J.S. and D.A. SWANSON. *The Methods and Materials of Demography*. San Diego: Elsevier Academic Press, 2004. 301-340.

KIRDAR, M.G., M.DAYIOĞLU and İ.KOÇ. "The Impact of Schooling on the Timing of Marriage and Fertility: Evidence from a Change in Compulsory Schooling Law." *MPRA Paper No. 13410,* 2009.

KOÇ, İ., et al. *Türkiye'nin Demografik Dönüşümü Doğurganlık, Aile Planlaması, Anne-Çocuk Sağlığı ve Beş Yaş Altı Ölümlerdeki Değişimler: 1968-2008*. Ankara: Hacettepe University Institute of Population Studies, 2010.

KPEDEKPO, G.M.K. "On Working Life Tables in Ghana with Particular Reference to the Female Working Population." *Journal of the Royal Statistical Society, Series A (General),* 132, 3, 1969: 431-441.

KURTULUŞ, Elif. "Labor Force Structure of Turkey and a Comparison with the European Union Countries." Unpublished MA Thesis, HUIPS, Ankara, 1999.

LAND, K.C. and G.C. HOUGH. "New Methods for Tables of School Life, with Applications to U.S. Data from Recent School Years." *Journal of the American Statistical Association,* 84, 405, 1989: 63–75.

LAND, K.C., G.C.HOUGH and M.M.MCMILLEN. "Voting status life tables for the United States, 1968–1980." *Demography,* 23, 3, 1986: 381-402.

LAND, K.C., J.M. GURALNIK and D.G. BLAZER. "Estimating Increment-Decrement Life Tables with Multiple Covariates from Panel Data: The Case of Active Life Expectancy." *Demography,* 31, 2, 1994: 297-319.

LYNCH, S.M. and J.S. BROWN. "A New Approach to Estimating Life Tables with Covariates and Constructing Interval Estimates of Life Table Quantities." *Sociological Methodology,* 35, 1, 2005: 177-225.

LYNCH, S.M. and J.S.BROWN. "Obtaining Multistate Life Table Distributions for Highly Refined Subpopulations from Cross-sectional Data: A Bayesian Extension of Sullivan's Method." *Demography,* 47, 4, 2010: 1053-1077.

MADDALA, G.S. *Introduction to Econometrics*. 3rd. Chichester: John Wiley&Sons, Ltd., 2001.

MILLIMET, D.L., et al. "Estimating Worklife Expectancy: An Econometric Approach." *Journal of Econometrics*, 113, 1, 2003: 83-113.

MINCER, Jacob. "Labor Force Participation of Married Women: A Study of Labor Supply." Research, Universities-National Bureau of Economic. *Aspects of Labor Economics*. Princeton: Princeton University Press, 1962: 63-106.

NEWELL, Colin. *Methods and Models in Demography*. London: Belhaven Press, 1988.

ÖZGÖREN, A. and İ.KOÇ. "An Application of Working Life Tables for Males in Turkey: 1980-2000." *Turkish Journal of Population Studies*, 30-31, 2012: 55-79.

PALLONI, Alberto. "Increment-Decrement Life Tables." PRESTON, S.H. and P.HEUVELINE and M.GUILLOT. *Demography: Measuring and Modeling Population Processes*. Oxford: Blackwell Publishers, 2001: 256-272.

PRESTON, S.H., P. HEUVELINE and M.GUILLOT. *Demography: Measuring and Modeling Population Processes*. Oxford: Blackwell, 2001.

ROGERS, A. and J.LEDENT. "Increment-Decrement Life Tables: A Comment." *Demography*, 13, 2, 1976: 287-290.

ROGERS, Andrei. *Introduction to Multiregional Mathematical Demography*. 1975.

—. *Multiregional Demography: Principals, Methods and Extensions*. Chichester: John Wiley&Sons, 1995.

ROGOT, E., P.D.SORLIE and N.J.JOHNSON. "Life Expectancy by Employment Status, Income, and Education in the National Longitudinal Mortality Study." *Public Health Reports*, 107, 4, 1992: 457–461.

ROWLAND, Donald T. *Demographic Methods and Concepts*. New York: Oxford University Press, 2003.

SCHOEN, R. and K. WOODROW. "Labor Force Status Life Tables for the United States, 1972." *Demography*, 17, 3, 1980: 297-322.

SCHOEN, R. and V.E. NELSON. "Marriage, Divorce, and Mortality: A Life Table Analysis." *Demography*, 11, 2, 1974: 267-290.

SCHOEN, Robert. "Constructing Increment-Decrement Life Tables." *Demography*, 12, 2, 1975: 313-324.

SMITH, Shirley J. *Tables of Working Life: The Increment-Decrement Model*. Washington, D.C.: U.S. Department of Labor, Bureau of Labor Statistics, 1982.

—. *Worklife Estimates: Effects of Race and Education*. Washington, D.C.: U.S. Bureau of Labor Statistics, 1986.

State Planning Organization and World Bank. "Female Labor Force Participation in Turkey." 2009.

SULLIVAN, D.F. "A Single Index of Mortality and Morbidity." *HSMHA Health Reports*, 86, 4, 1971: 347–354.

TANSEL, Aysıt. *2050'ye Doğru Nüfusbilim ve Yönetim: İşgücü Piyasasına Bakış*. İstanbul: TÜSİAD, 2012.

—. "Economic Development and Female Labor Force Participation in Turkey: Time-Series Evidence and Cross-Province Estimates." *METU/ERC Working Paper, 02/3,* 2002.

TAYMAZ, Erol. *Growth, Employment, Skills and Female Labor Force* . Ankara: State Planning Organization and World Bank, 2010.

TOROS, Aykut. "Life Tables for the Last Decade of XX. Century in Turkey." *Turkish Journal of Population Studies,* 22, 2000: 57-110.

TURKSTAT. "Household Labor Force Survey." Ankara: TURKSTAT, 2012.

—. "Income and Living Conditions Survey 2007-2010." 2010. CD-ROM.

—. *Labor Force Statistics*. 2013. Online. 18 12 2013. <http://www.turkstat.gov.tr/PreTablo.do?alt_id=1007>.

—. *Vital Statistics*. 2013. Online. 18 12 2013. <http://www.turkstat.gov.tr/PreTablo.do?alt_id=1060>.

URAZ, A., et al. *Recent Trends in Female Labor Force Participation in Turkey*. Ankara: State Planning Organization and World Bank, 2010.

VOGLER-LUDWIG, Kurt. "Monitoring the duration of active working life in the European Union: Final Report." *Economix Research&Consulting: Study for the European Commission Employment, Social Affairs and Equal Opportunities DG,* 2009.

WARNER, D.F., M.D.HAYWARD and M.A.HARDY. "The Retirement Life Course in America at the Dawn of the Twenty-first Century." *Population Research and Policy Review,* 29, 6, 2010: 893-919.

WILLEKENS, F.J., et al. "Multi-state Analysis of Marital Status Life Tables: Theory and Application." *Population Studies,* 36, 1, 1982: 129-144.

WILLEKENS, Frans J. "Multistate Analysis: Tables of Working Life." *Environment and Planning A,* 12, 5, 1980: 563-588.

WOLFBEIN, Seymour L. "The Length of Working Life." *Population Studies,* 3, 3, 1949: 286-294.

World Bank. *World Development Indicators*. 2013. Online. 18 12 2013. <http://databank.worldbank.org/data/home.aspx>.

YAŞIT, Bilge. "An Econometric Analysis of Fertility Transition in Turkey." Unpublished MSc Thesis, METU, Ankara, 2007.

APPENDIX

Table A.1: Single decrement life table for Turkish women in 2009*

Age	$_nq_x$	l_x	e_x	Age	$_nq_x$	l_x	e_x
0	0.0130	100000	76.14	*51*	0.0037	94637	27.86
1	0.0008	98700	76.14	*52*	0.0041	94284	26.96
2	0.0005	98623	75.20	*53*	0.0046	93894	26.07
3	0.0004	98576	74.24	*54*	0.0051	93462	25.19
4	0.0003	98542	73.26	*55*	0.0057	92984	24.32
5	0.0002	98514	72.28	*56*	0.0063	92455	23.45
6	0.0002	98490	71.30	*57*	0.0070	91870	22.60
7	0.0002	98469	70.31	*58*	0.0078	91224	21.76
8	0.0002	98450	69.33	*59*	0.0087	90511	20.92
9	0.0002	98433	68.34	*60*	0.0097	89724	20.10
10	0.0002	98416	67.35	*61*	0.0108	88856	19.29
11	0.0002	98399	66.36	*62*	0.0120	87900	18.50
12	0.0002	98383	65.37	*63*	0.0133	86849	17.72
13	0.0002	98365	64.39	*64*	0.0148	85693	16.95
14	0.0002	98347	63.40	*65*	0.0165	84425	16.20
15	0.0002	98327	62.41	*66*	0.0183	83037	15.46
16	0.0003	98305	61.42	*67*	0.0203	81518	14.74
17	0.0003	98280	60.44	*68*	0.0226	79861	14.03
18	0.0003	98253	59.46	*69*	0.0251	78058	13.35
19	0.0003	98223	58.47	*70*	0.0279	76099	12.68
20	0.0004	98189	57.49	*71*	0.0310	73978	12.03
21	0.0004	98153	56.51	*72*	0.0344	71689	11.39
22	0.0004	98115	55.54	*73*	0.0381	69226	10.78
23	0.0005	98073	54.56	*74*	0.0423	66588	10.19
24	0.0005	98029	53.58	*75*	0.0469	63773	9.62
25	0.0005	97982	52.61	*76*	0.0519	60784	9.06
26	0.0005	97933	51.64	*77*	0.0575	57628	8.53
27	0.0006	97882	50.66	*78*	0.0636	54314	8.02
28	0.0006	97828	49.69	*79*	0.0704	50858	7.53
29	0.0006	97772	48.72	*80*	0.0778	47278	7.07
30	0.0006	97713	47.75	*81*	0.0859	43601	6.62
31	0.0007	97651	46.78	*82*	0.0947	39857	6.20
32	0.0007	97586	45.81	*83*	0.1044	36081	5.79
33	0.0007	97518	44.84	*84*	0.1149	32313	5.41
34	0.0008	97445	43.87	*85*	0.1264	28599	5.05
35	0.0009	97368	42.91	*86*	0.1388	24985	4.70

Table A.1 continued

36	0.0009	97285	41.94	*87*	0.1522	21517	4.38
37	0.0010	97197	40.98	*88*	0.1667	18242	4.08
38	0.0011	97102	40.02	*89*	0.1822	15202	3.79
39	0.0012	96998	39.06	*90*	0.1988	12432	3.53
40	0.0013	96886	38.11	*91*	0.2166	9960	3.28
41	0.0014	96764	37.16	*92*	0.2355	7803	3.05
42	0.0015	96631	36.21	*93*	0.2555	5965	2.83
43	0.0017	96485	35.26	*94*	0.2765	4441	2.63
44	0.0018	96325	34.32	*95*	0.2986	3213	2.45
45	0.0020	96149	33.38	*96*	0.3217	2254	2.28
46	0.0022	95955	32.45	*97*	0.3457	1529	2.12
47	0.0025	95741	31.52	*98*	0.3705	1000	1.97
48	0.0027	95505	30.59	*99*	0.3960	630	1.84
49	0.0030	95245	29.68	*100+*	1.0000	380	1.71

Source: Author's calculations

**Estimated by using Coale-Demeny West model life table in MORTPAK Version 4.0*

Table A.2: General multistate working life table based on transition rates derived directly from the data

Age	Occurrence/exposure rates				Smoothed occurrence/exposure rates				Death rate	M(x) (transition rate matrix)				P(x) (transition probability matrix)			
	μ_{11}	μ_{12}	μ_{21}	μ_{22}	μ_{11}	μ_{12}	μ_{21}	μ_{22}	$\mu_{i\delta}$ $i=1,2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}
15	0.94690	0.05310	0.39390	0.60610	0.94690	0.05310	0.39390	0.60610	0.00023	0.05333	-0.39390	-0.05310	0.39413	0.95637	0.32188	0.04339	0.67789
16	0.91320	0.08680	0.26420	0.73580	0.93005	0.06995	0.32905	0.67095	0.00025	0.07020	-0.32905	-0.06995	0.32930	0.94145	0.27426	0.05830	0.72549
17	0.91940	0.08060	0.25000	0.75000	0.92650	0.07350	0.30270	0.69730	0.00028	0.07378	-0.30270	-0.07350	0.30298	0.93787	0.25471	0.06185	0.74501
18	0.87580	0.12420	0.17190	0.82810	0.91382	0.08618	0.27000	0.73000	0.00031	0.08649	-0.27000	-0.08618	0.27031	0.92657	0.22912	0.07313	0.77057
19	0.91260	0.08740	0.18750	0.81250	0.91358	0.08642	0.25350	0.74650	0.00034	0.08676	-0.25350	-0.08642	0.25384	0.92582	0.21661	0.07384	0.78305
20	0.86710	0.13290	0.22730	0.77270	0.90583	0.09417	0.24913	0.75087	0.00037	0.09454	-0.24913	-0.09417	0.24950	0.91929	0.21256	0.08034	0.78707
21	0.85230	0.14770	0.18390	0.81610	0.89819	0.10181	0.23981	0.76019	0.00040	0.10221	-0.23981	-0.10181	0.24021	0.91267	0.20475	0.08693	0.79485
22	0.80280	0.19720	0.29030	0.70970	0.88626	0.11374	0.24612	0.75388	0.00042	0.11416	-0.24612	-0.11374	0.24654	0.90322	0.20851	0.09636	0.79107
23	0.83330	0.16670	0.15480	0.84520	0.88038	0.11962	0.23598	0.76402	0.00045	0.12007	-0.23598	-0.11962	0.23643	0.89802	0.20027	0.10152	0.79928
24	0.84440	0.15560	0.15000	0.85000	0.87678	0.12322	0.22738	0.77262	0.00048	0.12370	-0.22738	-0.12322	0.22786	0.89473	0.19338	0.10479	0.80614
25	0.93290	0.06710	0.19780	0.80220	0.87538	0.12462	0.20777	0.79223	0.00050	0.12512	-0.20777	-0.12462	0.20827	0.89269	0.17808	0.10681	0.82142
26	0.86310	0.13690	0.19270	0.80730	0.87037	0.12963	0.20062	0.79938	0.00052	0.13015	-0.20062	-0.12963	0.20114	0.88828	0.17211	0.11120	0.82738
27	0.89270	0.10730	0.17540	0.82460	0.86770	0.13230	0.19316	0.80684	0.00055	0.13285	-0.19316	-0.13230	0.19371	0.88572	0.16604	0.11373	0.83341
28	0.94510	0.05490	0.17890	0.82110	0.87463	0.12537	0.19386	0.80614	0.00057	0.12594	-0.19386	-0.12537	0.19443	0.89137	0.16709	0.10805	0.83235
29	0.87330	0.12670	0.11670	0.88330	0.87070	0.12930	0.18678	0.81322	0.00060	0.12990	-0.18678	-0.12930	0.18738	0.88781	0.16120	0.11159	0.83820
30	0.90320	0.09680	0.19440	0.80560	0.87431	0.12569	0.18349	0.81651	0.00063	0.12632	-0.18349	-0.12569	0.18412	0.89057	0.15882	0.10879	0.84054
31	0.91930	0.08070	0.16190	0.83810	0.88101	0.11899	0.18129	0.81871	0.00067	0.11966	-0.18129	-0.11899	0.18196	0.89594	0.15753	0.10339	0.84180
32	0.92960	0.07040	0.14890	0.85110	0.89369	0.10631	0.16715	0.83285	0.00070	0.10701	-0.16715	-0.10631	0.16785	0.90584	0.14695	0.09346	0.85235
33	0.91950	0.08050	0.14100	0.85900	0.90231	0.09769	0.16577	0.83423	0.00074	0.09843	-0.16577	-0.09769	0.16651	0.91300	0.14637	0.08626	0.85289
34	0.89220	0.10780	0.11700	0.88300	0.90709	0.09291	0.16247	0.83753	0.00079	0.09370	-0.16247	-0.09291	0.16326	0.91688	0.14396	0.08232	0.85524
35	0.92620	0.07380	0.11710	0.88290	0.90642	0.09358	0.15440	0.84560	0.00085	0.09443	-0.15440	-0.09358	0.15525	0.91596	0.13726	0.08319	0.86189

Table A.2 continued

36	0.93200	0.06800	0.05560	0.94440	0.91331	0.08669	0.14069	0.85931	0.00091	0.08760	-0.14069	-0.08669	0.14160	0.92132	0.12621	0.07778	0.87287
37	0.91330	0.08670	0.13330	0.86670	0.91537	0.08463	0.13648	0.86352	0.00098	0.08561	-0.13648	-0.08463	0.13746	0.92289	0.12278	0.07613	0.87624
38	0.94330	0.05670	0.08930	0.91070	0.91519	0.08481	0.12752	0.87248	0.00106	0.08587	-0.12752	-0.08481	0.12858	0.92234	0.11516	0.07660	0.88378
39	0.93700	0.06300	0.12050	0.87950	0.92156	0.07844	0.12790	0.87210	0.00115	0.07959	-0.12790	-0.07844	0.12905	0.92782	0.11581	0.07103	0.88303
40	0.96490	0.03510	0.21950	0.78050	0.92773	0.07227	0.13041	0.86959	0.00126	0.07353	-0.13041	-0.07227	0.13167	0.93320	0.11827	0.06554	0.88047
41	0.94060	0.05940	0.10000	0.90000	0.92986	0.07014	0.12422	0.87578	0.00138	0.07152	-0.12422	-0.07014	0.12560	0.93478	0.11307	0.06384	0.88555
42	0.92420	0.07580	0.09300	0.90700	0.92932	0.07068	0.11863	0.88137	0.00151	0.07219	-0.11863	-0.07068	0.12014	0.93402	0.10821	0.06448	0.89028
43	0.92020	0.07980	0.12660	0.87340	0.92939	0.07061	0.11719	0.88281	0.00166	0.07227	-0.11719	-0.07061	0.11885	0.93389	0.10696	0.06445	0.89138
44	0.97040	0.02960	0.14290	0.85710	0.93721	0.06279	0.11978	0.88022	0.00183	0.06462	-0.11978	-0.06279	0.12161	0.94073	0.10957	0.05743	0.88861
45	0.91070	0.08930	0.15220	0.84780	0.93566	0.06434	0.12329	0.87671	0.00202	0.06636	-0.12329	-0.06434	0.12531	0.93927	0.11250	0.05871	0.88548
46	0.96400	0.03600	0.14670	0.85330	0.93886	0.06114	0.13240	0.86760	0.00223	0.06337	-0.13240	-0.06114	0.13463	0.94214	0.12046	0.05563	0.87731
47	0.93600	0.06400	0.12070	0.87930	0.94113	0.05887	0.13114	0.86886	0.00247	0.06134	-0.13114	-0.05887	0.13361	0.94390	0.11948	0.05363	0.87806
48	0.93940	0.06060	0.10530	0.89470	0.94074	0.05926	0.13274	0.86726	0.00273	0.06199	-0.13274	-0.05926	0.13547	0.94335	0.12080	0.05393	0.87647
49	0.93390	0.06610	0.16070	0.83930	0.94043	0.05957	0.13676	0.86324	0.00303	0.06260	-0.13676	-0.05957	0.13979	0.94289	0.12418	0.05408	0.87280
50	0.92920	0.07080	0.18750	0.81250	0.93686	0.06314	0.13356	0.86644	0.00336	0.06650	-0.13356	-0.06314	0.13692	0.93934	0.12121	0.05730	0.87543
51	0.94320	0.05680	0.14000	0.86000	0.93712	0.06288	0.13756	0.86244	0.00373	0.06661	-0.13756	-0.06288	0.14129	0.93932	0.12459	0.05695	0.87170
52	0.99320	0.00680	0.08470	0.91530	0.94402	0.05598	0.13673	0.86327	0.00414	0.06012	-0.13673	-0.05598	0.14087	0.94501	0.12423	0.05086	0.87164
53	0.94700	0.05300	0.15150	0.84850	0.94670	0.05330	0.13922	0.86078	0.00460	0.05790	-0.13922	-0.05330	0.14382	0.94700	0.12644	0.04841	0.86897
54	0.97320	0.02680	0.13560	0.86440	0.94698	0.05302	0.13849	0.86151	0.00511	0.05813	-0.13849	-0.05302	0.14360	0.94675	0.12578	0.04815	0.86913
55	0.95830	0.04170	0.12120	0.87880	0.95174	0.04826	0.13539	0.86461	0.00569	0.05395	-0.13539	-0.04826	0.14108	0.95037	0.12333	0.04396	0.87100
56	0.99010	0.00990	0.13160	0.86840	0.95435	0.04565	0.13388	0.86612	0.00632	0.05197	-0.13388	-0.04565	0.14020	0.95206	0.12211	0.04164	0.87159
57	0.95000	0.05000	0.17390	0.82610	0.95575	0.04425	0.13920	0.86080	0.00703	0.05128	-0.13920	-0.04425	0.14623	0.95273	0.12665	0.04026	0.86634
58	0.98390	0.01610	0.10260	0.89740	0.96020	0.03980	0.13893	0.86107	0.00782	0.04762	-0.13893	-0.03980	0.14675	0.95595	0.12658	0.03626	0.86563
59	0.98110	0.01890	0.33330	0.66670	0.96492	0.03508	0.15619	0.84381	0.00870	0.04378	-0.15619	-0.03508	0.16489	0.95958	0.14137	0.03175	0.84996
60	1.00000	0.00000	0.41670	0.58330	0.97200	0.02800	0.17911	0.82089	0.00967	0.03767	-0.17911	-0.02800	0.18878	0.96523	0.16082	0.02514	0.82956

Table A.2 continued

61	1.00000	0.00000	0.13040	0.86960	0.97768	0.02232	0.17815	0.82185	0.01076	0.03308	-0.17815	-0.02232	0.18891	0.96922	0.16027	0.02008	0.82903
62	0.95510	0.04490	0.36840	0.63160	0.97387	0.02613	0.20652	0.79348	0.01196	0.03809	-0.20652	-0.02613	0.21848	0.96496	0.18292	0.02315	0.80519
63	0.96510	0.03490	0.11110	0.88890	0.97568	0.02432	0.20248	0.79752	0.01330	0.03762	-0.20248	-0.02432	0.21578	0.96522	0.17958	0.02157	0.80720
64	0.95650	0.04350	0.16670	0.83330	0.97401	0.02599	0.20559	0.79441	0.01479	0.04078	-0.20559	-0.02599	0.22038	0.96235	0.18169	0.02297	0.80362
65	1.00000	0.00000	0.33330	0.66670	0.97818	0.02182	0.22680	0.77320	0.01645	0.03827	-0.22680	-0.02182	0.24325	0.96458	0.19863	0.01911	0.78506
66	0.97400	0.02600	0.36360	0.63640	0.97657	0.02343	0.25000	0.75000	0.01829	0.04172	-0.25000	-0.02343	0.26829	0.96161	0.21620	0.02026	0.76567
67	1.00000	0.00000	0.44440	0.55560	0.98157	0.01843	0.27705	0.72295	0.02032	0.03875	-0.27705	-0.01843	0.29737	0.96412	0.23686	0.01576	0.74303
68	1.00000	0.00000	0.33330	0.66670	0.98318	0.01682	0.30012	0.69988	0.02259	0.03941	-0.30012	-0.01682	0.32271	0.96344	0.25370	0.01422	0.72397
69	0.97730	0.02270	0.00000	1.00000	0.98280	0.01720	0.26679	0.73321	0.02509	0.04229	-0.26679	-0.01720	0.29188	0.96050	0.22822	0.01471	0.74700
70	0.98310	0.01690	0.00000	1.00000	0.98111	0.01889	0.22512	0.77488	0.02787	0.04676	-0.22512	-0.01889	0.25299	0.95611	0.19546	0.01641	0.77706
71	1.00000	0.00000	0.12500	0.87500	0.98111	0.01889	0.22458	0.77542	0.03095	0.04984	-0.22458	-0.01889	0.25553	0.95316	0.19447	0.01636	0.77505
72	1.00000	0.00000	0.66670	0.33330	0.98560	0.01440	0.25441	0.74559	0.03435	0.04875	-0.25441	-0.01440	0.28876	0.95394	0.21719	0.01229	0.74904
73	0.98210	0.01790	0.28570	0.71430	0.98730	0.01270	0.27187	0.72813	0.03811	0.05081	-0.27187	-0.01270	0.30998	0.95188	0.22972	0.01073	0.73288
74	1.00000	0.00000	0.50000	0.50000	0.99165	0.00835	0.30520	0.69480	0.04227	0.05062	-0.30520	-0.00835	0.34747	0.95166	0.25374	0.00694	0.70486

Source: Author's calculations

Notes: $\mathbf{M(x)} = \begin{bmatrix} m_1 & m_2 \\ m_3 & m_4 \end{bmatrix} = \begin{bmatrix} \mu_{12}(x) + \mu_{1\delta}(x) & -\mu_{21}(x) \\ -\mu_{12}(x) & \mu_{21}(x) + \mu_{2\delta}(x) \end{bmatrix}$

Table A.2 continued

	d_{ij} where $i, j = 1, 2$				$d_{i\delta}$ where $i = 1, 2$			l(x)			L(x)			$\hat{l}^{Total}$	L(x) (for state based expectancies) Inactive		Active	
Age	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}	L_1	L_2	L^{Total}		L_{11}	L_{12}	L_{21}	L_{22}
15	94037	4266	0	0	23	0	23	98327	0	98327	0.97819	0.02170	0.99988	1.00000				
16	88531	5482	1170	3095	24	1	25	94037	4266	98304	0.93433	0.06531	0.99964	0.99977	0.97072	0.02915	0.13713	0.86274
17	84128	5548	2185	6390	25	2	28	89701	8578	98279	0.89505	0.10432	0.99937	0.99951	0.96894	0.03092	0.12736	0.87250
18	79975	6312	2735	9199	26	4	30	86313	11938	98251	0.85950	0.13958	0.99908	0.99923	0.96328	0.03656	0.11456	0.88528
19	76574	6108	3360	12146	28	5	33	82710	15511	98221	0.82706	0.17170	0.99876	0.99892	0.96291	0.03692	0.10830	0.89153
20	73482	6422	3880	14367	30	7	37	79934	18254	98188	0.79987	0.19853	0.99840	0.99859	0.95964	0.04017	0.10628	0.89353
21	70606	6725	4257	16524	31	8	39	77362	20789	98151	0.77408	0.22394	0.99801	0.99821	0.95634	0.04347	0.10238	0.89742
22	67618	7214	4848	18392	31	10	41	74863	23249	98112	0.74918	0.24843	0.99760	0.99781	0.95161	0.04818	0.10425	0.89554
23	65076	7357	5128	20466	33	11	44	72466	25605	98071	0.72549	0.27168	0.99717	0.99739	0.94901	0.05076	0.10014	0.89964
24	62813	7357	5380	22429	34	13	47	70204	27823	98027	0.70376	0.29294	0.99670	0.99694	0.94736	0.05240	0.09669	0.90307
25	60876	7284	5304	24467	34	15	49	68194	29786	97979	0.68330	0.31292	0.99622	0.99647	0.94634	0.05341	0.08904	0.91071
26	58786	7359	5464	26270	34	17	51	66180	31750	97930	0.66325	0.33246	0.99571	0.99597	0.94414	0.05560	0.08605	0.91369
27	56908	7307	5584	28027	36	18	54	64251	33629	97880	0.64450	0.35068	0.99518	0.99545	0.94286	0.05686	0.08302	0.91671
28	55704	6752	5904	29410	36	20	56	62492	35334	97826	0.63105	0.36356	0.99462	0.99490	0.94569	0.05403	0.08354	0.91617
29	54696	6875	5829	30311	37	22	59	61608	36162	97770	0.62105	0.37298	0.99403	0.99433	0.94390	0.05580	0.08060	0.91910
30	53902	6585	5906	31256	38	24	62	60525	37186	97711	0.61190	0.38152	0.99342	0.99374	0.94529	0.05440	0.07941	0.92027
31	53584	6183	5961	31855	40	25	66	59808	37841	97649	0.60692	0.38585	0.99277	0.99311	0.94797	0.05169	0.07876	0.92090
32	53938	5565	5590	32422	42	27	68	59545	38038	97584	0.60550	0.38660	0.99209	0.99244	0.95292	0.04673	0.07348	0.92617
33	54349	5135	5560	32399	44	28	72	59528	37987	97515	0.60735	0.38403	0.99138	0.99174	0.95650	0.04313	0.07318	0.92645
34	54929	4932	5403	32101	48	30	77	59909	37534	97443	0.61144	0.37918	0.99062	0.99101	0.95844	0.04116	0.07198	0.92762
35	55262	5019	5083	31918	52	32	83	60333	37033	97366	0.61366	0.37614	0.98980	0.99022	0.95798	0.04159	0.06863	0.93094

Table A.2 continued

36	55597	4694	4662	32241	55	34	88	60345	36937	97282	0.61328	0.37565	0.98893	0.98938	0.96066	0.03889	0.06311	0.93644
37	55613	4588	4535	32364	59	36	95	60259	36935	97194	0.61228	0.37572	0.98799	0.98848	0.96145	0.03807	0.06139	0.93812
38	55477	4607	4255	32657	64	39	103	60147	36951	97099	0.60960	0.37739	0.98699	0.98751	0.96117	0.03830	0.05758	0.94189
39	55421	4243	4316	32905	69	43	112	59732	37264	96996	0.60751	0.37839	0.98589	0.98646	0.96391	0.03551	0.05791	0.94152
40	55746	3915	4394	32708	75	47	122	59736	37148	96884	0.60958	0.37513	0.98471	0.98533	0.96660	0.03277	0.05914	0.94023
41	56217	3840	4141	32431	83	51	133	60140	36622	96762	0.61274	0.37067	0.98341	0.98408	0.96739	0.03192	0.05653	0.94278
42	56376	3892	3925	32291	91	55	146	60358	36271	96629	0.61356	0.36843	0.98199	0.98273	0.96701	0.03224	0.05411	0.94514
43	56314	3886	3870	32252	100	60	160	60301	36182	96483	0.61267	0.36776	0.98043	0.98125	0.96695	0.03223	0.05348	0.94569
44	56617	3457	3960	32113	110	66	176	60184	36139	96323	0.61408	0.36464	0.97872	0.97962	0.97037	0.02872	0.05478	0.94430
45	56899	3556	4002	31496	122	72	194	60577	35570	96147	0.61772	0.35912	0.97684	0.97783	0.96964	0.02935	0.05625	0.94274
46	57377	3388	4222	30752	136	78	214	60900	35052	95953	0.62292	0.35185	0.97476	0.97585	0.97107	0.02781	0.06023	0.93865
47	58143	3304	4079	29976	152	84	236	61599	34139	95738	0.62964	0.34283	0.97247	0.97367	0.97195	0.02682	0.05974	0.93903
48	58697	3356	4020	29169	169	91	260	62222	33280	95502	0.63533	0.33462	0.96995	0.97127	0.97167	0.02696	0.06040	0.93824
49	59135	3392	4039	28388	190	98	288	62717	32525	95242	0.64017	0.32699	0.96716	0.96862	0.97144	0.02704	0.06209	0.93640
50	59342	3620	3852	27821	212	107	319	63174	31780	94954	0.64259	0.32148	0.96407	0.96569	0.96967	0.02865	0.06061	0.93772
51	59360	3599	3917	27407	236	117	352	63194	31441	94635	0.64311	0.31755	0.96066	0.96245	0.96966	0.02847	0.06229	0.93585
52	59797	3218	3852	27026	261	128	390	63277	31006	94283	0.64543	0.31146	0.95689	0.95887	0.97251	0.02543	0.06211	0.93582
53	60276	3081	3824	26281	292	139	431	63649	30244	93893	0.64961	0.30310	0.95272	0.95491	0.97350	0.02420	0.06322	0.93449
54	60686	3086	3693	25520	327	150	477	64100	29362	93462	0.65333	0.29477	0.94810	0.95052	0.97337	0.02408	0.06289	0.93457
55	61184	2830	3528	24916	365	162	527	64379	28606	92986	0.65644	0.28656	0.94300	0.94568	0.97518	0.02198	0.06166	0.93550
56	61610	2695	3388	24183	408	175	582	64712	27746	92458	0.65958	0.27777	0.93735	0.94031	0.97603	0.02082	0.06106	0.93579
57	61926	2617	3404	23285	455	188	643	64998	26878	91876	0.66273	0.26839	0.93112	0.93439	0.97637	0.02013	0.06333	0.93317
58	62452	2369	3279	22422	509	202	711	65330	25903	91232	0.66645	0.25778	0.92423	0.92785	0.97797	0.01813	0.06329	0.93282
59	63074	2087	3505	21072	569	215	784	65731	24791	90522	0.67280	0.24383	0.91663	0.92062	0.97979	0.01588	0.07069	0.92498
60	64264	1674	3724	19212	641	223	864	66579	23159	89738	0.68428	0.22397	0.90825	0.91264	0.98262	0.01257	0.08041	0.91478

Table A.2 continued

61	65896	1365	3347	17315	728	224	951	67988	20885	88874	0.69783	0.20119	0.89902	0.90386	0.98461	0.01004	0.08013	0.91452
62	66817	1603	3417	15041	823	222	1045	69243	18680	87923	0.70925	0.17962	0.88887	0.89419	0.98248	0.01157	0.09146	0.90260
63	67791	1515	2989	13435	928	220	1148	70234	16644	86877	0.71706	0.16066	0.87772	0.88355	0.98261	0.01078	0.08979	0.90360
64	68115	1625	2716	12014	1039	220	1259	70780	14950	85729	0.72010	0.14538	0.86548	0.87188	0.98117	0.01148	0.09085	0.90181
65	68322	1354	2709	10708	1155	222	1378	70831	13639	84470	0.72138	0.13069	0.85207	0.85908	0.98229	0.00955	0.09931	0.89253
66	68305	1439	2608	9235	1288	219	1506	71031	12061	83093	0.72179	0.11561	0.83740	0.84506	0.98081	0.01013	0.10810	0.88284
67	68368	1118	2528	7931	1426	215	1641	70912	10674	81586	0.72111	0.10029	0.82140	0.82974	0.98206	0.00788	0.11843	0.87151
68	68304	1008	2296	6551	1584	202	1786	70896	9049	79945	0.71952	0.08445	0.80397	0.81305	0.98172	0.00711	0.12685	0.86198
69	67811	1039	1725	5647	1750	187	1937	70600	7559	78159	0.71260	0.07243	0.78504	0.79489	0.98025	0.00736	0.11411	0.87350
70	66485	1141	1307	5195	1911	184	2095	69537	6685	76222	0.69832	0.06621	0.76454	0.77519	0.97806	0.00820	0.09773	0.88853
71	64616	1109	1232	4910	2066	193	2259	67791	6336	74127	0.67957	0.06283	0.74240	0.75388	0.97658	0.00818	0.09724	0.88752
72	62816	810	1307	4509	2223	203	2427	65849	6020	71868	0.66092	0.05765	0.71857	0.73091	0.97697	0.00615	0.10859	0.87452
73	61037	688	1222	3898	2398	199	2597	64123	5318	69441	0.64266	0.05036	0.69303	0.70623	0.97594	0.00537	0.11486	0.86644
74	59249	432	1164	3232	2578	190	2767	62259	4586	66845	0.64941	0.05978	0.70918	0.67982	0.97583	0.00347	0.12687	0.85243

Source: Author's calculations

Table A.2 continued

	e(x) (working age population based)			**e(x)** (population based)			**e(x)** (state based) Inactive		Active		e^{Total}
Age	e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	e_{11}	e_{12}	e_{21}	e_{22}	
15	40.81	15.43	56.23	40.12	15.17	55.29					
16	39.84	15.41	55.25	39.17	15.15	54.32	39.93	15.27	37.22	17.99	55.20
17	38.91	15.35	54.26	38.26	15.09	53.35	39.13	15.08	36.32	17.90	54.22
18	38.03	15.25	53.27	37.39	14.99	52.38	38.35	14.88	35.46	17.77	53.23
19	37.18	15.11	52.29	36.56	14.86	51.42	37.61	14.63	34.69	17.56	52.25
20	36.36	14.95	51.31	35.75	14.70	50.45	36.88	14.38	33.96	17.31	51.27
21	35.57	14.75	50.33	34.98	14.51	49.49	36.17	14.11	33.24	17.04	50.28
22	34.81	14.53	49.35	34.23	14.29	48.52	35.48	13.82	32.55	16.75	49.30
23	34.08	14.29	48.37	33.51	14.05	47.56	34.83	13.49	31.83	16.49	48.32
24	33.36	14.02	47.39	32.81	13.79	46.60	34.21	13.13	31.13	16.22	47.35
25	32.67	13.74	46.41	32.13	13.51	45.64	33.62	12.75	30.43	15.94	46.37
26	32.00	13.43	45.43	31.47	13.21	44.67	33.03	12.36	29.78	15.61	45.39
27	31.35	13.10	44.46	30.83	12.88	43.71	32.48	11.94	29.13	15.28	44.41
28	30.72	12.76	43.48	30.21	12.54	42.75	31.95	11.49	28.49	14.95	43.44
29	30.11	12.40	42.51	29.60	12.19	41.80	31.41	11.06	27.83	14.64	42.46
30	29.50	12.03	41.53	29.01	11.83	40.84	30.90	10.59	27.16	14.33	41.49
31	28.90	11.66	40.56	28.42	11.46	39.88	30.40	10.12	26.47	14.04	40.51
32	28.31	11.27	39.59	27.84	11.09	38.92	29.90	9.64	25.76	13.78	39.54
33	27.72	10.89	38.61	27.26	10.71	37.97	29.37	9.20	25.07	13.50	38.57
34	27.13	10.51	37.64	26.67	10.34	37.01	28.82	8.78	24.36	13.23	37.60
35	26.53	10.14	36.67	26.09	9.97	36.06	28.26	8.36	23.65	12.98	36.63

Table A.2 continued

36	25.93	9.77	35.70	25.50	9.60	35.10	27.73	7.93	22.94	12.72	35.66
37	25.34	9.40	34.73	24.91	9.24	34.15	27.17	7.52	22.28	12.41	34.69
38	24.74	9.02	33.77	24.33	8.87	33.20	26.61	7.11	21.63	12.10	33.72
39	24.15	8.65	32.80	23.75	8.51	32.25	26.07	6.69	21.01	11.75	32.76
40	23.56	8.28	31.84	23.17	8.14	31.31	25.50	6.30	20.38	11.41	31.80
41	22.97	7.91	30.88	22.59	7.77	30.36	24.90	5.93	19.74	11.10	30.83
42	22.38	7.54	29.92	22.01	7.41	29.42	24.30	5.58	19.12	10.75	29.88
43	21.79	7.18	28.97	21.42	7.06	28.48	23.70	5.22	18.54	10.38	28.92
44	21.20	6.81	28.01	20.85	6.70	27.54	23.10	4.87	17.97	10.00	27.97
45	20.61	6.45	27.06	20.27	6.34	26.61	22.46	4.56	17.39	9.63	27.02
46	20.02	6.10	26.12	19.68	6.00	25.68	21.83	4.24	16.80	9.27	26.07
47	19.42	5.75	25.17	19.10	5.65	24.75	21.19	3.94	16.17	8.96	25.13
48	18.82	5.41	24.24	18.51	5.32	23.83	20.53	3.66	15.55	8.64	24.19
49	18.22	5.08	23.30	17.91	5.00	22.91	19.88	3.37	14.94	8.32	23.26
50	17.61	4.76	22.37	17.32	4.68	21.99	19.24	3.09	14.30	8.02	22.32
51	17.00	4.44	21.44	16.72	4.36	21.08	18.61	2.79	13.69	7.70	21.40
52	16.40	4.12	20.52	16.12	4.06	20.18	17.99	2.49	13.07	7.41	20.48
53	15.79	3.82	19.60	15.52	3.75	19.28	17.34	2.22	12.45	7.11	19.56
54	15.18	3.51	18.69	14.92	3.46	18.38	16.67	1.97	11.83	6.82	18.65
55	14.57	3.22	17.79	14.32	3.17	17.49	16.01	1.73	11.22	6.52	17.74
56	13.95	2.93	16.88	13.72	2.88	16.60	15.33	1.51	10.64	6.20	16.84
57	13.33	2.66	15.99	13.11	2.61	15.72	14.64	1.31	10.09	5.86	15.94
58	12.71	2.38	15.10	12.50	2.34	14.84	13.93	1.12	9.53	5.52	15.05
59	12.09	2.12	14.21	11.89	2.09	13.97	13.21	0.95	9.01	5.16	14.16
60	11.46	1.87	13.33	11.26	1.84	13.11	12.47	0.82	8.44	4.84	13.28

Table A.2 continued

61	10.81	1.65	12.46	10.63	1.62	12.25	11.70	0.71	7.81	4.60	12.41
62	10.15	1.44	11.59	9.98	1.41	11.39	10.90	0.63	7.22	4.32	11.54
63	9.47	1.25	10.72	9.31	1.23	10.54	10.12	0.55	6.55	4.12	10.67
64	8.77	1.08	9.86	8.62	1.07	9.69	9.34	0.47	5.92	3.88	9.81
65	8.06	0.93	9.00	7.93	0.92	8.84	8.56	0.39	5.32	3.62	8.94
66	7.34	0.79	8.14	7.22	0.78	8.00	7.76	0.33	4.69	3.39	8.08
67	6.61	0.67	7.28	6.50	0.66	7.16	6.96	0.26	4.02	3.21	7.22
68	5.86	0.56	6.42	5.76	0.55	6.31	6.15	0.21	3.29	3.07	6.36
69	5.09	0.46	5.55	5.00	0.46	5.46	5.33	0.17	2.50	3.00	5.50
70	4.30	0.38	4.68	4.22	0.38	4.60	4.50	0.13	1.82	2.80	4.62
71	3.49	0.31	3.80	3.43	0.30	3.73	3.66	0.08	1.30	2.44	3.74
72	2.67	0.23	2.90	2.63	0.23	2.85	2.80	0.04	0.85	2.00	2.84
73	1.83	0.16	1.99	1.80	0.15	1.95	1.91	0.02	0.43	1.49	1.92
74	0.96	0.09	1.04	0.94	0.09	1.03	0.98	0.00	0.13	0.85	0.98

Source: Author's calculations

Table A.3: General multistate working life table based on transition rates estimated from Equation 1

	Estimated transition rates		***Death rate***	**M(x)** ***(transition rate matrix)***				**P(x)** ***(transition probability matrix)***				d_{ij} *where* $i, j = 1, 2$				$d_{i\delta}$ *where* $i = 1, 2$			**l(x)**		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1, 2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
15	0.12879	0.35786	0.00023	0.12902	-0.35786	-0.12879	0.35809	0.89621	0.28777	0.10356	0.71201	88121	10183	0	0	23	0	23	98327	0	98327
16	0.13006	0.33457	0.00025	0.13031	-0.33457	-0.13006	0.33482	0.89423	0.27144	0.10552	0.72831	78801	9298	2764	7416	22	3	25	88121	10183	98304
17	0.13105	0.31364	0.00028	0.13133	-0.31364	-0.13105	0.31392	0.89253	0.25652	0.10719	0.74320	72799	8743	4288	12422	23	5	28	81565	16714	98279
18	0.13176	0.29479	0.00031	0.13207	-0.29479	-0.13176	0.29510	0.89112	0.24290	0.10857	0.75679	68693	8369	5141	16018	24	7	31	77086	21165	98252
19	0.13217	0.27780	0.00034	0.13251	-0.27780	-0.13217	0.27814	0.89000	0.23047	0.10966	0.76919	65712	8096	5620	18758	25	8	33	73834	24387	98221
20	0.13229	0.26250	0.00037	0.13266	-0.26250	-0.13229	0.26287	0.88919	0.21915	0.11045	0.78048	63428	7879	5885	20959	26	10	36	71333	26854	98187
21	0.13211	0.24869	0.00040	0.13251	-0.24869	-0.13211	0.24909	0.88866	0.20883	0.11094	0.79077	61596	7690	6022	22804	28	12	39	69313	28838	98151
22	0.13164	0.23623	0.00042	0.13206	-0.23623	-0.13164	0.23665	0.88843	0.19946	0.11115	0.80012	60074	7515	6082	24399	28	13	41	67618	30494	98112
23	0.13088	0.22500	0.00045	0.13133	-0.22500	-0.13088	0.22545	0.88849	0.19093	0.11106	0.80862	58779	7347	6094	25807	29	14	44	66156	31915	98071
24	0.12983	0.21486	0.00048	0.13031	-0.21486	-0.12983	0.21534	0.88883	0.18319	0.11069	0.81633	57661	7181	6074	27065	31	16	47	64873	33154	98027
25	0.12849	0.20573	0.00050	0.12899	-0.20573	-0.12849	0.20623	0.88945	0.17619	0.11005	0.82331	56689	7014	6034	28194	32	17	49	63735	34245	97980
26	0.12689	0.19751	0.00052	0.12741	-0.19751	-0.12689	0.19803	0.89035	0.16986	0.10913	0.82962	55845	6845	5980	29210	33	18	51	62723	35208	97931
27	0.12503	0.19012	0.00055	0.12558	-0.19012	-0.12503	0.19067	0.89150	0.16416	0.10795	0.83530	55117	6674	5919	30116	34	20	54	61826	36055	97880
28	0.12292	0.18349	0.00057	0.12349	-0.18349	-0.12292	0.18406	0.89290	0.15903	0.10653	0.84040	54499	6502	5851	30919	34	21	55	61036	36791	97826
29	0.12057	0.17756	0.00060	0.12117	-0.17756	-0.12057	0.17816	0.89453	0.15444	0.10487	0.84496	53985	6329	5779	31619	36	22	59	60350	37421	97771
30	0.11801	0.17228	0.00063	0.11864	-0.17228	-0.11801	0.17291	0.89638	0.15036	0.10299	0.84901	53571	6155	5706	32219	38	24	62	59764	37949	97713
31	0.11524	0.16760	0.00067	0.11591	-0.16760	-0.11524	0.16827	0.89844	0.14674	0.10090	0.85258	53257	5981	5631	32717	39	26	65	59277	38374	97651
32	0.11228	0.16348	0.00070	0.11298	-0.16348	-0.11228	0.16418	0.90069	0.14358	0.09861	0.85572	53040	5807	5556	33114	41	27	68	58888	38697	97585
33	0.10915	0.15989	0.00074	0.10989	-0.15989	-0.10915	0.16063	0.90311	0.14083	0.09615	0.85843	52919	5634	5481	33411	43	29	72	58596	38921	97517
34	0.10588	0.15679	0.00079	0.10667	-0.15679	-0.10588	0.15758	0.90570	0.13848	0.09352	0.86073	52892	5461	5407	33607	46	31	77	58400	39045	97445
35	0.10247	0.15415	0.00085	0.10332	-0.15415	-0.10247	0.15500	0.90841	0.13652	0.09075	0.86264	52960	5291	5333	33702	49	33	82	58299	39069	97368

Table A.3 continued

36	0.09895	0.15196	0.00091	0.09986	-0.15196	-0.09895	0.15287	0.91125	0.13491	0.08785	0.86418	53119	5121	5260	33697	53	36	88	58293	38993	97286
37	0.09534	0.15021	0.00098	0.09632	-0.15021	-0.09534	0.15119	0.91418	0.13366	0.08484	0.86537	53370	4953	5188	33591	57	38	95	58380	38818	97197
38	0.09165	0.14886	0.00106	0.09271	-0.14886	-0.09165	0.14992	0.91721	0.13275	0.08173	0.86619	53710	4786	5117	33387	62	41	103	58558	38544	97102
39	0.08791	0.14792	0.00115	0.08906	-0.14792	-0.08791	0.14907	0.92030	0.13217	0.07856	0.86667	54138	4621	5045	33083	67	44	111	58826	38173	96999
40	0.08413	0.14737	0.00126	0.08539	-0.14737	-0.08413	0.14863	0.92342	0.13193	0.07532	0.86681	54651	4458	4974	32683	75	47	122	59183	37705	96888
41	0.08034	0.14722	0.00138	0.08172	-0.14722	-0.08034	0.14860	0.92658	0.13201	0.07204	0.86661	55248	4295	4903	32186	82	51	133	59626	37140	96766
42	0.07654	0.14746	0.00151	0.07805	-0.14746	-0.07654	0.14897	0.92975	0.13242	0.06873	0.86608	55925	4134	4831	31596	91	55	146	60151	36482	96632
43	0.07276	0.14809	0.00166	0.07442	-0.14809	-0.07276	0.14975	0.93292	0.13315	0.06542	0.86519	56681	3975	4757	30914	101	59	160	60756	35730	96486
44	0.06902	0.14911	0.00183	0.07085	-0.14911	-0.06902	0.15094	0.93605	0.13422	0.06212	0.86396	57509	3817	4683	30142	112	64	176	61438	34889	96326
45	0.06532	0.15054	0.00202	0.06734	-0.15054	-0.06532	0.15256	0.93914	0.13562	0.05884	0.86237	58407	3659	4605	29285	126	69	194	62192	33959	96151
46	0.06167	0.15239	0.00223	0.06390	-0.15239	-0.06167	0.15462	0.94218	0.13737	0.05560	0.86041	59369	3503	4526	28346	140	73	213	63012	32945	95957
47	0.05811	0.15467	0.00247	0.06058	-0.15467	-0.05811	0.15714	0.94514	0.13947	0.05239	0.85806	60389	3348	4442	27328	158	78	236	63895	31849	95744
48	0.05462	0.15740	0.00273	0.05735	-0.15740	-0.05462	0.16013	0.94801	0.14194	0.04926	0.85532	61461	3193	4354	26238	177	84	261	64831	30676	95507
49	0.05123	0.16061	0.00303	0.05426	-0.16061	-0.05123	0.16364	0.95078	0.14480	0.04620	0.85217	62576	3040	4262	25080	199	89	288	65815	29431	95246
50	0.04794	0.16431	0.00336	0.05130	-0.16431	-0.04794	0.16767	0.95344	0.14808	0.04320	0.84857	63726	2888	4164	23862	224	94	319	66838	28121	94958
51	0.04477	0.16855	0.00373	0.04850	-0.16855	-0.04477	0.17228	0.95597	0.15176	0.04031	0.84451	64900	2736	4060	22591	253	100	353	67890	26750	94640
52	0.04171	0.17335	0.00414	0.04585	-0.17335	-0.04171	0.17749	0.95836	0.15590	0.03751	0.83997	66088	2586	3949	21274	285	105	390	68960	25327	94287
53	0.03877	0.17876	0.00460	0.04337	-0.17876	-0.03877	0.18336	0.96059	0.16052	0.03482	0.83489	67277	2439	3830	19921	321	110	431	70037	23860	93897
54	0.03596	0.18483	0.00511	0.04107	-0.18483	-0.03596	0.18994	0.96268	0.16566	0.03223	0.82925	68453	2292	3704	18542	362	114	476	71107	22359	93467
55	0.03328	0.19162	0.00569	0.03897	-0.19162	-0.03328	0.19731	0.96458	0.17132	0.02975	0.82301	69601	2147	3569	17146	409	118	527	72157	20833	92991
56	0.03073	0.19918	0.00632	0.03705	-0.19918	-0.03073	0.20550	0.96631	0.17758	0.02739	0.81612	70705	2004	3426	15745	461	122	583	73171	19293	92463
57	0.02831	0.20759	0.00703	0.03534	-0.20759	-0.02831	0.21462	0.96784	0.18445	0.02515	0.80854	71747	1864	3274	14351	520	124	644	74131	17750	91881
58	0.02602	0.21692	0.00782	0.03384	-0.21692	-0.02602	0.22474	0.96918	0.19200	0.02303	0.80021	72709	1728	3113	12976	584	126	711	75021	16216	91237
59	0.02386	0.22728	0.00870	0.03256	-0.22728	-0.02386	0.23598	0.97031	0.20028	0.02103	0.79106	73571	1594	2945	11631	657	127	784	75823	14704	90526
60	0.02184	0.23877	0.00967	0.03151	-0.23877	-0.02184	0.24844	0.97123	0.20933	0.01915	0.78105	74315	1465	2769	10330	736	127	863	76516	13226	89742

Table A.3 continued

61	0.01994	0.25150	0.01076	0.03070	-0.25150	-0.01994	0.26226	0.97192	0.21922	0.01738	0.77008	74919	1340	2586	9083	825	126	951	77084	11795	88879
62	0.01816	0.26561	0.01196	0.03012	-0.26561	-0.01816	0.27757	0.97238	0.23001	0.01573	0.75810	75364	1219	2397	7901	921	124	1045	77505	10423	87927
63	0.01651	0.28125	0.01330	0.02981	-0.28125	-0.01651	0.29455	0.97259	0.24179	0.01420	0.74500	75630	1104	2205	6795	1027	121	1148	77762	9121	86882
64	0.01497	0.29861	0.01479	0.02976	-0.29861	-0.01497	0.31340	0.97255	0.25462	0.01277	0.73070	75699	994	2011	5772	1142	116	1258	77835	7899	85734
65	0.01355	0.31789	0.01645	0.03000	-0.31789	-0.01355	0.33434	0.97224	0.26857	0.01145	0.71511	75553	890	1817	4838	1268	110	1378	77710	6766	84476
66	0.01223	0.33930	0.01829	0.03052	-0.33930	-0.01223	0.35759	0.97165	0.28376	0.01023	0.69812	75176	792	1625	3999	1402	104	1506	77370	5728	83098
67	0.01102	0.36312	0.02032	0.03134	-0.36312	-0.01102	0.38344	0.97077	0.30025	0.00911	0.67964	74557	700	1438	3256	1545	96	1641	76801	4791	81592
68	0.00991	0.38964	0.02259	0.03250	-0.38964	-0.00991	0.41223	0.96957	0.31814	0.00809	0.65953	73683	615	1258	2609	1698	88	1786	75995	3956	79951
69	0.00888	0.41920	0.02509	0.03397	-0.41920	-0.00888	0.44429	0.96806	0.33753	0.00715	0.63769	72548	536	1088	2056	1857	80	1937	74941	3223	78165
70	0.00795	0.45221	0.02787	0.03582	-0.45221	-0.00795	0.48008	0.96621	0.35851	0.00631	0.61400	71148	464	929	1591	2024	71	2095	73636	2592	76227
71	0.00710	0.48911	0.03095	0.03805	-0.48911	-0.00710	0.52006	0.96399	0.38118	0.00553	0.58834	69482	399	784	1209	2196	63	2259	72077	2056	74133
72	0.00632	0.53042	0.03435	0.04067	-0.53042	-0.00632	0.56477	0.96139	0.40563	0.00483	0.56060	67552	340	652	902	2373	54	2427	70265	1608	71873
73	0.00562	0.57675	0.03811	0.04373	-0.57675	-0.00562	0.61486	0.95839	0.43195	0.00421	0.53065	65367	287	536	659	2551	46	2597	68205	1241	69446
74	0.00498	0.62879	0.04227	0.04725	-0.62879	-0.00498	0.67106	0.95495	0.46021	0.00365	0.49839	62934	240	435	471	2728	39	2768	65903	946	66848

Source: *Author's calculations*

Table A.3 continued

											L(x) (for state based expectancies)				**e(x)** (state based)				
	L(x)			$\hat{l}^{Total}$	**e(x)** (working age population based)			**e(x)** (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
15	0.94810	0.05178	0.99988	1.00000	41.67	14.57	56.23	40.97	14.32	55.29									
16	0.86287	0.13677	0.99964	0.99977	40.73	14.52	55.25	40.05	14.28	54.32	0.94711	0.05276	0.13572	0.86416	40.93	14.27	38.61	16.60	55.20
17	0.80675	0.19262	0.99937	0.99951	39.88	14.39	54.26	39.21	14.14	53.35	0.94626	0.05360	0.12826	0.87160	40.25	13.97	37.82	16.39	54.22
18	0.76744	0.23163	0.99908	0.99923	39.08	14.20	53.28	38.43	13.96	52.39	0.94556	0.05428	0.12145	0.87839	39.59	13.65	37.06	16.18	53.23
19	0.73818	0.26056	0.99875	0.99892	38.32	13.97	52.29	37.68	13.74	51.42	0.94500	0.05483	0.11524	0.88459	38.94	13.31	36.31	15.94	52.25
20	0.71520	0.28320	0.99840	0.99858	37.60	13.71	51.31	36.97	13.48	50.45	0.94459	0.05522	0.10958	0.89024	38.31	12.96	35.57	15.69	51.27
21	0.69631	0.30171	0.99801	0.99821	36.89	13.43	50.33	36.28	13.21	49.49	0.94433	0.05547	0.10442	0.89538	37.69	12.60	34.86	15.43	50.29
22	0.68025	0.31735	0.99761	0.99782	36.21	13.14	49.35	35.61	12.92	48.52	0.94422	0.05557	0.09973	0.90006	37.09	12.22	34.15	15.15	49.31
23	0.66629	0.33088	0.99717	0.99740	35.54	12.82	48.37	34.95	12.61	47.56	0.94425	0.05553	0.09547	0.90431	36.49	11.83	33.46	14.86	48.33
24	0.65398	0.34273	0.99671	0.99695	34.89	12.50	47.39	34.31	12.29	46.60	0.94442	0.05534	0.09160	0.90816	35.91	11.43	32.78	14.56	47.35
25	0.64305	0.35318	0.99622	0.99647	34.25	12.16	46.41	33.68	11.96	45.64	0.94473	0.05502	0.08810	0.91165	35.34	11.03	32.11	14.26	46.37
26	0.63334	0.36238	0.99572	0.99598	33.62	11.81	45.44	33.06	11.61	44.68	0.94517	0.05457	0.08493	0.91481	34.78	10.61	31.46	13.94	45.39
27	0.62476	0.37042	0.99518	0.99546	33.01	11.45	44.46	32.45	11.26	43.72	0.94575	0.05398	0.08208	0.91765	34.23	10.19	30.81	13.61	44.42
28	0.61726	0.37737	0.99463	0.99491	32.40	11.09	43.48	31.85	10.90	42.76	0.94645	0.05327	0.07952	0.92020	33.68	9.76	30.16	13.28	43.44
29	0.61079	0.38326	0.99405	0.99435	31.79	10.71	42.51	31.26	10.54	41.80	0.94726	0.05244	0.07722	0.92248	33.14	9.33	29.53	12.94	42.46
30	0.60533	0.38810	0.99344	0.99375	31.20	10.34	41.53	30.68	10.16	40.84	0.94819	0.05149	0.07518	0.92450	32.60	8.89	28.89	12.60	41.49
31	0.60088	0.39191	0.99279	0.99312	30.61	9.95	40.56	30.10	9.78	39.88	0.94922	0.05045	0.07337	0.92629	32.06	8.45	28.27	12.25	40.52
32	0.59741	0.39470	0.99211	0.99246	30.02	9.56	39.59	29.52	9.40	38.92	0.95035	0.04930	0.07179	0.92786	31.53	8.02	27.64	11.90	39.54
33	0.59493	0.39646	0.99139	0.99176	29.44	9.17	38.61	28.95	9.02	37.97	0.95156	0.04807	0.07041	0.92922	30.99	7.58	27.02	11.55	38.57
34	0.59342	0.39721	0.99064	0.99103	28.86	8.78	37.64	28.38	8.63	37.01	0.95285	0.04676	0.06924	0.93036	30.45	7.15	26.39	11.20	37.60
35	0.59288	0.39695	0.98983	0.99025	28.29	8.38	36.67	27.81	8.24	36.06	0.95420	0.04537	0.06826	0.93132	29.91	6.72	25.77	10.85	36.63

Table A.3 continued

36	0.59329	0.39567	0.98896	0.98941	27.71	7.99	35.70	27.25	7.86	35.10	0.95562	0.04392	0.06745	0.93209	29.36	6.30	25.15	10.51	35.66
37	0.59464	0.39339	0.98803	0.98851	27.14	7.60	34.73	26.68	7.47	34.15	0.95709	0.04242	0.06683	0.93268	28.81	5.88	24.53	10.16	34.69
38	0.59691	0.39011	0.98702	0.98754	26.56	7.21	33.77	26.12	7.09	33.20	0.95860	0.04087	0.06637	0.93310	28.25	5.48	23.91	9.82	33.72
39	0.60009	0.38584	0.98593	0.98650	25.98	6.82	32.80	25.55	6.70	32.25	0.96015	0.03928	0.06609	0.93334	27.68	5.08	23.28	9.48	32.76
40	0.60415	0.38059	0.98474	0.98536	25.40	6.43	31.84	24.98	6.33	31.31	0.96171	0.03766	0.06596	0.93341	27.09	4.70	22.65	9.14	31.80
41	0.60907	0.37437	0.98344	0.98412	24.82	6.06	30.88	24.41	5.95	30.36	0.96329	0.03602	0.06600	0.93331	26.50	4.33	22.03	8.81	30.84
42	0.61482	0.36720	0.98202	0.98277	24.24	5.68	29.92	23.83	5.59	29.42	0.96488	0.03437	0.06621	0.93304	25.90	3.98	21.39	8.48	29.88
43	0.62137	0.35910	0.98047	0.98128	23.65	5.32	28.97	23.25	5.23	28.48	0.96646	0.03271	0.06657	0.93260	25.29	3.64	20.76	8.16	28.92
44	0.62867	0.35009	0.97876	0.97965	23.05	4.96	28.01	22.67	4.88	27.54	0.96803	0.03106	0.06711	0.93198	24.66	3.31	20.12	7.85	27.97
45	0.63667	0.34021	0.97688	0.97787	22.45	4.61	27.06	22.08	4.53	26.61	0.96957	0.02942	0.06781	0.93118	24.01	3.01	19.48	7.54	27.02
46	0.64533	0.32948	0.97481	0.97589	21.84	4.27	26.12	21.48	4.20	25.68	0.97109	0.02780	0.06868	0.93020	23.36	2.72	18.84	7.23	26.07
47	0.65458	0.31794	0.97252	0.97373	21.23	3.94	25.17	20.88	3.88	24.75	0.97257	0.02620	0.06974	0.92903	22.69	2.44	18.20	6.93	25.13
48	0.66434	0.30565	0.97000	0.97132	20.61	3.63	24.24	20.26	3.56	23.83	0.97401	0.02463	0.07097	0.92766	22.00	2.19	17.55	6.64	24.19
49	0.67455	0.29266	0.96720	0.96867	19.98	3.32	23.30	19.65	3.26	22.91	0.97539	0.02310	0.07240	0.92608	21.30	1.95	16.90	6.36	23.26
50	0.68510	0.27902	0.96412	0.96574	19.34	3.03	22.37	19.02	2.98	22.00	0.97672	0.02160	0.07404	0.92428	20.59	1.73	16.25	6.08	22.32
51	0.69589	0.26482	0.96071	0.96250	18.70	2.75	21.44	18.38	2.70	21.08	0.97798	0.02015	0.07588	0.92226	19.86	1.53	15.59	5.81	21.40
52	0.70681	0.25012	0.95693	0.95891	18.04	2.48	20.52	17.74	2.44	20.18	0.97918	0.01875	0.07795	0.91998	19.13	1.35	14.94	5.54	20.48
53	0.71773	0.23503	0.95276	0.95495	17.37	2.23	19.60	17.08	2.19	19.28	0.98030	0.01741	0.08026	0.91744	18.38	1.18	14.28	5.28	19.56
54	0.72851	0.21964	0.94815	0.95057	16.70	1.99	18.69	16.42	1.96	18.38	0.98134	0.01611	0.08283	0.91463	17.62	1.03	13.62	5.03	18.65
55	0.73900	0.20404	0.94305	0.94573	16.01	1.77	17.79	15.75	1.74	17.49	0.98229	0.01488	0.08566	0.91150	16.85	0.89	12.96	4.78	17.74
56	0.74904	0.18836	0.93740	0.94037	15.32	1.56	16.88	15.06	1.54	16.60	0.98315	0.01370	0.08879	0.90806	16.07	0.77	12.29	4.54	16.84
57	0.75845	0.17271	0.93117	0.93444	14.62	1.37	15.99	14.37	1.35	15.72	0.98392	0.01257	0.09223	0.90427	15.28	0.66	11.63	4.31	15.94
58	0.76705	0.15723	0.92428	0.92789	13.90	1.20	15.10	13.67	1.18	14.84	0.98459	0.01152	0.09600	0.90010	14.49	0.56	10.97	4.08	15.05
59	0.77465	0.14202	0.91668	0.92066	13.18	1.03	14.21	12.96	1.02	13.97	0.98516	0.01051	0.10014	0.89553	13.69	0.48	10.30	3.86	14.16
60	0.78107	0.12723	0.90830	0.91269	12.44	0.89	13.33	12.24	0.87	13.11	0.98562	0.00957	0.10466	0.89052	12.88	0.40	9.63	3.65	13.28

Table A.3 continued

61	0.78609	0.11298	0.89907	0.90391	11.70	0.76	12.46	11.50	0.74	12.25	0.98596	0.00869	0.10961	0.88504	12.07	0.34	8.96	3.44	12.41
62	0.78954	0.09938	0.88892	0.89423	10.95	0.64	11.59	10.76	0.63	11.39	0.98619	0.00786	0.11501	0.87905	11.26	0.28	8.29	3.24	11.54
63	0.79122	0.08654	0.87777	0.88360	10.19	0.53	10.72	10.02	0.52	10.54	0.98629	0.00710	0.12090	0.87250	10.44	0.23	7.62	3.05	10.67
64	0.79096	0.07457	0.86553	0.87193	9.42	0.44	9.86	9.26	0.43	9.69	0.98628	0.00639	0.12731	0.86535	9.62	0.19	6.94	2.86	9.81
65	0.78859	0.06353	0.85213	0.85913	8.63	0.36	9.00	8.49	0.35	8.84	0.98612	0.00573	0.13429	0.85755	8.79	0.15	6.26	2.68	8.94
66	0.78397	0.05349	0.83746	0.84512	7.84	0.29	8.14	7.71	0.29	8.00	0.98582	0.00512	0.14188	0.84906	7.96	0.12	5.58	2.50	8.08
67	0.77698	0.04448	0.82146	0.82980	7.04	0.23	7.28	6.93	0.23	7.16	0.98539	0.00456	0.15012	0.83982	7.13	0.09	4.89	2.33	7.22
68	0.76752	0.03651	0.80403	0.81311	6.23	0.18	6.42	6.13	0.18	6.31	0.98479	0.00404	0.15907	0.82976	6.29	0.07	4.20	2.16	6.36
69	0.75553	0.02957	0.78509	0.79495	5.41	0.14	5.55	5.32	0.14	5.46	0.98403	0.00358	0.16876	0.81884	5.44	0.05	3.50	2.00	5.50
70	0.74096	0.02363	0.76459	0.77524	4.57	0.11	4.68	4.50	0.10	4.60	0.98311	0.00315	0.17925	0.80700	4.59	0.04	2.80	1.83	4.62
71	0.72382	0.01863	0.74245	0.75394	3.72	0.08	3.80	3.66	0.08	3.73	0.98200	0.00277	0.19059	0.79417	3.72	0.02	2.10	1.64	3.74
72	0.70413	0.01449	0.71862	0.73096	2.85	0.05	2.90	2.80	0.05	2.85	0.98070	0.00242	0.20282	0.78030	2.83	0.01	1.41	1.44	2.84
73	0.68195	0.01112	0.69307	0.70628	1.95	0.04	1.99	1.92	0.04	1.95	0.97919	0.00210	0.21597	0.76532	1.92	0.01	0.76	1.16	1.92
74	0.69501	0.01421	0.70923	0.67986	1.02	0.02	1.04	1.01	0.02	1.03	0.97748	0.00182	0.23010	0.74920	0.98	0.00	0.23	0.75	0.98

Source: Author's calculations

Table A.4: Multistate working life table for low educated women based on transition rates estimated from Equation 2

	Estimated transition rates		*Death rate*	**M(x)** *(transition rate matrix)*				**P(x)** *(transition probability matrix)*				d_{ij} *where* $i, j = 1,2$				$d_{i\delta}$ *where* $i = 1,2$			**l(x)**		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1,2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
15	0.11017	0.42627	0.00023	0.11040	-0.42627	-0.11017	0.42650	0.91292	0.33605	0.08686	0.66372	89764	8540	0	0	22	0	22	98327	0	98327
16	0.11141	0.39758	0.00025	0.11166	-0.39758	-0.11141	0.39783	0.91096	0.31685	0.08878	0.68289	81772	7970	2706	5832	23	2	25	89764	8540	98305
17	0.11241	0.37179	0.00028	0.11269	-0.37179	-0.11241	0.37207	0.90925	0.29925	0.09047	0.70047	76812	7643	4130	9668	24	4	28	84478	13802	98280
18	0.11317	0.34858	0.00031	0.11348	-0.34858	-0.11317	0.34889	0.90777	0.28312	0.09191	0.71658	73477	7440	4901	12404	25	5	31	80942	17311	98252
19	0.11369	0.32766	0.00034	0.11403	-0.32766	-0.11369	0.32800	0.90656	0.26834	0.09310	0.73132	71054	7297	5325	14512	27	7	33	78378	19844	98222
20	0.11396	0.30880	0.00037	0.11433	-0.30880	-0.11396	0.30917	0.90558	0.25483	0.09404	0.74480	69167	7183	5558	16244	29	8	37	76379	21809	98188
21	0.11398	0.29178	0.00040	0.11438	-0.29178	-0.11398	0.29218	0.90488	0.24248	0.09472	0.75712	67617	7078	5680	17737	30	9	39	74725	23426	98151
22	0.11376	0.27642	0.00042	0.11418	-0.27642	-0.11376	0.27684	0.90443	0.23121	0.09515	0.76837	66292	6974	5737	19067	31	10	41	73297	24815	98112
23	0.11329	0.26255	0.00045	0.11374	-0.26255	-0.11329	0.26300	0.90422	0.22092	0.09533	0.77863	65131	6867	5753	20277	32	12	44	72029	26041	98071
24	0.11258	0.25002	0.00048	0.11306	-0.25002	-0.11258	0.25050	0.90426	0.21155	0.09526	0.78797	64097	6752	5742	21388	34	13	47	70884	27143	98027
25	0.11162	0.23871	0.00050	0.11212	-0.23871	-0.11162	0.23921	0.90456	0.20303	0.09494	0.79647	63174	6631	5713	22413	35	14	49	69840	28140	97980
26	0.11043	0.22850	0.00052	0.11095	-0.22850	-0.11043	0.22902	0.90509	0.19529	0.09439	0.80419	62350	6502	5672	23356	36	15	51	68888	29043	97931
27	0.10902	0.21930	0.00055	0.10957	-0.21930	-0.10902	0.21985	0.90585	0.18828	0.09360	0.81118	61617	6367	5622	24221	38	16	54	68022	29859	97880
28	0.10739	0.21101	0.00057	0.10796	-0.21101	-0.10739	0.21158	0.90684	0.18194	0.09260	0.81750	60975	6226	5565	25005	38	17	55	67239	30587	97826
29	0.10556	0.20357	0.00060	0.10616	-0.20357	-0.10556	0.20417	0.90802	0.17621	0.09138	0.82319	60419	6080	5503	25709	40	19	59	66540	31231	97771
30	0.10353	0.19690	0.00063	0.10416	-0.19690	-0.10353	0.19753	0.90941	0.17108	0.08995	0.82829	59951	5930	5439	26331	42	20	62	65923	31789	97712
31	0.10132	0.19094	0.00067	0.10199	-0.19094	-0.10132	0.19161	0.91099	0.16649	0.08835	0.83284	59569	5777	5371	26868	43	21	65	65390	32261	97650
32	0.09894	0.18564	0.00070	0.09964	-0.18564	-0.09894	0.18634	0.91274	0.16241	0.08656	0.83689	59274	5621	5302	27320	45	23	68	64940	32645	97586
33	0.09640	0.18096	0.00074	0.09714	-0.18096	-0.09640	0.18170	0.91466	0.15881	0.08460	0.84045	59065	5463	5231	27686	48	24	72	64576	32941	97517
34	0.09373	0.17686	0.00079	0.09452	-0.17686	-0.09373	0.17765	0.91671	0.15567	0.08249	0.84354	58941	5304	5160	27962	51	26	77	64296	33149	97445
35	0.09093	0.17330	0.00085	0.09178	-0.17330	-0.09093	0.17415	0.91890	0.15295	0.08025	0.84619	58903	5144	5088	28150	55	28	83	64101	33266	97368

Table A.4 continued

36	0.08802	0.17025	0.00091	0.08893	-0.17025	-0.08802	0.17116	0.92120	0.15065	0.07789	0.84844	58948	4984	5016	28248	58	30	89	63991	33294	97284
37	0.08502	0.16769	0.00098	0.08600	-0.16769	-0.08502	0.16867	0.92361	0.14875	0.07541	0.85027	59078	4824	4943	28256	63	33	95	63964	33232	97196
38	0.08194	0.16560	0.00106	0.08300	-0.16560	-0.08194	0.16666	0.92610	0.14722	0.07284	0.85173	59290	4664	4870	28175	68	35	103	64021	33080	97101
39	0.07881	0.16396	0.00115	0.07996	-0.16396	-0.07881	0.16511	0.92865	0.14605	0.07020	0.85279	59582	4504	4796	28004	74	38	112	64159	32838	96998
40	0.07562	0.16276	0.00126	0.07688	-0.16276	-0.07562	0.16402	0.93125	0.14525	0.06749	0.85349	59952	4345	4722	27745	81	41	122	64378	32508	96886
41	0.07241	0.16199	0.00138	0.07379	-0.16199	-0.07241	0.16337	0.93389	0.14480	0.06473	0.85382	60398	4187	4647	27399	89	44	133	64674	32090	96764
42	0.06918	0.16164	0.00151	0.07069	-0.16164	-0.06918	0.16315	0.93655	0.14471	0.06194	0.85379	60918	4029	4571	26967	98	48	146	65045	31586	96630
43	0.06596	0.16171	0.00166	0.06762	-0.16171	-0.06596	0.16337	0.93922	0.14496	0.05912	0.85338	61508	3872	4493	26451	109	51	160	65488	30996	96484
44	0.06274	0.16220	0.00183	0.06457	-0.16220	-0.06274	0.16403	0.94187	0.14555	0.05630	0.85262	62164	3716	4414	25854	121	56	177	66001	30323	96324
45	0.05956	0.16312	0.00202	0.06158	-0.16312	-0.05956	0.16514	0.94449	0.14649	0.05349	0.85149	62882	3561	4332	25179	134	60	194	66578	29570	96148
46	0.05641	0.16446	0.00223	0.05864	-0.16446	-0.05641	0.16669	0.94708	0.14779	0.05069	0.84998	63657	3407	4247	24428	150	64	214	67214	28740	95954
47	0.05331	0.16625	0.00247	0.05578	-0.16625	-0.05331	0.16872	0.94961	0.14946	0.04793	0.84808	64483	3255	4160	23606	167	69	236	67905	27835	95740
48	0.05027	0.16850	0.00273	0.05300	-0.16850	-0.05027	0.17123	0.95208	0.15149	0.04520	0.84579	65353	3103	4069	22718	187	73	260	68643	26861	95504
49	0.04730	0.17122	0.00303	0.05033	-0.17122	-0.04730	0.17425	0.95445	0.15391	0.04252	0.84307	66260	2952	3974	21769	210	78	288	69423	25821	95244
50	0.04441	0.17443	0.00336	0.04777	-0.17443	-0.04441	0.17779	0.95674	0.15673	0.03991	0.83992	67196	2803	3875	20764	236	83	319	70235	24721	94956
51	0.04161	0.17817	0.00373	0.04534	-0.17817	-0.04161	0.18190	0.95892	0.15997	0.03736	0.83631	68151	2655	3770	19709	264	88	352	71071	23566	94637
52	0.03890	0.18246	0.00414	0.04304	-0.18246	-0.03890	0.18660	0.96098	0.16364	0.03489	0.83223	69115	2509	3660	18612	297	92	390	71921	22364	94285
53	0.03628	0.18735	0.00460	0.04088	-0.18735	-0.03628	0.19195	0.96292	0.16777	0.03249	0.82764	70076	2365	3544	17481	334	97	431	72774	21121	93896
54	0.03377	0.19286	0.00511	0.03888	-0.19286	-0.03377	0.19797	0.96472	0.17239	0.03019	0.82252	71022	2223	3421	16323	375	101	476	73619	19845	93465
55	0.03136	0.19905	0.00569	0.03705	-0.19905	-0.03136	0.20474	0.96635	0.17752	0.02797	0.81680	71938	2082	3292	15148	423	105	528	74443	18546	92989
56	0.02907	0.20597	0.00632	0.03539	-0.20597	-0.02907	0.21229	0.96785	0.18321	0.02585	0.81049	72811	1945	3157	13965	474	109	583	75230	17231	92461
57	0.02688	0.21369	0.00703	0.03391	-0.21369	-0.02688	0.22072	0.96917	0.18948	0.02383	0.80351	73626	1811	3015	12784	532	112	643	75968	15910	91878
58	0.02480	0.22227	0.00782	0.03262	-0.22227	-0.02480	0.23009	0.97030	0.19638	0.02191	0.79583	74364	1679	2866	11615	597	114	711	76640	14595	91235
59	0.02283	0.23180	0.00870	0.03153	-0.23180	-0.02283	0.24050	0.97125	0.20394	0.02009	0.78740	75010	1552	2711	10468	669	115	784	77230	13294	90524
60	0.02097	0.24236	0.00967	0.03064	-0.24236	-0.02097	0.25203	0.97201	0.21223	0.01837	0.77815	75546	1428	2551	9353	748	116	863	77721	12019	89740

Table A.4 continued

61	0.01923	0.25407	0.01076	0.02999	-0.25407	-0.01923	0.26483	0.97256	0.22129	0.01674	0.76801	75953	1307	2386	8279	836	115	951	78096	10780	88877
62	0.01758	0.26703	0.01196	0.02954	-0.26703	-0.01758	0.27899	0.97289	0.23117	0.01522	0.75694	76215	1192	2216	7257	931	114	1045	78339	9587	87926
63	0.01605	0.28139	0.01330	0.02935	-0.28139	-0.01605	0.29469	0.97299	0.24195	0.01380	0.74484	76313	1082	2044	6293	1036	112	1148	78431	8449	86880
64	0.01462	0.29729	0.01479	0.02941	-0.29729	-0.01462	0.31208	0.97285	0.25367	0.01247	0.73165	76230	977	1871	5396	1150	108	1258	78357	7375	85732
65	0.01328	0.31490	0.01645	0.02973	-0.31490	-0.01328	0.33135	0.97244	0.26642	0.01124	0.71726	75948	878	1698	4571	1275	104	1379	78101	6373	84474
66	0.01204	0.33442	0.01829	0.03033	-0.33442	-0.01204	0.35271	0.97178	0.28027	0.01009	0.70160	75455	784	1527	3823	1408	99	1506	77646	5449	83095
67	0.01089	0.35608	0.02032	0.03121	-0.35608	-0.01089	0.37640	0.97085	0.29531	0.00904	0.68457	74738	696	1360	3153	1549	93	1641	76982	4607	81589
68	0.00984	0.38013	0.02259	0.03243	-0.38013	-0.00984	0.40272	0.96960	0.31160	0.00806	0.66606	73785	614	1199	2564	1700	86	1785	76098	3849	79948
69	0.00886	0.40685	0.02509	0.03395	-0.40685	-0.00886	0.43194	0.96806	0.32924	0.00717	0.64598	72589	538	1046	2053	1858	79	1936	74985	3178	78162
70	0.00796	0.43658	0.02787	0.03583	-0.43658	-0.00796	0.46445	0.96616	0.34831	0.00635	0.62420	71143	468	902	1617	2024	71	2096	73636	2590	76226
71	0.00714	0.46971	0.03095	0.03809	-0.46971	-0.00714	0.50066	0.96391	0.36889	0.00561	0.60063	69445	404	769	1252	2196	64	2260	72046	2085	74130
72	0.00639	0.50666	0.03435	0.04074	-0.50666	-0.00639	0.54101	0.96130	0.39107	0.00494	0.57516	67497	347	648	953	2371	56	2427	70214	1656	71870
73	0.00571	0.54794	0.03811	0.04382	-0.54794	-0.00571	0.58605	0.95828	0.41493	0.00432	0.54767	65301	294	539	712	2549	49	2597	68145	1299	69444
74	0.00509	0.59413	0.04227	0.04736	-0.59413	-0.00509	0.63640	0.95483	0.44053	0.00377	0.51807	62867	248	443	521	2726	42	2767	65841	1006	66846

Source: Author’s calculations

Table A.4 continued

											L(x) (for state based expectancies)				e(x) (state based)				
	L(x)			$\hat{l}^{Total}$	e(x) (working age population based)			e(x) (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
15	0.95646	0.04343	0.99989	1.00000	43.74	12.50	56.23	43.00	12.29	55.29									
16	0.88604	0.11361	0.99965	0.99978	42.79	12.46	55.25	42.07	12.25	54.32	0.95548	0.04439	0.15843	0.84145	42.94	12.27	40.81	14.39	55.20
17	0.84117	0.15821	0.99938	0.99952	41.91	12.35	54.26	41.21	12.14	53.35	0.95462	0.04524	0.14963	0.85023	42.19	12.03	39.95	14.26	54.22
18	0.81015	0.18893	0.99908	0.99924	41.08	12.19	53.28	40.40	11.99	52.38	0.95389	0.04596	0.14156	0.85829	41.46	11.77	39.11	14.12	53.23
19	0.78695	0.21181	0.99876	0.99893	40.29	12.01	52.29	39.61	11.81	51.42	0.95328	0.04655	0.13417	0.86566	40.74	11.50	38.29	13.96	52.25
20	0.76837	0.23003	0.99840	0.99859	39.51	11.80	51.31	38.85	11.60	50.45	0.95279	0.04702	0.12741	0.87240	40.04	11.22	37.48	13.79	51.27
21	0.75270	0.24531	0.99801	0.99821	38.76	11.57	50.33	38.11	11.38	49.49	0.95244	0.04736	0.12124	0.87856	39.36	10.93	36.68	13.60	50.28
22	0.73900	0.25861	0.99760	0.99781	38.02	11.33	49.35	37.38	11.14	48.52	0.95221	0.04758	0.11560	0.88419	38.68	10.62	35.90	13.40	49.30
23	0.72672	0.27045	0.99717	0.99740	37.29	11.08	48.37	36.67	10.89	47.56	0.95211	0.04767	0.11046	0.88931	38.02	10.31	35.14	13.19	48.32
24	0.71559	0.28112	0.99671	0.99695	36.58	10.81	47.39	35.97	10.63	46.60	0.95213	0.04763	0.10578	0.89398	37.37	9.98	34.38	12.96	47.35
25	0.70544	0.29078	0.99622	0.99647	35.88	10.53	46.41	35.28	10.36	45.64	0.95228	0.04747	0.10151	0.89824	36.73	9.64	33.64	12.73	46.37
26	0.69619	0.29952	0.99571	0.99597	35.19	10.25	45.44	34.60	10.08	44.68	0.95255	0.04719	0.09765	0.90209	36.10	9.29	32.91	12.49	45.39
27	0.68781	0.30737	0.99518	0.99545	34.51	9.95	44.46	33.93	9.78	43.72	0.95292	0.04680	0.09414	0.90559	35.47	8.94	32.18	12.23	44.42
28	0.68027	0.31435	0.99462	0.99491	33.84	9.65	43.48	33.27	9.49	42.76	0.95342	0.04630	0.09097	0.90875	34.86	8.58	31.47	11.97	43.44
29	0.67358	0.32046	0.99405	0.99434	33.17	9.34	42.51	32.62	9.18	41.80	0.95401	0.04569	0.08811	0.91159	34.25	8.22	30.76	11.70	42.46
30	0.66773	0.32570	0.99343	0.99375	32.51	9.02	41.53	31.97	8.87	40.84	0.95471	0.04498	0.08554	0.91415	33.64	7.85	30.06	11.43	41.49
31	0.66274	0.33005	0.99279	0.99312	31.86	8.70	40.56	31.33	8.55	39.88	0.95549	0.04417	0.08325	0.91642	33.04	7.48	29.36	11.15	40.51
32	0.65860	0.33351	0.99211	0.99246	31.21	8.37	39.59	30.69	8.23	38.92	0.95637	0.04328	0.08121	0.91844	32.44	7.11	28.67	10.87	39.54
33	0.65532	0.33607	0.99140	0.99176	30.57	8.04	38.61	30.06	7.91	37.97	0.95733	0.04230	0.07941	0.92022	31.83	6.73	27.98	10.58	38.57
34	0.65291	0.33772	0.99064	0.99103	29.93	7.71	37.64	29.43	7.58	37.01	0.95836	0.04125	0.07783	0.92177	31.23	6.36	27.30	10.30	37.60
35	0.65136	0.33846	0.98982	0.99024	29.30	7.37	36.67	28.81	7.25	36.06	0.95945	0.04012	0.07648	0.92310	30.63	6.00	26.62	10.01	36.63

Table A.4 continued

36	0.65066	0.33829	0.98895	0.98940	28.66	7.04	35.70	28.19	6.92	35.10	0.96060	0.03894	0.07533	0.92422	30.02	5.63	25.94	9.72	35.66
37	0.65081	0.33720	0.98801	0.98850	28.03	6.70	34.73	27.56	6.59	34.15	0.96180	0.03771	0.07437	0.92514	29.41	5.28	25.26	9.43	34.69
38	0.65181	0.33520	0.98700	0.98753	27.40	6.37	33.77	26.94	6.26	33.20	0.96305	0.03642	0.07361	0.92586	28.80	4.93	24.59	9.14	33.72
39	0.65362	0.33229	0.98591	0.98648	26.77	6.03	32.80	26.32	5.93	32.25	0.96432	0.03510	0.07303	0.92640	28.18	4.58	23.91	8.85	32.76
40	0.65624	0.32848	0.98472	0.98534	26.14	5.70	31.84	25.70	5.61	31.31	0.96563	0.03374	0.07263	0.92674	27.55	4.25	23.23	8.56	31.80
41	0.65963	0.32379	0.98342	0.98410	25.50	5.38	30.88	25.08	5.29	30.36	0.96694	0.03237	0.07240	0.92691	26.91	3.93	22.56	8.28	30.84
42	0.66377	0.31823	0.98200	0.98274	24.87	5.05	29.92	24.45	4.97	29.42	0.96828	0.03097	0.07235	0.92689	26.26	3.62	21.88	8.00	29.88
43	0.66863	0.31181	0.98045	0.98126	24.23	4.74	28.97	23.82	4.66	28.48	0.96961	0.02956	0.07248	0.92669	25.60	3.32	21.20	7.72	28.92
44	0.67417	0.30456	0.97873	0.97963	23.59	4.43	28.01	23.19	4.35	27.54	0.97093	0.02815	0.07277	0.92631	24.93	3.03	20.53	7.44	27.97
45	0.68034	0.29651	0.97685	0.97784	22.94	4.12	27.06	22.56	4.05	26.61	0.97225	0.02674	0.07325	0.92574	24.26	2.76	19.85	7.17	27.02
46	0.68709	0.28769	0.97477	0.97586	22.29	3.83	26.12	21.92	3.76	25.68	0.97354	0.02534	0.07390	0.92499	23.57	2.51	19.17	6.90	26.07
47	0.69435	0.27813	0.97249	0.97368	21.63	3.54	25.17	21.27	3.48	24.75	0.97480	0.02396	0.07473	0.92404	22.87	2.26	18.49	6.64	25.13
48	0.70207	0.26789	0.96997	0.97129	20.97	3.26	24.24	20.62	3.21	23.83	0.97604	0.02260	0.07575	0.92289	22.15	2.04	17.81	6.38	24.19
49	0.71017	0.25701	0.96718	0.96864	20.30	3.00	23.30	19.96	2.95	22.91	0.97722	0.02126	0.07696	0.92153	21.43	1.82	17.13	6.12	23.26
50	0.71855	0.24555	0.96409	0.96571	19.63	2.74	22.37	19.30	2.69	22.00	0.97837	0.01995	0.07837	0.91996	20.70	1.63	16.45	5.87	22.32
51	0.72712	0.23356	0.96068	0.96247	18.95	2.49	21.44	18.63	2.45	21.08	0.97946	0.01868	0.07998	0.91816	19.95	1.45	15.77	5.63	21.40
52	0.73578	0.22113	0.95691	0.95889	18.26	2.26	20.52	17.96	2.22	20.18	0.98049	0.01744	0.08182	0.91612	19.20	1.28	15.09	5.39	20.48
53	0.74442	0.20832	0.95274	0.95493	17.57	2.04	19.60	17.27	2.00	19.28	0.98146	0.01625	0.08388	0.91382	18.43	1.12	14.41	5.15	19.56
54	0.75291	0.19522	0.94813	0.95055	16.87	1.83	18.69	16.58	1.80	18.38	0.98236	0.01510	0.08620	0.91126	17.66	0.99	13.73	4.92	18.65
55	0.76110	0.18193	0.94302	0.94571	16.16	1.63	17.79	15.89	1.60	17.49	0.98317	0.01399	0.08876	0.90840	16.88	0.86	13.04	4.70	17.74
56	0.76885	0.16852	0.93738	0.94034	15.44	1.45	16.88	15.18	1.42	16.60	0.98392	0.01293	0.09160	0.90525	16.09	0.74	12.36	4.47	16.84
57	0.77603	0.15512	0.93114	0.93441	14.71	1.27	15.99	14.47	1.25	15.72	0.98458	0.01192	0.09474	0.90176	15.30	0.64	11.68	4.26	15.94
58	0.78244	0.14181	0.92426	0.92787	13.98	1.12	15.10	13.75	1.10	14.84	0.98515	0.01096	0.09819	0.89791	14.50	0.55	11.00	4.05	15.05
59	0.78794	0.12872	0.91666	0.92064	13.24	0.97	14.21	13.02	0.95	13.97	0.98562	0.01005	0.10197	0.89370	13.70	0.47	10.32	3.84	14.16
60	0.79234	0.11594	0.90828	0.91267	12.49	0.84	13.33	12.28	0.82	13.11	0.98601	0.00918	0.10611	0.88907	12.89	0.40	9.64	3.64	13.28

Table A.4 continued

61	0.79548	0.10357	0.89905	0.90389	11.74	0.72	12.46	11.54	0.71	12.25	0.98628	0.00837	0.11064	0.88401	12.07	0.33	8.96	3.45	12.41
62	0.79719	0.09171	0.88890	0.89422	10.98	0.61	11.59	10.79	0.60	11.39	0.98645	0.00761	0.11558	0.87847	11.26	0.28	8.28	3.26	11.54
63	0.79728	0.08047	0.87775	0.88358	10.21	0.51	10.72	10.03	0.51	10.54	0.98650	0.00690	0.12097	0.87242	10.44	0.23	7.60	3.07	10.67
64	0.79560	0.06991	0.86551	0.87191	9.43	0.43	9.86	9.27	0.42	9.69	0.98643	0.00624	0.12683	0.86582	9.62	0.19	6.91	2.89	9.81
65	0.79198	0.06012	0.85210	0.85911	8.64	0.35	9.00	8.50	0.35	8.84	0.98622	0.00562	0.13321	0.85863	8.79	0.15	6.23	2.72	8.94
66	0.78630	0.05113	0.83743	0.84509	7.85	0.29	8.14	7.72	0.28	8.00	0.98589	0.00505	0.14014	0.85080	7.96	0.12	5.54	2.55	8.08
67	0.77843	0.04300	0.82143	0.82977	7.05	0.23	7.28	6.93	0.23	7.16	0.98542	0.00452	0.14766	0.84229	7.13	0.10	4.84	2.38	7.22
68	0.76827	0.03573	0.80400	0.81308	6.23	0.18	6.42	6.13	0.18	6.31	0.98480	0.00403	0.15580	0.83303	6.29	0.07	4.15	2.21	6.36
69	0.75574	0.02933	0.78507	0.79492	5.41	0.14	5.55	5.32	0.14	5.46	0.98403	0.00358	0.16462	0.82299	5.44	0.05	3.45	2.05	5.50
70	0.74080	0.02377	0.76457	0.77523	4.57	0.11	4.68	4.49	0.11	4.60	0.98308	0.00318	0.17415	0.81210	4.58	0.04	2.75	1.88	4.62
71	0.72340	0.01902	0.74242	0.75391	3.72	0.08	3.80	3.66	0.08	3.73	0.98195	0.00280	0.18444	0.80032	3.71	0.03	2.05	1.69	3.74
72	0.70357	0.01503	0.71859	0.73093	2.84	0.06	2.90	2.80	0.06	2.85	0.98065	0.00247	0.19553	0.78758	2.83	0.02	1.37	1.48	2.84
73	0.68132	0.01172	0.69305	0.70625	1.95	0.04	1.99	1.92	0.04	1.95	0.97914	0.00216	0.20746	0.77384	1.92	0.01	0.73	1.19	1.92
74	0.69451	0.01469	0.70920	0.67984	1.02	0.02	1.04	1.00	0.02	1.03	0.97742	0.00188	0.22026	0.75904	0.98	0.00	0.22	0.76	0.98

Source: Author's calculations

Table A.5: Multistate working life table for high educated women based on transition rates estimated from Equation 2

	Estimated transition rates		***Death rate***	**M(x)** ***(transition rate matrix)***				**P(x)** ***(transition probability matrix)***				d_{ij} *where* $i, j = 1, 2$				$d_{i\delta}$ *where* $i = 1, 2$			**l(x)**		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1, 2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
20	0.18707	0.21383	0.00037	0.18744	-0.21383	-0.18707	0.21420	0.84385	0.17807	0.15579	0.82156	50958	9408	6731	31057	22	14	36	60388	37802	98190
21	0.18711	0.20205	0.00040	0.18751	-0.20205	-0.18711	0.20245	0.84302	0.16908	0.15658	0.83052	48634	9033	6842	33606	23	16	39	57690	40464	98154
22	0.18675	0.19141	0.00042	0.18717	-0.19141	-0.18675	0.19183	0.84259	0.16092	0.15699	0.83866	46743	8709	6861	35760	23	18	41	55475	42639	98115
23	0.18597	0.18180	0.00045	0.18642	-0.18180	-0.18597	0.18225	0.84253	0.15350	0.15702	0.84605	45163	8417	6826	37623	24	20	44	53605	44469	98074
24	0.18480	0.17313	0.00048	0.18528	-0.17313	-0.18480	0.17361	0.84284	0.14678	0.15668	0.85274	43819	8146	6758	39260	25	22	47	51989	46040	98030
25	0.18323	0.16530	0.00050	0.18373	-0.16530	-0.18323	0.16580	0.84353	0.14070	0.15597	0.85880	42663	7888	6670	40712	25	24	49	50577	47406	97983
26	0.18129	0.15823	0.00052	0.18181	-0.15823	-0.18129	0.15875	0.84458	0.13520	0.15490	0.86428	41666	7642	6571	42005	26	25	51	49333	48601	97934
27	0.17897	0.15185	0.00055	0.17952	-0.15185	-0.17897	0.15240	0.84596	0.13024	0.15348	0.86922	40806	7404	6466	43153	27	27	54	48236	49646	97883
28	0.17629	0.14612	0.00057	0.17686	-0.14612	-0.17629	0.14669	0.84769	0.12577	0.15174	0.87367	40072	7173	6358	44170	27	29	55	47272	50557	97829
29	0.17328	0.14096	0.00060	0.17388	-0.14096	-0.17328	0.14156	0.84973	0.12175	0.14967	0.87765	39453	6949	6251	45061	28	31	59	46430	51343	97774
30	0.16995	0.13634	0.00063	0.17058	-0.13634	-0.16995	0.13697	0.85208	0.11816	0.14729	0.88120	38944	6732	6146	45832	29	33	62	45705	52010	97715
31	0.16632	0.13222	0.00067	0.16699	-0.13222	-0.16632	0.13289	0.85471	0.11498	0.14463	0.88436	38538	6521	6043	46485	30	35	65	45090	52563	97653
32	0.16241	0.12855	0.00070	0.16311	-0.12855	-0.16241	0.12925	0.85761	0.11215	0.14169	0.88715	38234	6317	5945	47024	31	37	68	44582	53006	97588
33	0.15825	0.12531	0.00074	0.15899	-0.12531	-0.15825	0.12605	0.86076	0.10968	0.13850	0.88958	38027	6119	5850	47451	33	39	72	44179	53341	97520
34	0.15386	0.12247	0.00079	0.15465	-0.12247	-0.15386	0.12326	0.86413	0.10753	0.13508	0.89169	37916	5927	5760	47768	34	42	76	43878	53570	97448
35	0.14926	0.12000	0.00085	0.15011	-0.12000	-0.14926	0.12085	0.86770	0.10568	0.13145	0.89347	37898	5741	5674	47974	37	46	83	43676	53695	97371
36	0.14449	0.11789	0.00091	0.14540	-0.11789	-0.14449	0.11880	0.87147	0.10413	0.12763	0.89496	37972	5561	5594	48073	39	49	88	43572	53716	97288
37	0.13957	0.11612	0.00098	0.14055	-0.11612	-0.13957	0.11710	0.87539	0.10286	0.12363	0.89616	38137	5386	5517	48065	43	53	95	43566	53634	97200
38	0.13452	0.11467	0.00106	0.13558	-0.11467	-0.13452	0.11573	0.87945	0.10187	0.11949	0.89707	38391	5216	5445	47949	46	57	103	43654	53451	97105
39	0.12936	0.11354	0.00115	0.13051	-0.11354	-0.12936	0.11469	0.88362	0.10113	0.11523	0.89772	38735	5051	5377	47728	51	61	111	43836	53165	97002
40	0.12414	0.11271	0.00126	0.12540	-0.11271	-0.12414	0.11397	0.88788	0.10065	0.11086	0.89809	39165	4890	5312	47400	56	66	122	44111	52779	96890

Table A.5 continued

41	0.11887	0.11217	0.00138	0.12025	-0.11217	-0.11887	0.11355	0.89221	0.10043	0.10642	0.89819	39683	4733	5251	46967	61	72	133	44478	52291	96768
42	0.11357	0.11193	0.00151	0.11508	-0.11193	-0.11357	0.11344	0.89658	0.10045	0.10191	0.89805	40287	4579	5193	46429	68	78	146	44935	51700	96635
43	0.10827	0.11198	0.00166	0.10993	-0.11198	-0.10827	0.11364	0.90096	0.10071	0.09738	0.89763	40976	4429	5137	45787	75	85	160	45481	51009	96489
44	0.10300	0.11232	0.00183	0.10483	-0.11232	-0.10300	0.11415	0.90535	0.10123	0.09283	0.89695	41749	4281	5083	45041	84	92	176	46113	50216	96329
45	0.09777	0.11295	0.00202	0.09979	-0.11295	-0.09777	0.11497	0.90971	0.10199	0.08827	0.89599	42603	4134	5030	44192	95	100	194	46832	49322	96153
46	0.09260	0.11389	0.00223	0.09483	-0.11389	-0.09260	0.11612	0.91402	0.10301	0.08376	0.89476	43538	3990	4978	43240	106	108	214	47634	48326	95959
47	0.08751	0.11512	0.00247	0.08998	-0.11512	-0.08751	0.11759	0.91826	0.10429	0.07928	0.89324	44550	3846	4925	42187	119	117	236	48516	47229	95746
48	0.08253	0.11668	0.00273	0.08526	-0.11668	-0.08253	0.11941	0.92242	0.10583	0.07485	0.89144	45637	3703	4872	41036	135	125	260	49476	46034	95509
49	0.07765	0.11856	0.00303	0.08068	-0.11856	-0.07765	0.12159	0.92647	0.10766	0.07051	0.88931	46795	3562	4817	39788	153	136	288	50509	44740	95249
50	0.07291	0.12079	0.00336	0.07627	-0.12079	-0.07291	0.12415	0.93039	0.10977	0.06625	0.88688	48019	3420	4758	38446	173	145	319	51612	43349	94961
51	0.06831	0.12338	0.00373	0.07204	-0.12338	-0.06831	0.12711	0.93416	0.11219	0.06211	0.88409	49303	3278	4697	37013	197	156	352	52777	41865	94642
52	0.06385	0.12635	0.00414	0.06799	-0.12635	-0.06385	0.13049	0.93779	0.11493	0.05808	0.88094	50640	3136	4630	35494	223	166	390	53999	40290	94290
53	0.05956	0.12973	0.00460	0.06416	-0.12973	-0.05956	0.13433	0.94124	0.11800	0.05417	0.87741	52023	2994	4558	33894	254	177	431	55270	38630	93900
54	0.05544	0.13355	0.00511	0.06055	-0.13355	-0.05544	0.13866	0.94450	0.12142	0.05041	0.87348	53441	2852	4479	32221	288	188	476	56581	36889	93469
55	0.05149	0.13783	0.00569	0.05718	-0.13783	-0.05149	0.14352	0.94755	0.12523	0.04678	0.86910	54882	2709	4392	30482	329	199	528	57920	35073	92993
56	0.04771	0.14263	0.00632	0.05403	-0.14263	-0.04771	0.14895	0.95039	0.12945	0.04331	0.86425	56333	2567	4296	28686	373	209	583	59274	33191	92465
57	0.04412	0.14797	0.00703	0.05115	-0.14797	-0.04412	0.15500	0.95301	0.13411	0.03998	0.85889	57781	2424	4191	26843	424	219	643	60630	31253	91883
58	0.04071	0.15391	0.00782	0.04853	-0.15391	-0.04071	0.16173	0.95539	0.13923	0.03682	0.85299	59208	2282	4075	24964	483	228	711	61972	29267	91240
59	0.03748	0.16051	0.00870	0.04618	-0.16051	-0.03748	0.16921	0.95752	0.14485	0.03382	0.84649	60594	2140	3947	23064	548	236	784	63283	27246	90529
60	0.03443	0.16783	0.00967	0.04410	-0.16783	-0.03443	0.17750	0.95939	0.15102	0.03098	0.83936	61920	1999	3806	21155	621	243	864	64541	25204	89745
61	0.03156	0.17594	0.01076	0.04232	-0.17594	-0.03156	0.18670	0.96100	0.15778	0.02830	0.83152	63163	1860	3653	19253	703	248	951	65726	23154	88881
62	0.02887	0.18491	0.01196	0.04083	-0.18491	-0.02887	0.19687	0.96233	0.16517	0.02578	0.82294	64299	1723	3487	17375	794	251	1045	66816	21113	87929
63	0.02635	0.19485	0.01330	0.03965	-0.19485	-0.02635	0.20815	0.96337	0.17326	0.02342	0.81353	65303	1588	3309	15537	896	252	1148	67786	19098	86884
64	0.02399	0.20586	0.01479	0.03878	-0.20586	-0.02399	0.22065	0.96410	0.18208	0.02122	0.80324	66149	1456	3118	13755	1007	251	1258	68612	17124	85736
65	0.02180	0.21806	0.01645	0.03825	-0.21806	-0.02180	0.23451	0.96451	0.19171	0.01917	0.79198	66808	1328	2916	12047	1130	248	1379	69266	15211	84478

Table A.5 continued

66	0.01977	0.23158	0.01829	0.03806	-0.23158	-0.01977	0.24987	0.96461	0.20222	0.01726	0.77966	67257	1203	2705	10428	1264	242	1506	69725	13374	83099
67	0.01788	0.24657	0.02032	0.03820	-0.24657	-0.01788	0.26689	0.96439	0.21367	0.01550	0.76621	67470	1084	2485	8912	1407	234	1641	69962	11631	81593
68	0.01615	0.26322	0.02259	0.03874	-0.26322	-0.01615	0.28581	0.96379	0.22614	0.01387	0.75152	67422	970	2260	7512	1563	223	1786	69955	9996	79951
69	0.01454	0.28173	0.02509	0.03963	-0.28173	-0.01454	0.30682	0.96284	0.23972	0.01237	0.73550	67094	862	2033	6239	1727	210	1937	69683	8482	78165
70	0.01307	0.30232	0.02787	0.04094	-0.30232	-0.01307	0.33019	0.96151	0.25449	0.01101	0.71803	66466	761	1807	5099	1900	195	2095	69127	7101	76228
71	0.01172	0.32526	0.03095	0.04267	-0.32526	-0.01172	0.35621	0.95977	0.27053	0.00975	0.69899	65526	666	1585	4096	2081	179	2260	68273	5860	74133
72	0.01049	0.35085	0.03435	0.04484	-0.35085	-0.01049	0.38520	0.95762	0.28795	0.00861	0.67828	64267	578	1371	3230	2266	161	2427	67112	4761	71873
73	0.00937	0.37943	0.03811	0.04748	-0.37943	-0.00937	0.41754	0.95502	0.30684	0.00757	0.65576	62686	497	1168	2497	2455	142	2597	65639	3808	69446
74	0.00835	0.41141	0.04227	0.05062	-0.41141	-0.00835	0.45368	0.95196	0.32729	0.00664	0.63132	60787	424	980	1890	2644	124	2768	63855	2994	66849

Source: Author's calculations

Table A.5 continued

											L(x) (for state based expectancies)				e(x) (state based)				
	L(x)			$\hat{l}^{Total}$	**e(x)** (working age population based)			**e(x)** (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
20	0.60043	0.39799	0.99842	0.99861	30.80	20.52	51.31	30.28	20.17	50.45	0.92192	0.07789	0.08904	0.91078	31.79	19.48	29.13	22.13	51.27
21	0.57545	0.42259	0.99804	0.99824	30.20	20.12	50.33	29.70	19.79	49.49	0.92151	0.07829	0.08454	0.91526	31.30	18.98	28.57	21.72	50.29
22	0.55468	0.44295	0.99763	0.99784	29.64	19.71	49.35	29.14	19.38	48.52	0.92130	0.07849	0.08046	0.91933	30.84	18.47	28.02	21.29	49.31
23	0.53695	0.46025	0.99720	0.99742	29.10	19.27	48.37	28.61	18.95	47.56	0.92126	0.07851	0.07675	0.92302	30.38	17.94	27.48	20.84	48.33
24	0.52156	0.47518	0.99674	0.99697	28.57	18.82	47.39	28.09	18.50	46.60	0.92142	0.07834	0.07339	0.92637	29.94	17.40	26.96	20.39	47.35
25	0.50805	0.48820	0.99625	0.99650	28.06	18.35	46.41	27.59	18.04	45.64	0.92176	0.07799	0.07035	0.92940	29.52	16.85	26.45	19.92	46.37
26	0.49615	0.49959	0.99574	0.99600	27.57	17.87	45.44	27.10	17.57	44.68	0.92229	0.07745	0.06760	0.93214	29.10	16.29	25.95	19.45	45.39
27	0.48567	0.50954	0.99521	0.99548	27.08	17.38	44.46	26.63	17.09	43.72	0.92298	0.07674	0.06512	0.93461	28.70	15.72	25.45	18.96	44.42
28	0.47648	0.51817	0.99465	0.99493	26.61	16.88	43.48	26.16	16.59	42.76	0.92385	0.07587	0.06288	0.93683	28.30	15.14	24.97	18.47	43.44
29	0.46851	0.52556	0.99407	0.99437	26.14	16.36	42.51	25.71	16.09	41.80	0.92487	0.07483	0.06088	0.93882	27.92	14.55	24.48	17.98	42.46
30	0.46170	0.53176	0.99346	0.99377	25.69	15.85	41.53	25.26	15.58	40.84	0.92604	0.07364	0.05908	0.94060	27.54	13.95	24.01	17.48	41.49
31	0.45599	0.53683	0.99281	0.99314	25.24	15.32	40.56	24.82	15.06	39.88	0.92735	0.07231	0.05749	0.94218	27.16	13.35	23.54	16.98	40.52
32	0.45135	0.54078	0.99214	0.99248	24.80	14.79	39.59	24.38	14.54	38.92	0.92880	0.07085	0.05608	0.94357	26.79	12.75	23.07	16.48	39.54
33	0.44777	0.54365	0.99142	0.99179	24.36	14.25	38.61	23.95	14.02	37.97	0.93038	0.06925	0.05484	0.94479	26.42	12.15	22.60	15.97	38.57
34	0.44522	0.54545	0.99067	0.99106	23.93	13.72	37.64	23.53	13.49	37.01	0.93207	0.06754	0.05376	0.94584	26.05	11.54	22.13	15.47	37.60
35	0.44367	0.54619	0.98985	0.99028	23.49	13.18	36.67	23.10	12.96	36.06	0.93385	0.06572	0.05284	0.94673	25.69	10.94	21.66	14.97	36.63
36	0.44310	0.54588	0.98898	0.98943	23.07	12.64	35.70	22.68	12.42	35.10	0.93573	0.06381	0.05207	0.94748	25.32	10.34	21.19	14.47	35.66
37	0.44352	0.54454	0.98805	0.98854	22.64	12.09	34.73	22.26	11.89	34.15	0.93770	0.06181	0.05143	0.94808	24.95	9.74	20.71	13.98	34.69
38	0.44489	0.54215	0.98705	0.98757	22.21	11.56	33.77	21.84	11.36	33.20	0.93972	0.05975	0.05093	0.94854	24.57	9.16	20.23	13.49	33.72
39	0.44722	0.53874	0.98596	0.98652	21.78	11.02	32.80	21.42	10.83	32.25	0.94181	0.05761	0.05057	0.94886	24.18	8.58	19.75	13.00	32.76
40	0.45048	0.53429	0.98477	0.98539	21.36	10.48	31.84	21.00	10.31	31.31	0.94394	0.05543	0.05033	0.94905	23.79	8.01	19.27	12.53	31.80

Table A.5 continued

41	0.45467	0.52880	0.98347	0.98415	20.93	9.95	30.88	20.58	9.79	30.36	0.94610	0.05321	0.05021	0.94910	23.39	7.45	18.78	12.06	30.84
42	0.45977	0.52228	0.98205	0.98279	20.49	9.43	29.92	20.15	9.27	29.42	0.94829	0.05096	0.05022	0.94902	22.97	6.91	18.28	11.60	29.88
43	0.46576	0.51473	0.98049	0.98131	20.05	8.91	28.97	19.72	8.76	28.48	0.95048	0.04869	0.05036	0.94881	22.54	6.38	17.78	11.14	28.92
44	0.47263	0.50615	0.97879	0.97968	19.61	8.40	28.01	19.28	8.26	27.54	0.95268	0.04641	0.05061	0.94847	22.10	5.87	17.27	10.70	27.97
45	0.48036	0.49654	0.97691	0.97789	19.16	7.90	27.06	18.84	7.77	26.61	0.95485	0.04414	0.05100	0.94799	21.64	5.38	16.76	10.26	27.02
46	0.48893	0.48590	0.97483	0.97592	18.71	7.41	26.12	18.40	7.28	25.68	0.95701	0.04188	0.05150	0.94738	21.16	4.91	16.24	9.83	26.07
47	0.49830	0.47425	0.97255	0.97375	18.25	6.92	25.17	17.95	6.81	24.75	0.95913	0.03964	0.05214	0.94662	20.66	4.47	15.71	9.42	25.13
48	0.50843	0.46159	0.97002	0.97134	17.78	6.45	24.24	17.49	6.34	23.83	0.96121	0.03743	0.05292	0.94572	20.15	4.04	15.18	9.01	24.19
49	0.51929	0.44794	0.96723	0.96870	17.31	5.99	23.30	17.02	5.89	22.91	0.96323	0.03526	0.05383	0.94466	19.61	3.65	14.64	8.61	23.26
50	0.53083	0.43332	0.96415	0.96577	16.82	5.55	22.37	16.54	5.46	21.99	0.96520	0.03313	0.05488	0.94344	19.05	3.27	14.10	8.23	22.32
51	0.54297	0.41777	0.96073	0.96253	16.33	5.12	21.44	16.05	5.03	21.08	0.96708	0.03105	0.05609	0.94205	18.48	2.92	13.55	7.85	21.40
52	0.55565	0.40132	0.95696	0.95894	15.82	4.70	20.52	15.56	4.62	20.18	0.96889	0.02904	0.05746	0.94047	17.88	2.59	12.99	7.49	20.48
53	0.56877	0.38402	0.95279	0.95498	15.30	4.30	19.60	15.05	4.23	19.28	0.97062	0.02709	0.05900	0.93871	17.26	2.29	12.43	7.13	19.56
54	0.58224	0.36593	0.94818	0.95060	14.78	3.92	18.69	14.53	3.85	18.38	0.97225	0.02520	0.06071	0.93674	16.63	2.02	11.86	6.79	18.65
55	0.59594	0.34713	0.94307	0.94575	14.24	3.55	17.79	14.00	3.49	17.49	0.97377	0.02339	0.06262	0.93455	15.97	1.77	11.29	6.45	17.74
56	0.60972	0.32770	0.93742	0.94039	13.68	3.20	16.88	13.46	3.15	16.60	0.97520	0.02165	0.06472	0.93213	15.30	1.54	10.71	6.13	16.84
57	0.62344	0.30775	0.93119	0.93446	13.12	2.87	15.99	12.90	2.82	15.72	0.97651	0.01999	0.06705	0.92945	14.61	1.33	10.13	5.81	15.94
58	0.63693	0.28737	0.92431	0.92792	12.54	2.56	15.10	12.33	2.51	14.84	0.97770	0.01841	0.06961	0.92649	13.91	1.14	9.54	5.51	15.05
59	0.64999	0.26671	0.91670	0.92069	11.95	2.27	14.21	11.75	2.23	13.97	0.97876	0.01691	0.07243	0.92324	13.19	0.98	8.95	5.21	14.16
60	0.66242	0.24590	0.90832	0.91272	11.34	1.99	13.33	11.15	1.96	13.11	0.97970	0.01549	0.07551	0.91968	12.46	0.83	8.36	4.92	13.28
61	0.67399	0.22510	0.89909	0.90393	10.72	1.74	12.46	10.54	1.71	12.25	0.98050	0.01415	0.07889	0.91576	11.71	0.70	7.76	4.64	12.41
62	0.68446	0.20448	0.88894	0.89425	10.08	1.51	11.59	9.91	1.48	11.39	0.98116	0.01289	0.08259	0.91147	10.96	0.58	7.16	4.37	11.54
63	0.69359	0.18419	0.87779	0.88362	9.42	1.29	10.72	9.27	1.27	10.54	0.98168	0.01171	0.08663	0.90677	10.19	0.48	6.56	4.11	10.67
64	0.70112	0.16443	0.86555	0.87195	8.76	1.10	9.86	8.61	1.08	9.69	0.98205	0.01061	0.09104	0.90162	9.41	0.39	5.95	3.86	9.81
65	0.70678	0.14536	0.85214	0.85915	8.07	0.93	9.00	7.93	0.91	8.84	0.98226	0.00958	0.09586	0.89599	8.63	0.32	5.34	3.61	8.94

Table A.5 continued

66	0.71032	0.12715	0.83747	0.84513	7.37	0.77	8.14	7.24	0.76	8.00	0.98231	0.00863	0.10111	0.88983	7.83	0.25	4.72	3.36	8.08
67	0.71149	0.10997	0.82146	0.82981	6.65	0.63	7.28	6.54	0.62	7.16	0.98219	0.00775	0.10684	0.88311	7.03	0.20	4.10	3.12	7.22
68	0.71007	0.09396	0.80403	0.81312	5.91	0.51	6.42	5.81	0.50	6.31	0.98189	0.00693	0.11307	0.87576	6.21	0.15	3.48	2.88	6.36
69	0.70586	0.07924	0.78510	0.79495	5.15	0.40	5.55	5.06	0.39	5.46	0.98142	0.00619	0.11986	0.86775	5.39	0.11	2.86	2.63	5.50
70	0.69869	0.06591	0.76459	0.77525	4.37	0.31	4.68	4.30	0.30	4.60	0.98076	0.00550	0.12724	0.85902	4.55	0.08	2.25	2.37	4.62
71	0.68844	0.05401	0.74245	0.75394	3.57	0.23	3.80	3.51	0.23	3.73	0.97988	0.00488	0.13527	0.84950	3.69	0.05	1.65	2.09	3.74
72	0.67504	0.04358	0.71862	0.73096	2.74	0.16	2.90	2.69	0.16	2.85	0.97881	0.00431	0.14398	0.83914	2.81	0.03	1.07	1.77	2.84
73	0.65848	0.03459	0.69307	0.70628	1.88	0.11	1.99	1.85	0.11	1.95	0.97751	0.00379	0.15342	0.82788	1.91	0.01	0.56	1.36	1.92
74	0.66802	0.04121	0.70923	0.67986	0.98	0.06	1.04	0.97	0.06	1.03	0.97598	0.00332	0.16365	0.81566	0.98	0.00	0.16	0.82	0.98

Source: Author's calculations

Table A.6: Multistate working life table for never married women based on transition rates estimated from Equation 3

	Estimated transition rates		***Death rate***	**M(x)** ***(transition rate matrix)***				**P(x)** ***(transition probability matrix)***				d_{ij} *where* $i, j = 1, 2$				$d_{i\delta}$ *where* $i = 1, 2$			**l(x)**		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1, 2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
15	0.13645	0.34074	0.00023	0.13668	-0.34074	-0.13645	0.34097	0.88963	0.27504	0.11014	0.72473	87474	10830	0	0	23	0	23	98327	0	98327
16	0.14199	0.31171	0.00025	0.14224	-0.31171	-0.14199	0.31196	0.88404	0.25401	0.11570	0.74573	77331	10121	2751	8076	22	3	25	87474	10830	98304
17	0.14725	0.28606	0.00028	0.14753	-0.28606	-0.14725	0.28634	0.87872	0.23506	0.12100	0.76466	70369	9690	4277	13915	22	5	28	80082	18197	98279
18	0.15220	0.26337	0.00031	0.15251	-0.26337	-0.15220	0.26368	0.87371	0.21799	0.12598	0.78169	65220	9404	5146	18452	23	7	30	74647	23605	98251
19	0.15678	0.24325	0.00034	0.15712	-0.24325	-0.15678	0.24359	0.86905	0.20264	0.13061	0.79702	61151	9190	5645	22202	24	9	33	70366	27856	98221
20	0.16096	0.22539	0.00037	0.16133	-0.22539	-0.16096	0.22576	0.86477	0.18883	0.13486	0.81079	57763	9008	5928	25452	25	12	37	66796	31392	98188
21	0.16470	0.20951	0.00040	0.16510	-0.20951	-0.16470	0.20991	0.86091	0.17642	0.13869	0.82318	54832	8833	6079	28367	25	14	39	63691	34460	98151
22	0.16795	0.19537	0.00042	0.16837	-0.19537	-0.16795	0.19579	0.85750	0.16527	0.14208	0.83431	52232	8654	6148	31036	26	16	41	60912	37200	98112
23	0.17069	0.18277	0.00045	0.17114	-0.18277	-0.17069	0.18322	0.85455	0.15526	0.14500	0.84429	49889	8465	6162	33511	26	18	44	58380	39691	98071
24	0.17290	0.17153	0.00048	0.17338	-0.17153	-0.17290	0.17201	0.85209	0.14627	0.14743	0.85325	47761	8264	6140	35816	27	20	47	56051	41976	98027
25	0.17454	0.16150	0.00050	0.17504	-0.16150	-0.17454	0.16200	0.85014	0.13820	0.14936	0.86130	45823	8051	6092	37965	27	22	49	53900	44079	97980
26	0.17561	0.15254	0.00052	0.17613	-0.15254	-0.17561	0.15306	0.84870	0.13098	0.15078	0.86850	44060	7828	6027	39965	27	24	51	51915	46016	97931
27	0.17609	0.14454	0.00055	0.17664	-0.14454	-0.17609	0.14509	0.84777	0.12451	0.15168	0.87494	42462	7597	5951	41816	28	27	54	50087	47793	97880
28	0.17597	0.13740	0.00057	0.17654	-0.13740	-0.17597	0.13797	0.84738	0.11872	0.15206	0.88070	41024	7361	5867	43518	27	28	56	48413	49413	97826
29	0.17527	0.13103	0.00060	0.17587	-0.13103	-0.17527	0.13163	0.84750	0.11357	0.15190	0.88583	39739	7123	5778	45071	28	31	59	46890	50880	97770
30	0.17398	0.12536	0.00063	0.17461	-0.12536	-0.17398	0.12599	0.84813	0.10898	0.15124	0.89040	38605	6884	5688	46473	28	33	61	45518	52193	97711
31	0.17212	0.12031	0.00067	0.17279	-0.12031	-0.17212	0.12098	0.84927	0.10490	0.15007	0.89443	37617	6647	5597	47724	29	35	65	44293	53357	97650
32	0.16970	0.11584	0.00070	0.17040	-0.11584	-0.16970	0.11654	0.85090	0.10130	0.14840	0.89800	36771	6413	5508	48825	30	38	68	43214	54371	97585
33	0.16676	0.11189	0.00074	0.16750	-0.11189	-0.16676	0.11263	0.85299	0.09814	0.14627	0.90112	36063	6184	5421	49776	31	41	72	42278	55239	97517
34	0.16332	0.10843	0.00079	0.16411	-0.10843	-0.16332	0.10922	0.85554	0.09538	0.14368	0.90382	35492	5960	5338	50578	33	44	77	41485	55960	97445
35	0.15941	0.10540	0.00085	0.16026	-0.10540	-0.15941	0.10625	0.85849	0.09300	0.14065	0.90614	35052	5743	5258	51232	35	48	83	40829	56538	97368

Table A.6 continued

36	0.15507	0.10279	0.00091	0.15598	-0.10279	-0.15507	0.10370	0.86185	0.09098	0.13724	0.90812	34741	5532	5183	51740	37	52	88	40310	56975	97285
37	0.15034	0.10057	0.00098	0.15132	-0.10057	-0.15034	0.10155	0.86556	0.08927	0.13346	0.90975	34557	5328	5113	52103	39	56	95	39924	57272	97196
38	0.14526	0.09871	0.00106	0.14632	-0.09871	-0.14526	0.09977	0.86960	0.08788	0.12934	0.91106	34497	5131	5047	52323	42	61	103	39670	57431	97101
39	0.13989	0.09719	0.00115	0.14104	-0.09719	-0.13989	0.09834	0.87392	0.08679	0.12492	0.91205	34559	4940	4986	52401	46	66	112	39544	57454	96998
40	0.13426	0.09600	0.00126	0.13552	-0.09600	-0.13426	0.09726	0.87849	0.08599	0.12025	0.91275	34740	4755	4931	52338	50	72	122	39545	57341	96886
41	0.12842	0.09513	0.00138	0.12980	-0.09513	-0.12842	0.09651	0.88326	0.08546	0.11536	0.91316	35039	4576	4879	52136	55	79	133	39670	57094	96764
42	0.12243	0.09458	0.00151	0.12394	-0.09458	-0.12243	0.09609	0.88821	0.08520	0.11028	0.91330	35456	4402	4832	51795	60	85	146	39919	56712	96631
43	0.11632	0.09432	0.00166	0.11798	-0.09432	-0.11632	0.09598	0.89327	0.08520	0.10507	0.91314	35988	4233	4788	51316	67	93	160	40288	56197	96485
44	0.11014	0.09437	0.00183	0.11197	-0.09437	-0.11014	0.09620	0.89842	0.08547	0.09975	0.91271	36634	4067	4748	50700	75	101	176	40776	55549	96325
45	0.10394	0.09472	0.00202	0.10596	-0.09472	-0.10394	0.09674	0.90361	0.08600	0.09437	0.91199	37393	3905	4710	49947	84	111	194	41382	54767	96149
46	0.09776	0.09538	0.00223	0.09999	-0.09538	-0.09776	0.09761	0.90881	0.08679	0.08896	0.91098	38263	3746	4674	49058	94	120	214	42103	53852	95955
47	0.09164	0.09635	0.00247	0.09411	-0.09635	-0.09164	0.09882	0.91396	0.08786	0.08357	0.90967	39243	3588	4639	48034	106	131	237	42937	52804	95741
48	0.08561	0.09764	0.00273	0.08834	-0.09764	-0.08561	0.10037	0.91905	0.08921	0.07823	0.90807	40330	3433	4605	46877	119	140	260	43882	51622	95505
49	0.07971	0.09926	0.00303	0.08274	-0.09926	-0.07971	0.10229	0.92402	0.09084	0.07296	0.90613	41521	3278	4570	45587	136	152	288	44935	50309	95245
50	0.07397	0.10124	0.00336	0.07733	-0.10124	-0.07397	0.10460	0.92885	0.09278	0.06780	0.90386	42812	3125	4534	44167	155	164	319	46091	48865	94956
51	0.06841	0.10358	0.00373	0.07214	-0.10358	-0.06841	0.10731	0.93351	0.09504	0.06277	0.90123	44198	2972	4495	42621	176	176	352	47346	47292	94638
52	0.06306	0.10632	0.00414	0.06720	-0.10632	-0.06306	0.11046	0.93796	0.09763	0.05790	0.89824	45672	2819	4451	40954	201	188	390	48692	45593	94286
53	0.05793	0.10948	0.00460	0.06253	-0.10948	-0.05793	0.11408	0.94220	0.10058	0.05321	0.89483	47226	2667	4403	39170	230	201	431	50123	43773	93896
54	0.05303	0.11310	0.00511	0.05814	-0.11310	-0.05303	0.11821	0.94618	0.10391	0.04873	0.89099	48850	2516	4347	37276	263	213	476	51628	41837	93465
55	0.04839	0.11721	0.00569	0.05408	-0.11721	-0.04839	0.12290	0.94988	0.10766	0.04445	0.88667	50531	2365	4284	35282	302	226	527	53197	39792	92989
56	0.04401	0.12186	0.00632	0.05033	-0.12186	-0.04401	0.12818	0.95331	0.11185	0.04039	0.88185	52256	2214	4211	33199	345	237	583	54815	37647	92462
57	0.03988	0.12710	0.00703	0.04691	-0.12710	-0.03988	0.13413	0.95643	0.11652	0.03656	0.87648	54006	2064	4126	31039	396	248	644	56467	35413	91880
58	0.03603	0.13299	0.00782	0.04385	-0.13299	-0.03603	0.14081	0.95924	0.12171	0.03297	0.87050	55763	1917	4029	28817	453	258	711	58132	33103	91236
59	0.03243	0.13960	0.00870	0.04113	-0.13960	-0.03243	0.14830	0.96172	0.12747	0.02962	0.86386	57503	1771	3918	26549	518	266	784	59792	30733	90525
60	0.02910	0.14700	0.00967	0.03877	-0.14700	-0.02910	0.15667	0.96388	0.13386	0.02650	0.85651	59202	1628	3791	24257	591	273	863	61421	28320	89741

Table A.6 continued

61	0.02602	0.15530	0.01076	0.03678	-0.15530	-0.02602	0.16606	0.96568	0.14093	0.02361	0.84837	60832	1487	3648	21959	674	277	951	62993	25884	88878
62	0.02319	0.16458	0.01196	0.03515	-0.16458	-0.02319	0.17654	0.96716	0.14875	0.02095	0.83936	62362	1351	3488	19680	767	279	1045	64480	23447	87926
63	0.02060	0.17499	0.01330	0.03390	-0.17499	-0.02060	0.18829	0.96826	0.15739	0.01853	0.82940	63760	1220	3310	17443	870	278	1148	65850	21031	86881
64	0.01823	0.18664	0.01479	0.03302	-0.18664	-0.01823	0.20143	0.96901	0.16694	0.01631	0.81838	64991	1094	3116	15274	984	274	1258	67070	18663	85733
65	0.01608	0.19971	0.01645	0.03253	-0.19971	-0.01608	0.21616	0.96939	0.17748	0.01429	0.80621	66022	973	2905	13196	1112	267	1379	68107	16368	84475
66	0.01414	0.21438	0.01829	0.03243	-0.21438	-0.01414	0.23267	0.96940	0.18910	0.01247	0.79277	66818	860	2679	11233	1250	257	1506	68927	14169	83096
67	0.01239	0.23087	0.02032	0.03271	-0.23087	-0.01239	0.25119	0.96904	0.20193	0.01084	0.77795	67346	754	2442	9407	1398	243	1641	69497	12093	81590
68	0.01082	0.24942	0.02259	0.03341	-0.24942	-0.01082	0.27201	0.96828	0.21608	0.00938	0.76159	67574	654	2196	7739	1559	227	1786	69787	10161	79948
69	0.00942	0.27032	0.02509	0.03451	-0.27032	-0.00942	0.29541	0.96714	0.23166	0.00807	0.74355	67477	563	1944	6240	1729	208	1937	69769	8393	78162
70	0.00817	0.29392	0.02787	0.03604	-0.29392	-0.00817	0.32179	0.96560	0.24883	0.00692	0.72369	67033	481	1693	4924	1908	187	2095	69421	6804	76225
71	0.00707	0.32059	0.03095	0.03802	-0.32059	-0.00707	0.35154	0.96362	0.26771	0.00590	0.70182	66226	405	1447	3793	2095	165	2260	68726	5404	74130
72	0.00609	0.35081	0.03435	0.04044	-0.35081	-0.00609	0.38516	0.96122	0.28846	0.00500	0.67777	65048	339	1211	2845	2286	142	2427	67672	4198	71871
73	0.00523	0.38511	0.03811	0.04334	-0.38511	-0.00523	0.42322	0.95838	0.31123	0.00422	0.65137	63501	280	991	2074	2478	119	2597	66259	3184	69443
74	0.00447	0.42411	0.04227	0.04674	-0.42411	-0.00447	0.46638	0.95506	0.33619	0.00355	0.62242	61594	229	791	1465	2669	97	2767	64492	2354	66846

Source: Author's calculations

Table A.6 continued

											L(x) (for state based expectancies)				**e(x)** (state based)				
	L(x)			$\hat{l}^{Total}$	**e(x)** (working age population based)			**e(x)** (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
15	0.94481	0.05507	0.99988	1.00000	33.73	22.51	56.23	33.16	22.13	55.29									
16	0.85204	0.14760	0.99964	0.99977	32.79	22.46	55.25	32.24	22.08	54.32	0.94202	0.05785	0.12701	0.87287	33.02	22.18	30.64	24.56	55.20
17	0.78681	0.21257	0.99937	0.99951	31.94	22.32	54.26	31.41	21.94	53.35	0.93936	0.06050	0.11753	0.88233	32.37	21.84	29.89	24.33	54.22
18	0.73740	0.26168	0.99908	0.99923	31.17	22.11	53.28	30.64	21.74	52.38	0.93686	0.06299	0.10900	0.89085	31.76	21.48	29.17	24.06	53.23
19	0.69748	0.30128	0.99875	0.99892	30.44	21.85	52.29	29.93	21.49	51.42	0.93453	0.06530	0.10132	0.89851	31.17	21.08	28.49	23.76	52.25
20	0.66353	0.33486	0.99840	0.99858	29.75	21.56	51.31	29.25	21.20	50.45	0.93238	0.06743	0.09442	0.90540	30.60	20.66	27.84	23.43	51.27
21	0.63361	0.36440	0.99801	0.99821	29.10	21.23	50.33	28.61	20.88	49.49	0.93046	0.06934	0.08821	0.91159	30.07	20.22	27.22	23.07	50.29
22	0.60661	0.39100	0.99760	0.99781	28.47	20.88	49.35	28.00	20.53	48.52	0.92875	0.07104	0.08264	0.91715	29.55	19.75	26.62	22.68	49.30
23	0.58189	0.41528	0.99717	0.99739	27.88	20.49	48.37	27.41	20.15	47.56	0.92728	0.07250	0.07763	0.92215	29.07	19.26	26.05	22.27	48.33
24	0.55911	0.43760	0.99671	0.99695	27.30	20.09	47.39	26.85	19.75	46.60	0.92604	0.07372	0.07313	0.92663	28.60	18.75	25.51	21.84	47.35
25	0.53808	0.45814	0.99622	0.99647	26.76	19.66	46.41	26.31	19.33	45.64	0.92507	0.07468	0.06910	0.93065	28.16	18.21	24.98	21.39	46.37
26	0.51869	0.47703	0.99571	0.99597	26.23	19.21	45.44	25.79	18.88	44.68	0.92435	0.07539	0.06549	0.93425	27.73	17.66	24.47	20.92	45.39
27	0.50088	0.49430	0.99518	0.99545	25.72	18.74	44.46	25.29	18.42	43.72	0.92388	0.07584	0.06225	0.93747	27.32	17.09	23.98	20.43	44.42
28	0.48462	0.50999	0.99462	0.99490	25.23	18.25	43.48	24.81	17.95	42.76	0.92369	0.07603	0.05936	0.94035	26.94	16.50	23.51	19.93	43.44
29	0.46990	0.52413	0.99404	0.99433	24.76	17.75	42.51	24.35	17.45	41.80	0.92375	0.07595	0.05678	0.94292	26.56	15.90	23.04	19.42	42.46
30	0.45669	0.53673	0.99343	0.99374	24.30	17.23	41.53	23.90	16.94	40.84	0.92407	0.07562	0.05449	0.94520	26.20	15.29	22.59	18.90	41.49
31	0.44498	0.54781	0.99279	0.99312	23.86	16.70	40.56	23.46	16.42	39.88	0.92463	0.07503	0.05245	0.94722	25.86	14.66	22.14	18.37	40.52
32	0.43473	0.55737	0.99211	0.99246	23.42	16.16	39.59	23.03	15.89	38.92	0.92545	0.07420	0.05065	0.94900	25.52	14.02	21.70	17.84	39.54
33	0.42594	0.56545	0.99140	0.99176	23.00	15.61	38.61	22.62	15.35	37.97	0.92650	0.07313	0.04907	0.95056	25.20	13.37	21.27	17.30	38.57
34	0.41857	0.57206	0.99064	0.99103	22.59	15.05	37.64	22.21	14.80	37.01	0.92777	0.07184	0.04769	0.95191	24.88	12.72	20.84	16.76	37.60
35	0.41260	0.57722	0.98982	0.99025	22.19	14.49	36.67	21.81	14.24	36.06	0.92925	0.07033	0.04650	0.95307	24.57	12.06	20.41	16.22	36.63

Table A.6 continued

36	0.40800	0.58095	0.98895	0.98940	21.79	13.91	35.70	21.42	13.68	35.10	0.93092	0.06862	0.04549	0.95406	24.27	11.39	19.98	15.67	35.66
37	0.40474	0.58327	0.98802	0.98850	21.39	13.34	34.73	21.04	13.12	34.15	0.93278	0.06673	0.04464	0.95487	23.96	10.73	19.55	15.13	34.69
38	0.40281	0.58420	0.98701	0.98753	21.01	12.76	33.77	20.65	12.55	33.20	0.93480	0.06467	0.04394	0.95553	23.66	10.07	19.12	14.60	33.72
39	0.40217	0.58374	0.98592	0.98649	20.62	12.18	32.80	20.27	11.98	32.25	0.93696	0.06246	0.04340	0.95603	23.35	9.41	18.69	14.07	32.76
40	0.40282	0.58191	0.98473	0.98535	20.24	11.60	31.84	19.90	11.41	31.31	0.93924	0.06013	0.04299	0.95638	23.03	8.76	18.25	13.54	31.80
41	0.40472	0.57871	0.98343	0.98411	19.85	11.03	30.88	19.52	10.84	30.36	0.94163	0.05768	0.04273	0.95658	22.71	8.12	17.81	13.02	30.84
42	0.40785	0.57415	0.98201	0.98275	19.47	10.45	29.92	19.14	10.28	29.42	0.94410	0.05514	0.04260	0.95665	22.38	7.49	17.36	12.51	29.88
43	0.41221	0.56824	0.98045	0.98127	19.08	9.88	28.97	18.76	9.72	28.48	0.94664	0.05253	0.04260	0.95657	22.04	6.88	16.91	12.01	28.92
44	0.41778	0.56097	0.97874	0.97964	18.69	9.32	28.01	18.38	9.17	27.54	0.94921	0.04987	0.04274	0.95635	21.67	6.29	16.45	11.52	27.97
45	0.42452	0.55234	0.97686	0.97785	18.30	8.76	27.06	17.99	8.62	26.61	0.95181	0.04718	0.04300	0.95599	21.29	5.72	15.98	11.04	27.02
46	0.43243	0.54235	0.97479	0.97588	17.90	8.22	26.12	17.60	8.08	25.68	0.95440	0.04448	0.04340	0.95549	20.89	5.18	15.51	10.57	26.07
47	0.44148	0.53102	0.97250	0.97370	17.50	7.68	25.17	17.20	7.55	24.75	0.95698	0.04178	0.04393	0.95484	20.47	4.66	15.02	10.10	25.13
48	0.45164	0.51833	0.96997	0.97130	17.09	7.15	24.24	16.80	7.03	23.83	0.95953	0.03911	0.04461	0.95403	20.02	4.17	14.53	9.66	24.19
49	0.46288	0.50431	0.96719	0.96865	16.67	6.63	23.30	16.39	6.52	22.91	0.96201	0.03648	0.04542	0.95306	19.54	3.71	14.04	9.22	23.26
50	0.47513	0.48897	0.96410	0.96572	16.24	6.13	22.37	15.97	6.03	22.00	0.96442	0.03390	0.04639	0.95193	19.04	3.28	13.53	8.79	22.32
51	0.48836	0.47233	0.96069	0.96248	15.80	5.65	21.44	15.53	5.55	21.08	0.96675	0.03139	0.04752	0.95062	18.51	2.89	13.02	8.38	21.40
52	0.50248	0.45444	0.95692	0.95890	15.35	5.17	20.52	15.09	5.09	20.18	0.96898	0.02895	0.04882	0.94912	17.95	2.52	12.50	7.97	20.48
53	0.51741	0.43533	0.95275	0.95494	14.89	4.72	19.60	14.64	4.64	19.28	0.97110	0.02661	0.05029	0.94742	17.37	2.19	11.98	7.58	19.56
54	0.53305	0.41509	0.94813	0.95055	14.41	4.28	18.69	14.17	4.21	18.38	0.97309	0.02436	0.05196	0.94550	16.76	1.89	11.44	7.20	18.65
55	0.54925	0.39378	0.94303	0.94571	13.92	3.87	17.79	13.69	3.80	17.49	0.97494	0.02223	0.05383	0.94333	16.12	1.62	10.90	6.84	17.74
56	0.56587	0.37152	0.93739	0.94035	13.41	3.47	16.88	13.19	3.41	16.60	0.97666	0.02019	0.05592	0.94093	15.46	1.38	10.36	6.48	16.84
57	0.58274	0.34841	0.93116	0.93443	12.89	3.09	15.99	12.68	3.04	15.72	0.97821	0.01828	0.05826	0.93824	14.78	1.16	9.81	6.13	15.94
58	0.59965	0.32461	0.92427	0.92788	12.36	2.74	15.10	12.15	2.69	14.84	0.97962	0.01648	0.06085	0.93525	14.07	0.98	9.26	5.79	15.05
59	0.61638	0.30029	0.91667	0.92065	11.80	2.41	14.21	11.61	2.37	13.97	0.98086	0.01481	0.06374	0.93193	13.35	0.81	8.70	5.47	14.16
60	0.63265	0.27563	0.90829	0.91268	11.23	2.10	13.33	11.04	2.07	13.11	0.98194	0.01325	0.06693	0.92826	12.61	0.67	8.13	5.15	13.28

Table A.6 continued

61	0.64821	0.25085	0.89906	0.90390	10.64	1.82	12.46	10.46	1.79	12.25	0.98284	0.01181	0.07047	0.92418	11.86	0.55	7.56	4.85	12.41
62	0.66273	0.22617	0.88891	0.89422	10.03	1.56	11.59	9.86	1.53	11.39	0.98358	0.01048	0.07437	0.91968	11.09	0.45	6.99	4.55	11.54
63	0.67590	0.20185	0.87776	0.88359	9.40	1.32	10.72	9.24	1.30	10.54	0.98413	0.00926	0.07869	0.91470	10.31	0.36	6.41	4.26	10.67
64	0.68738	0.17814	0.86552	0.87192	8.75	1.10	9.86	8.60	1.09	9.69	0.98451	0.00816	0.08347	0.90919	9.52	0.28	5.83	3.98	9.81
65	0.69683	0.15528	0.85211	0.85912	8.08	0.91	9.00	7.95	0.90	8.84	0.98469	0.00715	0.08874	0.90311	8.72	0.22	5.24	3.71	8.94
66	0.70390	0.13354	0.83744	0.84510	7.39	0.74	8.14	7.27	0.73	8.00	0.98470	0.00624	0.09455	0.89638	7.91	0.17	4.65	3.44	8.08
67	0.70827	0.11316	0.82143	0.82978	6.68	0.60	7.28	6.57	0.59	7.16	0.98452	0.00542	0.10097	0.88898	7.10	0.13	4.05	3.18	7.22
68	0.70966	0.09435	0.80400	0.81309	5.95	0.47	6.42	5.85	0.46	6.31	0.98414	0.00469	0.10804	0.88079	6.27	0.10	3.45	2.92	6.36
69	0.70780	0.07728	0.78507	0.79492	5.19	0.36	5.55	5.10	0.36	5.46	0.98357	0.00404	0.11583	0.87178	5.43	0.07	2.84	2.65	5.50
70	0.70249	0.06208	0.76457	0.77522	4.41	0.27	4.68	4.33	0.27	4.60	0.98280	0.00346	0.12441	0.86185	4.58	0.05	2.24	2.38	4.62
71	0.69360	0.04883	0.74242	0.75392	3.60	0.20	3.80	3.54	0.19	3.73	0.98181	0.00295	0.13385	0.85091	3.71	0.03	1.65	2.09	3.74
72	0.68105	0.03754	0.71859	0.73093	2.76	0.14	2.90	2.72	0.13	2.85	0.98061	0.00250	0.14423	0.83889	2.83	0.02	1.08	1.76	2.84
73	0.66488	0.02816	0.69304	0.70625	1.90	0.09	1.99	1.86	0.09	1.95	0.97919	0.00211	0.15562	0.82568	1.92	0.01	0.57	1.35	1.92
74	0.67457	0.03462	0.70919	0.67983	0.99	0.05	1.04	0.98	0.05	1.03	0.97753	0.00177	0.16810	0.81121	0.98	0.00	0.17	0.81	0.98

Source: Author's calculations

Table A.7: Multistate working life table for currently married women based on transition rates estimated from Equation 3

	Estimated transition rates		***Death rate***	**M(x)** ***(transition rate matrix)***				**P(x)** ***(transition probability matrix)***				d_{ij} *where* $i, j = 1, 2$				$d_{i\delta}$ *where* $i = 1, 2$			**l(x)**		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1, 2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
15	0.08350	0.53124	0.00023	0.08373	-0.53124	-0.08350	0.53147	0.93591	0.40626	0.06386	0.59351	92025	6279	0	0	23	0	23	98327	0	98327
16	0.08689	0.48597	0.00025	0.08714	-0.48597	-0.08689	0.48622	0.93222	0.37769	0.06752	0.62206	85788	6214	2371	3906	23	2	25	92025	6279	98304
17	0.09011	0.44599	0.00028	0.09039	-0.44599	-0.09011	0.44627	0.92867	0.35163	0.07105	0.64809	81871	6264	3558	6559	25	3	28	88159	10120	98279
18	0.09314	0.41061	0.00031	0.09345	-0.41061	-0.09314	0.41092	0.92531	0.32790	0.07438	0.67179	79049	6354	4204	8614	26	4	30	85429	12822	98251
19	0.09594	0.37925	0.00034	0.09628	-0.37925	-0.09594	0.37959	0.92216	0.30634	0.07750	0.69332	76773	6452	4585	10377	28	5	33	83253	14968	98221
20	0.09850	0.35140	0.00037	0.09887	-0.35140	-0.09850	0.35177	0.91924	0.28677	0.08039	0.71286	74788	6540	4826	11997	30	6	37	81358	16830	98188
21	0.10079	0.32664	0.00040	0.10119	-0.32664	-0.10079	0.32704	0.91659	0.26903	0.08301	0.73057	72974	6609	4987	13543	32	7	39	79614	18537	98151
22	0.10278	0.30460	0.00042	0.10320	-0.30460	-0.10278	0.30502	0.91423	0.25296	0.08535	0.74662	71274	6654	5097	15045	33	8	41	77961	20151	98112
23	0.10446	0.28496	0.00045	0.10491	-0.28496	-0.10446	0.28541	0.91216	0.23842	0.08740	0.76114	69662	6675	5174	16516	34	10	44	76371	21700	98071
24	0.10581	0.26743	0.00048	0.10629	-0.26743	-0.10581	0.26791	0.91040	0.22528	0.08912	0.77424	68131	6670	5224	17956	36	11	47	74836	23191	98027
25	0.10681	0.25179	0.00050	0.10731	-0.25179	-0.10681	0.25229	0.90897	0.21341	0.09053	0.78609	66677	6641	5255	19358	37	12	49	73355	24625	97980
26	0.10746	0.23783	0.00052	0.10798	-0.23783	-0.10746	0.23835	0.90788	0.20271	0.09160	0.79677	65306	6589	5270	20715	37	14	51	71933	25999	97931
27	0.10776	0.22535	0.00055	0.10831	-0.22535	-0.10776	0.22590	0.90713	0.19308	0.09233	0.80637	64022	6516	5272	22017	38	15	53	70577	27304	97880
28	0.10769	0.21422	0.00057	0.10826	-0.21422	-0.10769	0.21479	0.90672	0.18442	0.09271	0.81501	62830	6424	5262	23255	40	16	56	69294	28533	97827
29	0.10726	0.20429	0.00060	0.10786	-0.20429	-0.10726	0.20489	0.90665	0.17665	0.09275	0.82275	61736	6316	5243	24418	41	18	59	68092	29679	97771
30	0.10647	0.19544	0.00063	0.10710	-0.19544	-0.10647	0.19607	0.90692	0.16971	0.09245	0.82966	60744	6192	5216	25498	43	20	62	66979	30734	97712
31	0.10533	0.18758	0.00067	0.10600	-0.18758	-0.10533	0.18825	0.90751	0.16351	0.09181	0.83582	59860	6056	5182	26487	44	21	66	65960	31690	97650
32	0.10385	0.18060	0.00070	0.10455	-0.18060	-0.10385	0.18130	0.90844	0.15801	0.09086	0.84129	59086	5910	5142	27378	46	23	68	65041	32543	97585
33	0.10205	0.17445	0.00074	0.10279	-0.17445	-0.10205	0.17519	0.90967	0.15315	0.08959	0.84611	58427	5754	5098	28166	48	25	72	64228	33288	97517
34	0.09994	0.16904	0.00079	0.10073	-0.16904	-0.09994	0.16983	0.91118	0.14889	0.08803	0.85031	57882	5592	5050	28842	50	27	77	63525	33920	97444
35	0.09755	0.16433	0.00085	0.09840	-0.16433	-0.09755	0.16518	0.91296	0.14519	0.08619	0.85396	57455	5424	5000	29406	53	29	82	62933	34434	97367

Table A.7 continued

36	0.09489	0.16026	0.00091	0.09580	-0.16026	-0.09489	0.16117	0.91501	0.14201	0.08409	0.85708	57147	5252	4946	29852	57	32	88	62455	34830	97285
37	0.09200	0.15679	0.00098	0.09298	-0.15679	-0.09200	0.15777	0.91727	0.13932	0.08175	0.85970	56956	5076	4891	30179	61	34	95	62093	35104	97196
38	0.08890	0.15389	0.00106	0.08996	-0.15389	-0.08890	0.15495	0.91975	0.13709	0.07919	0.86185	56883	4898	4833	30384	66	37	103	61847	35255	97101
39	0.08561	0.15153	0.00115	0.08676	-0.15153	-0.08561	0.15268	0.92240	0.13531	0.07645	0.86353	56927	4718	4774	30467	71	41	112	61716	35282	96998
40	0.08216	0.14968	0.00126	0.08342	-0.14968	-0.08216	0.15094	0.92520	0.13397	0.07354	0.86477	57086	4537	4714	30427	78	44	122	61701	35185	96886
41	0.07859	0.14832	0.00138	0.07997	-0.14832	-0.07859	0.14970	0.92814	0.13303	0.07048	0.86559	57359	4356	4651	30265	85	48	133	61800	34964	96764
42	0.07492	0.14745	0.00151	0.07643	-0.14745	-0.07492	0.14896	0.93117	0.13251	0.06733	0.86598	57742	4175	4588	29981	93	52	145	62010	34621	96631
43	0.07118	0.14706	0.00166	0.07284	-0.14706	-0.07118	0.14872	0.93427	0.13238	0.06408	0.86596	58232	3994	4522	29578	103	57	160	62330	34156	96486
44	0.06740	0.14713	0.00183	0.06923	-0.14713	-0.06740	0.14896	0.93740	0.13265	0.06077	0.86553	58826	3813	4453	29057	115	61	176	62754	33572	96326
45	0.06361	0.14768	0.00202	0.06563	-0.14768	-0.06361	0.14970	0.94057	0.13331	0.05742	0.86467	59518	3633	4382	28422	128	66	194	63279	32870	96149
46	0.05983	0.14870	0.00223	0.06206	-0.14870	-0.05983	0.15093	0.94371	0.13437	0.05406	0.86339	60303	3454	4307	27676	143	72	214	63900	32055	95955
47	0.05608	0.15021	0.00247	0.05855	-0.15021	-0.05608	0.15268	0.94681	0.13585	0.05072	0.86169	61174	3277	4229	26825	160	77	236	64610	31131	95741
48	0.05239	0.15222	0.00273	0.05512	-0.15222	-0.05239	0.15495	0.94987	0.13774	0.04741	0.85953	62124	3101	4146	25874	178	82	260	65403	30102	95505
49	0.04878	0.15476	0.00303	0.05181	-0.15476	-0.04878	0.15779	0.95282	0.14006	0.04415	0.85692	63144	2926	4058	24829	201	88	288	66270	28974	95244
50	0.04527	0.15784	0.00336	0.04863	-0.15784	-0.04527	0.16120	0.95569	0.14283	0.04096	0.85382	64224	2753	3964	23697	225	93	319	67202	27754	94956
51	0.04186	0.16149	0.00373	0.04559	-0.16149	-0.04186	0.16522	0.95841	0.14607	0.03786	0.85021	65352	2582	3864	22488	254	98	353	68188	26450	94638
52	0.03859	0.16576	0.00414	0.04273	-0.16576	-0.03859	0.16990	0.96100	0.14980	0.03487	0.84606	66516	2414	3756	21210	286	104	390	69215	25070	94285
53	0.03545	0.17069	0.00460	0.04005	-0.17069	-0.03545	0.17529	0.96342	0.15407	0.03199	0.84134	67701	2248	3640	19876	323	108	431	70272	23624	93896
54	0.03245	0.17633	0.00511	0.03756	-0.17633	-0.03245	0.18144	0.96566	0.15889	0.02925	0.83601	68891	2086	3515	18496	363	113	476	71341	22124	93465
55	0.02961	0.18274	0.00569	0.03530	-0.18274	-0.02961	0.18843	0.96770	0.16431	0.02663	0.83002	70068	1928	3382	17084	410	117	527	72406	20582	92989
56	0.02693	0.18999	0.00632	0.03325	-0.18999	-0.02693	0.19631	0.96955	0.17037	0.02415	0.82333	71213	1773	3239	15653	463	120	583	73450	19012	92462
57	0.02441	0.19816	0.00703	0.03144	-0.19816	-0.02441	0.20519	0.97118	0.17713	0.02181	0.81587	72306	1624	3087	14218	522	122	644	74452	17427	91879
58	0.02205	0.20734	0.00782	0.02987	-0.20734	-0.02205	0.21516	0.97258	0.18463	0.01963	0.80758	73326	1480	2925	12794	587	123	711	75393	15842	91235
59	0.01985	0.21764	0.00870	0.02855	-0.21764	-0.01985	0.22634	0.97375	0.19295	0.01759	0.79839	74249	1341	2754	11396	661	124	784	76251	14273	90524
60	0.01781	0.22919	0.00967	0.02748	-0.22919	-0.01781	0.23886	0.97467	0.20214	0.01570	0.78823	75052	1209	2575	10040	741	123	864	77003	12737	89740

Table A.7 continued

61	0.01592	0.24212	0.01076	0.02668	-0.24212	-0.01592	0.25288	0.97534	0.21229	0.01396	0.77701	75713	1084	2388	8741	831	120	951	77627	11249	88876
62	0.01419	0.25660	0.01196	0.02615	-0.25660	-0.01419	0.26856	0.97575	0.22348	0.01236	0.76463	76207	966	2196	7512	929	117	1045	78101	9824	87925
63	0.01260	0.27282	0.01330	0.02590	-0.27282	-0.01260	0.28612	0.97590	0.23580	0.01089	0.75099	76512	854	1999	6366	1036	112	1148	78402	8477	86880
64	0.01116	0.29099	0.01479	0.02595	-0.29099	-0.01116	0.30578	0.97576	0.24935	0.00956	0.73598	76608	751	1800	5314	1152	106	1258	78511	7220	85732
65	0.00984	0.31137	0.01645	0.02629	-0.31137	-0.00984	0.32782	0.97533	0.26422	0.00835	0.71946	76474	655	1602	4363	1280	99	1379	78409	6065	84474
66	0.00865	0.33424	0.01829	0.02694	-0.33424	-0.00865	0.35253	0.97461	0.28055	0.00727	0.70133	76095	567	1408	3519	1415	91	1506	78077	5018	83095
67	0.00758	0.35994	0.02032	0.02790	-0.35994	-0.00758	0.38026	0.97360	0.29845	0.00629	0.68144	75456	487	1220	2785	1559	82	1641	77502	4087	81589
68	0.00662	0.38886	0.02259	0.02921	-0.38886	-0.00662	0.41145	0.97224	0.31804	0.00542	0.65962	74548	415	1041	2158	1713	73	1786	76676	3272	79948
69	0.00577	0.42145	0.02509	0.03086	-0.42145	-0.00577	0.44654	0.97057	0.33946	0.00464	0.63576	73364	351	874	1636	1873	64	1937	75588	2574	78162
70	0.00500	0.45824	0.02787	0.03287	-0.45824	-0.00500	0.48611	0.96855	0.36284	0.00396	0.60967	71903	294	721	1211	2041	55	2096	74238	1987	76225
71	0.00432	0.49983	0.03095	0.03527	-0.49983	-0.00432	0.53078	0.96616	0.38831	0.00336	0.58120	70166	244	585	875	2214	46	2260	72624	1505	74129
72	0.00373	0.54694	0.03435	0.03808	-0.54694	-0.00373	0.58129	0.96339	0.41602	0.00283	0.55021	68161	200	465	616	2390	38	2427	70751	1119	71869
73	0.00320	0.60041	0.03811	0.04131	-0.60041	-0.00320	0.63852	0.96023	0.44607	0.00238	0.51654	65897	163	364	421	2566	31	2597	68626	816	69442
74	0.00274	0.66123	0.04227	0.04501	-0.66123	-0.00274	0.70350	0.95663	0.47855	0.00198	0.48005	63387	131	280	281	2743	24	2767	66261	585	66845

Source: Author’s calculations

Table A.7 continued

											L(x) (for state based expectancies)				e(x) (state based)				
	L(x)			$\hat{l}^{Total}$	e(x) (working age population based)			e(x) (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
15	0.96795	0.03193	0.99988	1.00000	43.68	12.56	56.23	42.94	12.35	55.29									
16	0.91625	0.08339	0.99964	0.99977	42.72	12.53	55.25	42.00	12.32	54.32	0.96611	0.03376	0.18884	0.81103	42.80	12.40	40.89	14.31	55.20
17	0.88271	0.11666	0.99937	0.99951	41.81	12.45	54.26	41.11	12.24	53.35	0.96434	0.03552	0.17581	0.82405	41.98	12.23	39.94	14.28	54.22
18	0.85776	0.14131	0.99908	0.99923	40.94	12.34	53.28	40.26	12.13	52.38	0.96266	0.03719	0.16395	0.83589	41.19	12.05	39.01	14.23	53.23
19	0.83706	0.16169	0.99876	0.99893	40.09	12.20	52.29	39.42	11.99	51.42	0.96108	0.03875	0.15317	0.84666	40.41	11.84	38.10	14.15	52.25
20	0.81856	0.17984	0.99840	0.99859	39.27	12.04	51.31	38.61	11.84	50.45	0.95962	0.04019	0.14339	0.85643	39.65	11.62	37.21	14.06	51.27
21	0.80128	0.19673	0.99801	0.99821	38.46	11.86	50.33	37.82	11.67	49.49	0.95830	0.04150	0.13451	0.86529	38.91	11.38	36.34	13.94	50.28
22	0.78479	0.21282	0.99760	0.99781	37.68	11.67	49.35	37.05	11.48	48.52	0.95711	0.04268	0.12648	0.87331	38.19	11.12	35.50	13.80	49.30
23	0.76890	0.22827	0.99717	0.99740	36.91	11.46	48.37	36.29	11.27	47.56	0.95608	0.04370	0.11921	0.88057	37.49	10.84	34.68	13.65	48.33
24	0.75356	0.24315	0.99671	0.99695	36.15	11.24	47.39	35.55	11.05	46.60	0.95520	0.04456	0.11264	0.88712	36.80	10.54	33.87	13.47	47.35
25	0.73880	0.25743	0.99622	0.99647	35.41	11.00	46.41	34.82	10.82	45.64	0.95448	0.04527	0.10671	0.89304	36.14	10.23	33.09	13.28	46.37
26	0.72467	0.27105	0.99572	0.99598	34.69	10.75	45.44	34.11	10.57	44.68	0.95394	0.04580	0.10136	0.89838	35.49	9.90	32.33	13.07	45.39
27	0.71125	0.28393	0.99519	0.99546	33.98	10.48	44.46	33.41	10.31	43.72	0.95356	0.04616	0.09654	0.90319	34.85	9.56	31.58	12.84	44.42
28	0.69862	0.29601	0.99463	0.99491	33.28	10.20	43.48	32.72	10.03	42.76	0.95336	0.04635	0.09221	0.90751	34.23	9.21	30.84	12.60	43.44
29	0.68685	0.30720	0.99405	0.99435	32.60	9.91	42.51	32.05	9.74	41.80	0.95332	0.04638	0.08833	0.91137	33.62	8.84	30.12	12.34	42.46
30	0.67600	0.31743	0.99343	0.99375	31.93	9.61	41.53	31.39	9.45	40.84	0.95346	0.04622	0.08485	0.91483	33.02	8.47	29.42	12.07	41.49
31	0.66615	0.32663	0.99279	0.99312	31.27	9.29	40.56	30.74	9.14	39.88	0.95376	0.04591	0.08176	0.91791	32.43	8.09	28.72	11.79	40.52
32	0.65735	0.33476	0.99210	0.99245	30.62	8.97	39.59	30.10	8.82	38.92	0.95422	0.04543	0.07900	0.92065	31.85	7.69	28.04	11.51	39.54
33	0.64963	0.34176	0.99139	0.99176	29.97	8.64	38.61	29.47	8.49	37.97	0.95484	0.04479	0.07658	0.92305	31.27	7.30	27.36	11.21	38.57
34	0.64304	0.34759	0.99063	0.99102	29.34	8.30	37.64	28.85	8.16	37.01	0.95559	0.04401	0.07445	0.92516	30.70	6.90	26.69	10.91	37.60
35	0.63760	0.35221	0.98982	0.99024	28.71	7.96	36.67	28.23	7.82	36.06	0.95648	0.04310	0.07260	0.92698	30.13	6.50	26.02	10.61	36.63

Table A.7 continued

36	0.63333	0.35562	0.98895	0.98940	28.09	7.61	35.70	27.62	7.48	35.10	0.95750	0.04204	0.07100	0.92854	29.56	6.10	25.36	10.30	35.66
37	0.63024	0.35778	0.98802	0.98850	27.48	7.25	34.73	27.02	7.13	34.15	0.95864	0.04087	0.06966	0.92985	28.99	5.70	24.70	9.99	34.69
38	0.62833	0.35868	0.98701	0.98753	26.87	6.90	33.77	26.42	6.78	33.20	0.95987	0.03960	0.06854	0.93093	28.41	5.31	24.05	9.68	33.72
39	0.62759	0.35833	0.98592	0.98649	26.26	6.54	32.80	25.82	6.43	32.25	0.96120	0.03822	0.06766	0.93177	27.84	4.92	23.39	9.36	32.76
40	0.62801	0.35672	0.98473	0.98535	25.65	6.19	31.84	25.22	6.08	31.31	0.96260	0.03677	0.06698	0.93239	27.25	4.55	22.74	9.05	31.80
41	0.62958	0.35385	0.98343	0.98411	25.05	5.83	30.88	24.63	5.73	30.36	0.96407	0.03524	0.06652	0.93279	26.66	4.18	22.09	8.74	30.83
42	0.63228	0.34973	0.98201	0.98275	24.44	5.48	29.92	24.03	5.39	29.42	0.96558	0.03366	0.06626	0.93299	26.05	3.82	21.44	8.43	29.88
43	0.63606	0.34440	0.98046	0.98127	23.83	5.13	28.97	23.44	5.05	28.48	0.96713	0.03204	0.06619	0.93298	25.44	3.48	20.79	8.13	28.92
44	0.64089	0.33786	0.97875	0.97964	23.22	4.79	28.01	22.84	4.71	27.54	0.96870	0.03038	0.06632	0.93276	24.81	3.16	20.14	7.83	27.97
45	0.64671	0.33015	0.97687	0.97785	22.61	4.45	27.06	22.23	4.38	26.61	0.97028	0.02871	0.06666	0.93234	24.17	2.85	19.49	7.53	27.02
46	0.65348	0.32131	0.97479	0.97588	21.99	4.12	26.12	21.63	4.05	25.68	0.97185	0.02703	0.06719	0.93170	23.52	2.55	18.84	7.24	26.07
47	0.66113	0.31137	0.97250	0.97370	21.37	3.80	25.17	21.01	3.74	24.75	0.97341	0.02536	0.06792	0.93084	22.85	2.28	18.18	6.95	25.13
48	0.66957	0.30041	0.96997	0.97130	20.74	3.49	24.24	20.40	3.43	23.83	0.97493	0.02370	0.06887	0.92977	22.17	2.02	17.53	6.66	24.19
49	0.67872	0.28847	0.96718	0.96865	20.11	3.19	23.30	19.77	3.14	22.91	0.97641	0.02207	0.07003	0.92846	21.47	1.79	16.87	6.38	23.26
50	0.68847	0.27563	0.96410	0.96572	19.47	2.90	22.37	19.14	2.85	21.99	0.97784	0.02048	0.07141	0.92691	20.75	1.57	16.21	6.11	22.32
51	0.69871	0.26198	0.96069	0.96248	18.82	2.62	21.44	18.50	2.58	21.08	0.97920	0.01893	0.07304	0.92510	20.03	1.37	15.56	5.84	21.40
52	0.70930	0.24761	0.95691	0.95889	18.16	2.36	20.52	17.86	2.32	20.18	0.98050	0.01743	0.07490	0.92303	19.29	1.19	14.90	5.58	20.48
53	0.72011	0.23263	0.95274	0.95493	17.49	2.11	19.60	17.20	2.08	19.28	0.98171	0.01600	0.07704	0.92067	18.53	1.03	14.24	5.32	19.56
54	0.73096	0.21716	0.94813	0.95055	16.82	1.88	18.69	16.53	1.84	18.38	0.98283	0.01462	0.07945	0.91801	17.77	0.88	13.58	5.07	18.65
55	0.74169	0.20134	0.94303	0.94571	16.13	1.66	17.79	15.86	1.63	17.49	0.98385	0.01331	0.08215	0.91501	16.99	0.75	12.92	4.82	17.74
56	0.75209	0.18529	0.93738	0.94035	15.43	1.45	16.88	15.17	1.43	16.60	0.98478	0.01207	0.08519	0.91166	16.20	0.64	12.26	4.58	16.84
57	0.76198	0.16917	0.93115	0.93442	14.73	1.26	15.99	14.48	1.24	15.72	0.98559	0.01091	0.08856	0.90793	15.41	0.54	11.60	4.34	15.94
58	0.77112	0.15314	0.92426	0.92787	14.01	1.09	15.10	13.77	1.07	14.84	0.98629	0.00981	0.09232	0.90379	14.60	0.45	10.94	4.11	15.05
59	0.77931	0.13735	0.91666	0.92065	13.28	0.93	14.21	13.06	0.92	13.97	0.98687	0.00880	0.09647	0.89920	13.79	0.37	10.27	3.89	14.16
60	0.78631	0.12197	0.90828	0.91267	12.54	0.79	13.33	12.33	0.78	13.11	0.98733	0.00785	0.10107	0.89412	12.98	0.31	9.61	3.67	13.28

Table A.7 continued

61	0.79189	0.10716	0.89905	0.90388	11.79	0.66	12.46	11.60	0.65	12.25	0.98767	0.00698	0.10615	0.88850	12.16	0.25	8.95	3.46	12.41
62	0.79583	0.09307	0.88889	0.89421	11.04	0.55	11.59	10.85	0.54	11.39	0.98787	0.00618	0.11174	0.88232	11.33	0.20	8.28	3.25	11.54
63	0.79792	0.07982	0.87774	0.88358	10.27	0.45	10.72	10.10	0.44	10.54	0.98795	0.00545	0.11790	0.87550	10.51	0.16	7.62	3.05	10.67
64	0.79795	0.06756	0.86551	0.87190	9.49	0.36	9.86	9.33	0.36	9.69	0.98788	0.00478	0.12467	0.86799	9.68	0.13	6.95	2.86	9.81
65	0.79574	0.05636	0.85210	0.85911	8.70	0.29	9.00	8.56	0.29	8.84	0.98766	0.00418	0.13211	0.85973	8.84	0.10	6.27	2.67	8.94
66	0.79113	0.04630	0.83743	0.84509	7.91	0.23	8.14	7.77	0.23	8.00	0.98731	0.00363	0.14027	0.85066	8.01	0.08	5.60	2.49	8.08
67	0.78401	0.03742	0.82143	0.82977	7.10	0.18	7.28	6.98	0.18	7.16	0.98680	0.00314	0.14922	0.84072	7.16	0.06	4.92	2.31	7.22
68	0.77427	0.02973	0.80400	0.81308	6.28	0.14	6.42	6.18	0.13	6.31	0.98612	0.00271	0.15902	0.82981	6.32	0.04	4.23	2.14	6.36
69	0.76187	0.02319	0.78507	0.79492	5.45	0.10	5.55	5.36	0.10	5.46	0.98529	0.00232	0.16973	0.81788	5.46	0.03	3.53	1.96	5.50
70	0.74680	0.01776	0.76456	0.77522	4.61	0.07	4.68	4.53	0.07	4.60	0.98427	0.00198	0.18142	0.80484	4.60	0.02	2.83	1.79	4.62
71	0.72907	0.01334	0.74241	0.75390	3.75	0.05	3.80	3.68	0.05	3.73	0.98308	0.00168	0.19416	0.79060	3.73	0.01	2.13	1.61	3.74
72	0.70874	0.00984	0.71858	0.73092	2.87	0.04	2.90	2.82	0.04	2.85	0.98170	0.00142	0.20801	0.77510	2.83	0.01	1.44	1.40	2.84
73	0.68591	0.00712	0.69303	0.70624	1.96	0.02	1.99	1.93	0.02	1.95	0.98012	0.00119	0.22303	0.75827	1.92	0.00	0.78	1.14	1.92
74	0.69968	0.00951	0.70919	0.67983	1.03	0.01	1.04	1.01	0.01	1.03	0.97831	0.00099	0.23928	0.74002	0.98	0.00	0.24	0.74	0.98

Source: Author's calculations

Table A.8: Multistate working life table for formerly married women based on transition rates estimated from Equation 3

	Estimated transition rates		***Death rate***	**M(x)** ***(transition rate matrix)***				**P(x)** ***(transition probability matrix)***				d_{ij} *where* $i, j = 1, 2$				$d_{i\delta}$ *where* $i = 1, 2$			**l(x)**		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1, 2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
15	0.14276	0.58757	0.00023	0.14299	-0.58757	-0.14276	0.58780	0.89521	0.43031	0.10455	0.56945	88024	10280	0	0	23	0	23	98327	0	98327
16	0.14856	0.53750	0.00025	0.14881	-0.53750	-0.14856	0.53775	0.88916	0.40013	0.11059	0.59962	78267	9734	4113	6164	22	3	24	88024	10280	98304
17	0.15406	0.49328	0.00028	0.15434	-0.49328	-0.15406	0.49356	0.88336	0.37257	0.11636	0.62715	72772	9586	5923	9971	23	4	28	82381	15899	98280
18	0.15924	0.45415	0.00031	0.15955	-0.45415	-0.15924	0.45446	0.87785	0.34746	0.12183	0.65223	69083	9588	6795	12756	25	6	31	78695	19557	98252
19	0.16404	0.41946	0.00034	0.16438	-0.41946	-0.16404	0.41980	0.87271	0.32462	0.12695	0.67504	66219	9633	7253	15082	26	8	33	75878	22343	98221
20	0.16841	0.38866	0.00037	0.16878	-0.38866	-0.16841	0.38903	0.86795	0.30389	0.13167	0.69574	63771	9674	7511	17195	27	9	37	73473	24715	98188
21	0.17232	0.36128	0.00040	0.17272	-0.36128	-0.17232	0.36168	0.86362	0.28509	0.13598	0.71451	61560	9693	7660	19199	29	11	39	71281	26870	98151
22	0.17572	0.33690	0.00042	0.17614	-0.33690	-0.17572	0.33732	0.85976	0.26806	0.13982	0.73152	59513	9678	7745	21135	29	12	41	69220	28892	98112
23	0.17859	0.31517	0.00045	0.17904	-0.31517	-0.17859	0.31562	0.85638	0.25267	0.14318	0.74689	57598	9630	7785	23014	30	14	44	67258	30813	98071
24	0.18090	0.29579	0.00048	0.18138	-0.29579	-0.18090	0.29627	0.85350	0.23875	0.14602	0.76077	55805	9547	7794	24834	31	16	47	65384	32643	98027
25	0.18262	0.27849	0.00050	0.18312	-0.27849	-0.18262	0.27899	0.85116	0.22621	0.14834	0.77329	54133	9434	7778	26587	32	17	49	63599	34381	97980
26	0.18373	0.26304	0.00052	0.18425	-0.26304	-0.18373	0.26356	0.84936	0.21491	0.15012	0.78457	52585	9294	7741	28261	32	19	51	61911	36021	97931
27	0.18423	0.24925	0.00055	0.18478	-0.24925	-0.18423	0.24980	0.84811	0.20474	0.15134	0.79470	51163	9130	7689	29845	33	21	54	60326	37554	97880
28	0.18411	0.23693	0.00057	0.18468	-0.23693	-0.18411	0.23750	0.84742	0.19563	0.15202	0.80381	49872	8947	7625	31328	33	22	55	58852	38975	97827
29	0.18338	0.22595	0.00060	0.18398	-0.22595	-0.18338	0.22655	0.84726	0.18746	0.15214	0.81194	48715	8748	7550	32701	34	24	59	57497	40275	97771
30	0.18203	0.21616	0.00063	0.18266	-0.21616	-0.18203	0.21679	0.84765	0.18017	0.15171	0.81920	47693	8536	7468	33954	36	26	62	56264	41448	97713
31	0.18008	0.20746	0.00067	0.18075	-0.20746	-0.18008	0.20813	0.84858	0.17368	0.15076	0.82565	46808	8316	7380	35082	37	29	65	55160	42490	97651
32	0.17755	0.19975	0.00070	0.17825	-0.19975	-0.17755	0.20045	0.85002	0.16794	0.14928	0.83136	46060	8089	7288	36079	38	30	68	54187	43398	97585
33	0.17448	0.19295	0.00074	0.17522	-0.19295	-0.17448	0.19369	0.85196	0.16289	0.14730	0.83637	45451	7858	7194	36941	39	33	72	53349	44168	97517
34	0.17087	0.18697	0.00079	0.17166	-0.18697	-0.17087	0.18776	0.85438	0.15847	0.14484	0.84073	44979	7625	7099	37664	41	36	77	52646	44799	97445
35	0.16678	0.18175	0.00085	0.16763	-0.18175	-0.16678	0.18260	0.85723	0.15466	0.14192	0.84449	44643	7391	7004	38246	44	38	83	52079	45289	97368

Table A.8 continued

36	0.16224	0.17725	0.00091	0.16315	-0.17725	-0.16224	0.17816	0.86051	0.15141	0.13858	0.84769	44443	7157	6910	38686	47	41	89	51648	45637	97285
37	0.15729	0.17342	0.00098	0.15827	-0.17342	-0.15729	0.17440	0.86417	0.14868	0.13485	0.85035	44378	6925	6816	38983	50	45	95	51353	45844	97197
38	0.15198	0.17021	0.00106	0.15304	-0.17021	-0.15198	0.17127	0.86817	0.14644	0.13077	0.85250	44445	6694	6723	39136	54	49	103	51193	45908	97101
39	0.14636	0.16759	0.00115	0.14751	-0.16759	-0.14636	0.16874	0.87248	0.14470	0.12637	0.85415	44643	6466	6632	39147	59	53	112	51168	45831	96999
40	0.14047	0.16555	0.00126	0.14173	-0.16555	-0.14047	0.16681	0.87706	0.14341	0.12168	0.85533	44971	6239	6541	39014	65	57	122	51275	45612	96887
41	0.13436	0.16405	0.00138	0.13574	-0.16405	-0.13436	0.16543	0.88185	0.14256	0.11677	0.85606	45426	6015	6451	38739	71	62	133	51512	45253	96765
42	0.12809	0.16309	0.00151	0.12960	-0.16309	-0.12809	0.16460	0.88684	0.14216	0.11165	0.85633	46007	5792	6362	38324	79	68	146	51877	44754	96632
43	0.12170	0.16265	0.00166	0.12336	-0.16265	-0.12170	0.16431	0.89196	0.14218	0.10639	0.85616	46711	5571	6272	37771	87	73	160	52369	44116	96485
44	0.11524	0.16273	0.00183	0.11707	-0.16273	-0.11524	0.16456	0.89717	0.14263	0.10100	0.85554	47535	5351	6182	37081	97	79	176	52983	43342	96325
45	0.10875	0.16334	0.00202	0.11077	-0.16334	-0.10875	0.16536	0.90243	0.14350	0.09555	0.85448	48476	5133	6089	36258	108	86	194	53717	42433	96150
46	0.10229	0.16447	0.00223	0.10452	-0.16447	-0.10229	0.16670	0.90771	0.14481	0.09006	0.85296	49529	4914	5994	35304	122	92	214	54565	41390	95956
47	0.09588	0.16614	0.00247	0.09835	-0.16614	-0.09588	0.16861	0.91295	0.14655	0.08458	0.85098	50690	4696	5894	34225	137	99	236	55523	40218	95741
48	0.08958	0.16836	0.00273	0.09231	-0.16836	-0.08958	0.17109	0.91814	0.14875	0.07914	0.84852	51952	4478	5789	33026	154	106	260	56584	38921	95505
49	0.08340	0.17117	0.00303	0.08643	-0.17117	-0.08340	0.17420	0.92320	0.15140	0.07377	0.84557	53306	4260	5678	31712	175	114	289	57741	37504	95245
50	0.07739	0.17457	0.00336	0.08075	-0.17457	-0.07739	0.17793	0.92813	0.15455	0.06852	0.84209	54745	4042	5559	30291	198	121	319	58985	35972	94956
51	0.07158	0.17862	0.00373	0.07531	-0.17862	-0.07158	0.18235	0.93289	0.15820	0.06340	0.83808	56257	3823	5432	28774	224	128	352	60305	34333	94638
52	0.06597	0.18334	0.00414	0.07011	-0.18334	-0.06597	0.18748	0.93743	0.16238	0.05844	0.83349	57829	3605	5293	27169	255	135	390	61689	32597	94286
53	0.06061	0.18879	0.00460	0.06521	-0.18879	-0.06061	0.19339	0.94176	0.16714	0.05365	0.82827	59446	3387	5143	25489	290	141	431	63122	30774	93896
54	0.05549	0.19503	0.00511	0.06060	-0.19503	-0.05549	0.20014	0.94583	0.17248	0.04907	0.82242	61091	3169	4981	23748	330	147	477	64590	28876	93465
55	0.05063	0.20212	0.00569	0.05632	-0.20212	-0.05063	0.20781	0.94962	0.17848	0.04470	0.81585	62742	2954	4804	21960	375	153	528	66071	26917	92989
56	0.04604	0.21013	0.00632	0.05236	-0.21013	-0.04604	0.21645	0.95313	0.18517	0.04057	0.80853	64381	2740	4613	20144	426	157	583	67547	24914	92461
57	0.04173	0.21917	0.00703	0.04876	-0.21917	-0.04173	0.22620	0.95632	0.19260	0.03667	0.80039	65981	2530	4407	18316	484	160	644	68994	22884	91878
58	0.03769	0.22932	0.00782	0.04551	-0.22932	-0.03769	0.23714	0.95920	0.20083	0.03301	0.79138	67516	2324	4187	16497	548	162	711	70388	20846	91234
59	0.03393	0.24072	0.00870	0.04263	-0.24072	-0.03393	0.24942	0.96174	0.20993	0.02960	0.78141	68959	2122	3951	14707	621	163	784	71702	18821	90523
60	0.03044	0.25349	0.00967	0.04011	-0.25349	-0.03044	0.26316	0.96395	0.21997	0.02642	0.77040	70282	1926	3702	12965	702	162	864	72910	16829	89739

Table A.8 continued

61	0.02722	0.26779	0.01076	0.03798	-0.26779	-0.02722	0.27855	0.96581	0.23104	0.02349	0.75826	71455	1738	3440	11291	792	159	951	73984	14891	88875
62	0.02426	0.28381	0.01196	0.03622	-0.28381	-0.02426	0.29577	0.96732	0.24320	0.02079	0.74491	72448	1557	3169	9705	890	155	1045	74895	13029	87924
63	0.02155	0.30174	0.01330	0.03485	-0.30174	-0.02155	0.31504	0.96847	0.25657	0.01832	0.73022	73232	1385	2890	8224	999	149	1148	75616	11262	86879
64	0.01907	0.32184	0.01479	0.03386	-0.32184	-0.01907	0.33663	0.96925	0.27124	0.01608	0.71408	73781	1224	2606	6862	1117	141	1258	76122	9609	85731
65	0.01683	0.34438	0.01645	0.03328	-0.34438	-0.01683	0.36083	0.96964	0.28732	0.01404	0.69636	74068	1072	2323	5630	1247	132	1379	76387	8086	84473
66	0.01480	0.36968	0.01829	0.03309	-0.36968	-0.01480	0.38797	0.96967	0.30492	0.01221	0.67695	74075	932	2044	4537	1384	121	1506	76391	6703	83094
67	0.01297	0.39811	0.02032	0.03329	-0.39811	-0.01297	0.41843	0.96933	0.32418	0.01056	0.65571	73784	803	1773	3587	1531	110	1641	76118	5470	81588
68	0.01132	0.43009	0.02259	0.03391	-0.43009	-0.01132	0.45268	0.96857	0.34520	0.00909	0.63246	73182	687	1515	2777	1688	98	1786	75557	4390	79947
69	0.00986	0.46614	0.02509	0.03495	-0.46614	-0.00986	0.49123	0.96744	0.36813	0.00779	0.60709	72266	582	1275	2102	1851	86	1936	74698	3463	78161
70	0.00855	0.50683	0.02787	0.03642	-0.50683	-0.00855	0.53470	0.96588	0.39309	0.00664	0.57943	71031	488	1055	1555	2021	74	2095	73540	2684	76224
71	0.00739	0.55283	0.03095	0.03834	-0.55283	-0.00739	0.58378	0.96390	0.42020	0.00562	0.54932	69484	405	859	1122	2197	62	2259	72086	2043	74130
72	0.00637	0.60494	0.03435	0.04072	-0.60494	-0.00637	0.63929	0.96149	0.44958	0.00473	0.51665	67634	333	687	789	2376	52	2427	70343	1528	71871
73	0.00547	0.66408	0.03811	0.04358	-0.66408	-0.00547	0.70219	0.95864	0.48135	0.00397	0.48126	65495	271	540	540	2555	42	2597	68321	1122	69443
74	0.00468	0.73134	0.04227	0.04695	-0.73134	-0.00468	0.77361	0.95530	0.51557	0.00330	0.44304	63084	218	418	359	2734	34	2767	66035	811	66847

Source: Author's calculations

Table A.8 continued

											L(x) (for state based expectancies)				**e(x)** (state based)				
	L(x)			$\hat{l}^{Total}$	**e(x)** (working age population based)			**e(x)** (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
15	0.94761	0.05228	0.99988	1.00000	39.48	16.75	56.23	38.82	16.47	55.29									
16	0.86652	0.13312	0.99964	0.99977	38.54	16.71	55.25	37.90	16.43	54.32	0.94458	0.05529	0.20006	0.79981	38.67	16.54	37.12	18.08	55.20
17	0.81908	0.18029	0.99938	0.99952	37.68	16.58	54.26	37.05	16.30	53.35	0.94168	0.05818	0.18628	0.81358	37.91	16.30	36.27	17.94	54.22
18	0.78602	0.21306	0.99908	0.99924	36.87	16.40	53.28	36.26	16.13	52.38	0.93893	0.06092	0.17373	0.82611	37.18	16.05	35.45	17.78	53.23
19	0.75946	0.23930	0.99875	0.99892	36.10	16.19	52.29	35.50	15.92	51.42	0.93635	0.06348	0.16231	0.83752	36.48	15.77	34.66	17.59	52.25
20	0.73608	0.26231	0.99840	0.99858	35.35	15.96	51.31	34.76	15.69	50.45	0.93398	0.06584	0.15194	0.84787	35.79	15.47	33.89	17.37	51.27
21	0.71446	0.28355	0.99801	0.99821	34.63	15.70	50.33	34.05	15.44	49.49	0.93181	0.06799	0.14254	0.85726	35.13	15.15	33.15	17.13	50.28
22	0.69400	0.30360	0.99760	0.99781	33.92	15.42	49.35	33.36	15.17	48.52	0.92988	0.06991	0.13403	0.86576	34.49	14.81	32.43	16.87	49.30
23	0.67449	0.32268	0.99717	0.99739	33.24	15.13	48.37	32.69	14.87	47.56	0.92819	0.07159	0.12633	0.87344	33.88	14.45	31.74	16.59	48.33
24	0.65589	0.34083	0.99671	0.99695	32.58	14.81	47.39	32.04	14.56	46.60	0.92675	0.07301	0.11938	0.88038	33.28	14.06	31.07	16.28	47.35
25	0.63822	0.35800	0.99622	0.99647	31.94	14.47	46.41	31.40	14.23	45.64	0.92558	0.07417	0.11311	0.88664	32.71	13.66	30.42	15.95	46.37
26	0.62158	0.37413	0.99572	0.99597	31.31	14.12	45.44	30.79	13.89	44.68	0.92468	0.07506	0.10745	0.89229	32.15	13.25	29.78	15.61	45.39
27	0.60603	0.38916	0.99518	0.99546	30.71	13.75	44.46	30.19	13.52	43.72	0.92406	0.07567	0.10237	0.89735	31.60	12.81	29.17	15.25	44.42
28	0.59164	0.40299	0.99463	0.99491	30.11	13.37	43.48	29.61	13.15	42.76	0.92371	0.07601	0.09781	0.90190	31.08	12.36	28.57	14.87	43.44
29	0.57848	0.41557	0.99405	0.99435	29.54	12.97	42.51	29.04	12.75	41.80	0.92363	0.07607	0.09373	0.90597	30.56	11.90	27.98	14.49	42.46
30	0.56660	0.42683	0.99344	0.99375	28.97	12.56	41.53	28.49	12.35	40.84	0.92383	0.07586	0.09008	0.90960	30.06	11.43	27.40	14.09	41.49
31	0.55604	0.43675	0.99279	0.99312	28.42	12.14	40.56	27.94	11.94	39.88	0.92429	0.07538	0.08684	0.91282	29.57	10.94	26.84	13.68	40.51
32	0.54683	0.44528	0.99211	0.99246	27.88	11.71	39.59	27.41	11.51	38.92	0.92501	0.07464	0.08397	0.91568	29.09	10.45	26.28	13.26	39.54
33	0.53899	0.45241	0.99139	0.99176	27.35	11.27	38.61	26.89	11.08	37.97	0.92598	0.07365	0.08144	0.91819	28.62	9.95	25.73	12.84	38.57
34	0.53253	0.45811	0.99064	0.99103	26.82	10.82	37.64	26.37	10.64	37.01	0.92719	0.07242	0.07924	0.92037	28.15	9.44	25.18	12.42	37.60
35	0.52746	0.46237	0.98983	0.99025	26.31	10.36	36.67	25.87	10.19	36.06	0.92861	0.07096	0.07733	0.92225	27.69	8.94	24.63	11.99	36.63

Table A.8 continued

36	0.52377	0.46519	0.98895	0.98940	25.80	9.91	35.70	25.36	9.74	35.10	0.93025	0.06929	0.07570	0.92384	27.23	8.43	24.09	11.57	35.66
37	0.52146	0.46656	0.98802	0.98850	25.29	9.44	34.73	24.87	9.29	34.15	0.93208	0.06743	0.07434	0.92517	26.77	7.92	23.55	11.14	34.69
38	0.52051	0.46650	0.98701	0.98754	24.79	8.98	33.77	24.37	8.83	33.20	0.93409	0.06538	0.07322	0.92625	26.31	7.41	23.01	10.71	33.72
39	0.52093	0.46500	0.98592	0.98649	24.28	8.52	32.80	23.88	8.38	32.25	0.93624	0.06318	0.07235	0.92708	25.84	6.91	22.46	10.29	32.76
40	0.52268	0.46206	0.98474	0.98536	23.78	8.06	31.84	23.39	7.92	31.31	0.93853	0.06084	0.07170	0.92767	25.37	6.42	21.92	9.88	31.80
41	0.52574	0.45769	0.98344	0.98411	23.28	7.60	30.88	22.89	7.47	30.36	0.94093	0.05838	0.07128	0.92803	24.90	5.94	21.37	9.47	30.83
42	0.53010	0.45191	0.98201	0.98276	22.78	7.14	29.92	22.40	7.02	29.42	0.94342	0.05582	0.07108	0.92816	24.41	5.47	20.81	9.07	29.88
43	0.53572	0.44473	0.98046	0.98127	22.27	6.69	28.97	21.90	6.58	28.48	0.94598	0.05319	0.07109	0.92808	23.91	5.01	20.25	8.67	28.92
44	0.54258	0.43617	0.97875	0.97964	21.76	6.25	28.01	21.40	6.14	27.54	0.94859	0.05050	0.07132	0.92777	23.40	4.57	19.68	8.29	27.97
45	0.55062	0.42625	0.97687	0.97786	21.25	5.81	27.06	20.89	5.72	26.61	0.95122	0.04778	0.07175	0.92724	22.87	4.15	19.11	7.91	27.02
46	0.55981	0.41499	0.97479	0.97588	20.73	5.39	26.12	20.38	5.30	25.68	0.95386	0.04503	0.07240	0.92648	22.33	3.74	18.53	7.54	26.07
47	0.57007	0.40243	0.97250	0.97370	20.20	4.97	25.17	19.86	4.89	24.75	0.95648	0.04229	0.07328	0.92549	21.77	3.36	17.94	7.19	25.13
48	0.58135	0.38863	0.96998	0.97130	19.66	4.57	24.23	19.33	4.50	23.83	0.95907	0.03957	0.07437	0.92426	21.19	3.00	17.35	6.84	24.19
49	0.59356	0.37363	0.96719	0.96865	19.12	4.18	23.30	18.80	4.11	22.91	0.96160	0.03689	0.07570	0.92278	20.59	2.67	16.75	6.51	23.25
50	0.60659	0.35750	0.96410	0.96572	18.56	3.81	22.37	18.25	3.75	21.99	0.96406	0.03426	0.07728	0.92105	19.97	2.35	16.14	6.18	22.32
51	0.62035	0.34034	0.96069	0.96248	17.99	3.45	21.44	17.69	3.39	21.08	0.96644	0.03170	0.07910	0.91904	19.33	2.06	15.53	5.87	21.40
52	0.63467	0.32225	0.95692	0.95890	17.41	3.11	20.52	17.12	3.06	20.18	0.96872	0.02922	0.08119	0.91674	18.67	1.80	14.91	5.57	20.48
53	0.64942	0.30332	0.95275	0.95494	16.82	2.78	19.60	16.54	2.74	19.28	0.97088	0.02683	0.08357	0.91414	18.00	1.56	14.29	5.27	19.56
54	0.66442	0.28371	0.94813	0.95056	16.21	2.48	18.69	15.94	2.44	18.38	0.97291	0.02454	0.08624	0.91121	17.30	1.35	13.65	4.99	18.65
55	0.67946	0.26357	0.94302	0.94571	15.59	2.19	17.79	15.33	2.15	17.49	0.97481	0.02235	0.08924	0.90792	16.59	1.15	13.02	4.72	17.74
56	0.69432	0.24306	0.93738	0.94034	14.96	1.92	16.88	14.71	1.89	16.60	0.97656	0.02029	0.09259	0.90426	15.86	0.98	12.38	4.46	16.84
57	0.70877	0.22237	0.93114	0.93441	14.31	1.68	15.99	14.07	1.65	15.72	0.97816	0.01833	0.09630	0.90020	15.11	0.83	11.74	4.21	15.94
58	0.72254	0.20171	0.92425	0.92786	13.65	1.45	15.10	13.42	1.42	14.84	0.97960	0.01651	0.10041	0.89569	14.36	0.69	11.09	3.96	15.05
59	0.73537	0.18128	0.91665	0.92064	12.97	1.24	14.21	12.75	1.22	13.97	0.98087	0.01480	0.10497	0.89070	13.59	0.58	10.43	3.73	14.16
60	0.74697	0.16130	0.90827	0.91266	12.28	1.05	13.33	12.07	1.03	13.11	0.98198	0.01321	0.10999	0.88520	12.81	0.48	9.78	3.51	13.28

Table A.8 continued

61	0.75706	0.14198	0.89904	0.90387	11.57	0.88	12.46	11.38	0.87	12.25	0.98291	0.01174	0.11552	0.87913	12.02	0.39	9.12	3.29	12.41
62	0.76536	0.12352	0.88888	0.89420	10.85	0.73	11.59	10.67	0.72	11.39	0.98366	0.01039	0.12160	0.87245	11.22	0.32	8.46	3.08	11.54
63	0.77160	0.10613	0.87773	0.88357	10.12	0.60	10.72	9.95	0.59	10.54	0.98423	0.00916	0.12829	0.86511	10.41	0.26	7.79	2.88	10.67
64	0.77552	0.08998	0.86550	0.87190	9.37	0.49	9.86	9.21	0.48	9.69	0.98462	0.00804	0.13562	0.85704	9.60	0.20	7.12	2.69	9.81
65	0.77689	0.07520	0.85209	0.85910	8.60	0.39	9.00	8.46	0.39	8.84	0.98482	0.00702	0.14366	0.84818	8.78	0.16	6.44	2.51	8.94
66	0.77552	0.06190	0.83742	0.84508	7.83	0.31	8.14	7.70	0.31	8.00	0.98484	0.00610	0.15246	0.83847	7.96	0.12	5.76	2.33	8.08
67	0.77128	0.05014	0.82142	0.82976	7.04	0.24	7.28	6.92	0.24	7.16	0.98466	0.00528	0.16209	0.82785	7.13	0.10	5.07	2.16	7.22
68	0.76406	0.03993	0.80399	0.81307	6.23	0.18	6.42	6.13	0.18	6.31	0.98429	0.00454	0.17260	0.81623	6.29	0.07	4.37	1.99	6.36
69	0.75380	0.03126	0.78506	0.79491	5.41	0.14	5.55	5.32	0.14	5.46	0.98372	0.00389	0.18407	0.80355	5.45	0.05	3.66	1.83	5.50
70	0.74052	0.02404	0.76456	0.77521	4.58	0.10	4.68	4.50	0.10	4.60	0.98294	0.00332	0.19654	0.78971	4.59	0.04	2.95	1.67	4.62
71	0.72426	0.01816	0.74242	0.75391	3.73	0.07	3.80	3.66	0.07	3.73	0.98195	0.00281	0.21010	0.77466	3.72	0.02	2.23	1.51	3.74
72	0.70512	0.01347	0.71859	0.73093	2.85	0.05	2.90	2.80	0.05	2.85	0.98075	0.00237	0.22479	0.75832	2.83	0.01	1.52	1.32	2.84
73	0.68321	0.00983	0.69304	0.70625	1.95	0.03	1.99	1.92	0.03	1.95	0.97932	0.00198	0.24067	0.74063	1.92	0.01	0.84	1.09	1.92
74	0.69576	0.01343	0.70919	0.67984	1.02	0.02	1.04	1.01	0.02	1.03	0.97765	0.00165	0.25778	0.72152	0.98	0.00	0.26	0.72	0.98

Source: Author's calculations

Table A.9: Multistate working life table for low educated never married women based on transition rates estimated from Equation 4

	Estimated transition rates		***Death rate***	**M(x)** ***(transition rate matrix)***				**P(x)** ***(transition probability matrix)***				d_{ij} *where* $i, j = 1, 2$				$d_{i\delta}$ *where* $i = 1, 2$			**l(x)**		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1, 2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
15	0.11697	0.39829	0.00023	0.11720	-0.39829	-0.11697	0.39852	0.90678	0.31663	0.09299	0.68314	89161	9143	0	0	23	0	23	98327	0	98327
16	0.12133	0.36494	0.00025	0.12158	-0.36494	-0.12133	0.36519	0.90217	0.29350	0.09758	0.70625	80439	8700	2684	6457	22	2	25	89161	9143	98304
17	0.12545	0.33541	0.00028	0.12573	-0.33541	-0.12545	0.33569	0.89779	0.27253	0.10193	0.72719	74627	8473	4131	11022	23	4	28	83122	15157	98280
18	0.12930	0.30921	0.00031	0.12961	-0.30921	-0.12930	0.30952	0.89367	0.25354	0.10602	0.74615	70383	8350	4943	14546	24	6	30	78757	19495	98252
19	0.13285	0.28593	0.00034	0.13319	-0.28593	-0.13285	0.28627	0.88985	0.23635	0.10981	0.76331	67028	8272	5412	17477	26	8	33	75326	22896	98222
20	0.13606	0.26521	0.00037	0.13643	-0.26521	-0.13606	0.26558	0.88634	0.22082	0.11329	0.77881	64207	8206	5686	20053	27	10	36	72440	25748	98188
21	0.13891	0.24675	0.00040	0.13931	-0.24675	-0.13891	0.24715	0.88319	0.20678	0.11641	0.79282	61728	8136	5844	22405	28	11	39	69892	28260	98152
22	0.14137	0.23027	0.00042	0.14179	-0.23027	-0.14137	0.23069	0.88041	0.19411	0.11917	0.80547	59491	8053	5928	24600	28	13	41	67572	30541	98113
23	0.14342	0.21555	0.00045	0.14387	-0.21555	-0.14342	0.21600	0.87800	0.18267	0.12155	0.81688	57438	7951	5965	26673	29	15	44	65419	32653	98072
24	0.14504	0.20239	0.00048	0.14552	-0.20239	-0.14504	0.20287	0.87600	0.17236	0.12352	0.82716	55541	7832	5968	28640	30	17	47	63403	34625	98028
25	0.14621	0.19061	0.00050	0.14671	-0.19061	-0.14621	0.19111	0.87442	0.16306	0.12508	0.83644	53784	7694	5947	30506	31	18	49	61509	36472	97981
26	0.14693	0.18007	0.00052	0.14745	-0.18007	-0.14693	0.18059	0.87326	0.15469	0.12622	0.84479	52161	7539	5909	32271	31	20	51	59732	38200	97932
27	0.14718	0.17063	0.00055	0.14773	-0.17063	-0.14718	0.17118	0.87251	0.14716	0.12694	0.85229	50667	7371	5859	33930	32	22	54	58070	39810	97881
28	0.14697	0.16219	0.00057	0.14754	-0.16219	-0.14697	0.16276	0.87221	0.14040	0.12722	0.85903	49302	7191	5799	35479	32	24	56	56526	41301	97827
29	0.14629	0.15463	0.00060	0.14689	-0.15463	-0.14629	0.15523	0.87231	0.13433	0.12709	0.86507	48065	7003	5732	36913	33	26	59	55101	42670	97771
30	0.14516	0.14787	0.00063	0.14579	-0.14787	-0.14516	0.14850	0.87284	0.12890	0.12653	0.87047	46956	6807	5661	38227	34	28	62	53797	43916	97712
31	0.14357	0.14184	0.00067	0.14424	-0.14184	-0.14357	0.14251	0.87377	0.12405	0.12556	0.87528	45975	6607	5587	39417	35	30	65	52617	45034	97651
32	0.14156	0.13648	0.00070	0.14226	-0.13648	-0.14156	0.13718	0.87510	0.11974	0.12420	0.87956	45121	6404	5511	40481	36	32	68	51561	46024	97585
33	0.13913	0.13172	0.00074	0.13987	-0.13172	-0.13913	0.13246	0.87681	0.11593	0.12245	0.88333	44395	6200	5435	41415	37	35	72	50632	46885	97517
34	0.13631	0.12751	0.00079	0.13710	-0.12751	-0.13631	0.12830	0.87887	0.11257	0.12034	0.88664	43794	5996	5360	42217	39	38	77	49830	47615	97445
35	0.13313	0.12382	0.00085	0.13398	-0.12382	-0.13313	0.12467	0.88127	0.10963	0.11788	0.88952	43318	5794	5286	42887	42	41	83	49154	48214	97368

Table A.9 continued

36	0.12960	0.12060	0.00091	0.13051	-0.12060	-0.12960	0.12151	0.88400	0.10710	0.11509	0.89199	42966	5594	5214	43423	44	44	88	48604	48681	97285
37	0.12578	0.11782	0.00098	0.12676	-0.11782	-0.12578	0.11880	0.88700	0.10493	0.11202	0.89409	42735	5397	5143	43826	47	48	95	48180	49017	97197
38	0.12168	0.11546	0.00106	0.12274	-0.11546	-0.12168	0.11652	0.89027	0.10312	0.10867	0.89582	42625	5203	5076	44095	51	52	103	47879	49223	97102
39	0.11734	0.11350	0.00115	0.11849	-0.11350	-0.11734	0.11465	0.89377	0.10164	0.10508	0.89721	42634	5012	5011	44230	55	57	111	47701	49298	96999
40	0.11279	0.11190	0.00126	0.11405	-0.11190	-0.11279	0.11316	0.89746	0.10048	0.10128	0.89826	42759	4825	4948	44233	60	62	122	47644	49243	96887
41	0.10808	0.11067	0.00138	0.10946	-0.11067	-0.10808	0.11205	0.90132	0.09963	0.09730	0.89899	42999	4642	4888	44103	66	68	133	47707	49058	96765
42	0.10324	0.10979	0.00151	0.10475	-0.10979	-0.10324	0.11130	0.90532	0.09908	0.09317	0.89941	43353	4462	4830	43842	72	74	146	47887	48745	96632
43	0.09831	0.10925	0.00166	0.09997	-0.10925	-0.09831	0.11091	0.90942	0.09882	0.08892	0.89952	43818	4285	4773	43450	80	80	160	48183	48303	96486
44	0.09331	0.10904	0.00183	0.09514	-0.10904	-0.09331	0.11087	0.91358	0.09885	0.08459	0.89933	44392	4110	4718	42929	89	87	176	48591	47735	96326
45	0.08829	0.10916	0.00202	0.09031	-0.10916	-0.08829	0.11118	0.91778	0.09916	0.08020	0.89882	45073	3939	4665	42280	99	95	194	49111	47039	96150
46	0.08327	0.10962	0.00223	0.08550	-0.10962	-0.08327	0.11185	0.92199	0.09977	0.07578	0.89801	45857	3769	4611	41504	111	103	214	49738	46218	95956
47	0.07829	0.11042	0.00247	0.08076	-0.11042	-0.07829	0.11289	0.92616	0.10066	0.07137	0.89687	46742	3602	4557	40605	125	112	236	50469	45274	95742
48	0.07337	0.11157	0.00273	0.07610	-0.11157	-0.07337	0.11430	0.93029	0.10186	0.06699	0.89542	47723	3436	4503	39583	140	121	260	51299	44206	95506
49	0.06855	0.11307	0.00303	0.07158	-0.11307	-0.06855	0.11610	0.93431	0.10335	0.06266	0.89362	48795	3273	4446	38443	158	130	288	52226	43020	95246
50	0.06384	0.11494	0.00336	0.06720	-0.11494	-0.06384	0.11830	0.93823	0.10517	0.05841	0.89148	49953	3110	4387	37189	179	140	319	53242	41716	94957
51	0.05927	0.11720	0.00373	0.06300	-0.11720	-0.05927	0.12093	0.94201	0.10731	0.05427	0.88896	51189	2949	4325	35824	202	150	352	54340	40299	94639
52	0.05484	0.11987	0.00414	0.05898	-0.11987	-0.05484	0.12401	0.94563	0.10980	0.05024	0.88606	52495	2789	4257	34355	229	160	390	55514	38773	94287
53	0.05059	0.12298	0.00460	0.05519	-0.12298	-0.05059	0.12758	0.94906	0.11266	0.04635	0.88275	53862	2630	4185	32789	260	170	431	56753	37144	93897
54	0.04652	0.12655	0.00511	0.05163	-0.12655	-0.04652	0.13166	0.95229	0.11590	0.04261	0.87900	55278	2473	4105	31134	296	181	476	58047	35419	93466
55	0.04265	0.13063	0.00569	0.04834	-0.13063	-0.04265	0.13632	0.95529	0.11956	0.03903	0.87477	56728	2318	4018	29398	337	191	528	59383	33607	92990
56	0.03897	0.13525	0.00632	0.04529	-0.13525	-0.03897	0.14157	0.95807	0.12366	0.03563	0.87004	58199	2164	3922	27594	383	200	583	60746	31716	92462
57	0.03549	0.14046	0.00703	0.04252	-0.14046	-0.03549	0.14749	0.96059	0.12823	0.03240	0.86476	59673	2013	3816	25734	435	208	644	62121	29759	91880
58	0.03223	0.14632	0.00782	0.04005	-0.14632	-0.03223	0.15414	0.96284	0.13332	0.02937	0.85889	61130	1864	3699	23832	495	216	711	63489	27747	91236
59	0.02917	0.15289	0.00870	0.03787	-0.15289	-0.02917	0.16159	0.96482	0.13897	0.02651	0.85237	62549	1719	3571	21902	562	223	784	64829	25696	90525
60	0.02632	0.16024	0.00967	0.03599	-0.16024	-0.02632	0.16991	0.96653	0.14522	0.02385	0.84516	63906	1577	3430	19964	636	227	864	66120	23621	89741

Table A.9 continued

61	0.02367	0.16846	0.01076	0.03443	-0.16846	-0.02367	0.17922	0.96792	0.15212	0.02137	0.83717	65177	1439	3277	18033	721	231	951	67337	21541	88877
62	0.02122	0.17764	0.01196	0.03318	-0.17764	-0.02122	0.18960	0.96903	0.15975	0.01908	0.82836	66333	1306	3111	16130	814	232	1045	68454	19473	87926
63	0.01897	0.18790	0.01330	0.03227	-0.18790	-0.01897	0.20120	0.96982	0.16815	0.01697	0.81864	67348	1179	2932	14274	918	230	1148	69444	17437	86881
64	0.01690	0.19936	0.01479	0.03169	-0.19936	-0.01690	0.21415	0.97028	0.17740	0.01503	0.80792	68192	1057	2741	12485	1032	227	1259	70280	15453	85733
65	0.01500	0.21216	0.01645	0.03145	-0.21216	-0.01500	0.22861	0.97042	0.18758	0.01327	0.79610	68835	941	2540	10780	1157	221	1378	70933	13541	84474
66	0.01328	0.22648	0.01829	0.03157	-0.22648	-0.01328	0.24477	0.97022	0.19878	0.01166	0.78310	69249	832	2330	9179	1294	212	1506	71375	11721	83096
67	0.01172	0.24250	0.02032	0.03204	-0.24250	-0.01172	0.26282	0.96968	0.21109	0.01020	0.76880	69409	730	2113	7696	1440	201	1641	71579	10011	81590
68	0.01031	0.26045	0.02259	0.03290	-0.26045	-0.01031	0.28304	0.96877	0.22460	0.00889	0.75306	69288	636	1893	6346	1598	188	1786	71522	8427	79949
69	0.00904	0.28058	0.02509	0.03413	-0.28058	-0.00904	0.30567	0.96751	0.23943	0.00771	0.73579	68868	549	1672	5137	1764	173	1937	71181	6982	78163
70	0.00790	0.30320	0.02787	0.03577	-0.30320	-0.00790	0.33107	0.96585	0.25570	0.00666	0.71682	68131	470	1454	4076	1939	156	2095	70540	5686	76226
71	0.00689	0.32864	0.03095	0.03784	-0.32864	-0.00689	0.35959	0.96379	0.27352	0.00573	0.69601	67065	399	1243	3164	2121	139	2259	69585	4546	74131
72	0.00598	0.35731	0.03435	0.04033	-0.35731	-0.00598	0.39166	0.96133	0.29302	0.00490	0.67321	65667	335	1044	2399	2307	120	2427	68309	3563	71871
73	0.00518	0.38966	0.03811	0.04329	-0.38966	-0.00518	0.42777	0.95843	0.31433	0.00418	0.64827	63937	279	859	1772	2495	102	2597	66711	2734	69444
74	0.00447	0.42625	0.04227	0.04674	-0.42625	-0.00447	0.46852	0.95507	0.33759	0.00354	0.62102	61885	229	692	1274	2682	85	2767	64797	2051	66847

Source: Author's calculations

Table A.9 continued

											L(x) (for state based expectancies)				**e(x)** (state based)				
	L(x)			$\hat{l}^{Total}$	**e(x)** (working age population based)			**e(x)** (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
15	0.95339	0.04649	0.99989	1.00000	37.21	19.02	56.23	36.59	18.70	55.29									
16	0.87607	0.12357	0.99965	0.99977	36.27	18.98	55.25	35.66	18.66	54.32	0.95109	0.04879	0.14675	0.85312	36.44	18.76	34.20	21.00	55.20
17	0.82317	0.17621	0.99938	0.99952	35.40	18.86	54.26	34.81	18.54	53.35	0.94890	0.05096	0.13626	0.86360	35.73	18.48	33.37	20.85	54.22
18	0.78352	0.21556	0.99909	0.99924	34.59	18.69	53.28	34.01	18.38	52.38	0.94684	0.05301	0.12677	0.87308	35.05	18.19	32.57	20.66	53.23
19	0.75140	0.24736	0.99876	0.99893	33.81	18.48	52.29	33.25	18.17	51.42	0.94492	0.05491	0.11818	0.88165	34.39	17.86	31.79	20.45	52.25
20	0.72377	0.27464	0.99841	0.99859	33.07	18.24	51.31	32.52	17.93	50.45	0.94317	0.05664	0.11041	0.88941	33.75	17.52	31.05	20.22	51.27
21	0.69902	0.29901	0.99802	0.99822	32.36	17.97	50.33	31.82	17.67	49.49	0.94159	0.05821	0.10339	0.89641	33.14	17.15	30.33	19.96	50.28
22	0.67627	0.32135	0.99761	0.99782	31.67	17.68	49.35	31.14	17.38	48.52	0.94020	0.05959	0.09706	0.90273	32.55	16.76	29.64	19.67	49.30
23	0.65507	0.34211	0.99718	0.99740	31.01	17.36	48.37	30.49	17.07	47.56	0.93900	0.06077	0.09134	0.90844	31.98	16.35	28.97	19.36	48.33
24	0.63519	0.36153	0.99672	0.99695	30.36	17.03	47.39	29.86	16.74	46.60	0.93800	0.06176	0.08618	0.91358	31.43	15.92	28.32	19.03	47.35
25	0.61652	0.37971	0.99623	0.99648	29.74	16.67	46.41	29.24	16.39	45.64	0.93721	0.06254	0.08153	0.91822	30.90	15.47	27.69	18.67	46.37
26	0.59903	0.39669	0.99572	0.99598	29.14	16.30	45.44	28.65	16.03	44.68	0.93663	0.06311	0.07735	0.92239	30.40	15.00	27.09	18.30	45.39
27	0.58273	0.41246	0.99519	0.99546	28.55	15.91	44.46	28.07	15.64	43.72	0.93626	0.06347	0.07358	0.92614	29.90	14.51	26.50	17.92	44.42
28	0.56763	0.42700	0.99463	0.99491	27.98	15.50	43.48	27.51	15.24	42.76	0.93610	0.06361	0.07020	0.92952	29.43	14.01	25.92	17.52	43.44
29	0.55375	0.44030	0.99405	0.99435	27.43	15.08	42.51	26.97	14.83	41.80	0.93616	0.06354	0.06716	0.93254	28.97	13.50	25.36	17.11	42.46
30	0.54112	0.45232	0.99344	0.99375	26.88	14.65	41.53	26.43	14.40	40.84	0.93642	0.06327	0.06445	0.93524	28.52	12.97	24.81	16.68	41.49
31	0.52975	0.46304	0.99279	0.99312	26.36	14.20	40.56	25.92	13.96	39.88	0.93688	0.06278	0.06203	0.93764	28.09	12.43	24.27	16.25	40.52
32	0.51966	0.47245	0.99211	0.99246	25.84	13.75	39.59	25.41	13.52	38.92	0.93755	0.06210	0.05987	0.93978	27.66	11.88	23.73	15.81	39.54
33	0.51086	0.48054	0.99140	0.99176	25.33	13.28	38.61	24.91	13.06	37.97	0.93840	0.06123	0.05796	0.94167	27.24	11.32	23.21	15.36	38.57
34	0.50334	0.48730	0.99064	0.99103	24.84	12.80	37.64	24.42	12.59	37.01	0.93944	0.06017	0.05628	0.94332	26.83	10.76	22.68	14.91	37.60
35	0.49711	0.49272	0.98983	0.99025	24.35	12.32	36.67	23.94	12.12	36.06	0.94064	0.05894	0.05482	0.94476	26.43	10.20	22.16	14.46	36.63

Table A.9 continued

36	0.49215	0.49680	0.98896	0.98941	23.87	11.83	35.70	23.47	11.64	35.10	0.94200	0.05755	0.05355	0.94600	26.03	9.63	21.65	14.01	35.66
37	0.48846	0.49956	0.98802	0.98851	23.39	11.34	34.73	23.00	11.15	34.15	0.94350	0.05601	0.05247	0.94704	25.62	9.06	21.13	13.56	34.69
38	0.48603	0.50098	0.98702	0.98754	22.92	10.85	33.77	22.54	10.67	33.20	0.94514	0.05433	0.05156	0.94791	25.22	8.50	20.62	13.11	33.72
39	0.48484	0.50109	0.98593	0.98649	22.45	10.35	32.80	22.08	10.18	32.25	0.94689	0.05254	0.05082	0.94860	24.82	7.94	20.10	12.66	32.76
40	0.48487	0.49987	0.98474	0.98536	21.99	9.85	31.84	21.62	9.69	31.31	0.94873	0.05064	0.05024	0.94913	24.40	7.39	19.58	12.21	31.80
41	0.48610	0.49734	0.98344	0.98412	21.52	9.36	30.88	21.16	9.20	30.36	0.95066	0.04865	0.04981	0.94950	23.98	6.85	19.06	11.77	30.83
42	0.48852	0.49350	0.98202	0.98276	21.06	8.87	29.92	20.70	8.72	29.42	0.95266	0.04658	0.04954	0.94971	23.55	6.32	18.54	11.34	29.88
43	0.49210	0.48836	0.98046	0.98128	20.59	8.38	28.97	20.24	8.24	28.48	0.95471	0.04446	0.04941	0.94976	23.11	5.81	18.01	10.91	28.92
44	0.49682	0.48193	0.97875	0.97965	20.12	7.89	28.01	19.78	7.76	27.54	0.95679	0.04229	0.04942	0.94966	22.65	5.31	17.48	10.49	27.97
45	0.50265	0.47422	0.97687	0.97786	19.65	7.41	27.06	19.32	7.29	26.61	0.95889	0.04010	0.04958	0.94941	22.18	4.84	16.94	10.08	27.02
46	0.50956	0.46524	0.97480	0.97589	19.17	6.94	26.12	18.85	6.83	25.68	0.96099	0.03789	0.04988	0.94900	21.69	4.38	16.40	9.67	26.07
47	0.51750	0.45501	0.97251	0.97371	18.69	6.48	25.17	18.38	6.37	24.75	0.96308	0.03569	0.05033	0.94844	21.18	3.95	15.85	9.28	25.13
48	0.52643	0.44355	0.96999	0.97131	18.21	6.03	24.24	17.90	5.93	23.83	0.96514	0.03349	0.05093	0.94771	20.65	3.54	15.30	8.89	24.19
49	0.53631	0.43089	0.96720	0.96866	17.71	5.59	23.30	17.42	5.49	22.91	0.96716	0.03133	0.05168	0.94681	20.10	3.16	14.75	8.51	23.26
50	0.54706	0.41705	0.96411	0.96573	17.21	5.16	22.37	16.92	5.07	21.99	0.96912	0.02921	0.05258	0.94574	19.52	2.80	14.19	8.14	22.32
51	0.55862	0.40208	0.96070	0.96249	16.70	4.74	21.44	16.42	4.66	21.08	0.97101	0.02713	0.05366	0.94448	18.93	2.47	13.62	7.77	21.40
52	0.57088	0.38604	0.95693	0.95891	16.18	4.34	20.52	15.91	4.27	20.18	0.97282	0.02512	0.05490	0.94303	18.31	2.17	13.05	7.42	20.48
53	0.58376	0.36899	0.95276	0.95495	15.65	3.95	19.60	15.39	3.89	19.28	0.97453	0.02317	0.05633	0.94138	17.67	1.89	12.48	7.08	19.56
54	0.59714	0.35100	0.94814	0.95056	15.11	3.58	18.69	14.86	3.52	18.38	0.97615	0.02130	0.05795	0.93950	17.01	1.64	11.90	6.74	18.65
55	0.61086	0.33217	0.94304	0.94572	14.55	3.23	17.79	14.31	3.18	17.49	0.97765	0.01952	0.05978	0.93738	16.33	1.41	11.32	6.42	17.74
56	0.62479	0.31260	0.93739	0.94035	13.99	2.90	16.88	13.75	2.85	16.60	0.97904	0.01781	0.06183	0.93502	15.63	1.21	10.74	6.10	16.84
57	0.63874	0.29242	0.93116	0.93443	13.41	2.58	15.99	13.18	2.54	15.72	0.98029	0.01620	0.06412	0.93238	14.92	1.02	10.15	5.79	15.94
58	0.65251	0.27176	0.92427	0.92788	12.81	2.28	15.10	12.60	2.24	14.84	0.98142	0.01468	0.06666	0.92944	14.19	0.86	9.56	5.49	15.05
59	0.66589	0.25078	0.91667	0.92065	12.21	2.01	14.21	12.00	1.97	13.97	0.98241	0.01326	0.06948	0.92618	13.44	0.72	8.97	5.19	14.16
60	0.67864	0.22965	0.90829	0.91268	11.58	1.75	13.33	11.39	1.72	13.11	0.98326	0.01193	0.07261	0.92258	12.68	0.60	8.38	4.91	13.28

Table A.9 continued

61	0.69050	0.20856	0.89906	0.90390	10.95	1.51	12.46	10.76	1.49	12.25	0.98396	0.01069	0.07606	0.91859	11.91	0.50	7.78	4.63	12.41
62	0.70122	0.18769	0.88891	0.89422	10.29	1.29	11.59	10.12	1.27	11.39	0.98451	0.00954	0.07987	0.91418	11.13	0.41	7.18	4.36	11.54
63	0.71051	0.16725	0.87775	0.88359	9.62	1.10	10.72	9.46	1.08	10.54	0.98491	0.00849	0.08407	0.90932	10.34	0.33	6.57	4.10	10.67
64	0.71808	0.14744	0.86552	0.87192	8.94	0.92	9.86	8.79	0.90	9.69	0.98514	0.00752	0.08870	0.90396	9.54	0.26	5.97	3.84	9.81
65	0.72364	0.12846	0.85211	0.85912	8.23	0.76	9.00	8.10	0.75	8.84	0.98521	0.00663	0.09379	0.89805	8.74	0.21	5.36	3.59	8.94
66	0.72693	0.11051	0.83744	0.84510	7.51	0.62	8.14	7.39	0.61	8.00	0.98511	0.00583	0.09939	0.89155	7.92	0.16	4.74	3.34	8.08
67	0.72768	0.09376	0.82144	0.82978	6.78	0.50	7.28	6.66	0.49	7.16	0.98484	0.00510	0.10554	0.88440	7.10	0.12	4.13	3.10	7.22
68	0.72566	0.07835	0.80401	0.81309	6.02	0.40	6.42	5.92	0.39	6.31	0.98439	0.00445	0.11230	0.87653	6.27	0.09	3.51	2.85	6.36
69	0.72066	0.06442	0.78508	0.79493	5.24	0.31	5.55	5.16	0.30	5.46	0.98375	0.00386	0.11972	0.86789	5.43	0.06	2.89	2.61	5.50
70	0.71254	0.05203	0.76458	0.77523	4.45	0.23	4.68	4.37	0.23	4.60	0.98292	0.00333	0.12785	0.85841	4.58	0.04	2.28	2.35	4.62
71	0.70120	0.04123	0.74243	0.75392	3.63	0.17	3.80	3.57	0.17	3.73	0.98190	0.00287	0.13676	0.84800	3.71	0.03	1.67	2.07	3.74
72	0.68658	0.03202	0.71860	0.73094	2.78	0.12	2.90	2.74	0.12	2.85	0.98066	0.00245	0.14651	0.83661	2.83	0.02	1.09	1.75	2.84
73	0.66872	0.02433	0.69305	0.70626	1.91	0.08	1.99	1.88	0.08	1.95	0.97921	0.00209	0.15717	0.82414	1.92	0.01	0.57	1.35	1.92
74	0.67950	0.02972	0.70921	0.67985	1.00	0.04	1.04	0.98	0.04	1.03	0.97753	0.00177	0.16879	0.81051	0.98	0.00	0.17	0.81	0.98

Source: Author's calculations

Table A.10: Multistate working life table for low educated currently married women based on transition rates estimated from Equation 4

	Estimated transition rates		***Death rate***	**M(x)** ***(transition rate matrix)***				**P(x)** ***(transition probability matrix)***				d_{ij} *where* $i, j = 1, 2$				$d_{i\delta}$ *where* $i = 1, 2$			**l(x)**		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1, 2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
15	0.07724	0.57682	0.00023	0.07747	-0.57682	-0.07724	0.57705	0.94157	0.43458	0.05820	0.56519	92582	5722	0	0	23	0	23	98327	0	98327
16	0.08012	0.52853	0.00025	0.08037	-0.52853	-0.08012	0.52878	0.93834	0.40512	0.06141	0.59463	86873	5686	2318	3403	23	1	25	92582	5722	98304
17	0.08284	0.48576	0.00028	0.08312	-0.48576	-0.08284	0.48604	0.93523	0.37813	0.06449	0.62159	83415	5752	3437	5649	25	3	28	89191	9088	98280
18	0.08539	0.44781	0.00031	0.08570	-0.44781	-0.08539	0.44812	0.93229	0.35346	0.06740	0.64623	80971	5853	4030	7368	27	4	30	86851	11401	98252
19	0.08773	0.41410	0.00034	0.08807	-0.41410	-0.08773	0.41444	0.92955	0.33094	0.07011	0.66872	79012	5960	4375	8841	29	4	33	85001	13221	98222
20	0.08985	0.38409	0.00037	0.09022	-0.38409	-0.08985	0.38446	0.92702	0.31041	0.07261	0.68922	77302	6055	4594	10201	31	5	36	83388	14801	98188
21	0.09173	0.35735	0.00040	0.09213	-0.35735	-0.09173	0.35775	0.92471	0.29172	0.07489	0.70788	75730	6133	4742	11508	33	7	39	81896	16256	98152
22	0.09336	0.33349	0.00042	0.09378	-0.33349	-0.09336	0.33391	0.92267	0.27473	0.07691	0.72485	74250	6189	4846	12787	34	7	41	80473	17640	98113
23	0.09471	0.31217	0.00045	0.09516	-0.31217	-0.09471	0.31262	0.92088	0.25929	0.07867	0.74026	72838	6222	4920	14047	36	9	44	79096	18976	98072
24	0.09578	0.29311	0.00048	0.09626	-0.29311	-0.09578	0.29359	0.91937	0.24529	0.08015	0.75423	71488	6233	4972	15288	37	10	47	77758	20269	98028
25	0.09656	0.27606	0.00050	0.09706	-0.27606	-0.09656	0.27656	0.91814	0.23260	0.08136	0.76690	70201	6220	5006	16504	38	11	49	76460	21521	97981
26	0.09703	0.26079	0.00052	0.09755	-0.26079	-0.09703	0.26131	0.91722	0.22111	0.08227	0.77837	68981	6187	5025	17688	39	12	51	75207	22725	97932
27	0.09720	0.24712	0.00055	0.09775	-0.24712	-0.09720	0.24767	0.91657	0.21072	0.08288	0.78873	67831	6133	5031	18831	41	13	54	74005	23875	97881
28	0.09705	0.23488	0.00057	0.09762	-0.23488	-0.09705	0.23545	0.91623	0.20134	0.08320	0.79809	66759	6062	5026	19924	42	14	56	72862	24965	97827
29	0.09661	0.22394	0.00060	0.09721	-0.22394	-0.09661	0.22454	0.91618	0.19290	0.08322	0.80650	65769	5974	5013	20958	43	16	59	71785	25986	97771
30	0.09586	0.21415	0.00063	0.09649	-0.21415	-0.09586	0.21478	0.91643	0.18531	0.08294	0.81407	64866	5871	4990	21924	45	17	62	70781	26931	97712
31	0.09481	0.20542	0.00067	0.09548	-0.20542	-0.09481	0.20609	0.91694	0.17850	0.08239	0.82083	64054	5755	4961	22815	47	19	65	69856	27795	97651
32	0.09348	0.19765	0.00070	0.09418	-0.19765	-0.09348	0.19835	0.91775	0.17242	0.08155	0.82688	63339	5628	4926	23624	48	20	68	69016	28570	97585
33	0.09188	0.19076	0.00074	0.09262	-0.19076	-0.09188	0.19150	0.91881	0.16702	0.08045	0.83224	62723	5492	4886	24345	50	22	72	68265	29252	97517
34	0.09002	0.18467	0.00079	0.09081	-0.18467	-0.09002	0.18546	0.92012	0.16225	0.07909	0.83696	62208	5347	4841	24972	53	24	77	67609	29836	97445
35	0.08791	0.17932	0.00085	0.08876	-0.17932	-0.08791	0.18017	0.92166	0.15806	0.07749	0.84109	61797	5196	4792	25501	57	26	83	67049	30319	97368

Table A.10 continued

36	0.08559	0.17466	0.00091	0.08650	-0.17466	-0.08559	0.17557	0.92342	0.15441	0.07567	0.84468	61489	5039	4740	25929	61	28	88	66589	30697	97285
37	0.08306	0.17063	0.00098	0.08404	-0.17063	-0.08306	0.17161	0.92538	0.15129	0.07364	0.84773	61287	4877	4685	26252	65	30	95	66229	30967	97197
38	0.08035	0.16722	0.00106	0.08141	-0.16722	-0.08035	0.16828	0.92751	0.14865	0.07143	0.85029	61190	4712	4627	26469	70	33	103	65972	31129	97102
39	0.07749	0.16437	0.00115	0.07864	-0.16437	-0.07749	0.16552	0.92980	0.14648	0.06905	0.85237	61197	4545	4567	26578	76	36	111	65817	31181	96999
40	0.07449	0.16206	0.00126	0.07575	-0.16206	-0.07449	0.16332	0.93221	0.14475	0.06653	0.85399	61306	4375	4505	26579	83	39	122	65764	31123	96887
41	0.07138	0.16028	0.00138	0.07276	-0.16028	-0.07138	0.16166	0.93474	0.14345	0.06388	0.85517	61516	4204	4440	26471	91	43	133	65811	30954	96765
42	0.06818	0.15900	0.00151	0.06969	-0.15900	-0.06818	0.16051	0.93735	0.14258	0.06114	0.85591	61825	4032	4374	26255	100	46	146	65957	30675	96632
43	0.06492	0.15821	0.00166	0.06658	-0.15821	-0.06492	0.15987	0.94003	0.14211	0.05831	0.85623	62229	3860	4304	25933	110	50	160	66198	30288	96486
44	0.06162	0.15791	0.00183	0.06345	-0.15791	-0.06162	0.15974	0.94274	0.14205	0.05543	0.85613	62723	3688	4232	25507	122	54	176	66533	29793	96326
45	0.05830	0.15809	0.00202	0.06032	-0.15809	-0.05830	0.16011	0.94547	0.14239	0.05251	0.85560	63304	3516	4157	24979	135	59	194	66955	29195	96150
46	0.05499	0.15876	0.00223	0.05722	-0.15876	-0.05499	0.16099	0.94820	0.14313	0.04957	0.85465	63967	3344	4078	24353	150	63	214	67461	28495	95956
47	0.05170	0.15992	0.00247	0.05417	-0.15992	-0.05170	0.16239	0.95089	0.14428	0.04664	0.85326	64703	3174	3996	23633	168	68	236	68045	27697	95742
48	0.04845	0.16158	0.00273	0.05118	-0.16158	-0.04845	0.16431	0.95354	0.14584	0.04374	0.85143	65507	3005	3909	22824	187	73	260	68699	26807	95506
49	0.04527	0.16375	0.00303	0.04830	-0.16375	-0.04527	0.16678	0.95611	0.14783	0.04087	0.84915	66370	2837	3818	21932	210	78	288	69417	25829	95246
50	0.04216	0.16646	0.00336	0.04552	-0.16646	-0.04216	0.16982	0.95859	0.15026	0.03805	0.84639	67282	2671	3722	20964	235	83	319	70188	24769	94957
51	0.03914	0.16974	0.00373	0.04287	-0.16974	-0.03914	0.17347	0.96097	0.15314	0.03531	0.84314	68232	2507	3620	19928	264	88	352	71004	23635	94639
52	0.03622	0.17360	0.00414	0.04036	-0.17360	-0.03622	0.17774	0.96322	0.15650	0.03265	0.83937	69209	2346	3511	18831	297	93	390	71852	22435	94287
53	0.03341	0.17810	0.00460	0.03801	-0.17810	-0.03341	0.18270	0.96533	0.16037	0.03008	0.83504	70198	2188	3396	17684	334	97	431	72720	21177	93897
54	0.03072	0.18328	0.00511	0.03583	-0.18328	-0.03072	0.18839	0.96728	0.16476	0.02762	0.83014	71187	2033	3274	16496	375	101	476	73595	19872	93466
55	0.02816	0.18918	0.00569	0.03385	-0.18918	-0.02816	0.19487	0.96906	0.16972	0.02526	0.82461	72157	1881	3145	15279	422	105	528	74461	18529	92990
56	0.02573	0.19587	0.00632	0.03205	-0.19587	-0.02573	0.20219	0.97067	0.17528	0.02303	0.81842	73093	1734	3008	14044	474	108	583	75302	17160	92462
57	0.02344	0.20342	0.00703	0.03047	-0.20342	-0.02344	0.21045	0.97208	0.18148	0.02091	0.81151	73977	1591	2863	12804	533	111	644	76101	15778	91880
58	0.02128	0.21190	0.00782	0.02910	-0.21190	-0.02128	0.21972	0.97329	0.18838	0.01892	0.80383	74788	1454	2712	11572	599	112	711	76840	14396	91236
59	0.01926	0.22142	0.00870	0.02796	-0.22142	-0.01926	0.23012	0.97428	0.19602	0.01705	0.79532	75507	1322	2553	10360	671	113	784	77500	13026	90525
60	0.01738	0.23206	0.00967	0.02705	-0.23206	-0.01738	0.24173	0.97506	0.20446	0.01531	0.78592	76113	1195	2388	9180	751	112	864	78060	11681	89741

Table A.10 continued

61	0.01563	0.24397	0.01076	0.02639	-0.24397	-0.01563	0.25473	0.97560	0.21377	0.01370	0.77553	76586	1075	2218	8047	840	111	951	78502	10376	88877
62	0.01401	0.25727	0.01196	0.02597	-0.25727	-0.01401	0.26923	0.97591	0.22401	0.01220	0.76410	76906	962	2043	6970	937	108	1045	78804	9122	87926
63	0.01252	0.27212	0.01330	0.02582	-0.27212	-0.01252	0.28542	0.97596	0.23528	0.01083	0.75151	77051	855	1866	5961	1043	105	1148	78949	7932	86881
64	0.01116	0.28872	0.01479	0.02595	-0.28872	-0.01116	0.30351	0.97575	0.24764	0.00957	0.73768	77004	755	1688	5028	1159	100	1259	78917	6816	85733
65	0.00991	0.30726	0.01645	0.02636	-0.30726	-0.00991	0.32371	0.97526	0.26119	0.00842	0.72250	76745	663	1510	4178	1284	94	1378	78691	5783	84474
66	0.00877	0.32799	0.01829	0.02706	-0.32799	-0.00877	0.34628	0.97449	0.27602	0.00738	0.70585	76259	578	1336	3417	1418	88	1506	78255	4841	83096
67	0.00774	0.35120	0.02032	0.02806	-0.35120	-0.00774	0.37152	0.97344	0.29225	0.00644	0.68764	75535	500	1167	2747	1561	80	1641	77595	3995	81590
68	0.00681	0.37720	0.02259	0.02940	-0.37720	-0.00681	0.39979	0.97207	0.30997	0.00560	0.66769	74560	429	1006	2168	1713	73	1786	76702	3247	79949
69	0.00597	0.40636	0.02509	0.03106	-0.40636	-0.00597	0.43145	0.97038	0.32930	0.00484	0.64592	73328	366	855	1677	1872	64	1937	75566	2597	78163
70	0.00522	0.43911	0.02787	0.03309	-0.43911	-0.00522	0.46698	0.96835	0.35036	0.00416	0.62216	71835	309	716	1271	2039	56	2095	74183	2043	76226
71	0.00455	0.47596	0.03095	0.03550	-0.47596	-0.00455	0.50691	0.96596	0.37325	0.00357	0.59627	70081	259	590	942	2211	48	2259	72551	1580	74131
72	0.00395	0.51747	0.03435	0.03830	-0.51747	-0.00395	0.55182	0.96319	0.39811	0.00304	0.56812	68069	215	478	682	2387	41	2427	70671	1201	71871
73	0.00342	0.56433	0.03811	0.04153	-0.56433	-0.00342	0.60244	0.96003	0.42502	0.00258	0.53758	65807	177	381	482	2563	34	2597	68547	897	69444
74	0.00295	0.61731	0.04227	0.04522	-0.61731	-0.00295	0.65958	0.95643	0.45411	0.00217	0.50450	63305	144	299	332	2740	27	2767	66189	659	66847

Source: Author’s calculations

Table A.10 continued

											L(x) (for state based expectancies)				**e(x)** (state based)				
	L(x)			$\hat{l}^{Total}$	**e(x)** (working age population based)			**e(x)** (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
15	0.97079	0.02910	0.99989	1.00000	45.07	11.17	56.23	44.31	10.98	55.29									
16	0.92433	0.07531	0.99965	0.99977	44.10	11.14	55.25	43.37	10.96	54.32	0.96917	0.03071	0.20256	0.79731	44.17	11.03	42.38	12.83	55.20
17	0.89519	0.10419	0.99938	0.99952	43.19	11.07	54.26	42.47	10.88	53.35	0.96762	0.03224	0.18907	0.81079	43.33	10.89	41.41	12.81	54.22
18	0.87388	0.12521	0.99909	0.99924	42.31	10.97	53.28	41.60	10.79	52.38	0.96615	0.03370	0.17673	0.82312	42.51	10.73	40.45	12.78	53.23
19	0.85627	0.14249	0.99876	0.99893	41.45	10.85	52.29	40.75	10.67	51.42	0.96477	0.03506	0.16547	0.83436	41.70	10.55	39.52	12.73	52.25
20	0.84048	0.15793	0.99841	0.99859	40.60	10.71	51.31	39.92	10.53	50.45	0.96351	0.03631	0.15520	0.84461	40.91	10.35	38.60	12.67	51.27
21	0.82566	0.17237	0.99802	0.99822	39.77	10.55	50.33	39.11	10.38	49.49	0.96236	0.03744	0.14586	0.85394	40.14	10.14	37.70	12.59	50.28
22	0.81142	0.18620	0.99761	0.99782	38.96	10.38	49.35	38.31	10.21	48.52	0.96134	0.03845	0.13736	0.86243	39.39	9.92	36.82	12.49	49.30
23	0.79761	0.19956	0.99718	0.99740	38.17	10.20	48.37	37.53	10.03	47.56	0.96044	0.03933	0.12965	0.87013	38.65	9.68	35.95	12.37	48.33
24	0.78421	0.21250	0.99672	0.99695	37.38	10.01	47.39	36.76	9.84	46.60	0.95968	0.04008	0.12264	0.87712	37.93	9.42	35.11	12.24	47.35
25	0.77124	0.22499	0.99623	0.99648	36.61	9.80	46.41	36.00	9.63	45.64	0.95907	0.04068	0.11630	0.88345	37.22	9.15	34.28	12.09	46.37
26	0.75876	0.23696	0.99572	0.99598	35.86	9.58	45.44	35.26	9.42	44.68	0.95861	0.04113	0.11055	0.88919	36.53	8.86	33.47	11.92	45.39
27	0.74683	0.24835	0.99519	0.99546	35.11	9.34	44.46	34.53	9.19	43.72	0.95829	0.04144	0.10536	0.89437	35.85	8.57	32.68	11.74	44.42
28	0.73554	0.25909	0.99463	0.99491	34.38	9.10	43.48	33.81	8.95	42.76	0.95812	0.04160	0.10067	0.89904	35.18	8.26	31.89	11.55	43.44
29	0.72496	0.26909	0.99405	0.99435	33.66	8.84	42.51	33.10	8.70	41.80	0.95809	0.04161	0.09645	0.90325	34.53	7.94	31.13	11.34	42.46
30	0.71515	0.27829	0.99344	0.99375	32.95	8.58	41.53	32.40	8.44	40.84	0.95821	0.04147	0.09265	0.90703	33.88	7.61	30.37	11.12	41.49
31	0.70617	0.28662	0.99279	0.99312	32.25	8.30	40.56	31.71	8.17	39.88	0.95847	0.04119	0.08925	0.91042	33.25	7.27	29.63	10.89	40.52
32	0.69808	0.29403	0.99211	0.99246	31.56	8.02	39.59	31.04	7.89	38.92	0.95888	0.04077	0.08621	0.91344	32.62	6.93	28.89	10.65	39.54
33	0.69093	0.30047	0.99140	0.99176	30.88	7.73	38.61	30.37	7.60	37.97	0.95941	0.04022	0.08351	0.91612	31.99	6.58	28.16	10.41	38.57
34	0.68475	0.30589	0.99064	0.99103	30.21	7.43	37.64	29.70	7.31	37.01	0.96006	0.03954	0.08112	0.91848	31.37	6.23	27.45	10.15	37.60
35	0.67956	0.31027	0.98983	0.99025	29.54	7.13	36.67	29.05	7.01	36.06	0.96083	0.03874	0.07903	0.92055	30.75	5.87	26.73	9.89	36.63

Table A.10 continued

36	0.67539	0.31357	0.98896	0.98941	28.88	6.82	35.70	28.40	6.71	35.10	0.96171	0.03783	0.07721	0.92234	30.14	5.52	26.03	9.63	35.66
37	0.67226	0.31577	0.98802	0.98851	28.22	6.51	34.73	27.75	6.40	34.15	0.96269	0.03682	0.07564	0.92387	29.52	5.17	25.32	9.36	34.69
38	0.67016	0.31686	0.98702	0.98754	27.57	6.20	33.77	27.11	6.09	33.20	0.96376	0.03571	0.07432	0.92515	28.90	4.82	24.63	9.10	33.72
39	0.66910	0.31682	0.98593	0.98649	26.92	5.88	32.80	26.47	5.78	32.25	0.96490	0.03453	0.07324	0.92619	28.28	4.48	23.93	8.83	32.76
40	0.66907	0.31567	0.98474	0.98536	26.27	5.57	31.84	25.83	5.48	31.31	0.96611	0.03326	0.07238	0.92700	27.65	4.15	23.24	8.56	31.80
41	0.67005	0.31339	0.98344	0.98412	25.62	5.25	30.88	25.20	5.17	30.36	0.96737	0.03194	0.07173	0.92758	27.01	3.82	22.55	8.28	30.83
42	0.67202	0.31000	0.98202	0.98276	24.98	4.94	29.92	24.56	4.86	29.42	0.96868	0.03057	0.07129	0.92796	26.37	3.51	21.86	8.02	29.88
43	0.67495	0.30552	0.98046	0.98128	24.33	4.63	28.97	23.92	4.56	28.48	0.97002	0.02916	0.07105	0.92812	25.72	3.20	21.17	7.75	28.92
44	0.67880	0.29996	0.97875	0.97965	23.68	4.33	28.01	23.29	4.26	27.54	0.97137	0.02771	0.07102	0.92806	25.05	2.91	20.49	7.48	27.97
45	0.68352	0.29335	0.97687	0.97786	23.03	4.03	27.06	22.65	3.96	26.61	0.97274	0.02625	0.07119	0.92780	24.38	2.64	19.80	7.21	27.02
46	0.68906	0.28574	0.97480	0.97589	22.38	3.74	26.12	22.00	3.68	25.68	0.97410	0.02479	0.07156	0.92732	23.70	2.38	19.12	6.95	26.07
47	0.69536	0.27716	0.97251	0.97371	21.72	3.45	25.17	21.36	3.40	24.75	0.97544	0.02332	0.07214	0.92663	23.00	2.13	18.44	6.69	25.13
48	0.70233	0.26765	0.96999	0.97131	21.06	3.18	24.24	20.71	3.12	23.83	0.97677	0.02187	0.07292	0.92572	22.29	1.90	17.75	6.44	24.19
49	0.70990	0.25729	0.96720	0.96866	20.39	2.91	23.30	20.05	2.86	22.91	0.97805	0.02043	0.07391	0.92457	21.57	1.68	17.07	6.19	23.26
50	0.71797	0.24614	0.96411	0.96573	19.72	2.65	22.37	19.39	2.61	21.99	0.97930	0.01903	0.07513	0.92319	20.84	1.49	16.39	5.94	22.32
51	0.72643	0.23427	0.96070	0.96249	19.04	2.41	21.44	18.72	2.37	21.08	0.98048	0.01766	0.07657	0.92157	20.09	1.31	15.71	5.69	21.40
52	0.73516	0.22177	0.95693	0.95891	18.35	2.17	20.52	18.04	2.13	20.18	0.98161	0.01633	0.07825	0.91968	19.34	1.14	15.02	5.45	20.48
53	0.74402	0.20874	0.95276	0.95495	17.66	1.95	19.60	17.36	1.91	19.28	0.98266	0.01504	0.08018	0.91752	18.57	0.99	14.34	5.21	19.56
54	0.75287	0.19527	0.94814	0.95056	16.96	1.74	18.69	16.67	1.71	18.38	0.98364	0.01381	0.08238	0.91507	17.79	0.85	13.67	4.98	18.65
55	0.76155	0.18148	0.94304	0.94572	16.25	1.54	17.79	15.98	1.51	17.49	0.98453	0.01263	0.08486	0.91230	17.01	0.73	12.99	4.75	17.74
56	0.76990	0.16750	0.93739	0.94035	15.53	1.35	16.88	15.27	1.33	16.60	0.98534	0.01151	0.08764	0.90921	16.21	0.63	12.31	4.53	16.84
57	0.77772	0.15344	0.93116	0.93443	14.80	1.18	15.99	14.56	1.16	15.72	0.98604	0.01046	0.09074	0.90576	15.41	0.53	11.63	4.31	15.94
58	0.78483	0.13944	0.92427	0.92788	14.07	1.03	15.10	13.84	1.01	14.84	0.98665	0.00946	0.09419	0.90192	14.60	0.45	10.96	4.09	15.05
59	0.79103	0.12564	0.91667	0.92065	13.33	0.88	14.21	13.11	0.87	13.97	0.98714	0.00853	0.09801	0.89766	13.79	0.37	10.28	3.88	14.16
60	0.79613	0.11216	0.90829	0.91268	12.58	0.75	13.33	12.37	0.74	13.11	0.98753	0.00766	0.10223	0.89296	12.97	0.31	9.61	3.68	13.28

Table A.10 continued

61	0.79991	0.09915	0.89906	0.90390	11.82	0.64	12.46	11.62	0.63	12.25	0.98780	0.00685	0.10688	0.88777	12.15	0.26	8.93	3.48	12.41
62	0.80219	0.08672	0.88891	0.89422	11.05	0.53	11.59	10.87	0.52	11.39	0.98795	0.00610	0.11201	0.88205	11.33	0.21	8.26	3.28	11.54
63	0.80276	0.07499	0.87775	0.88359	10.28	0.44	10.72	10.11	0.43	10.54	0.98798	0.00541	0.11764	0.87576	10.50	0.17	7.58	3.09	10.67
64	0.80145	0.06406	0.86552	0.87192	9.50	0.36	9.86	9.34	0.35	9.69	0.98787	0.00478	0.12382	0.86884	9.67	0.14	6.90	2.90	9.81
65	0.79808	0.05402	0.85211	0.85912	8.70	0.29	9.00	8.56	0.29	8.84	0.98763	0.00421	0.13059	0.86125	8.84	0.11	6.22	2.72	8.94
66	0.79251	0.04493	0.83744	0.84510	7.90	0.23	8.14	7.77	0.23	8.00	0.98725	0.00369	0.13801	0.85293	8.00	0.08	5.54	2.54	8.08
67	0.78461	0.03682	0.82144	0.82978	7.09	0.18	7.28	6.98	0.18	7.16	0.98672	0.00322	0.14612	0.84382	7.16	0.06	4.85	2.37	7.22
68	0.77429	0.02972	0.80401	0.81309	6.28	0.14	6.42	6.17	0.14	6.31	0.98603	0.00280	0.15498	0.83385	6.31	0.05	4.16	2.20	6.36
69	0.76148	0.02359	0.78508	0.79493	5.44	0.11	5.55	5.35	0.11	5.46	0.98519	0.00242	0.16465	0.82296	5.46	0.04	3.47	2.03	5.50
70	0.74615	0.01842	0.76458	0.77523	4.60	0.08	4.68	4.52	0.08	4.60	0.98417	0.00208	0.17518	0.81108	4.60	0.02	2.77	1.85	4.62
71	0.72829	0.01414	0.74243	0.75392	3.74	0.06	3.80	3.68	0.06	3.73	0.98298	0.00178	0.18663	0.79813	3.72	0.02	2.07	1.67	3.74
72	0.70793	0.01067	0.71860	0.73094	2.86	0.04	2.90	2.81	0.04	2.85	0.98160	0.00152	0.19905	0.78406	2.83	0.01	1.39	1.45	2.84
73	0.68514	0.00791	0.69305	0.70626	1.96	0.03	1.99	1.93	0.03	1.95	0.98001	0.00129	0.21251	0.76879	1.92	0.00	0.75	1.17	1.92
74	0.69893	0.01028	0.70921	0.67985	1.03	0.02	1.04	1.01	0.01	1.03	0.97822	0.00109	0.22705	0.75225	0.98	0.00	0.23	0.75	0.98

Source: Author's calculations

Table A.11: Multistate working life table for low educated formerly married women based on transition rates estimated from Equation 4

	Estimated transition rates		*Death rate*	**M(x)** *(transition rate matrix)*				**P(x)** *(transition probability matrix)*				d_{ij} *where* $i, j = 1,2$				$d_{i\delta}$ *where* $i = 1,2$			**l(x)**		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1,2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
15	0.12996	0.65016	0.00023	0.13019	-0.65016	-0.12996	0.65039	0.90630	0.46763	0.09347	0.53214	89113	9191	0	0	23	0	23	98327	0	98327
16	0.13480	0.59573	0.00025	0.13505	-0.59573	-0.13480	0.59598	0.90103	0.43625	0.09872	0.56350	80294	8797	4010	5179	22	2	25	89113	9191	98304
17	0.13938	0.54752	0.00028	0.13966	-0.54752	-0.13938	0.54780	0.89600	0.40745	0.10372	0.59227	75536	8744	5695	8278	24	4	28	84304	13976	98280
18	0.14366	0.50475	0.00031	0.14397	-0.50475	-0.14366	0.50506	0.89123	0.38107	0.10846	0.61862	72395	8810	6487	10530	25	5	30	81230	17022	98252
19	0.14760	0.46675	0.00034	0.14794	-0.46675	-0.14760	0.46709	0.88678	0.35696	0.11288	0.64270	69950	8904	6904	12430	27	7	33	78881	19340	98222
20	0.15117	0.43293	0.00037	0.15154	-0.43293	-0.15117	0.43330	0.88266	0.33496	0.11697	0.66467	67836	8989	7146	14180	28	8	36	76854	21335	98188
21	0.15434	0.40279	0.00040	0.15474	-0.40279	-0.15434	0.40319	0.87893	0.31492	0.12067	0.68468	65904	9048	7297	15864	30	9	39	74983	23170	98152
22	0.15708	0.37589	0.00042	0.15750	-0.37589	-0.15708	0.37631	0.87560	0.29669	0.12398	0.70289	64095	9075	7391	17511	31	10	41	73201	24912	98113
23	0.15935	0.35186	0.00045	0.15980	-0.35186	-0.15935	0.35231	0.87269	0.28012	0.12686	0.71943	62385	9069	7447	19127	32	12	44	71486	26586	98072
24	0.16115	0.33038	0.00048	0.16163	-0.33038	-0.16115	0.33086	0.87022	0.26509	0.12930	0.73443	60769	9030	7474	20708	34	14	47	69832	28195	98028
25	0.16246	0.31116	0.00050	0.16296	-0.31116	-0.16246	0.31166	0.86821	0.25147	0.13129	0.74803	59249	8960	7478	22244	34	15	49	68243	29737	97981
26	0.16325	0.29395	0.00052	0.16377	-0.29395	-0.16325	0.29447	0.86667	0.23914	0.13281	0.76034	57830	8862	7462	23726	35	16	51	66727	31204	97932
27	0.16353	0.27854	0.00055	0.16408	-0.27854	-0.16353	0.27909	0.86559	0.22801	0.13386	0.77144	56517	8740	7430	25140	36	18	54	65293	32588	97881
28	0.16329	0.26475	0.00057	0.16386	-0.26475	-0.16329	0.26532	0.86499	0.21796	0.13444	0.78147	55314	8597	7385	26476	36	19	56	63947	33880	97827
29	0.16254	0.25241	0.00060	0.16314	-0.25241	-0.16254	0.25301	0.86486	0.20893	0.13454	0.79047	54225	8435	7328	27724	38	21	59	62698	35073	97771
30	0.16128	0.24138	0.00063	0.16191	-0.24138	-0.16128	0.24201	0.86520	0.20081	0.13417	0.79856	53256	8259	7261	28875	39	23	62	61553	36159	97712
31	0.15952	0.23154	0.00067	0.16019	-0.23154	-0.15952	0.23221	0.86598	0.19356	0.13335	0.80577	52407	8070	7187	29922	41	25	65	60517	37134	97651
32	0.15728	0.22279	0.00070	0.15798	-0.22279	-0.15728	0.22349	0.86722	0.18709	0.13208	0.81221	51681	7871	7108	30857	42	27	68	59594	37991	97585
33	0.15458	0.21501	0.00074	0.15532	-0.21501	-0.15458	0.21575	0.86888	0.18135	0.13038	0.81791	51080	7665	7023	31676	43	29	72	58789	38728	97517
34	0.15145	0.20815	0.00079	0.15224	-0.20815	-0.15145	0.20894	0.87093	0.17630	0.12828	0.82291	50605	7453	6936	32374	46	31	77	58104	39341	97445
35	0.14791	0.20212	0.00085	0.14876	-0.20212	-0.14791	0.20297	0.87337	0.17188	0.12578	0.82727	50254	7238	6846	32948	49	34	83	57540	39828	97368

Table A.11 continued

36	0.14400	0.19686	0.00091	0.14491	-0.19686	-0.14400	0.19777	0.87616	0.16805	0.12293	0.83104	50028	7019	6753	33396	52	37	88	57099	40186	97285
37	0.13975	0.19233	0.00098	0.14073	-0.19233	-0.13975	0.19331	0.87928	0.16479	0.11974	0.83423	49927	6799	6660	33715	56	40	95	56782	40415	97197
38	0.13519	0.18848	0.00106	0.13625	-0.18848	-0.13519	0.18954	0.88270	0.16207	0.11625	0.83688	49949	6578	6566	33905	60	43	103	56587	40514	97102
39	0.13037	0.18527	0.00115	0.13152	-0.18527	-0.13037	0.18642	0.88637	0.15984	0.11248	0.83901	50094	6357	6471	33966	65	47	111	56515	40483	96999
40	0.12532	0.18267	0.00126	0.12658	-0.18267	-0.12532	0.18393	0.89027	0.15811	0.10847	0.84063	50358	6136	6375	33897	71	51	122	56565	40323	96887
41	0.12009	0.18066	0.00138	0.12147	-0.18066	-0.12009	0.18204	0.89436	0.15684	0.10426	0.84178	50740	5915	6279	33698	78	55	133	56733	40032	96765
42	0.11471	0.17922	0.00151	0.11622	-0.17922	-0.11471	0.18073	0.89862	0.15603	0.09987	0.84246	51238	5694	6181	33372	86	60	146	57019	39613	96632
43	0.10922	0.17833	0.00166	0.11088	-0.17833	-0.10922	0.17999	0.90300	0.15567	0.09535	0.84267	51849	5475	6082	32920	95	65	160	57419	39067	96486
44	0.10367	0.17799	0.00183	0.10550	-0.17799	-0.10367	0.17982	0.90745	0.15575	0.09072	0.84242	52570	5255	5980	32345	106	70	176	57931	38395	96326
45	0.09809	0.17820	0.00202	0.10011	-0.17820	-0.09809	0.18022	0.91196	0.15627	0.08602	0.84171	53395	5037	5876	31649	118	76	194	58550	37600	96150
46	0.09252	0.17895	0.00223	0.09475	-0.17895	-0.09252	0.18118	0.91648	0.15723	0.08129	0.84054	54320	4818	5768	30835	132	82	214	59271	36685	95956
47	0.08698	0.18025	0.00247	0.08945	-0.18025	-0.08698	0.18272	0.92098	0.15864	0.07655	0.83890	55340	4600	5656	29910	148	88	236	60089	35654	95742
48	0.08152	0.18212	0.00273	0.08425	-0.18212	-0.08152	0.18485	0.92543	0.16050	0.07184	0.83678	56448	4382	5539	28877	166	94	260	60996	34510	95506
49	0.07616	0.18457	0.00303	0.07919	-0.18457	-0.07616	0.18760	0.92979	0.16282	0.06719	0.83416	57634	4165	5415	27743	188	101	288	61986	33259	95246
50	0.07093	0.18763	0.00336	0.07429	-0.18763	-0.07093	0.19099	0.93403	0.16562	0.06261	0.83102	58890	3948	5285	26516	211	107	319	63049	31908	94957
51	0.06585	0.19132	0.00373	0.06958	-0.19132	-0.06585	0.19505	0.93814	0.16893	0.05814	0.82735	60205	3731	5146	25204	239	113	352	64175	30464	94639
52	0.06094	0.19568	0.00414	0.06508	-0.19568	-0.06094	0.19982	0.94207	0.17275	0.05380	0.82312	61565	3516	4999	23817	270	120	390	65351	28936	94287
53	0.05621	0.20075	0.00460	0.06081	-0.20075	-0.05621	0.20535	0.94581	0.17712	0.04960	0.81829	62957	3301	4841	22366	305	125	431	66564	27333	93897
54	0.05169	0.20658	0.00511	0.05680	-0.20658	-0.05169	0.21169	0.94934	0.18208	0.04556	0.81283	64364	3089	4674	20863	346	131	476	67798	25668	93466
55	0.04738	0.21324	0.00569	0.05307	-0.21324	-0.04738	0.21893	0.95263	0.18764	0.04170	0.80668	65767	2879	4495	19322	392	136	528	69037	23952	92990
56	0.04330	0.22078	0.00632	0.04962	-0.22078	-0.04330	0.22710	0.95568	0.19387	0.03802	0.79983	67148	2671	4304	17757	443	140	583	70262	22200	92462
57	0.03944	0.22928	0.00703	0.04647	-0.22928	-0.03944	0.23631	0.95846	0.20080	0.03454	0.79220	68483	2468	4102	16183	501	143	644	71452	20428	91880
58	0.03581	0.23885	0.00782	0.04363	-0.23885	-0.03581	0.24667	0.96096	0.20847	0.03125	0.78374	69751	2269	3888	14617	565	145	711	72585	18651	91236
59	0.03241	0.24957	0.00870	0.04111	-0.24957	-0.03241	0.25827	0.96316	0.21696	0.02817	0.77438	70927	2075	3663	13076	638	146	784	73639	16886	90525
60	0.02924	0.26157	0.00967	0.03891	-0.26157	-0.02924	0.27124	0.96508	0.22631	0.02530	0.76406	71985	1887	3429	11576	718	146	864	74590	15151	89741

Table A.11 continued

61	0.02630	0.27499	0.01076	0.03706	-0.27499	-0.02630	0.28575	0.96667	0.23660	0.02263	0.75269	72901	1706	3185	10134	807	144	951	75414	13463	88877
62	0.02358	0.28998	0.01196	0.03554	-0.28998	-0.02358	0.30194	0.96795	0.24791	0.02016	0.74020	73648	1534	2935	8764	905	141	1045	76086	11840	87926
63	0.02107	0.30673	0.01330	0.03437	-0.30673	-0.02107	0.32003	0.96891	0.26030	0.01788	0.72648	74202	1370	2681	7481	1012	136	1148	76583	10298	86881
64	0.01877	0.32543	0.01479	0.03356	-0.32543	-0.01877	0.34022	0.96952	0.27388	0.01580	0.71144	74539	1215	2424	6297	1129	130	1259	76882	8851	85733
65	0.01667	0.34633	0.01645	0.03312	-0.34633	-0.01667	0.36278	0.96979	0.28873	0.01390	0.69496	74638	1070	2169	5220	1256	123	1378	76963	7511	84474
66	0.01476	0.36970	0.01829	0.03305	-0.36970	-0.01476	0.38799	0.96970	0.30494	0.01217	0.67693	74479	935	1918	4258	1392	114	1506	76806	6290	83096
67	0.01302	0.39585	0.02032	0.03334	-0.39585	-0.01302	0.41617	0.96927	0.32264	0.01061	0.65725	74050	811	1675	3413	1537	104	1641	76397	5193	81590
68	0.01146	0.42516	0.02259	0.03405	-0.42516	-0.01146	0.44775	0.96845	0.34191	0.00921	0.63576	73336	698	1444	2685	1692	94	1786	75725	4224	79949
69	0.01005	0.45802	0.02509	0.03514	-0.45802	-0.01005	0.48311	0.96726	0.36287	0.00796	0.61235	72332	595	1228	2072	1853	84	1937	74780	3383	78163
70	0.00878	0.49494	0.02787	0.03665	-0.49494	-0.00878	0.52281	0.96567	0.38564	0.00684	0.58687	71034	503	1028	1565	2022	73	2095	73559	2667	76226
71	0.00765	0.53647	0.03095	0.03860	-0.53647	-0.00765	0.56742	0.96367	0.41032	0.00585	0.55921	69445	422	849	1157	2196	63	2259	72063	2068	74131
72	0.00664	0.58327	0.03435	0.04099	-0.58327	-0.00664	0.61762	0.96125	0.43701	0.00498	0.52922	67569	350	690	835	2374	53	2427	70293	1578	71871
73	0.00575	0.63608	0.03811	0.04386	-0.63608	-0.00575	0.67419	0.95839	0.46582	0.00421	0.49678	65419	288	552	589	2553	44	2597	68259	1185	69444
74	0.00497	0.69580	0.04227	0.04724	-0.69580	-0.00497	0.73807	0.95506	0.49682	0.00355	0.46178	63006	234	435	405	2731	36	2767	65971	876	66847

Source: Author's calculations

Table A.11 continued

											L(x) (for state based expectancies)				e(x) (state based)				
	L(x)			$\hat{l}^{Total}$	**e(x)** (working age population based)			**e(x)** (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
15	0.95315	0.04674	0.99989	1.00000	41.45	14.79	56.23	40.75	14.54	55.29									
16	0.88184	0.11781	0.99965	0.99977	40.50	14.74	55.25	39.82	14.50	54.32	0.95052	0.04936	0.21813	0.78175	40.60	14.60	39.15	16.05	55.20
17	0.84175	0.15763	0.99938	0.99952	39.63	14.63	54.26	38.97	14.39	53.35	0.94800	0.05186	0.20372	0.79614	39.81	14.40	38.27	15.95	54.22
18	0.81418	0.18491	0.99909	0.99924	38.80	14.48	53.28	38.15	14.23	52.38	0.94562	0.05423	0.19054	0.80931	39.05	14.19	37.41	15.82	53.23
19	0.79193	0.20683	0.99876	0.99893	38.00	14.30	52.29	37.36	14.06	51.42	0.94339	0.05644	0.17848	0.82135	38.30	13.95	36.57	15.68	52.25
20	0.77210	0.22631	0.99841	0.99859	37.22	14.09	51.31	36.59	13.86	50.45	0.94133	0.05848	0.16748	0.83233	37.57	13.69	35.76	15.51	51.27
21	0.75352	0.24450	0.99802	0.99822	36.46	13.87	50.33	35.85	13.64	49.49	0.93946	0.06034	0.15746	0.84234	36.87	13.42	34.96	15.32	50.28
22	0.73574	0.26187	0.99761	0.99782	35.72	13.63	49.35	35.12	13.40	48.52	0.93780	0.06199	0.14834	0.85145	36.18	13.12	34.19	15.11	49.30
23	0.71861	0.27857	0.99718	0.99740	34.99	13.38	48.37	34.41	13.15	47.56	0.93634	0.06343	0.14006	0.85971	35.52	12.81	33.44	14.88	48.33
24	0.70212	0.29459	0.99672	0.99695	34.29	13.10	47.39	33.71	12.88	46.60	0.93511	0.06465	0.13254	0.86722	34.87	12.48	32.71	14.63	47.35
25	0.68634	0.30989	0.99623	0.99648	33.60	12.81	46.41	33.04	12.60	45.64	0.93410	0.06565	0.12573	0.87402	34.24	12.13	32.00	14.37	46.37
26	0.67133	0.32439	0.99572	0.99598	32.93	12.51	45.44	32.38	12.30	44.68	0.93333	0.06641	0.11957	0.88017	33.63	11.76	31.31	14.08	45.39
27	0.65719	0.33799	0.99519	0.99546	32.27	12.19	44.46	31.73	11.99	43.72	0.93279	0.06693	0.11400	0.88572	33.03	11.38	30.63	13.78	44.42
28	0.64400	0.35063	0.99463	0.99491	31.63	11.86	43.48	31.10	11.66	42.76	0.93250	0.06722	0.10898	0.89073	32.45	10.99	29.97	13.47	43.44
29	0.63183	0.36222	0.99405	0.99435	31.00	11.51	42.51	30.48	11.32	41.80	0.93243	0.06727	0.10446	0.89524	31.88	10.59	29.32	13.14	42.46
30	0.62073	0.37270	0.99344	0.99375	30.38	11.15	41.53	29.87	10.97	40.84	0.93260	0.06709	0.10041	0.89928	31.32	10.17	28.68	12.81	41.49
31	0.61077	0.38202	0.99279	0.99312	29.77	10.78	40.56	29.28	10.60	39.88	0.93299	0.06667	0.09678	0.90289	30.77	9.75	28.05	12.46	40.52
32	0.60199	0.39013	0.99211	0.99246	29.18	10.41	39.59	28.69	10.23	38.92	0.93361	0.06604	0.09354	0.90611	30.23	9.31	27.43	12.11	39.54
33	0.59441	0.39699	0.99140	0.99176	28.59	10.02	38.61	28.11	9.85	37.97	0.93444	0.06519	0.09068	0.90895	29.70	8.87	26.82	11.75	38.57
34	0.58806	0.40258	0.99064	0.99103	28.01	9.63	37.64	27.55	9.47	37.01	0.93547	0.06414	0.08815	0.91146	29.17	8.43	26.21	11.38	37.60
35	0.58295	0.40688	0.98983	0.99025	27.44	9.23	36.67	26.98	9.07	36.06	0.93668	0.06289	0.08594	0.91364	28.65	7.98	25.61	11.02	36.63

Table A.11 continued

36	0.57909	0.40986	0.98896	0.98941	26.88	8.83	35.70	26.43	8.68	35.10	0.93808	0.06146	0.08403	0.91552	28.13	7.53	25.01	10.65	35.66
37	0.57649	0.41153	0.98802	0.98851	26.31	8.42	34.73	25.87	8.28	34.15	0.93964	0.05987	0.08240	0.91711	27.61	7.08	24.41	10.28	34.69
38	0.57514	0.41188	0.98702	0.98754	25.76	8.01	33.77	25.33	7.88	33.20	0.94135	0.05812	0.08103	0.91844	27.08	6.64	23.81	9.91	33.72
39	0.57502	0.41091	0.98593	0.98649	25.20	7.60	32.80	24.78	7.47	32.25	0.94319	0.05624	0.07992	0.91950	26.56	6.20	23.21	9.54	32.76
40	0.57613	0.40861	0.98474	0.98536	24.65	7.19	31.84	24.23	7.07	31.31	0.94514	0.05424	0.07905	0.92032	26.03	5.76	22.61	9.18	31.80
41	0.57844	0.40500	0.98344	0.98412	24.09	6.79	30.88	23.69	6.67	30.36	0.94718	0.05213	0.07842	0.92089	25.50	5.34	22.01	8.82	30.83
42	0.58193	0.40009	0.98202	0.98276	23.54	6.38	29.92	23.14	6.28	29.42	0.94931	0.04994	0.07802	0.92123	24.95	4.92	21.41	8.47	29.88
43	0.58656	0.39390	0.98046	0.98128	22.98	5.99	28.97	22.59	5.89	28.48	0.95150	0.04767	0.07784	0.92134	24.40	4.52	20.80	8.12	28.92
44	0.59231	0.38644	0.97875	0.97965	22.42	5.59	28.01	22.04	5.50	27.54	0.95373	0.04536	0.07788	0.92121	23.83	4.13	20.19	7.78	27.97
45	0.59912	0.37775	0.97687	0.97786	21.85	5.21	27.06	21.49	5.12	26.61	0.95598	0.04301	0.07814	0.92086	23.26	3.76	19.57	7.45	27.02
46	0.60695	0.36785	0.97480	0.97589	21.28	4.83	26.12	20.93	4.75	25.68	0.95824	0.04065	0.07862	0.92027	22.67	3.40	18.95	7.12	26.07
47	0.61572	0.35679	0.97251	0.97371	20.71	4.47	25.17	20.36	4.39	24.75	0.96049	0.03828	0.07932	0.91945	22.06	3.07	18.32	6.81	25.13
48	0.62538	0.34461	0.96999	0.97131	20.13	4.11	24.24	19.79	4.04	23.83	0.96271	0.03592	0.08025	0.91839	21.44	2.75	17.69	6.50	24.19
49	0.63582	0.33138	0.96720	0.96866	19.54	3.76	23.30	19.21	3.70	22.91	0.96489	0.03359	0.08141	0.91708	20.81	2.45	17.06	6.20	23.26
50	0.64694	0.31717	0.96411	0.96573	18.94	3.43	22.37	18.62	3.38	21.99	0.96702	0.03131	0.08281	0.91551	20.15	2.17	16.42	5.90	22.32
51	0.65865	0.30205	0.96070	0.96249	18.33	3.11	21.44	18.02	3.06	21.08	0.96907	0.02907	0.08446	0.91368	19.48	1.92	15.78	5.62	21.40
52	0.67080	0.28613	0.95693	0.95891	17.71	2.81	20.52	17.41	2.76	20.18	0.97104	0.02690	0.08638	0.91156	18.80	1.68	15.13	5.35	20.48
53	0.68324	0.26951	0.95276	0.95495	17.08	2.52	19.60	16.79	2.48	19.28	0.97291	0.02480	0.08856	0.90914	18.10	1.46	14.48	5.08	19.56
54	0.69582	0.25232	0.94814	0.95056	16.44	2.25	18.69	16.17	2.21	18.38	0.97467	0.02278	0.09104	0.90641	17.38	1.27	13.82	4.83	18.65
55	0.70835	0.23469	0.94304	0.94572	15.79	2.00	17.79	15.52	1.96	17.49	0.97632	0.02085	0.09382	0.90334	16.65	1.09	13.16	4.58	17.74
56	0.72062	0.21677	0.93739	0.94035	15.13	1.76	16.88	14.87	1.73	16.60	0.97784	0.01901	0.09694	0.89991	15.90	0.93	12.50	4.34	16.84
57	0.73244	0.19872	0.93116	0.93443	14.45	1.54	15.99	14.21	1.51	15.72	0.97923	0.01727	0.10040	0.89610	15.15	0.79	11.84	4.11	15.94
58	0.74356	0.18071	0.92427	0.92788	13.76	1.33	15.10	13.53	1.31	14.84	0.98048	0.01563	0.10424	0.89187	14.38	0.67	11.17	3.88	15.05
59	0.75376	0.16291	0.91667	0.92065	13.06	1.15	14.21	12.84	1.13	13.97	0.98158	0.01409	0.10848	0.88719	13.60	0.56	10.50	3.67	14.16
60	0.76278	0.14550	0.90829	0.91268	12.35	0.98	13.33	12.15	0.96	13.11	0.98254	0.01265	0.11316	0.88203	12.82	0.47	9.83	3.46	13.28

Table A.11 continued

61	0.77039	0.12867	0.89906	0.90390	11.63	0.83	12.46	11.43	0.81	12.25	0.98333	0.01131	0.11830	0.87635	12.02	0.39	9.15	3.25	12.41
62	0.77633	0.11257	0.88891	0.89422	10.89	0.69	11.59	10.71	0.68	11.39	0.98398	0.01008	0.12395	0.87010	11.22	0.32	8.48	3.06	11.54
63	0.78038	0.09737	0.87775	0.88359	10.14	0.57	10.72	9.97	0.56	10.54	0.98445	0.00894	0.13015	0.86324	10.41	0.26	7.80	2.87	10.67
64	0.78231	0.08320	0.86552	0.87192	9.39	0.47	9.86	9.23	0.46	9.69	0.98476	0.00790	0.13694	0.85572	9.60	0.21	7.12	2.69	9.81
65	0.78193	0.07018	0.85211	0.85912	8.61	0.38	9.00	8.47	0.37	8.84	0.98489	0.00695	0.14436	0.84748	8.78	0.16	6.43	2.52	8.94
66	0.77905	0.05839	0.83744	0.84510	7.83	0.30	8.14	7.70	0.30	8.00	0.98485	0.00609	0.15247	0.83847	7.96	0.13	5.74	2.35	8.08
67	0.77355	0.04788	0.82144	0.82978	7.04	0.24	7.28	6.92	0.24	7.16	0.98464	0.00531	0.16132	0.82862	7.13	0.10	5.04	2.18	7.22
68	0.76533	0.03868	0.80401	0.81309	6.23	0.19	6.42	6.13	0.18	6.31	0.98422	0.00461	0.17095	0.81788	6.29	0.07	4.34	2.02	6.36
69	0.75432	0.03076	0.78508	0.79493	5.41	0.14	5.55	5.32	0.14	5.46	0.98363	0.00398	0.18144	0.80617	5.44	0.05	3.63	1.87	5.50
70	0.74050	0.02408	0.76458	0.77523	4.58	0.10	4.68	4.50	0.10	4.60	0.98284	0.00342	0.19282	0.79344	4.59	0.04	2.91	1.71	4.62
71	0.72389	0.01854	0.74243	0.75392	3.72	0.08	3.80	3.66	0.07	3.73	0.98184	0.00293	0.20516	0.77960	3.72	0.02	2.20	1.54	3.74
72	0.70455	0.01405	0.71860	0.73094	2.85	0.05	2.90	2.80	0.05	2.85	0.98063	0.00249	0.21851	0.76461	2.83	0.01	1.49	1.36	2.84
73	0.68257	0.01048	0.69305	0.70626	1.95	0.03	1.99	1.92	0.03	1.95	0.97919	0.00211	0.23291	0.74839	1.92	0.01	0.81	1.11	1.92
74	0.69525	0.01395	0.70920	0.67985	1.02	0.02	1.04	1.01	0.02	1.03	0.97753	0.00177	0.24841	0.73089	0.98	0.00	0.25	0.73	0.98

Source: Author's calculations

Table A.12: Multistate working life table for high educated never married women based on transition rates estimated from Equation 4

	Estimated transition rates		***Death rate***	**M(x)** ***(transition rate matrix)***				**P(x)** ***(transition probability matrix)***				d_{ij} *where* $i, j = 1, 2$				$d_{i\delta}$ *where* $i = 1, 2$			l(x) (number of survivors by state)		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1, 2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
20	0.21423	0.19360	0.00037	0.21460	-0.19360	-0.21423	0.19397	0.82175	0.16076	0.17788	0.83887	46937	10160	6602	34451	21	15	37	57118	41069	98187
21	0.21872	0.18012	0.00040	0.21912	-0.18012	-0.21872	0.18052	0.81731	0.15012	0.18229	0.84948	43758	9759	6697	37897	21	18	39	53539	44612	98150
22	0.22259	0.16810	0.00042	0.22301	-0.16810	-0.22259	0.16852	0.81343	0.14057	0.18615	0.85901	41042	9392	6699	40937	21	20	41	50455	47656	98111
23	0.22582	0.15735	0.00045	0.22627	-0.15735	-0.22582	0.15780	0.81012	0.13200	0.18943	0.86755	38676	9044	6643	43663	21	22	44	47741	50329	98070
24	0.22837	0.14774	0.00048	0.22885	-0.14774	-0.22837	0.14822	0.80739	0.12430	0.19213	0.87522	36590	8707	6552	46130	22	25	47	45319	52707	98026
25	0.23021	0.13915	0.00050	0.23071	-0.13915	-0.23021	0.13965	0.80526	0.11740	0.19424	0.88210	34741	8380	6438	48372	22	27	49	43142	54837	97979
26	0.23134	0.13145	0.00052	0.23186	-0.13145	-0.23134	0.13197	0.80375	0.11122	0.19573	0.88826	33097	8060	6312	50411	21	30	51	41178	56752	97930
27	0.23174	0.12456	0.00055	0.23229	-0.12456	-0.23174	0.12511	0.80286	0.10567	0.19660	0.89377	31640	7748	6179	52259	22	32	54	39409	58470	97879
28	0.23140	0.11840	0.00057	0.23197	-0.11840	-0.23140	0.11897	0.80258	0.10072	0.19685	0.89872	30352	7445	6044	53929	22	34	56	37819	60007	97825
29	0.23033	0.11288	0.00060	0.23093	-0.11288	-0.23033	0.11348	0.80291	0.09629	0.19649	0.90311	29223	7151	5910	55427	22	37	59	36396	61374	97770
30	0.22855	0.10795	0.00063	0.22918	-0.10795	-0.22855	0.10858	0.80385	0.09234	0.19551	0.90702	28241	6869	5779	56760	22	40	62	35133	62579	97711
31	0.22605	0.10355	0.00067	0.22672	-0.10355	-0.22605	0.10422	0.80538	0.08884	0.19395	0.91049	27399	6598	5653	57933	23	43	66	34020	63629	97649
32	0.22288	0.09963	0.00070	0.22358	-0.09963	-0.22288	0.10033	0.80749	0.08573	0.19181	0.91357	26689	6340	5533	58954	23	45	68	33052	64532	97584
33	0.21906	0.09615	0.00074	0.21980	-0.09615	-0.21906	0.09689	0.81016	0.08301	0.18910	0.91625	26105	6093	5420	59825	24	48	72	32222	65294	97515
34	0.21462	0.09308	0.00079	0.21541	-0.09308	-0.21462	0.09387	0.81334	0.08061	0.18587	0.91860	25640	5859	5314	60553	25	52	77	31524	65919	97443
35	0.20961	0.09039	0.00085	0.21046	-0.09039	-0.20961	0.09124	0.81703	0.07853	0.18212	0.92061	25290	5637	5215	61140	26	57	83	30954	66412	97366
36	0.20406	0.08804	0.00091	0.20497	-0.08804	-0.20406	0.08895	0.82118	0.07675	0.17790	0.92234	25051	5427	5125	61591	28	60	88	30505	66777	97282
37	0.19804	0.08601	0.00098	0.19902	-0.08601	-0.19804	0.08699	0.82577	0.07524	0.17325	0.92378	24918	5228	5042	61910	30	66	95	30176	67018	97194
38	0.19158	0.08429	0.00106	0.19264	-0.08429	-0.19158	0.08535	0.83075	0.07399	0.16819	0.92495	24890	5039	4968	62099	32	71	103	29961	67138	97099
39	0.18475	0.08285	0.00115	0.18590	-0.08285	-0.18475	0.08400	0.83608	0.07300	0.16277	0.92586	24964	4860	4901	62160	34	77	111	29858	67138	96996
40	0.17759	0.08169	0.00126	0.17885	-0.08169	-0.17759	0.08295	0.84171	0.07222	0.15703	0.92652	25137	4690	4841	62095	38	84	122	29865	67020	96885

Table A.12 continued

41	0.17018	0.08079	0.00138	0.17156	-0.08079	-0.17018	0.08217	0.84761	0.07168	0.15101	0.92694	25410	4527	4787	61905	41	92	133	29978	66785	96763
42	0.16255	0.08015	0.00151	0.16406	-0.08015	-0.16255	0.08166	0.85374	0.07137	0.14476	0.92712	25780	4371	4741	61591	45	101	146	30197	66432	96629
43	0.15478	0.07975	0.00166	0.15644	-0.07975	-0.15478	0.08141	0.86002	0.07126	0.13832	0.92708	26249	4222	4701	61152	51	109	160	30521	65962	96483
44	0.14691	0.07960	0.00183	0.14874	-0.07960	-0.14691	0.08143	0.86643	0.07138	0.13174	0.92680	26816	4077	4666	60588	56	119	176	30950	65374	96323
45	0.13901	0.07969	0.00202	0.14103	-0.07969	-0.13901	0.08171	0.87292	0.07169	0.12506	0.92629	27481	3937	4636	59899	64	130	194	31482	64666	96148
46	0.13111	0.08002	0.00223	0.13334	-0.08002	-0.13111	0.08225	0.87943	0.07223	0.11833	0.92554	28245	3801	4611	59083	72	143	214	32117	63836	95954
47	0.12327	0.08061	0.00247	0.12574	-0.08061	-0.12327	0.08308	0.88593	0.07298	0.11160	0.92455	29108	3667	4589	58139	81	155	237	32856	62884	95739
48	0.11553	0.08144	0.00273	0.11826	-0.08144	-0.11553	0.08417	0.89238	0.07395	0.10489	0.92332	30070	3535	4570	57067	92	169	261	33697	61806	95503
49	0.10793	0.08254	0.00303	0.11096	-0.08254	-0.10793	0.08557	0.89871	0.07514	0.09827	0.92183	31132	3404	4554	55864	105	183	288	34641	60601	95242
50	0.10052	0.08391	0.00336	0.10388	-0.08391	-0.10052	0.08727	0.90491	0.07657	0.09174	0.92007	32293	3274	4538	54531	120	199	319	35686	59268	94954
51	0.09331	0.08556	0.00373	0.09704	-0.08556	-0.09331	0.08929	0.91093	0.07825	0.08535	0.91803	33550	3144	4523	53066	137	215	352	36831	57805	94636
52	0.08635	0.08751	0.00414	0.09049	-0.08751	-0.08635	0.09165	0.91673	0.08019	0.07913	0.91568	34904	3013	4507	51471	157	232	390	38074	56210	94284
53	0.07966	0.08977	0.00460	0.08426	-0.08977	-0.07966	0.09437	0.92230	0.08240	0.07311	0.91301	36349	2881	4489	49744	181	250	431	39411	54483	93894
54	0.07325	0.09238	0.00511	0.07836	-0.09238	-0.07325	0.09749	0.92759	0.08490	0.06732	0.91000	37881	2749	4468	47889	208	268	476	40838	52625	93463
55	0.06715	0.09536	0.00569	0.07284	-0.09536	-0.06715	0.10105	0.93256	0.08771	0.06176	0.90662	39493	2615	4442	45910	240	287	528	42349	50638	92987
56	0.06135	0.09873	0.00632	0.06767	-0.09873	-0.06135	0.10505	0.93723	0.09085	0.05647	0.90285	41177	2481	4409	43811	277	306	583	43934	48525	92459
57	0.05589	0.10253	0.00703	0.06292	-0.10253	-0.05589	0.10956	0.94156	0.09437	0.05143	0.89863	42921	2345	4369	41599	320	324	644	45585	46291	91877
58	0.05074	0.10681	0.00782	0.05856	-0.10681	-0.05074	0.11463	0.94553	0.09827	0.04668	0.89394	44714	2208	4318	39283	368	342	711	47290	43943	91233
59	0.04593	0.11161	0.00870	0.05463	-0.11161	-0.04593	0.12031	0.94912	0.10259	0.04222	0.88874	46538	2070	4257	36874	425	359	784	49032	41490	90523
60	0.04144	0.11697	0.00967	0.05111	-0.11697	-0.04144	0.12664	0.95234	0.10739	0.03804	0.88299	48373	1932	4182	34387	489	375	863	50794	38944	89739
61	0.03727	0.12297	0.01076	0.04803	-0.12297	-0.03727	0.13373	0.95515	0.11268	0.03415	0.87661	50199	1795	4093	31838	562	389	951	52556	36320	88875
62	0.03341	0.12968	0.01196	0.04537	-0.12968	-0.03341	0.14164	0.95757	0.11853	0.03054	0.86958	51988	1658	3987	29246	645	400	1045	54291	33633	87924
63	0.02986	0.13717	0.01330	0.04316	-0.13717	-0.02986	0.15047	0.95958	0.12499	0.02721	0.86180	53712	1523	3863	26634	740	408	1148	55974	30905	86879
64	0.02660	0.14553	0.01479	0.04139	-0.14553	-0.02660	0.16032	0.96117	0.13212	0.02415	0.85320	55338	1390	3720	24023	846	413	1259	57574	28157	85731
65	0.02362	0.15488	0.01645	0.04007	-0.15488	-0.02362	0.17133	0.96233	0.13997	0.02135	0.84372	56834	1261	3557	21442	964	415	1378	59058	25414	84472

Table A.12 continued

66	0.02091	0.16533	0.01829	0.03920	-0.16533	-0.02091	0.18362	0.96308	0.14863	0.01880	0.83325	58161	1136	3374	18917	1094	412	1506	60391	22703	83094
67	0.01845	0.17702	0.02032	0.03877	-0.17702	-0.01845	0.19734	0.96339	0.15817	0.01649	0.82171	59283	1015	3172	16477	1238	403	1641	61535	20053	81588
68	0.01623	0.19013	0.02259	0.03882	-0.19013	-0.01623	0.21272	0.96326	0.16869	0.01441	0.80897	60160	900	2951	14151	1395	391	1786	62454	17492	79947
69	0.01423	0.20483	0.02509	0.03932	-0.20483	-0.01423	0.22992	0.96269	0.18028	0.01253	0.79494	60756	791	2713	11964	1564	373	1937	63111	15050	78161
70	0.01244	0.22134	0.02787	0.04031	-0.22134	-0.01244	0.24921	0.96166	0.19304	0.01085	0.77948	61036	689	2462	9942	1745	351	2095	63470	12755	76225
71	0.01084	0.23991	0.03095	0.04179	-0.23991	-0.01084	0.27086	0.96016	0.20708	0.00936	0.76244	60968	594	2201	8105	1936	324	2260	63498	10631	74129
72	0.00942	0.26083	0.03435	0.04377	-0.26083	-0.00942	0.29518	0.95820	0.22254	0.00804	0.74369	60529	508	1936	6470	2133	294	2427	63170	8700	71870
73	0.00815	0.28445	0.03811	0.04626	-0.28445	-0.00815	0.32256	0.95574	0.23953	0.00687	0.72308	59701	429	1671	5045	2336	261	2597	62465	6977	69443
74	0.00704	0.31116	0.04227	0.04931	-0.31116	-0.00704	0.35343	0.95277	0.25819	0.00584	0.70042	58473	358	1413	3834	2540	227	2767	61372	5474	66846

Source: Author's calculations

Table A.12 continued

											L(x) (for state based expectancies)				e(x) (state based)				
	L(x)			$\hat{l}^{Total}$	**e(x)** (working age population based)			**e(x)** (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
20	0.56270	0.43569	0.99839	0.99858	24.44	26.87	51.31	24.03	26.42	50.45	0.91087	0.08894	0.08038	0.91943	25.49	25.77	22.93	28.33	51.27
21	0.52882	0.46919	0.99800	0.99820	23.89	26.44	50.33	23.49	26.00	49.49	0.90866	0.09114	0.07506	0.92474	25.06	25.23	22.44	27.84	50.28
22	0.49933	0.49826	0.99759	0.99780	23.37	25.98	49.35	22.97	25.55	48.52	0.90672	0.09307	0.07029	0.92950	24.64	24.66	21.98	27.33	49.30
23	0.47322	0.52394	0.99716	0.99738	22.87	25.49	48.37	22.49	25.07	47.56	0.90506	0.09472	0.06600	0.93378	24.25	24.07	21.53	26.79	48.32
24	0.44983	0.54687	0.99670	0.99694	22.41	24.98	47.39	22.04	24.56	46.60	0.90369	0.09607	0.06215	0.93761	23.89	23.46	21.11	26.24	47.35
25	0.42877	0.56744	0.99621	0.99646	21.97	24.44	46.41	21.60	24.03	45.64	0.90263	0.09712	0.05870	0.94105	23.54	22.83	20.70	25.67	46.37
26	0.40979	0.58591	0.99571	0.99596	21.55	23.89	45.44	21.19	23.49	44.68	0.90188	0.09786	0.05561	0.94413	23.21	22.18	20.31	25.08	45.39
27	0.39271	0.60246	0.99517	0.99545	21.15	23.31	44.46	20.80	22.92	43.71	0.90143	0.09830	0.05284	0.94689	22.90	21.52	19.94	24.47	44.42
28	0.37739	0.61723	0.99462	0.99490	20.77	22.72	43.48	20.42	22.34	42.76	0.90129	0.09843	0.05036	0.94936	22.60	20.84	19.58	23.86	43.44
29	0.36373	0.63031	0.99403	0.99433	20.40	22.11	42.51	20.06	21.74	41.80	0.90146	0.09824	0.04815	0.95155	22.32	20.14	19.23	23.24	42.46
30	0.35165	0.64177	0.99342	0.99374	20.05	21.49	41.53	19.71	21.13	40.84	0.90193	0.09776	0.04617	0.95351	22.06	19.43	18.89	22.60	41.49
31	0.34107	0.65171	0.99277	0.99311	19.70	20.85	40.56	19.37	20.51	39.88	0.90269	0.09698	0.04442	0.95524	21.81	18.71	18.55	21.96	40.51
32	0.33192	0.66017	0.99209	0.99244	19.37	20.21	39.59	19.05	19.87	38.92	0.90375	0.09590	0.04287	0.95678	21.57	17.97	18.22	21.32	39.54
33	0.32415	0.66722	0.99138	0.99174	19.05	19.56	38.61	18.73	19.23	37.97	0.90508	0.09455	0.04150	0.95813	21.34	17.23	17.90	20.67	38.57
34	0.31771	0.67291	0.99062	0.99101	18.74	18.90	37.64	18.43	18.59	37.01	0.90667	0.09293	0.04031	0.95930	21.12	16.47	17.57	20.03	37.60
35	0.31253	0.67727	0.98980	0.99022	18.43	18.24	36.67	18.12	17.93	36.06	0.90851	0.09106	0.03927	0.96031	20.91	15.71	17.25	19.38	36.63
36	0.30857	0.68036	0.98893	0.98938	18.13	17.57	35.70	17.83	17.27	35.10	0.91059	0.08895	0.03838	0.96117	20.71	14.95	16.93	18.73	35.66
37	0.30580	0.68219	0.98799	0.98848	17.84	16.90	34.73	17.54	16.61	34.15	0.91288	0.08663	0.03762	0.96189	20.52	14.17	16.60	18.09	34.69
38	0.30418	0.68281	0.98699	0.98751	17.55	16.22	33.77	17.25	15.95	33.20	0.91538	0.08410	0.03700	0.96247	20.32	13.40	16.28	17.44	33.72
39	0.30369	0.68221	0.98590	0.98646	17.26	15.55	32.80	16.97	15.29	32.25	0.91804	0.08138	0.03650	0.96293	20.13	12.62	15.95	16.81	32.76
40	0.30430	0.68041	0.98471	0.98533	16.97	14.87	31.84	16.68	14.62	31.31	0.92086	0.07851	0.03611	0.96326	19.94	11.85	15.61	16.18	31.80

Table A.12 continued

41	0.30599	0.67742	0.98341	0.98409	16.68	14.20	30.88	16.40	13.96	30.36	0.92381	0.07550	0.03584	0.96347	19.75	11.09	15.27	15.56	30.83
42	0.30876	0.67323	0.98199	0.98273	16.39	13.53	29.92	16.12	13.30	29.42	0.92687	0.07238	0.03568	0.96356	19.55	10.33	14.93	14.95	29.88
43	0.31259	0.66785	0.98044	0.98125	16.10	12.86	28.97	15.83	12.65	28.48	0.93001	0.06916	0.03563	0.96354	19.34	9.58	14.57	14.35	28.92
44	0.31747	0.66126	0.97873	0.97962	15.81	12.20	28.01	15.54	12.00	27.54	0.93322	0.06587	0.03569	0.96340	19.13	8.84	14.21	13.76	27.97
45	0.32341	0.65344	0.97685	0.97784	15.51	11.55	27.06	15.25	11.36	26.61	0.93646	0.06253	0.03585	0.96314	18.89	8.13	13.84	13.18	27.02
46	0.33039	0.64438	0.97477	0.97586	15.21	10.90	26.12	14.96	10.72	25.68	0.93972	0.05917	0.03611	0.96277	18.64	7.43	13.46	12.61	26.07
47	0.33843	0.63405	0.97248	0.97368	14.91	10.27	25.17	14.66	10.09	24.75	0.94297	0.05580	0.03649	0.96228	18.37	6.76	13.07	12.06	25.13
48	0.34750	0.62245	0.96995	0.97128	14.60	9.64	24.24	14.35	9.48	23.83	0.94619	0.05245	0.03697	0.96166	18.07	6.12	12.67	11.52	24.19
49	0.35762	0.60955	0.96716	0.96862	14.28	9.02	23.30	14.04	8.87	22.91	0.94936	0.04913	0.03757	0.96092	17.75	5.50	12.26	10.99	23.26
50	0.36875	0.59533	0.96408	0.96570	13.95	8.42	22.37	13.72	8.28	22.00	0.95245	0.04587	0.03829	0.96004	17.40	4.92	11.84	10.48	22.32
51	0.38090	0.57977	0.96067	0.96246	13.61	7.83	21.44	13.39	7.70	21.08	0.95547	0.04268	0.03913	0.95901	17.02	4.38	11.41	9.99	21.40
52	0.39402	0.56288	0.95690	0.95888	13.27	7.25	20.52	13.05	7.13	20.18	0.95837	0.03957	0.04009	0.95784	16.61	3.87	10.97	9.50	20.48
53	0.40807	0.54466	0.95273	0.95492	12.91	6.69	19.60	12.69	6.58	19.28	0.96115	0.03656	0.04120	0.95651	16.17	3.39	10.52	9.04	19.56
54	0.42301	0.52510	0.94811	0.95054	12.54	6.15	18.69	12.33	6.05	18.38	0.96379	0.03366	0.04245	0.95500	15.69	2.96	10.06	8.58	18.65
55	0.43875	0.50425	0.94301	0.94569	12.16	5.63	17.79	11.95	5.53	17.49	0.96628	0.03088	0.04386	0.95331	15.18	2.56	9.60	8.14	17.74
56	0.45521	0.48215	0.93736	0.94033	11.76	5.12	16.88	11.56	5.04	16.60	0.96862	0.02823	0.04543	0.95142	14.63	2.20	9.12	7.72	16.84
57	0.47228	0.45885	0.93113	0.93440	11.35	4.64	15.99	11.16	4.56	15.72	0.97078	0.02572	0.04719	0.94931	14.06	1.88	8.64	7.30	15.94
58	0.48981	0.43444	0.92424	0.92786	10.92	4.18	15.10	10.74	4.11	14.84	0.97276	0.02334	0.04914	0.94697	13.46	1.59	8.15	6.90	15.05
59	0.50763	0.40902	0.91664	0.92063	10.47	3.74	14.21	10.30	3.68	13.97	0.97456	0.02111	0.05130	0.94437	12.82	1.34	7.65	6.52	14.16
60	0.52554	0.38272	0.90826	0.91265	10.01	3.32	13.33	9.84	3.27	13.11	0.97617	0.01902	0.05369	0.94150	12.17	1.12	7.14	6.14	13.28
61	0.54332	0.35571	0.89904	0.90388	9.52	2.93	12.46	9.36	2.88	12.25	0.97758	0.01707	0.05634	0.93831	11.49	0.92	6.63	5.78	12.41
62	0.56071	0.32818	0.88889	0.89420	9.02	2.57	11.59	8.87	2.52	11.39	0.97878	0.01527	0.05927	0.93479	10.78	0.75	6.12	5.42	11.54
63	0.57740	0.30033	0.87773	0.88357	8.49	2.23	10.72	8.35	2.19	10.54	0.97979	0.01360	0.06249	0.93090	10.06	0.61	5.59	5.08	10.67
64	0.59309	0.27241	0.86550	0.87190	7.94	1.91	9.86	7.81	1.88	9.69	0.98058	0.01207	0.06606	0.92660	9.32	0.49	5.07	4.74	9.81
65	0.60741	0.24468	0.85209	0.85909	7.37	1.62	9.00	7.25	1.60	8.84	0.98117	0.01067	0.06999	0.92186	8.56	0.38	4.53	4.41	8.94

Table A.12 continued

66	0.62000	0.21741	0.83742	0.84508	6.78	1.36	8.14	6.66	1.34	8.00	0.98154	0.00940	0.07431	0.91662	7.79	0.30	4.00	4.08	8.08
67	0.63050	0.19092	0.82142	0.82976	6.15	1.12	7.28	6.05	1.10	7.16	0.98170	0.00825	0.07909	0.91085	7.00	0.22	3.46	3.76	7.22
68	0.63851	0.16548	0.80399	0.81307	5.50	0.91	6.42	5.41	0.90	6.31	0.98163	0.00720	0.08435	0.90448	6.20	0.16	2.92	3.44	6.36
69	0.64367	0.14139	0.78506	0.79491	4.83	0.72	5.55	4.75	0.71	5.46	0.98135	0.00627	0.09014	0.89747	5.38	0.12	2.39	3.11	5.50
70	0.64564	0.11892	0.76456	0.77522	4.12	0.56	4.68	4.05	0.55	4.60	0.98083	0.00543	0.09652	0.88974	4.54	0.08	1.86	2.76	4.62
71	0.64412	0.09830	0.74241	0.75390	3.38	0.42	3.80	3.32	0.41	3.73	0.98008	0.00468	0.10354	0.88122	3.69	0.05	1.35	2.39	3.74
72	0.63886	0.07972	0.71858	0.73092	2.60	0.30	2.90	2.56	0.29	2.85	0.97910	0.00402	0.11127	0.87185	2.81	0.03	0.87	1.97	2.84
73	0.62972	0.06332	0.69304	0.70624	1.79	0.19	1.99	1.76	0.19	1.95	0.97787	0.00343	0.11976	0.86154	1.91	0.01	0.45	1.48	1.92
74	0.63500	0.07419	0.70919	0.67984	0.93	0.11	1.04	0.92	0.11	1.03	0.97638	0.00292	0.12909	0.85021	0.98	0.00	0.13	0.85	0.98

Source: Author's calculations

Table A.13: Multistate working life table for high educated currently married women based on transition rates estimated from Equation 4

	Estimated transition rates		***Death rate***	**M(x)** ***(transition rate matrix)***				**P(x)** ***(transition probability matrix)***				d_{ij} *where* $i, j = 1, 2$				$d_{i\delta}$ *where* $i = 1, 2$			l(x) (number of survivors by state)		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1, 2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
20	0.14147	0.28039	0.00037	0.14184	-0.28039	-0.14147	0.28076	0.88284	0.23147	0.11679	0.76816	63867	8449	5982	19853	26	10	36	72343	25845	98188
21	0.14444	0.26086	0.00040	0.14484	-0.26086	-0.14444	0.26126	0.87954	0.21683	0.12006	0.78277	61436	8386	6137	22154	28	11	39	69849	28302	98152
22	0.14699	0.24345	0.00042	0.14741	-0.24345	-0.14699	0.24387	0.87664	0.20360	0.12294	0.79598	59237	8307	6218	24309	28	13	41	67572	30540	98113
23	0.14913	0.22788	0.00045	0.14958	-0.22788	-0.14913	0.22833	0.87413	0.19166	0.12542	0.80789	57216	8209	6251	26351	30	15	45	65455	32617	98071
24	0.15081	0.21397	0.00048	0.15129	-0.21397	-0.15081	0.21445	0.87203	0.18088	0.12749	0.81864	55345	8091	6251	28292	30	17	47	63467	34560	98027
25	0.15203	0.20152	0.00050	0.15253	-0.20152	-0.15203	0.20202	0.87037	0.17117	0.12913	0.82833	53612	7954	6228	30137	31	18	49	61596	36383	97980
26	0.15277	0.19038	0.00052	0.15329	-0.19038	-0.15277	0.19090	0.86914	0.16242	0.13034	0.83706	52009	7799	6187	31885	31	20	51	59840	38091	97931
27	0.15304	0.18040	0.00055	0.15359	-0.18040	-0.15304	0.18095	0.86835	0.15454	0.13110	0.84491	50534	7630	6133	33530	32	22	53	58196	39684	97880
28	0.15281	0.17147	0.00057	0.15338	-0.17147	-0.15281	0.17204	0.86801	0.14746	0.13143	0.85196	49188	7448	6069	35066	32	24	56	56667	41159	97826
29	0.15211	0.16347	0.00060	0.15271	-0.16347	-0.15211	0.16407	0.86810	0.14112	0.13130	0.85828	47969	7255	5999	36489	33	26	59	55257	42514	97771
30	0.15093	0.15633	0.00063	0.15156	-0.15633	-0.15093	0.15696	0.86862	0.13544	0.13075	0.86394	46878	7056	5925	37792	34	27	62	53968	43744	97712
31	0.14928	0.14996	0.00067	0.14995	-0.14996	-0.14928	0.15063	0.86956	0.13036	0.12977	0.86897	45914	6852	5846	38972	36	30	65	52802	44848	97651
32	0.14719	0.14429	0.00070	0.14789	-0.14429	-0.14719	0.14499	0.87092	0.12585	0.12838	0.87345	45080	6645	5767	40025	36	32	68	51761	45824	97585
33	0.14466	0.13925	0.00074	0.14540	-0.13925	-0.14466	0.13999	0.87267	0.12186	0.12659	0.87740	44372	6437	5687	40948	38	35	72	50847	46670	97517
34	0.14173	0.13481	0.00079	0.14252	-0.13481	-0.14173	0.13560	0.87479	0.11834	0.12443	0.88087	43792	6229	5608	41740	39	38	77	50060	47385	97445
35	0.13842	0.13090	0.00085	0.13927	-0.13090	-0.13842	0.13175	0.87726	0.11527	0.12189	0.88387	43336	6021	5530	42398	42	41	83	49399	47969	97368
36	0.13476	0.12750	0.00091	0.13567	-0.12750	-0.13476	0.12841	0.88006	0.11262	0.11904	0.88647	43004	5817	5453	42923	44	44	88	48865	48420	97285
37	0.13078	0.12456	0.00098	0.13176	-0.12456	-0.13078	0.12554	0.88315	0.11036	0.11587	0.88866	42796	5615	5379	43313	47	48	95	48458	48739	97197
38	0.12651	0.12207	0.00106	0.12757	-0.12207	-0.12651	0.12313	0.88652	0.10846	0.11242	0.89048	42708	5416	5307	43569	51	52	103	48174	48928	97102
39	0.12200	0.11999	0.00115	0.12315	-0.11999	-0.12200	0.12114	0.89013	0.10692	0.10871	0.89193	42739	5220	5237	43691	55	57	112	48014	48985	96999
40	0.11728	0.11831	0.00126	0.11854	-0.11831	-0.11728	0.11957	0.89395	0.10571	0.10480	0.89303	42888	5028	5170	43679	60	62	122	47976	48911	96887

Table A.13 continued

41	0.11238	0.11700	0.00138	0.11376	-0.11700	-0.11238	0.11838	0.89794	0.10483	0.10069	0.89379	43154	4839	5106	43533	66	67	133	48059	48706	96765
42	0.10735	0.11607	0.00151	0.10886	-0.11607	-0.10735	0.11758	0.90207	0.10425	0.09642	0.89423	43533	4653	5043	43256	73	73	146	48259	48372	96632
43	0.10221	0.11550	0.00166	0.10387	-0.11550	-0.10221	0.11716	0.90630	0.10399	0.09204	0.89435	44025	4471	4982	42847	81	79	160	48576	47909	96485
44	0.09702	0.11528	0.00183	0.09885	-0.11528	-0.09702	0.11711	0.91062	0.10403	0.08756	0.89414	44627	4291	4923	42309	89	86	176	49007	47318	96325
45	0.09180	0.11541	0.00202	0.09382	-0.11541	-0.09180	0.11743	0.91496	0.10437	0.08302	0.89361	45336	4114	4864	41642	100	94	194	49549	46600	96150
46	0.08658	0.11589	0.00223	0.08881	-0.11589	-0.08658	0.11812	0.91931	0.10502	0.07845	0.89276	46149	3938	4805	40849	112	102	214	50199	45756	95956
47	0.08140	0.11674	0.00247	0.08387	-0.11674	-0.08140	0.11921	0.92364	0.10597	0.07389	0.89157	47063	3765	4746	39931	126	110	236	50954	44787	95742
48	0.07629	0.11795	0.00273	0.07902	-0.11795	-0.07629	0.12068	0.92792	0.10722	0.06936	0.89005	48075	3594	4685	38892	141	119	260	51809	43696	95506
49	0.07127	0.11954	0.00303	0.07430	-0.11954	-0.07127	0.12257	0.93210	0.10881	0.06488	0.88817	49178	3423	4623	37734	159	128	288	52760	42485	95245
50	0.06638	0.12152	0.00336	0.06974	-0.12152	-0.06638	0.12488	0.93616	0.11073	0.06048	0.88592	50366	3254	4557	36462	180	138	319	53800	41157	94958
51	0.06162	0.12391	0.00373	0.06535	-0.12391	-0.06162	0.12764	0.94008	0.11298	0.05619	0.88329	51632	3086	4487	35081	205	148	353	54923	39716	94639
52	0.05703	0.12673	0.00414	0.06117	-0.12673	-0.05703	0.13087	0.94385	0.11561	0.05202	0.88026	52968	2919	4413	33597	232	158	390	56119	38167	94286
53	0.05260	0.13001	0.00460	0.05720	-0.13001	-0.05260	0.13461	0.94742	0.11862	0.04799	0.87680	54364	2754	4331	32017	263	168	431	57381	36516	93897
54	0.04837	0.13379	0.00511	0.05348	-0.13379	-0.04837	0.13890	0.95079	0.12203	0.04412	0.87288	55807	2590	4243	30350	299	177	476	58695	34771	93466
55	0.04434	0.13810	0.00569	0.05003	-0.13810	-0.04434	0.14379	0.95391	0.12587	0.04041	0.86845	57282	2427	4146	28607	341	187	528	60050	32940	92990
56	0.04052	0.14299	0.00632	0.04684	-0.14299	-0.04052	0.14931	0.95681	0.13018	0.03689	0.86352	58775	2266	4040	26798	387	196	583	61428	31034	92462
57	0.03691	0.14849	0.00703	0.04394	-0.14849	-0.03691	0.15552	0.95944	0.13499	0.03355	0.85801	60267	2107	3923	24938	440	204	644	62815	29064	91879
58	0.03351	0.15469	0.00782	0.04133	-0.15469	-0.03351	0.16251	0.96182	0.14033	0.03040	0.85188	61740	1951	3795	23039	500	211	711	64191	27045	91235
59	0.03033	0.16163	0.00870	0.03903	-0.16163	-0.03033	0.17033	0.96390	0.14626	0.02744	0.84508	63169	1798	3655	21118	568	216	784	65535	24990	90525
60	0.02736	0.16941	0.00967	0.03703	-0.16941	-0.02736	0.17908	0.96569	0.15281	0.02468	0.83756	64531	1649	3502	19194	643	221	864	66824	22917	89741
61	0.02461	0.17810	0.01076	0.03537	-0.17810	-0.02461	0.18886	0.96718	0.16006	0.02212	0.82924	65800	1505	3336	17284	728	223	951	68033	20843	88876
62	0.02206	0.18781	0.01196	0.03402	-0.18781	-0.02206	0.19977	0.96837	0.16805	0.01974	0.82006	66949	1365	3158	15408	822	223	1045	69136	18789	87925
63	0.01972	0.19865	0.01330	0.03302	-0.19865	-0.01972	0.21195	0.96923	0.17686	0.01756	0.80993	67950	1231	2966	13585	926	222	1148	70107	16773	86880
64	0.01757	0.21076	0.01479	0.03236	-0.21076	-0.01757	0.22555	0.96977	0.18654	0.01555	0.79878	68772	1102	2764	11835	1041	218	1259	70916	14816	85732
65	0.01560	0.22430	0.01645	0.03205	-0.22430	-0.01560	0.24075	0.96996	0.19719	0.01372	0.78649	69387	981	2551	10175	1168	211	1379	71536	12937	84473

Table A.13 continued

66	0.01381	0.23944	0.01829	0.03210	-0.23944	-0.01381	0.25773	0.96983	0.20891	0.01205	0.77298	69768	867	2331	8623	1303	202	1506	71938	11156	83094
67	0.01219	0.25637	0.02032	0.03251	-0.25637	-0.01219	0.27669	0.96935	0.22177	0.01054	0.75812	69888	760	2105	7195	1450	191	1641	72098	9490	81589
68	0.01072	0.27535	0.02259	0.03331	-0.27535	-0.01072	0.29794	0.96847	0.23588	0.00918	0.74179	69723	661	1876	5901	1608	178	1786	71993	7955	79948
69	0.00940	0.29664	0.02509	0.03449	-0.29664	-0.00940	0.32173	0.96725	0.25135	0.00796	0.72387	69255	570	1649	4750	1775	163	1937	71600	6562	78161
70	0.00822	0.32055	0.02787	0.03609	-0.32055	-0.00822	0.34842	0.96564	0.26830	0.00688	0.70421	68468	488	1427	3747	1949	146	2095	70904	5320	76224
71	0.00716	0.34745	0.03095	0.03811	-0.34745	-0.00716	0.37840	0.96362	0.28685	0.00591	0.68267	67352	413	1215	2891	2130	129	2259	69895	4234	74130
72	0.00622	0.37775	0.03435	0.04057	-0.37775	-0.00622	0.41210	0.96118	0.30714	0.00506	0.65910	65905	347	1015	2178	2315	112	2427	68567	3304	71870
73	0.00538	0.41196	0.03811	0.04349	-0.41196	-0.00538	0.45007	0.95830	0.32927	0.00430	0.63333	64129	288	831	1599	2503	94	2597	66920	2524	69444
74	0.00465	0.45064	0.04227	0.04692	-0.45064	-0.00465	0.49291	0.95496	0.35339	0.00364	0.60521	62034	237	667	1142	2689	78	2767	64960	1887	66846

Source: Author's calculations

Table A.13 continued

											L(x) (for state based expectancies)				**e(x)** (state based)				
	L(x)			$\hat{l}^{Total}$	**e(x)** (working age population based)			**e(x)** (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
20	0.72306	0.27534	0.99840	0.99859	33.29	18.02	51.31	32.73	17.72	50.45	0.94142	0.05840	0.11573	0.88408	33.93	17.34	31.37	19.89	51.27
21	0.69880	0.29922	0.99802	0.99822	32.58	17.75	50.33	32.03	17.46	49.49	0.93977	0.06003	0.10841	0.89139	33.31	16.97	30.65	19.63	50.28
22	0.67645	0.32116	0.99761	0.99782	31.89	17.46	49.35	31.36	17.17	48.52	0.93832	0.06147	0.10180	0.89799	32.71	16.59	29.96	19.35	49.30
23	0.65558	0.34160	0.99717	0.99740	31.22	17.14	48.37	30.70	16.86	47.56	0.93706	0.06271	0.09583	0.90394	32.14	16.18	29.29	19.04	48.33
24	0.63596	0.36075	0.99671	0.99695	30.58	16.81	47.39	30.07	16.53	46.60	0.93602	0.06374	0.09044	0.90932	31.59	15.76	28.64	18.71	47.35
25	0.61751	0.37871	0.99622	0.99647	29.96	16.46	46.41	29.46	16.18	45.64	0.93519	0.06456	0.08558	0.91417	31.05	15.31	28.01	18.36	46.37
26	0.60022	0.39549	0.99571	0.99597	29.35	16.08	45.44	28.86	15.82	44.68	0.93457	0.06517	0.08121	0.91853	30.54	14.85	27.40	17.99	45.39
27	0.58409	0.41109	0.99518	0.99545	28.76	15.70	44.46	28.28	15.43	43.72	0.93418	0.06555	0.07727	0.92246	30.04	14.37	26.81	17.61	44.42
28	0.56914	0.42548	0.99463	0.99491	28.19	15.29	43.48	27.72	15.03	42.76	0.93400	0.06571	0.07373	0.92598	29.56	13.88	26.23	17.21	43.44
29	0.55542	0.43863	0.99404	0.99434	27.64	14.87	42.51	27.17	14.62	41.80	0.93405	0.06565	0.07056	0.92914	29.09	13.37	25.67	16.80	42.46
30	0.54293	0.45050	0.99343	0.99375	27.09	14.44	41.53	26.64	14.20	40.84	0.93431	0.06537	0.06772	0.93197	28.64	12.85	25.11	16.38	41.49
31	0.53171	0.46108	0.99279	0.99312	26.56	13.99	40.56	26.12	13.76	39.88	0.93478	0.06489	0.06518	0.93449	28.20	12.32	24.57	15.94	40.52
32	0.52177	0.47034	0.99211	0.99246	26.05	13.54	39.59	25.61	13.31	38.92	0.93546	0.06419	0.06292	0.93673	27.77	11.78	24.04	15.51	39.54
33	0.51312	0.47828	0.99139	0.99176	25.54	13.07	38.61	25.11	12.86	37.97	0.93634	0.06330	0.06093	0.93870	27.34	11.23	23.51	15.06	38.57
34	0.50576	0.48488	0.99064	0.99103	25.04	12.60	37.64	24.62	12.39	37.01	0.93739	0.06221	0.05917	0.94043	26.92	10.67	22.98	14.62	37.60
35	0.49968	0.49014	0.98982	0.99024	24.55	12.12	36.67	24.14	11.92	36.06	0.93863	0.06095	0.05764	0.94194	26.51	10.12	22.46	14.17	36.63
36	0.49489	0.49406	0.98896	0.98940	24.06	11.64	35.70	23.66	11.44	35.10	0.94003	0.05952	0.05631	0.94324	26.10	9.56	21.94	13.72	35.66
37	0.49138	0.49664	0.98802	0.98851	23.59	11.15	34.73	23.19	10.96	34.15	0.94158	0.05793	0.05518	0.94433	25.69	9.00	21.42	13.26	34.69
38	0.48913	0.49789	0.98702	0.98754	23.11	10.66	33.77	22.72	10.48	33.20	0.94326	0.05621	0.05423	0.94524	25.28	8.44	20.91	12.82	33.72
39	0.48812	0.49780	0.98592	0.98649	22.64	10.16	32.80	22.26	9.99	32.25	0.94507	0.05436	0.05346	0.94596	24.87	7.89	20.39	12.37	32.76
40	0.48834	0.49639	0.98473	0.98535	22.17	9.67	31.84	21.80	9.51	31.31	0.94697	0.05240	0.05286	0.94652	24.45	7.34	19.87	11.93	31.80

Table A.13 continued

41	0.48978	0.49365	0.98344	0.98411	21.70	9.18	30.88	21.34	9.02	30.36	0.94897	0.05034	0.05241	0.94690	24.03	6.81	19.34	11.49	30.83
42	0.49241	0.48960	0.98201	0.98276	21.23	8.69	29.92	20.88	8.54	29.42	0.95103	0.04821	0.05213	0.94712	23.59	6.29	18.82	11.06	29.88
43	0.49622	0.48424	0.98046	0.98127	20.76	8.20	28.97	20.42	8.06	28.48	0.95315	0.04602	0.05200	0.94717	23.14	5.78	18.29	10.64	28.92
44	0.50117	0.47758	0.97875	0.97964	20.29	7.72	28.01	19.95	7.59	27.54	0.95531	0.04378	0.05202	0.94707	22.68	5.29	17.75	10.22	27.97
45	0.50723	0.46964	0.97687	0.97786	19.82	7.25	27.06	19.49	7.12	26.61	0.95748	0.04151	0.05218	0.94681	22.20	4.81	17.21	9.81	27.02
46	0.51437	0.46042	0.97480	0.97588	19.34	6.78	26.12	19.01	6.67	25.68	0.95966	0.03923	0.05251	0.94638	21.71	4.36	16.66	9.41	26.07
47	0.52256	0.44995	0.97251	0.97371	18.85	6.32	25.17	18.54	6.22	24.75	0.96182	0.03694	0.05298	0.94579	21.20	3.93	16.11	9.02	25.13
48	0.53174	0.43824	0.96998	0.97131	18.36	5.87	24.24	18.05	5.78	23.83	0.96396	0.03468	0.05361	0.94502	20.66	3.53	15.56	8.63	24.19
49	0.54187	0.42533	0.96720	0.96866	17.86	5.44	23.30	17.56	5.35	22.91	0.96605	0.03244	0.05441	0.94408	20.11	3.15	15.00	8.26	23.26
50	0.55287	0.41125	0.96411	0.96573	17.36	5.01	22.37	17.06	4.93	21.99	0.96808	0.03024	0.05536	0.94296	19.53	2.79	14.43	7.89	22.32
51	0.56466	0.39604	0.96070	0.96249	16.84	4.60	21.44	16.56	4.53	21.08	0.97004	0.02809	0.05649	0.94165	18.93	2.46	13.86	7.54	21.40
52	0.57716	0.37977	0.95692	0.95890	16.31	4.21	20.52	16.04	4.14	20.18	0.97193	0.02601	0.05781	0.94013	18.31	2.16	13.29	7.19	20.48
53	0.59026	0.36250	0.95275	0.95494	15.78	3.83	19.60	15.51	3.76	19.28	0.97371	0.02399	0.05931	0.93840	17.67	1.88	12.71	6.85	19.56
54	0.60383	0.34431	0.94814	0.95056	15.23	3.46	18.69	14.97	3.41	18.38	0.97539	0.02206	0.06101	0.93644	17.01	1.63	12.12	6.52	18.65
55	0.61772	0.32531	0.94303	0.94572	14.67	3.12	17.79	14.42	3.07	17.49	0.97695	0.02021	0.06293	0.93423	16.33	1.41	11.54	6.20	17.74
56	0.63178	0.30560	0.93739	0.94035	14.09	2.79	16.88	13.86	2.74	16.60	0.97841	0.01844	0.06509	0.93176	15.63	1.20	10.95	5.89	16.84
57	0.64583	0.28532	0.93115	0.93443	13.51	2.48	15.99	13.28	2.44	15.72	0.97972	0.01677	0.06749	0.92900	14.92	1.02	10.35	5.59	15.94
58	0.65966	0.26460	0.92426	0.92788	12.91	2.19	15.10	12.69	2.15	14.84	0.98091	0.01520	0.07016	0.92594	14.19	0.86	9.75	5.30	15.05
59	0.67305	0.24361	0.91666	0.92065	12.29	1.92	14.21	12.09	1.89	13.97	0.98195	0.01372	0.07313	0.92254	13.44	0.72	9.15	5.01	14.16
60	0.68576	0.22252	0.90828	0.91267	11.66	1.67	13.33	11.47	1.64	13.11	0.98284	0.01234	0.07641	0.91878	12.68	0.60	8.55	4.73	13.28
61	0.69751	0.20154	0.89905	0.90389	11.02	1.44	12.46	10.83	1.42	12.25	0.98359	0.01106	0.08003	0.91462	11.91	0.50	7.94	4.47	12.41
62	0.70806	0.18084	0.88890	0.89421	10.36	1.23	11.59	10.18	1.21	11.39	0.98418	0.00987	0.08402	0.91003	11.13	0.41	7.33	4.20	11.54
63	0.71711	0.16063	0.87774	0.88358	9.68	1.04	10.72	9.52	1.02	10.54	0.98462	0.00878	0.08843	0.90497	10.34	0.33	6.72	3.95	10.67
64	0.72438	0.14113	0.86551	0.87191	8.99	0.87	9.86	8.84	0.86	9.69	0.98488	0.00777	0.09327	0.89939	9.54	0.26	6.10	3.70	9.81
65	0.72958	0.12251	0.85209	0.85910	8.28	0.72	9.00	8.14	0.71	8.84	0.98498	0.00686	0.09860	0.89325	8.74	0.21	5.49	3.46	8.94

Table A.13 continued

66	0.73244	0.10499	0.83743	0.84508	7.55	0.59	8.14	7.42	0.58	8.00	0.98491	0.00603	0.10445	0.88649	7.92	0.16	4.86	3.22	8.08
67	0.73272	0.08871	0.82142	0.82977	6.81	0.47	7.28	6.69	0.46	7.16	0.98467	0.00527	0.11088	0.87906	7.10	0.12	4.24	2.99	7.22
68	0.73018	0.07382	0.80400	0.81308	6.05	0.37	6.42	5.95	0.36	6.31	0.98424	0.00459	0.11794	0.87089	6.27	0.09	3.61	2.76	6.36
69	0.72464	0.06042	0.78506	0.79491	5.27	0.29	5.55	5.18	0.28	5.46	0.98363	0.00398	0.12567	0.86194	5.43	0.07	2.98	2.52	5.50
70	0.71597	0.04859	0.76456	0.77521	4.46	0.21	4.68	4.39	0.21	4.60	0.98282	0.00344	0.13415	0.85211	4.58	0.05	2.35	2.28	4.62
71	0.70409	0.03833	0.74242	0.75391	3.64	0.16	3.80	3.58	0.15	3.73	0.98181	0.00296	0.14343	0.84133	3.71	0.03	1.73	2.01	3.74
72	0.68896	0.02964	0.71859	0.73093	2.79	0.11	2.90	2.75	0.11	2.85	0.98059	0.00253	0.15357	0.82955	2.83	0.02	1.14	1.71	2.84
73	0.67062	0.02243	0.69305	0.70625	1.91	0.07	1.99	1.88	0.07	1.95	0.97915	0.00215	0.16464	0.81667	1.92	0.01	0.60	1.33	1.92
74	0.68159	0.02761	0.70920	0.67984	1.00	0.04	1.04	0.99	0.04	1.03	0.97748	0.00182	0.17670	0.80261	0.98	0.00	0.18	0.80	0.98

Source: Author's calculations

Table A.14: Multistate working life table for high educated formerly married women based on transition rates estimated from Equation 4

	Estimated transition rates		***Death rate***	**M(x)** ***(transition rate matrix)***				**P(x)** ***(transition probability matrix)***				d_{ij} *where* $i, j = 1, 2$				$d_{i\delta}$ *where* $i = 1, 2$			l(x) (number of survivors by state)		
Age	μ_{12}	μ_{21}	$\mu_{i\delta}$ $i = 1, 2$	m_1	m_2	m_3	m_4	p_{11}	p_{12}	p_{21}	p_{22}	d_{11}	d_{12}	d_{21}	d_{22}	$d_{1\delta}$	$d_{2\delta}$	d_{δ}^{Total}	l_1	l_2	l^{Total}
20	0.23802	0.31604	0.00037	0.23839	-0.31604	-0.23802	0.31641	0.81330	0.24740	0.18633	0.75224	50676	11610	8876	26990	23	13	36	62309	35879	98188
21	0.24301	0.29403	0.00040	0.24341	-0.29403	-0.24301	0.29443	0.80810	0.23171	0.19150	0.76789	48124	11404	8944	29640	24	15	39	59552	38599	98152
22	0.24732	0.27440	0.00042	0.24774	-0.27440	-0.24732	0.27482	0.80350	0.21755	0.19608	0.78203	45854	11190	8929	32098	24	17	41	57068	41045	98112
23	0.25090	0.25686	0.00045	0.25135	-0.25686	-0.25090	0.25731	0.79953	0.20477	0.20002	0.79478	43801	10958	8864	34404	25	19	44	54783	43288	98071
24	0.25373	0.24118	0.00048	0.25421	-0.24118	-0.25373	0.24166	0.79621	0.19325	0.20331	0.80627	41932	10708	8766	36574	25	22	47	52665	45362	98027
25	0.25578	0.22714	0.00050	0.25628	-0.22714	-0.25578	0.22764	0.79356	0.18288	0.20594	0.81662	40232	10441	8647	38611	25	24	49	50698	47282	97980
26	0.25704	0.21458	0.00052	0.25756	-0.21458	-0.25704	0.21510	0.79159	0.17355	0.20789	0.82593	38692	10162	8513	40513	25	26	51	48879	49052	97931
27	0.25748	0.20333	0.00055	0.25803	-0.20333	-0.25748	0.20388	0.79030	0.16518	0.20916	0.83428	37306	9873	8370	42277	26	28	53	47205	50675	97880
28	0.25710	0.19327	0.00057	0.25767	-0.19327	-0.25710	0.19384	0.78969	0.15766	0.20974	0.84176	36070	9580	8222	43898	26	30	56	45676	52150	97827
29	0.25592	0.18426	0.00060	0.25652	-0.18426	-0.25592	0.18486	0.78976	0.15094	0.20964	0.84846	34980	9285	8072	45374	27	32	59	44292	53478	97770
30	0.25393	0.17621	0.00063	0.25456	-0.17621	-0.25393	0.17684	0.79050	0.14493	0.20887	0.85443	34033	8992	7922	46703	27	35	62	43052	54660	97712
31	0.25116	0.16903	0.00067	0.25183	-0.16903	-0.25116	0.16970	0.79190	0.13959	0.20743	0.85973	33224	8703	7775	47883	28	38	66	41955	55695	97650
32	0.24764	0.16263	0.00070	0.24834	-0.16263	-0.24764	0.16333	0.79395	0.13487	0.20535	0.86443	32551	8419	7631	48915	29	40	68	40999	56586	97584
33	0.24339	0.15696	0.00074	0.24413	-0.15696	-0.24339	0.15770	0.79660	0.13069	0.20266	0.86857	32009	8143	7493	49798	30	42	72	40182	57334	97516
34	0.23846	0.15195	0.00079	0.23925	-0.15195	-0.23846	0.15274	0.79984	0.12704	0.19937	0.87217	31595	7876	7361	50535	31	46	77	39502	57942	97444
35	0.23289	0.14755	0.00085	0.23374	-0.14755	-0.23289	0.14840	0.80363	0.12387	0.19551	0.87528	31307	7616	7235	51126	33	50	83	38956	58411	97367
36	0.22673	0.14371	0.00091	0.22764	-0.14371	-0.22673	0.14462	0.80795	0.12115	0.19113	0.87794	31140	7367	7116	51572	35	54	89	38542	58742	97284
37	0.22003	0.14040	0.00098	0.22101	-0.14040	-0.22003	0.14138	0.81275	0.11885	0.18627	0.88017	31093	7126	7005	51876	37	58	95	38256	58939	97195
38	0.21286	0.13759	0.00106	0.21392	-0.13759	-0.21286	0.13865	0.81800	0.11696	0.18095	0.88198	31164	6894	6901	52039	40	63	103	38098	59002	97099
39	0.20527	0.13525	0.00115	0.20642	-0.13525	-0.20527	0.13640	0.82363	0.11544	0.17521	0.88340	31351	6669	6803	52061	44	68	112	38064	58932	96997
40	0.19732	0.13335	0.00126	0.19858	-0.13335	-0.19732	0.13461	0.82961	0.11429	0.16913	0.88445	31653	6453	6712	51944	48	74	122	38154	58730	96885

Table A.14 continued

41	0.18908	0.13188	0.00138	0.19046	-0.13188	-0.18908	0.13326	0.83590	0.11350	0.16272	0.88512	32070	6243	6628	51688	53	81	133	38366	58397	96763
42	0.18061	0.13083	0.00151	0.18212	-0.13083	-0.18061	0.13234	0.84244	0.11304	0.15605	0.88545	32600	6039	6548	51295	59	88	146	38698	57931	96629
43	0.17197	0.13018	0.00166	0.17363	-0.13018	-0.17197	0.13184	0.84917	0.11292	0.14917	0.88542	33244	5840	6474	50765	65	95	160	39149	57334	96483
44	0.16323	0.12993	0.00183	0.16506	-0.12993	-0.16323	0.13176	0.85605	0.11313	0.14212	0.88505	34001	5645	6404	50098	72	103	176	39718	56605	96323
45	0.15445	0.13008	0.00202	0.15647	-0.13008	-0.15445	0.13210	0.86303	0.11367	0.13495	0.88432	34870	5453	6336	49294	82	112	194	40405	55743	96147
46	0.14567	0.13063	0.00223	0.14790	-0.13063	-0.14567	0.13286	0.87005	0.11454	0.12772	0.88324	35852	5263	6271	48355	92	122	214	41206	54747	95953
47	0.13696	0.13158	0.00247	0.13943	-0.13158	-0.13696	0.13405	0.87707	0.11574	0.12047	0.88179	36944	5074	6205	47279	104	132	236	42122	53617	95740
48	0.12836	0.13295	0.00273	0.13109	-0.13295	-0.12836	0.13568	0.88404	0.11728	0.11324	0.87999	38146	4886	6140	46071	117	143	260	43150	52354	95503
49	0.11992	0.13474	0.00303	0.12295	-0.13474	-0.11992	0.13777	0.89091	0.11918	0.10607	0.87780	39455	4698	6073	44730	134	154	288	44286	50957	95243
50	0.11168	0.13697	0.00336	0.11504	-0.13697	-0.11168	0.14033	0.89763	0.12143	0.09902	0.87521	40867	4508	6002	43259	153	166	319	45528	49427	94955
51	0.10368	0.13966	0.00373	0.10741	-0.13966	-0.10368	0.14339	0.90417	0.12407	0.09211	0.87220	42378	4317	5927	41663	174	178	352	46869	47767	94637
52	0.09594	0.14284	0.00414	0.10008	-0.14284	-0.09594	0.14698	0.91049	0.12711	0.08537	0.86876	43981	4124	5844	39945	200	190	390	48305	45980	94284
53	0.08851	0.14655	0.00460	0.09311	-0.14655	-0.08851	0.15115	0.91656	0.13056	0.07885	0.86485	45668	3929	5754	38113	229	202	431	49826	44069	93895
54	0.08139	0.15080	0.00511	0.08650	-0.15080	-0.08139	0.15591	0.92233	0.13446	0.07257	0.86043	47428	3731	5653	36175	262	214	477	51422	42042	93464
55	0.07460	0.15566	0.00569	0.08029	-0.15566	-0.07460	0.16135	0.92778	0.13884	0.06654	0.85548	49248	3532	5540	34139	301	227	528	53081	39906	92987
56	0.06817	0.16117	0.00632	0.07449	-0.16117	-0.06817	0.16749	0.93291	0.14372	0.06079	0.84998	51113	3330	5414	32019	345	237	583	54788	37671	92459
57	0.06209	0.16738	0.00703	0.06912	-0.16738	-0.06209	0.17441	0.93766	0.14915	0.05534	0.84385	53003	3128	5273	29830	396	247	643	56527	35350	91877
58	0.05638	0.17436	0.00782	0.06420	-0.17436	-0.05638	0.18218	0.94204	0.15517	0.05017	0.83704	54898	2924	5114	27587	454	257	711	58276	32958	91233
59	0.05103	0.18218	0.00870	0.05973	-0.18218	-0.05103	0.19088	0.94602	0.16182	0.04532	0.82952	56772	2720	4937	25309	520	264	784	60012	30511	90523
60	0.04604	0.19095	0.00967	0.05571	-0.19095	-0.04604	0.20062	0.94959	0.16916	0.04079	0.82121	58599	2517	4741	23018	594	270	863	61709	28029	89739
61	0.04141	0.20074	0.01076	0.05217	-0.20074	-0.04141	0.21150	0.95274	0.17725	0.03656	0.81204	60347	2316	4526	20735	678	273	951	63340	25535	88875
62	0.03712	0.21169	0.01196	0.04908	-0.21169	-0.03712	0.22365	0.95547	0.18615	0.03264	0.80196	61984	2118	4291	18486	771	274	1045	64873	23051	87924
63	0.03318	0.22391	0.01330	0.04648	-0.22391	-0.03318	0.23721	0.95775	0.19594	0.02903	0.79085	63475	1924	4037	16295	876	272	1148	66275	20604	86879
64	0.02956	0.23756	0.01479	0.04435	-0.23756	-0.02956	0.25235	0.95961	0.20668	0.02572	0.77863	64785	1736	3766	14186	991	268	1258	67512	18219	85731
65	0.02625	0.25282	0.01645	0.04270	-0.25282	-0.02625	0.26927	0.96100	0.21848	0.02268	0.76521	65877	1555	3479	12184	1119	260	1379	68551	15922	84472

Table A.14 continued

66	0.02324	0.26988	0.01829	0.04153	-0.26988	-0.02324	0.28817	0.96196	0.23140	0.01993	0.75048	66717	1382	3179	10310	1257	249	1506	69356	13738	83094
67	0.02050	0.28897	0.02032	0.04082	-0.28897	-0.02050	0.30929	0.96246	0.24557	0.01742	0.73431	67272	1218	2871	8586	1406	235	1641	69896	11692	81588
68	0.01804	0.31036	0.02259	0.04063	-0.31036	-0.01804	0.33295	0.96249	0.26108	0.01517	0.71658	67513	1064	2559	7025	1567	219	1786	70144	9803	79947
69	0.01582	0.33436	0.02509	0.04091	-0.33436	-0.01582	0.35945	0.96207	0.27805	0.01315	0.69718	67415	922	2249	5640	1736	200	1936	70072	8089	78162
70	0.01382	0.36131	0.02787	0.04169	-0.36131	-0.01382	0.38918	0.96116	0.29658	0.01135	0.67593	66958	790	1946	4435	1915	180	2096	69664	6561	76225
71	0.01205	0.39162	0.03095	0.04300	-0.39162	-0.01205	0.42257	0.95977	0.31681	0.00974	0.65271	66132	671	1655	3411	2100	159	2260	68904	5225	74130
72	0.01046	0.42578	0.03435	0.04481	-0.42578	-0.01046	0.46013	0.95790	0.33886	0.00833	0.62737	64934	564	1383	2561	2290	138	2427	67788	4082	71870
73	0.00906	0.46434	0.03811	0.04717	-0.46434	-0.00906	0.50245	0.95553	0.36286	0.00708	0.59975	63368	469	1134	1874	2480	117	2597	66317	3125	69443
74	0.00782	0.50793	0.04227	0.05009	-0.50793	-0.00782	0.55020	0.95262	0.38891	0.00599	0.56970	61446	386	912	1335	2670	97	2767	64502	2344	66846

Source: Author's calculations

Table A.14 continued

											L(x) (for state based expectancies)				e(x) (state based)				
	L(x)			$\hat{l}^{Total}$	e(x) (working age population based)			e(x) (population based)			Inactive		Active		Inactive		Active		e^{Total}
Age	L_1	L_2	L^{Total}		e_1	e_2	e^{Total}	e_1	e_2	e^{Total}	L_{11}	L_{12}	L_{21}	L_{22}	e_{11}	e_{12}	e_{21}	e_{22}	
20	0.61967	0.37873	0.99840	0.99859	29.15	22.16	51.31	28.66	21.79	50.45	0.90665	0.09316	0.12370	0.87612	29.81	21.46	27.93	23.33	51.27
21	0.59302	0.40499	0.99802	0.99822	28.54	21.79	50.33	28.07	21.42	49.49	0.90405	0.09575	0.11586	0.88394	29.27	21.01	27.34	22.95	50.28
22	0.56877	0.42884	0.99761	0.99782	27.96	21.39	49.35	27.49	21.03	48.52	0.90175	0.09804	0.10877	0.89102	28.76	20.54	26.77	22.53	49.30
23	0.54638	0.45079	0.99717	0.99740	27.40	20.97	48.37	26.94	20.62	47.56	0.89976	0.10001	0.10238	0.89739	28.27	20.05	26.23	22.10	48.32
24	0.52561	0.47110	0.99671	0.99695	26.87	20.52	47.39	26.42	20.18	46.60	0.89810	0.10166	0.09663	0.90313	27.81	19.54	25.71	21.64	47.35
25	0.50636	0.48986	0.99622	0.99647	26.35	20.06	46.41	25.91	19.73	45.64	0.89678	0.10297	0.09144	0.90831	27.36	19.01	25.21	21.16	46.37
26	0.48860	0.50712	0.99571	0.99597	25.86	19.58	45.44	25.42	19.25	44.68	0.89579	0.10395	0.08678	0.91296	26.93	18.46	24.72	20.67	45.39
27	0.47231	0.52287	0.99518	0.99545	25.38	19.08	44.46	24.95	18.76	43.71	0.89515	0.10458	0.08259	0.91714	26.52	17.89	24.26	20.16	44.41
28	0.45750	0.53713	0.99463	0.99491	24.92	18.57	43.48	24.50	18.25	42.76	0.89484	0.10487	0.07883	0.92088	26.12	17.31	23.81	19.63	43.44
29	0.44415	0.54989	0.99404	0.99434	24.47	18.04	42.51	24.06	17.73	41.80	0.89488	0.10482	0.07547	0.92423	25.74	16.72	23.36	19.10	42.46
30	0.43227	0.56116	0.99343	0.99374	24.04	17.49	41.53	23.64	17.20	40.84	0.89525	0.10443	0.07247	0.92722	25.37	16.11	22.93	18.55	41.49
31	0.42182	0.57096	0.99278	0.99312	23.62	16.94	40.56	23.22	16.66	39.88	0.89595	0.10371	0.06980	0.92987	25.02	15.50	22.51	18.00	40.51
32	0.41281	0.57929	0.99210	0.99245	23.21	16.38	39.59	22.82	16.10	38.92	0.89697	0.10268	0.06743	0.93222	24.67	14.87	22.10	17.44	39.54
33	0.40520	0.58619	0.99139	0.99175	22.81	15.80	38.61	22.43	15.54	37.97	0.89830	0.10133	0.06535	0.93428	24.34	14.23	21.69	16.88	38.57
34	0.39897	0.59166	0.99063	0.99102	22.42	15.22	37.64	22.04	14.97	37.01	0.89992	0.09968	0.06352	0.93609	24.01	13.59	21.29	16.31	37.60
35	0.39408	0.59573	0.98981	0.99024	22.03	14.64	36.67	21.66	14.39	36.06	0.90182	0.09776	0.06193	0.93764	23.68	12.94	20.88	15.74	36.63
36	0.39052	0.59841	0.98894	0.98939	21.65	14.05	35.70	21.29	13.81	35.10	0.90398	0.09557	0.06057	0.93897	23.37	12.29	20.48	15.18	35.66
37	0.38827	0.59973	0.98800	0.98848	21.28	13.46	34.73	20.92	13.23	34.15	0.90638	0.09313	0.05943	0.94008	23.05	11.64	20.08	14.61	34.69
38	0.38729	0.59970	0.98699	0.98752	20.91	12.86	33.77	20.56	12.65	33.20	0.90900	0.09047	0.05848	0.94099	22.74	10.98	19.67	14.05	33.72
39	0.38758	0.59832	0.98590	0.98647	20.54	12.27	32.80	20.19	12.06	32.25	0.91182	0.08761	0.05772	0.94170	22.43	10.33	19.26	13.49	32.76
40	0.38911	0.59560	0.98471	0.98533	20.17	11.67	31.84	19.83	11.48	31.31	0.91481	0.08456	0.05715	0.94222	22.11	9.68	18.85	12.94	31.80

Table A.14 continued

41	0.39187	0.59154	0.98341	0.98409	19.80	11.08	30.88	19.46	10.90	30.36	0.91795	0.08136	0.05675	0.94256	21.79	9.04	18.43	12.40	30.84
42	0.39586	0.58613	0.98199	0.98273	19.42	10.50	29.92	19.10	10.32	29.42	0.92122	0.07803	0.05652	0.94272	21.47	8.41	18.01	11.87	29.88
43	0.40104	0.57939	0.98043	0.98125	19.05	9.92	28.97	18.73	9.75	28.48	0.92458	0.07459	0.05646	0.94271	21.13	7.79	17.58	11.34	28.92
44	0.40743	0.57130	0.97872	0.97962	18.67	9.34	28.01	18.36	9.18	27.54	0.92803	0.07106	0.05657	0.94252	20.79	7.18	17.14	10.83	27.97
45	0.41500	0.56185	0.97685	0.97783	18.29	8.77	27.06	17.98	8.63	26.61	0.93151	0.06748	0.05683	0.94216	20.43	6.59	16.69	10.33	27.02
46	0.42373	0.55104	0.97477	0.97586	17.90	8.21	26.12	17.60	8.08	25.68	0.93503	0.06386	0.05727	0.94162	20.05	6.02	16.23	9.84	26.07
47	0.43361	0.53887	0.97248	0.97369	17.51	7.67	25.17	17.21	7.54	24.75	0.93854	0.06023	0.05787	0.94090	19.66	5.47	15.76	9.37	25.13
48	0.44462	0.52534	0.96996	0.97128	17.10	7.13	24.24	16.82	7.01	23.83	0.94202	0.05662	0.05864	0.94000	19.25	4.94	15.28	8.91	24.19
49	0.45671	0.51046	0.96717	0.96863	16.69	6.61	23.30	16.41	6.50	22.91	0.94545	0.05304	0.05959	0.93890	18.81	4.44	14.79	8.46	23.26
50	0.46985	0.49424	0.96409	0.96571	16.27	6.10	22.37	16.00	6.00	21.99	0.94881	0.04951	0.06072	0.93761	18.35	3.97	14.29	8.03	22.32
51	0.48397	0.47671	0.96068	0.96247	15.84	5.61	21.44	15.57	5.51	21.08	0.95209	0.04605	0.06204	0.93610	17.87	3.53	13.78	7.62	21.40
52	0.49900	0.45791	0.95691	0.95889	15.39	5.13	20.52	15.13	5.05	20.18	0.95525	0.04269	0.06355	0.93438	17.36	3.12	13.26	7.22	20.48
53	0.51485	0.43788	0.95273	0.95492	14.93	4.67	19.60	14.68	4.59	19.28	0.95828	0.03943	0.06528	0.93242	16.82	2.74	12.73	6.83	19.56
54	0.53141	0.41671	0.94812	0.95054	14.46	4.23	18.69	14.22	4.16	18.38	0.96117	0.03628	0.06723	0.93022	16.26	2.39	12.19	6.46	18.65
55	0.54852	0.39448	0.94301	0.94569	13.97	3.81	17.79	13.74	3.75	17.49	0.96389	0.03327	0.06942	0.92774	15.67	2.07	11.64	6.10	17.74
56	0.56604	0.37132	0.93736	0.94032	13.47	3.42	16.88	13.24	3.36	16.60	0.96646	0.03039	0.07186	0.92499	15.06	1.78	11.08	5.76	16.84
57	0.58378	0.34735	0.93113	0.93440	12.95	3.04	15.99	12.73	2.99	15.72	0.96883	0.02767	0.07458	0.92192	14.42	1.52	10.51	5.43	15.94
58	0.60150	0.32274	0.92424	0.92786	12.41	2.69	15.10	12.20	2.64	14.84	0.97102	0.02509	0.07759	0.91852	13.76	1.29	9.93	5.12	15.05
59	0.61896	0.29768	0.91664	0.92063	11.85	2.36	14.21	11.65	2.32	13.97	0.97301	0.02266	0.08091	0.91476	13.08	1.09	9.35	4.82	14.16
60	0.63589	0.27238	0.90826	0.91265	11.28	2.05	13.33	11.09	2.02	13.11	0.97480	0.02039	0.08458	0.91061	12.38	0.91	8.76	4.53	13.28
61	0.65197	0.24706	0.89904	0.90387	10.68	1.77	12.46	10.51	1.74	12.25	0.97637	0.01828	0.08863	0.90602	11.66	0.75	8.16	4.25	12.41
62	0.66690	0.22199	0.88888	0.89420	10.07	1.51	11.59	9.90	1.49	11.39	0.97773	0.01632	0.09308	0.90098	10.92	0.62	7.55	3.98	11.54
63	0.68032	0.19742	0.87773	0.88357	9.44	1.28	10.72	9.28	1.26	10.54	0.97888	0.01452	0.09797	0.89543	10.17	0.50	6.94	3.73	10.67
64	0.69189	0.17361	0.86550	0.87190	8.78	1.07	9.86	8.64	1.05	9.69	0.97980	0.01286	0.10334	0.88932	9.40	0.40	6.33	3.48	9.81
65	0.70126	0.15082	0.85209	0.85910	8.11	0.89	9.00	7.97	0.87	8.84	0.98050	0.01134	0.10924	0.88261	8.63	0.32	5.70	3.24	8.94

Table A.14 continued

66	0.70811	0.12932	0.83742	0.84508	7.41	0.72	8.14	7.29	0.71	8.00	0.98098	0.00996	0.11570	0.87524	7.84	0.25	5.07	3.01	8.08
67	0.71211	0.10931	0.82142	0.82977	6.70	0.58	7.28	6.59	0.57	7.16	0.98123	0.00871	0.12279	0.86716	7.03	0.19	4.43	2.79	7.22
68	0.71301	0.09099	0.80399	0.81307	5.96	0.46	6.42	5.86	0.45	6.31	0.98125	0.00759	0.13054	0.85829	6.22	0.14	3.79	2.57	6.36
69	0.71057	0.07450	0.78507	0.79491	5.20	0.35	5.55	5.11	0.35	5.46	0.98104	0.00658	0.13902	0.84859	5.39	0.10	3.14	2.35	5.50
70	0.70463	0.05994	0.76457	0.77522	4.41	0.27	4.68	4.34	0.26	4.60	0.98058	0.00567	0.14829	0.83797	4.55	0.07	2.50	2.13	4.62
71	0.69509	0.04733	0.74242	0.75391	3.60	0.19	3.80	3.54	0.19	3.73	0.97989	0.00487	0.15840	0.82635	3.69	0.05	1.85	1.89	3.74
72	0.68193	0.03665	0.71858	0.73093	2.77	0.14	2.90	2.72	0.13	2.85	0.97895	0.00416	0.16943	0.81368	2.82	0.03	1.23	1.62	2.84
73	0.66523	0.02781	0.69304	0.70624	1.90	0.09	1.99	1.87	0.09	1.95	0.97776	0.00354	0.18143	0.79988	1.91	0.01	0.65	1.27	1.92
74	0.67443	0.03475	0.70919	0.67983	0.99	0.05	1.04	0.98	0.05	1.03	0.97631	0.00299	0.19446	0.78485	0.98	0.00	0.19	0.78	0.98

Source: Author's calculations