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Effects of Economic Crisis on Marital Fertility in Turkey

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Abstract

The relations between demographic indicators and economic business cycles have been proven many times for historical and modern populations. The results from these studies indicated clear connections for demography and economy. Absence of this study for Turkey motivated me to investigate this phenomenon from marital fertility aspect. The aim of the study is to analyze the clear marital fertility responses to economic crisis for different characteristics of individuals in different parts of Turkey. To apply this, micro demographic data is combined with macro economic data for event history analysis purpose. The results indicated that the relation between marital fertility and economic fluctuations occurs as expected for Turkey. Also, the results provided important knowledge about the marital fertility responses of specific characteristics individuals to economic fluctuations and social differences between regions of Turkey.

Keywords: Marital fertility; Economic Fluctuations; Micro approach; Turkey; Survival analysis

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1. INTRODUCTION

The relationship between demographic indicators and economic crisis has been investigated many times by recent and early researchers. From 16th and 17th centuries to today, explaining the connection between economic fluctuations and population changes has special effects on economists, historians and demographers. In the early times, people were living in very difficult circumstances that the standard of living was very low, as a result; life expectancy and age of death were also not long for most of the human beings. Except, the aristocrats and privileged ones, most of people were facing with very hard situations such as diseases, poverty, sudden deaths in their lives. Especially for landless persons, the conditions were very bad that they were accepting to work just for food or a place to stay. Consequent of this, any minimum fluctuation in the food prices might affect this group at first and in the following, other vulnerable social groups very readily. Thus, besides the diseases at harsh times, it is unfortunate that, human beings might die because of malnourishment. These considerable effects of economic fluctuations on human beings motivated the early researchers to investigate this phenomenon. Known first researcher in this subject was Wargetin¹, and in the very near following years, Malthus² researched this close connection between the economic fluctuations and population movements deeper. At these times, it was hard to explain this relationship with limited opportunities. However, even these limited tools, these authors were establishing theories to explain this relationship. In the following years, these theories were used by many researchers and authors with new methods, and some researches were very beneficial that they added significant knowledge to the literature and some other did not. The important thing is these early authors and researches showed the way to us to explain this important connection.

The relationship between economic fluctuations and demographic responses has been studied many times with different methods. In the early times, investigating the mortality responses to economic crisis was much more popular than others as a result of high mortality rates. However, in the following years it became less important for researchers. If we look at the demographic process that human beings faced; before the industrialization, the mortality rates started to decrease slowly and after the industrialization process its speed increased, living standards started to improve. At this time, Europe was in the first phase of demographic change; mortality rates were going down but the fertility level was at the same level, as a result population of Europe rapidly increased. After that, as a response of first demographic change; fertility started to decline for Western Europe. The falling was very strong in the 20th century, even the fertility rates for Western Europe declined under the replacement level. Some of drastic declines in fertility were also caused by fluctuations in the economy. Thus, explaining the relationship between fertility response and economic fluctuation became essential.

Moreover, different types of methods were used to analyze and explain this connection between demographic responses and economic fluctuations. At first, analyzing macro level data was the accepted way of to research this phenomenon; the relation between demographic

¹ See, e.g., Wargetin 1776

² See, e.g., Malthus 1803

indicators and economic fluctuations has been proven many times in this type of studies³. The outcomes of these researches were indicating that there are significant relations between demographic and economic indicators. However, in the following years, it was understood that analyzing the macro level data was showing the demographic responses for large populations and could not indicating information for a specific social group, gender, age, and so on. For this reason, Bengtsson (1989) has developed entirely different method, combining longitudinal micro demographic data with macro economic data using an event history framework⁴. With this method, researches in demographic responses to economic fluctuations became more informative. In the example of Bengtsson and Dribe's article⁵, fertility and mortality responses to economic stress had been shown for different social groups, age groups and genders in four different parishes of Sweden. To analyze the fertility response to economic crisis at individual level, I will also use micro approach in our paper. In this paper, marital fertility has been chosen as a demographic indicator to measure the responses and its magnitudes to economic crisis for Turkey. Briefly, the reason behind the selection of Turkey was, there is no micro data study evidence, which demonstrates the fertility responses or any other demographic responses to the economic crisis in the current literature. Second of all, after 1950s, considerable economic fluctuations can be seen in Turkish economy, I wanted to analyze the fertility response of individuals to these economic hardships. Furthermore, marital fertility was selected as a demographic indicator, due to the cultural and social behaviors as well as religious beliefs, at this point; there are also women who are unmarried and have children in Turkey, however the proportion of this group is not as high as in Sweden, thus unmarried women in the dataset were restricted to analyze only marital fertility.

To investigate the relationship between marital fertility and economic crisis, individual level longitudinal data is used. In addition, demographic information of individuals was collected from three different demographic and health surveys, knowledge from these surveys was transformed to longitudinal form for event history analysis purpose. Furthermore, GDP per capita will be used as an economic indicator, and this macro data was taken from the website of Groningen Growth and Development Center. At first, both demographic and economic data was raw; we prepared the data for statistical analysis purpose. In the following chapters, to clarify the possible question, deeper information about RQ, aim of paper, data and so on, will be given for readers.

1.1 Research Question

The research question of this paper is "The Effect of Economic Crisis on Marital Fertility in Turkey". The relationship between economic crisis and demographic behaviors has been researched several times by recent and early scholars for developing and developed countries, and the conclusions from these researches indicated us the relationship between economic crisis and demographic indicators differs due to the selected time period that is examined and the specification of countries. Regarding to the differences among these concepts, for my thesis; Turkey is selected to analyze the connection between the economic crisis and the demographic indicator, which will be marital fertility in this paper.

³ See, e.g., Lee 1981 and 1990, Galloway 1988,

⁴ Bengtsson T., Campbell C., Lee J., et all. *Life Under Pressure Mortality and Living Standards in Europe and Asia 1700-1900* The MIT Pres London England 2004, pp.41

⁵ Bengtsson T. and Dribe M., *New Evidence on the Standard of Living in Sweden During the 18th and 19th Centuries* 2002

First of all, the main reason behind the selection of this country is this kind of study for Turkey has not been done before by any scholar; absence of the researches in the relationship between economic crisis and demographic responses for Turkey in the literature is the one of the reasons, which motivated me to research the effect of economic crisis on marital fertility. In addition to this, social economic status of Turkey has had significant effect on the selection of the country. More specifically, Turkey is categorized as a developing country and could not reach the development level of industrialized countries, but the process of developing in order to be industrialized country still continues. Therefore, when we consider the other countries, it is noticeable that the demographic responses of Turkish citizens to economic crisis are not similar to developed countries' citizens. On the other hand, it can be seen that the effects of economic crisis on Turkish citizens have not been as harsh as in the other developing countries like Southern American⁶ and Eastern European⁷ Countries. As a result, these differences formed the other reason behind the selection of country, which is the differentiation in demographic responses to economic crisis between developing countries. And last of all, for the selected period the economic condition of Turkey is not steady for some years, and due to these unstable macroeconomic conditions, fluctuations in the economic indicators could be readily seen, and moreover, some of these fluctuations can be also defined as economic crisis. As a result, number of occurred economic crisis in the selected time period makes it easier to analyze the fertility response to economic crisis compared to a country, which has stable economy.

Furthermore, as a demographic indicator, the marital fertility is selected to analyze its response to economic crisis. Several researches indicated that the economic crisis based on short term changes in prices and real wages has effects on demographic indicators in the pre-industrial and contemporary countries⁸ however, according to the other authors⁹, the response of fertility to economic crisis was stronger than the response of mortality or nuptiality. Regarding to this, analyzing the fertility response for the selected time period and selected country will be more substantive to show the considerable effect of economic crisis. Moreover, the marital fertility response is selected, because when we consider the cultural behavior, religious beliefs and the proportion of the number of unmarried couples' childbirths in Turkey, it will be more reasonable to analyze the effect of economic crisis on marital fertility instead of the effect on fertility.

1.2 Aim of the Thesis

The aim of this paper is to identify the relationship between the economic crisis and marital fertility for Turkey at individual level. As you know, the causal link between economic crisis and demographic indicators has been investigated several times by scholars for different types of countries and different time periods. And according to their researches, these scholars indicated that there is a causal relationship between economic crisis and demographic indicators for contemporary and historical populations¹⁰, for Sweden¹¹ and for other

⁶ See, e.g., Reher and Ortega Osona 1990

⁷ See, e.g., Kohler and Kohler 2002

⁸ See, e.g., Bengtsson and Reher 1998, Lee 1981

⁹ See, e.g., Bengtsson 2000, Galloway 1988

¹⁰ See, e.g., Lee 1990, Galloway 1988

¹¹ See, e.g., Bengtsson and Ohlsson 1978, Bengtsson 2000

developing countries¹². It is reasonable that the magnitude of demographic responses differs from one country to another and between time periods. Therefore, the basic reason to prepare this paper is to investigate the causal link between economic crisis and one selected demographic indicator (marital fertility) for Turkey.

In this paper, more specifically, the main purpose is to analyze the fertility behaviors of married couples, and measure the magnitude of these response to economic crisis that differ because of individuals' characteristics like; regional area, socio-economic status, etc. As you know, in the time of economic crisis these characteristics of individuals play important roles in persons' responses to external shocks. For instance, a person who educated from primary school might be more vulnerable to economic crisis than the one who educated from secondary school; of course, if we conjecture that their salaries have positive relationship with their education level. In a more general way, the occupation that is related to education of individual affects their responses to economic crisis. Moreover, the characteristic of behaviors also differs from the region to region. This relationship between regions and differences in individual's behaviors had been proven many times by Bengtsson for Sweden. In the example of Turkey, according to data from demographic and health surveys, the east part's residents have higher total fertility rates than western residents and when we consider the education level of eastern and western residents, the eastern residents are more likely to educated less than western residents; as a result, one can say that the relationship between education and fertility is negative that a person who educated less than other persons might have more children or high possibility to have more children than others. The relationship between education and fertility was proven in many researches for different societies, and some authors¹³ indicated that more education decreases the number of births in the developing and underdeveloped countries.

However, the aim of this research paper is not to investigate the relationship between education and fertility but the specific characteristics of regions and individuals and their specific characteristics will be taken into account as distinctive variables to understand the fertility responses to economic crisis at micro level. Using the micro level data for analyzing purpose gives privileges to the researchers, for instance; because of detailed information about households and individuals, the research could be deeper than macro level researches, and the outcomes from micro level researches provide more detailed and accurate knowledge for selected regions, groups, and so on.

And last of all, in this paper, the relationship between economic crisis and marital fertility will be investigated for Turkey at individual level. The specific characteristics of individuals, like; living in rural or urban areas, socio economic status, regions that they live, etc. will be considered in order to make comparisons in fertility response differences to economic crisis.

1.3 Outline of the Thesis

In this paper, the main purpose is to indicate the effect of economic crisis to marital fertility in Turkey. Therefore, to analyze the magnitude of fertility responses; in the background chapter, trend of fertility in Turkey and economic crisis in Turkey will be discussed to understand better what we are coping with. And also, in order to organize the foundation of this paper;

¹² See, e.g., Lindstrom and Berhanu 1999, Kohler 2001, Marine 1996

¹³ See. e.g., Lam, Sedlacek and Duryea 1993, Shapiro and Tambashe 1997

previous researches about this topic and theoretical background will be indicated in this chapter. In the trend of fertility part, the demographic transition of Turkey will be briefly specified and forecasting about future population and demographic transition will be made. Secondly, natural fertility decline and the shifting in the age of childbirth through the years will be discussed. And last of all, more significantly, the difference in fertility rates between west and east parts of Turkey and the reasons behind this differentiation will be indicated. Furthermore, differences in fertility rates between regions will be also investigated in the paper, to analyze this differentiation, it is necessary to indicate the fertility behavior differences between regions.

In the economic crisis in Turkey part, the types of macro economic crisis and the sectors or markets that the economic crises are related will be discussed. After this brief information, essential economic indicators will be indicated to specify the type and the year of economic crisis for Turkey. The reasons behind the economic crisis and wrong policies which caused economic crisis in Turkish economy will be discussed to identify character of economic crisis. Regarding to this, with the help of these economic indicators, comparisons will be made between Turkey and grouped countries to observe where Turkey is located in the global perspective. Moreover, economic indexes that we need for to separate economic crisis and fluctuations in the indicators will be shown and regarding to this economic indexes, the years and the types of economic crisis will be specified for deeper analysis. After this process, different types of economic crisis will be combined and a general economic crisis indicator will be shown, marked years of general economic crisis are the ones that will be consider as economic crisis, which affected individuals' behaviors in the times of economic stress.

In the following part of background chapter, previous researches about the economic crisis and fertility response will be shown. The reason to review previous researches is to examine outcomes and conclusion, and to realize the possible problems that might be encountered. Moreover, it is possible to benefit from previous researches, which investigates the same regions or countries. However, for our case, there is no previous research in the literature that studies the relationship between economic crisis and fertility response for Turkey. Thus, the previous researches about economic crisis and fertility responses for other countries and group of regions will be taken into account to reach more reliable conclusions. After the review of previous researches, theoretical background part will be prepared. This part generally based on the accepted theories and approaches that the early researchers and scholars discovered. For our case, the foundation of research question and its possible explanations by early researchers will be indicated. This part will be one of the important parts of the paper, so the approaches and methods that early researchers followed point out the process of examining the research question. Parts of previous research and theoretical background will give us the knowledge and method to confront any possible problems in the process of researching the subject.

In the third chapter, information about data and encountered problems in data will be indicated. More specifically, in the first part, the data source, data collection process and the problems in data will be shown. And secondly, sample size and preparation of data will be explained. Moreover, there will be also explanations for the restricted groups in the sample size to clarify the exclude reasons. In the following chapter, we will indicate the explanation of method that will be used to answer the research question. In the method part, type of study and research method will be indicated, after this; selected research method's analyzing process will be shown. More specifically; this chapter includes parts like; design of the data sets, type of regression estimators, definition of variables, and so on. Moreover, accurate

models that suit to the purpose of the paper and approved models from early researches will be also shown in this chapter.

The fifth chapter will explain the empirical model, which includes the statistical results and discussion parts. In the statistical results part, outcomes from regression models will be indicated in tables and in these tables, necessary information like, coefficient of variables, p-values, etc. about statistical analysis will be found. However, if there will be any statistically insignificant variables after statistical analysis, the outcomes from alternative models might be considered in order to draw more reliable conclusions. In the following part, the results from regression analysis will be discussed and interpretation of coefficients will be made. The compatibility of estimated values from regression analysis and the outcomes from theories and early research will be examined to avoid irrelevant results. In the last part of this chapter, there will be interpretation of all statistical and theoretical results to answer the research question. And in the final chapter; first of all, summary of the thesis and main conclusions will be indicated. Furthermore, with the assist of statistical analysis, there will be brief comparisons in the statistical results of selected country and other countries from early researches. These brief comparisons will help us to draw final conclusions and create possible solutions for future researches.

2. BACKGROUND

2.1 Economic Crisis in Turkey

In this chapter, types of the economic crisis in Turkey will be explained, and with the help of economic indicators, the years of economic crisis will be defined. The purpose of this chapter is mainly separate the economic crisis with fluctuations.

From 1950s to today, because of global economic fluctuations and instability of the economic conditions, there are many economic crises had occurred in Turkey. Those crises occurred not only because of any corruption in one specific economic area but interactions of sectors made the economic crisis harder to prevent. The lack of macroeconomic stability has not only affected economic growth and inflation but has also increased their volatility. Inflation increased dramatically while real GNP growth decreased on average. At the same time, inflation and growth uncertainty has increased and making forecasting growth and inflation even harder¹⁴. According to researchers and comprehensive studies on the global perspective, the basic macroeconomic crisis has occurred from two different economic areas; one is the financial markets that the investments are made on financial securities, commodities and other fungible items¹⁵. And the other one is the real sector that related to companies and their entities.

¹⁴ Leigh D., Rossi M., Leading Indicators of Growth and Inflation in Turkey. IMF Working Paper. 2002 pp 3

¹⁵ Source: www.wikipedia.org

According to Kibritcioglu¹⁶, the real-sector crisis has occurred because of the shrinkage in the amount of employment and production in the goods and services market and labor market. More specifically, if the prices in these markets continually increase more than normal level, consequently high inflation rates might be seen in the country. This type of specific economic crisis is called inflation crisis. In the 80s, many developing countries suffered to the economic crisis based on high inflation rates. For Turkey, booms and busts have characterized the fluctuations and inflation rates.

In the example of Turkey, after the 70s and energy crisis; it will be seen the prices and as a result the inflation rates steadily increased overtime and this events generated the characteristic of the inflation in Turkey. For some years, the global crisis and political crisis occurred at the same time and caused severe recessions in the economy of Turkey. Moreover, at these recession times hyper inflation could be also observed in Turkey's economy.

Before deeper investigation of economic crisis in Turkey, types of economic crisis will be indicated to understand the magnitude of economic crisis on individuals' social lives. In the graph below, the sub-groups of economic crisis is shown. These sub-groups have also their minor groups and indicate the starting point of economic crisis more specifically. In the following, identification of economic crisis will be made and with the help of economic indicators, the fluctuation in the economic indicators will be separated from economic crisis.

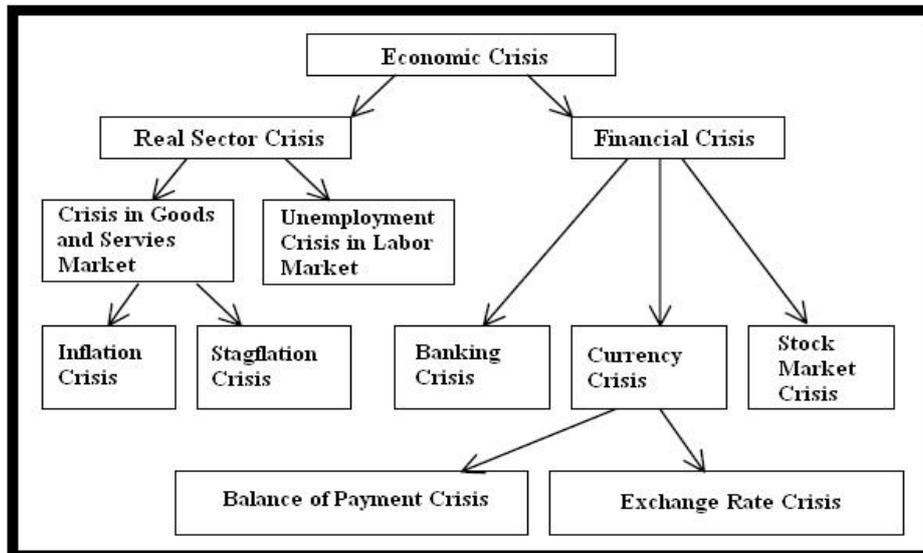


Figure 1: Classification of Basic Macroeconomic Crisis
Source: Kibritcioglu (2001)

Furthermore, besides the economic crisis based on Real Sector, there are also economic crises, which occur because of the strong fluctuations in the currency rates and stock markets. These types of economic crisis called the financial crisis. Mainly, the policies that created by government to protect citizens and country's rights, shape these kinds of crisis in a country. In addition to this, the magnitude of investment that is made by foreign investors and the attitudes of these investors have also effects on currency and stock market crisis. Secondly,

¹⁶ Kibritcioglu A. Turkiye'de Ekonomik Krizler ve Hukümetler, 1969-2001. Yeni Turkiye Dergisi – Ekonomik Krizler Ozel Sayısı. 2001 pp.1-2

there are also financial crisis that related to the banking sector; generally the increasing amount of the credits that do not pay back to banks cause serious payment problems in the financial markets. This type of economic crisis is also counted as financial crisis and could cause serious problems in economy. For instance, current global economic crisis has started from unpaid mortgage credits, and after that, this corruption in the credit sector affected the hedge funds, these incidents has caused irrecoverable damages in the banking sector and as a result, global economic crisis has occurred and affected all world economies.

If we review the economic history of Turkey, in the 1970s, different types of economic crises interacted with each other and affected country's economy. Besides economic crisis, unsuccessful monetary and fiscal policies made the resistance of the country to global economic crisis and inside economic crisis more vulnerable. For instance, the global energy crisis had very deep effects on Turkey's economy. Corruption in the balance of payment caused liquidity problems and budget of government had failed to accomplish its duties. Consequently, balance of payment crisis had occurred in the country and the government hardly paid the wages to employees. After this crisis, policymakers decided to make the foreign investments policies more flexible to attract the investors and to make cash flow in to country. However, this changing of the monetary and fiscal policies caused new problems in the economy. In the following years, this flexibility in the foreign investments, high inflation rates and high interest rates made the country hot money paradise and also made the country more open to speculative actions. For shorter period, it was going fine for both sides however, there was no policy exist to keep the hot money in the country or to tax the investors for their actions. Because of political and financial instability, the hot money had gone to outside of the country very easily. And as a result, this cash flow could cause serious problems in the economy of Turkey.

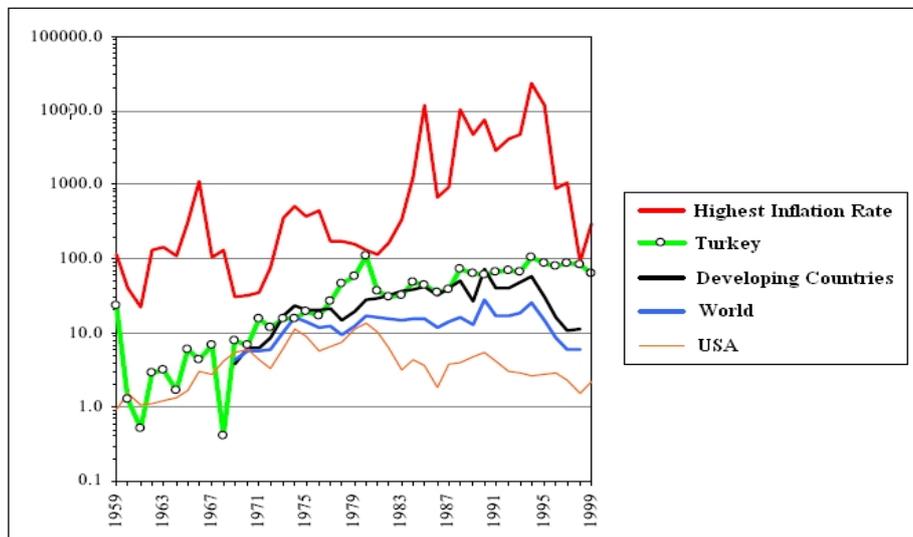


Figure 2: Inflation Rates
 Source: Kibritcioglu (2001)

In the graph above, percentage changes of the inflation rates in the world and in Turkey can be seen. The red marked pattern indicates the highest inflation rates in the world, and for some years Turkey's inflation rates are almost identical with the highest inflation rates in the world. After the 70s, the trend of inflation rates in the world is starting to decrease however, for Turkey and developing countries, the inflation rates diverge from average inflation rates of

the world. And also, differentiation between the inflation rates of Turkey and developing countries can be seen after 1990s.

The renovation in the policies could not solve the problems but create new ones. In addition, significant decrease on the amount of hot money causes currency crisis, and these currency problems led the country to other possible economic crisis. For those years, unsuccessful monetary and fiscal policies made the high inflation stable in the country and increased the amount of foreign loans and internal loans. Consequently, citizens forced to live in circumstances that the prices changes day by day, and for some goods; it was only possible to find them in black markets. For 50 years, residents of Turkey had to live under the pressure of high inflation rates. And at this times, besides the hyper inflation other economic crisis had also occurred and caused new problems in economy..

In the table below, the real GDP growth and its average in Turkey can be seen. These economic uncertainties made the GDP rates unstable and the economic crisis drive the GDP rates negative levels. Especially, after the mid 1970s, the GDP rates started to fluctuate more than before and in the 1990s, the peak point of fluctuations can be observed.

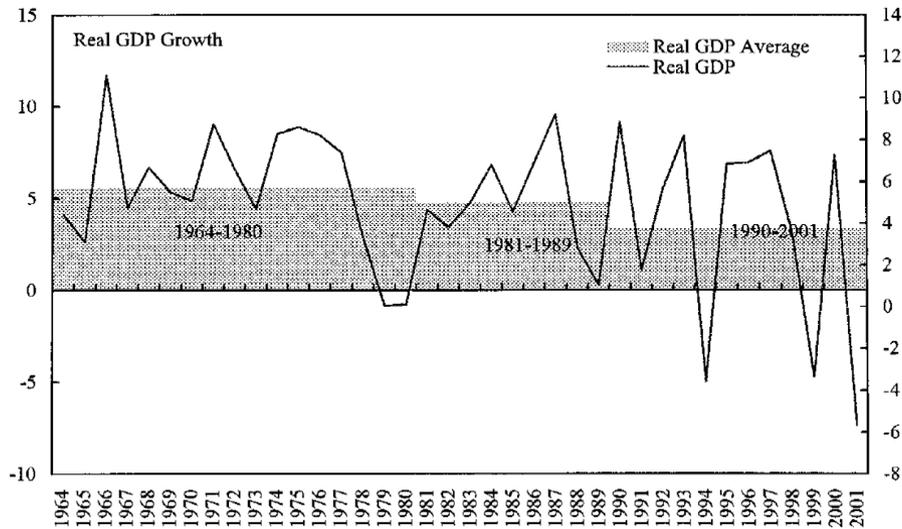


Figure 3: Turkey; Real GDP Growth 1964-2001

Source: Leigh and Rossi (2002)

If we go back to different types of economic crisis that occurred in Turkey, according to Kibritcioglu¹⁷, every decline in the real production could not be explained as economic crisis and at the same time, limited rising in the inflation rates and currency rates could not be explained as currency and inflation crisis, neither. To avoid this problem, author prepared an index to measure the effects of declines and risings in any economic indicator; as a result, with the help of these indexes, the fluctuations in the economic crisis could be defined as economic crisis more sufficiently.

¹⁷ Kibritcioglu A. Turkiye’de Ekonomik Krizler ve Hukümetler, 1969-2001. Yeni Turkiye Dergisi – Ekonomik Krizler Özel Sayısı. 2001

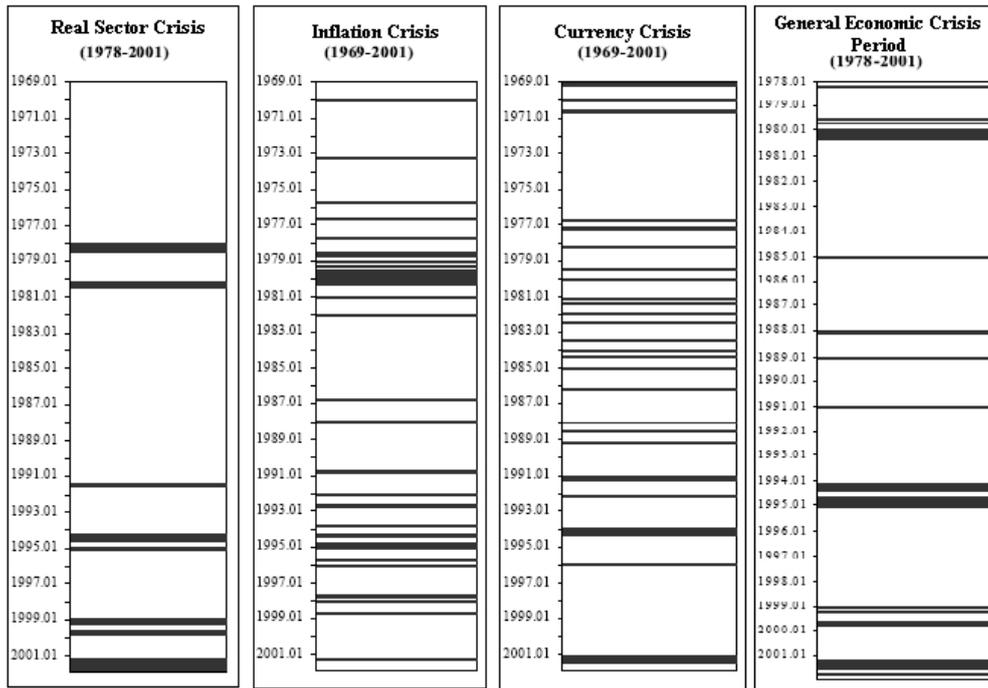


Figure 4: Real Sector, Inflation, Currency and General Economic Crisis
 Source: Kibritcioglu (2001)

In the table above, economic crisis are classified in the different groups of economic crisis. To measure the effect of economic crisis on marital fertility, defining the economic crisis with calculated indexes could be beneficial to our research and statistical analysis. It is important to indicate that the effect of specific economic crisis will not be measured in this paper but it is good to know where to consider during the statistical analysis. In the table, the selected time periods for different type of economic crisis and general economic crisis are normally the economic crisis that had significant effects on country's economy and on citizens.

Moreover, at these time periods, besides the effects of economic crisis on economy, there were significant effects of economic crises on citizens' social and demographic behaviors. Consequently, instability of the economic condition made the prices unstable and these incidents caused short and long term economic stresses on human beings' daily lives. In the early researches, the effects of economic crises on demographic behaviors proved several times¹⁸. More specifically, in the some of these researches, the fertility responses to economic crisis were much stronger than other demographic indicators like nuptiality and mortality in both modern and historical populations. Therefore, for our case, it would be hard to point out significant adult mortality responses to economic crisis. Because of these reasons and the phase of demographic transition that Turkey located, the marital fertility responses to economic crisis will be investigated in this paper. In the following, the fertility trend in Turkey and the rational for the selection of marital fertility will be pointed out.

¹⁸ See, e.g., Bengtsson and Ohlsson 1985, Galloway 1988, Lee 1981

2.2 Fertility Trend in Turkey

In this part, the trend of fertility in Turkey and the demographic transition of Turkey will be indicated. To understand the effect of economic crisis on fertility, the natural decrease on fertility should be taken into account. For this purpose, the demographic transition and fertility decline will be explained for the paper's time period.

After the foundation of the Republic of Turkey in 1923, the population started to increase rapidly. And the population of Turkey almost doubled between 1923 to 1955 period. For instance, in the 1923, the population of Turkey was 13.877.000 but in the 2008, it increased to 71.893.000¹⁹. Besides the enlargement in population, the decline in mortality rates had also effects on population growth. The improvements in health services and living standards have caused to decline in both child and adult mortality rates. The Crude Death Rate declined from around 30 per thousand in the 1940s to 7 per thousand at the beginning of the 2000s (SISb, 2003)²⁰.

In this paper, data from population and health surveys will be used, and with this way, we will be able to analyze the fertility response to economic fluctuations at individual level. According to these demographic and population surveys, the fertility rate in the early 1970s is about 5 children per woman; this rate is very high when we consider the countries that completed their demographic transition. However, for recent time period; the last demographic and health survey indicates us the fertility rate, which is 2.23 for 2003. And in addition, according to the other sources; the fertility rate in the 2008 is 1.87 children per woman²¹.

Age specific fertility rates (per 1,000 women) and total fertility rate, the 1978 Turkey Fertility Survey, the 1988 Turkey Population and Health Survey, and the 1993, 1998 and 2003 Turkey Demographic and Health Surveys

Age	TFS- 1978	TPHS- 1988	TDHS- 1993	TDHS- 1998	TDHS- 2003
15-19	93	45	56	60	46
20-24	259	193	179	163	136
25-29	218	183	151	150	134
30-34	154	102	94	93	78
35-39	101	55	38	42	38
40-44	38	19	12	13	12
45-49	2	7	0	1	2
TFR 15 49	4.33	3.02	2.65	2.61	2.23

Note: 1978, 1988 and 1993 rates refer to the year before the survey; 1998 and 2003 rates refer to the 3-year period before the survey.

Table 1: Age Specific Fertility Rates and Total Fertility Rates

Source: Turkey Demographic and Health Survey 2003

¹⁹ Historical Statistics for the World Economy: 1-2003 AD Angus Maddison

²⁰ Yavuz S. Fertility transition and the progression to third birth in Turkey, 2005. pp.4

²¹ Source: CIA World Factbook

The table above indicates the age specific fertility rates and total fertility rates from different demographic surveys, from these total fertility and age specific fertility rates; the last phase of the demographic transition can be readily seen during the period 1978 through 2003. Especially in the period of 1970s and 1980s the decline in fertility rate is rapid. Regarding to this, in the 1978 survey the total fertility rate is 4.33, on the other hand the fertility rate in the 1988 is calculated 3.02. Hence, there is considerable decline, which is more than 1 in the total fertility rate during this time period. After the 1990s the decline speed of fertility rate has slowed down and in the 2004, fertility rate falls under 2.00²².

According to some researchers²³, Turkey entered the last phase of demographic transition during the 1980s; furthermore the projections from these researches point out the demographic transition will be completed in the 2050s. And the population of Turkey will be about 95 million citizens²⁴.

Moreover, when we consider the age specific fertility rates in the demographic and health surveys, it can be seen that there is also significant shift in the age of birth from younger ages to older ages. In the graph below, the decline in the number of births and postponement of the childbirth can be seen during the 1978 to 2003. The changing in the behaviors of women is generally depending on achievement of social life and rising proportion of women in the business life cause the shift in the childbirth ages.

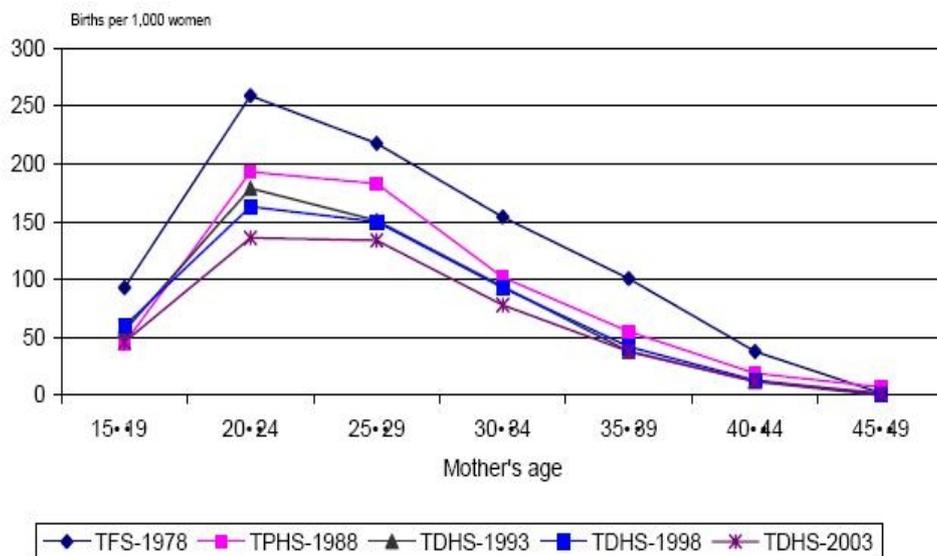


Figure 5: Age Specific Fertility Rates
 Source: Turkey Demographic and Health Survey 2003

Another important thing is the regional differences; these differences have also effects on fertility behaviors in Turkey. For instance, in the last demographic and health survey, the west part of Turkey's fertility rate was 1.88 children per woman, on the other hand for the east part,

²² Source: CIA World Factbook

²³ Koray, S., 1997. 'Dynamics of demography and development in Turkey: implications to the potential for migration to Europe'. *The Turkish Journal of Population Studies* 19: 37-56.

²⁴ State Institute of Statistics (SIS), 1995. *The Population of Turkey, 1923 – 1994: Demographic Structure and Development, With Projections to the Mid 21st Century*. State Institute of Statistics, Prime Ministry of Republic of Turkey, Ankara, Publication No. 1716.

the fertility rate occurred 3.65 children per woman. The fertility rate of the west part is almost half of the east part's fertility rate and it is a significant difference when you consider the regions, which are located in the same country. Possible reasons behind this considerable difference are generally based on the development and investment distinction between the west and the east part. For instance, scarce job opportunities and other regional problems like terrorism in the east part, force citizens to have more births than western citizens in order to increase the number of living children in the future and guarantee their old ages. As a result, this difference in fertility rates indicates us the eastern citizens' dependencies to intergenerational transfers and more importantly to kinships.

According to Yavuz²⁵, the richest parts of Turkey are located in the west part and the poorest ones are in the east part. These richest regions have also significant amount of shares in the manufacturing and services on the other hand, east regions are abandoned to produce agricultural products which is a sector that the opportunity of employment is scarce and the level of income is low. This differentiation in the policies and development strategies caused regional differences which affected ones social behaviors. In addition to this explanation, the difficulties in transportation and geographical condition in the east part make harder to invest this region. Moreover, there are also psychological effects on people who work and live in east part of Turkey. Because of the terrorism activities in the east part of Turkey, even the east part's salaries are twice of west part for same government job, people most likely to avoid working in there.

As a result of these circumstances, the fertility trend in the some parts of Turkey is identical with many developing countries' trend. However, in the eastern regions, this fertility trend was affected by governmental choices and social variables, consequently fertility rates diverged from east part's total fertility rates. Unfortunately, these factors affected and shaped the persons' demographic and social behaviors. However, the purpose of this paper is not to investigate the regional fertility differences caused by social dynamics but the marital fertility responses to economic crisis. On the other hand, underestimating these factors will not be reasonable to study this subject. Hence, to research the effect of economic crisis on marital fertility behavior without any doubts and for more reliable conclusions, the effects of natural fertility decline and regional differences on marital fertility rates will be considered during the research.

2.3 Previous Research

In this part, the previous researches in the topic of fertility responses to economic crisis will be indicated. The objective of this part is to review the previous researches and show the relationship between previous researches and research question of this paper. The outcomes from previous researches will be taken into account to decrease the possibilities of problems in this paper. When we consider the relationship between economic crisis and fertility responses, there are many reliable cases of researches in the literature for different countries and time periods. However, for Turkey, there is no research, which studies the relation between economic crisis and fertility responses in the literature. Lack of these studies makes it impossible to compare the outcomes for same areas and to gain knowledge from review process. Because of this, besides the researches for developed countries and different time

²⁵ Yavuz S. Fertility transition and the progression to third birth in Turkey, 2005. pp.6

periods, we will take into account the researches for developing countries, which are located in the same group with Turkey.

The relation between economic crisis and fertility response has been researched and proven several times by many authors. It is possible to measure the magnitude of fertility responses to economic crisis by different approaches. In some of the early researches, macro data analysis was used and the relations between economic and demographic indicators were investigated with distributed lag models. For instance, Galloway²⁶ and Lee²⁷ researched the demographic responses to economic fluctuations for historical and modern civilizations with distributed lag models and reached significant relations between economic and demographic indicators. In Galloway's article, effect of grain price fluctuations on economic indicators like; nuptiality, mortality, fertility in pre-industrial Europe was analyzed. And, the outcomes from Galloway researches confirmed that the short-term fluctuations in grain price had significant effects on demographic indicators for pre-industrial Europe. More specifically, when the fertility response is considered, according to Galloway; the fertility response is extremely sensitive to changes in grain prices in most of the pre-industrial European countries. In addition, the magnitude and the timing of fertility responses are also identical for all countries in the same time periods²⁸. At the same time, in the Lee's article²⁹, contemporary third world countries was investigated and demographic responses of these countries to economic crisis and pre-industrial European countries' demographic responses to price fluctuations were compared to specify the similarities in the demographic responses. Lee's study also proved that short term price fluctuations and economic crisis has significant effects on demographic indicators. However, it is important to indicate that, according to Bengtsson; the analysis of aggregated economic and demographic time series also has its pitfalls. One problem comes from the high levels of aggregation. They have covered the whole England, France, Sweden, or other countries. They show the average responses for large populations and cannot reflect the various age, gender, or social differences within the populations³⁰. Because of these possible problems in the estimations, Bengtsson³¹ developed the idea of analyzing the demographic response to short-term economic stress within different social groups combining longitudinal micro demographic data with macro-economic data. Furthermore, analyzing the fertility responses to economic crisis at individual level give you the opportunity to show how different individuals like; socio economic groups of people, age groups, and so on. were affected by fluctuation in the economic indicators. For instance, in the one of Bengtsson and Dribe's article³², combined version of time series and history event analysis was employed to analyze the effect of short term economic stress on fertility and mortality responses of landless individuals in the four parishes of Sweden. With the help of this method, the researcher will not only be allowed to analyze the demographic responses for specific groups but they have also ability to identify the causal links between economic and demographic indicators. The outcomes from statistical analysis indicated that the response of fertility to short term economic stress is negative and shows differentiations among parishes, age groups

²⁶ See, e.g., Galloway 1988

²⁷ See, e.g., Lee 1981 and 1990

²⁸ Galloway P., Basic Patterns in Annual Variations in Fertility, Nuptiality, Mortality, and Prices in Pre-industrial Europe, *Population Studies*, Vol.42, No.2 1988 pp. 24-25

²⁹ Lee R., The Demographic Response to Economic Crisis in Historical and Contemporary Populations, *Population Bulletin of the United Nations* No.29 1990

³⁰ Bengtsson T., Campbell C., Lee J., et al. *Life Under Pressure Mortality and Living Standards in Europe and Asia 1700-1900* The MIT Press London England 2004

³¹ See, e.g., Bengtsson 1989 and 1993

³² Bengtsson T. and Dribe M., *New Evidence on the Standard of Living in Sweden During the 18th and 19th Centuries* 2002

and selected time periods. The aim of the Bengtsson and Dribe's article was to investigate standard of living in four parishes for landless families. The authors defined the fertility response to economic stress as an indicator of standard of living and proved the relationship among them with their statistical analysis. To clarify the relationship, Bengtsson and Dribe indicates two explanations; one is the rising food prices caused hardships and these circumstances forced landless families to adapt their behaviors. For instance, postponing childbirth decreased the fertility rates in the times of economic stress. The other explanation is the nutritional problems in the times of economic stress affected the fecundity of landless women and this incident lowered the fertility rates. As a result, using the micro approach in analyzing the longitudinal data at individual level, besides measuring the magnitude of responses for different groups, it allows us to specify the causal links among indicators. For our case, we are also using longitudinal data at individual level and the relationship between micro demographic data and macro economic data will be investigated to analyze the responses by regions, socio economic status, age groups, and so on.

Furthermore, the relation between economic stress and fertility response was investigated deeper to clarify the reasons of fertility response by Bengtsson and Dribe³³. The aim of this paper was to discuss the fertility response to economic stress resulted because of a deliberate control by family or an effect of reducing fecundability. The analysis was made for all social groups with different family characteristics in four parishes for southern Sweden. The results from statistical analysis showed that there were differences in fertility responses among social groups and parishes and more importantly, the negative effect of rye prices on fertility response was proven. Furthermore, the clarify the reasons of fertility response to economic stress, new model for landless and semi landless families was estimated and in this model season of price fluctuations and the timing of response were considered to explain the fertility response reason. The outcomes from this specific model indicated that the fertility responses were stronger in the first six months after the harvest and this explanation proved that the fertility responses to economic stress were deliberate, persons were not affected by nutritional problems but they planned their fertility in the times of economic stress.

In addition to this, the relation between micro demographic data and macro economic data was also researched for developing countries and recent time periods. In the example of Ethiopia³⁴, the effect of war, famine and economic decline on marital fertility was investigated with history event analysis method to indicate the period effect on time of conception for selected intervals. The results showed that the military attacks, decrease in GDP per capita rates and increase in inflation rates in the specified years caused sharp decline in probability of conceptions. Another micro approach case was made for Russia³⁵ with longitudinal survey data. In this paper, the role of economic uncertainty and labor market crisis on fertility decline in the early and mid 1990s was investigated by Kohler and Kohler; however this research showed different outcomes than they expected. The research purpose of the paper is to clarify the effects of labor market crisis caused by economic uncertainties, on Russian women who have different characteristics. However, the statistical analysis could not indicate negative relation between fertility decline and labor market crisis but show positive relation. Moreover, the comparisons among macro and micro studies showed that there was

³³ Bengtsson T. and Dribe M., Fertility Response to Short-Term Economic Stress: Deliberate Control or Reduced Fecundability, 2002

³⁴ Lindstrom D. and Berhanu B., The Impact of War, Famine, and Economic Decline on Marital Fertility in Ethiopia 1999

³⁵ Kohler H. And Kohler I., Fertility Decline in Russia in the Early and Mid 1990s: The Role of Economic Uncertainty and Labor Market Crises, European Journal of Population 18:232-262, 2002

considerable divergence between outcomes. According to Kohler and Kohler, the divergence between macro and micro findings is not inconsistent but rather than expected situation. As a result, they paraphrased Friedman studies and explain positive relation between fertility response and labor market crisis with the idea of uncertainty reduction. Furthermore, brief explanation of this theory is children are global strategies available for individuals to reduce the uncertainties in their lives. And according to Kohler and Kohler, in the case of Russia, the statistical results were pointing out this uncertainty reduction theory. As a result, this last example of study indicates that how the macro and micro methods can diverge and the results can become different that expected.

In this part we reviewed the previous researches, which investigate the relation between fertility response and economic crisis. In the researches, micro approach was employed to analyze the longitudinal data from surveys and macro approach was used to analyze aggregate data for large populations. Except one study, other studies' results were not different from expectations. However, it can be understood that analyzing the demographic responses at individual level definitely can provide more knowledge than macro approaches for specific area, group, and so on. And with this way, we can reach more reliable and explanatory findings in our studies.

2.4 Theoretical Background

The relationship between demographic indicators and economic fluctuations has been investigated many times from different aspects by demographers, historians and economists. From 16th century to now, with the studies of Wargetin³⁶, Malthus³⁷ and their followers, this relationship has been researched with different methods for different countries and time periods. To show the relations between them, demographic indicators were researched from different angles. For early times, because of low living standards, mortality indicator was more popular in the researches. However, in the following time periods, fertility became more popular for researchers, especially for studies which research contemporary populations. In this paper, we will be investigated marital fertility responses to economic crisis in Turkey. Previous researches³⁸ in aggregate level indicated that the economic crisis has stronger effects on fertility behaviors than mortality and nuptiality indicators for pre-industrial European countries. In the individual level studies³⁹ for Sweden, it is also proven that the fertility behavior shows stronger responses than mortality to economic stress.

According to early authors, the fertility is a human beings' behavior, which is hard to explain the determinants of this process. This phenomenon was firstly formulated by Davis and Blake⁴⁰ in 1956 and in the following years, Bongaarts⁴¹ developed Davis and Blake's idea and presented simple, but comprehensive method of the fertility analysis. According to Bongaarts, in this method, there are indirect and direct determinants, and these determinants are used for to define the fertility behavior of human beings. Moreover, indirect determinants have effects

³⁶ See, e.g., Wargetin 1776

³⁷ See, e.g., Malthus 1803/1992

³⁸ See, e.g., Galloway 1988 and Lee 1990

³⁹ Bengtsson T. and Dribe M., New Evidence on the Standard of Living in Sweden During the 18th and 19th Centuries 2002

⁴⁰ See, e.g., Davis and Blake 1956

⁴¹ See, e.g., Bongaarts 1978

on direct determinants and these two main determinants have effects on fertility behavior. If we need to explain them more specifically, indirect determinants are represented by socioeconomic, cultural and environmental variables and on the other hand, direct determinants are represented by intermediate fertility variables.

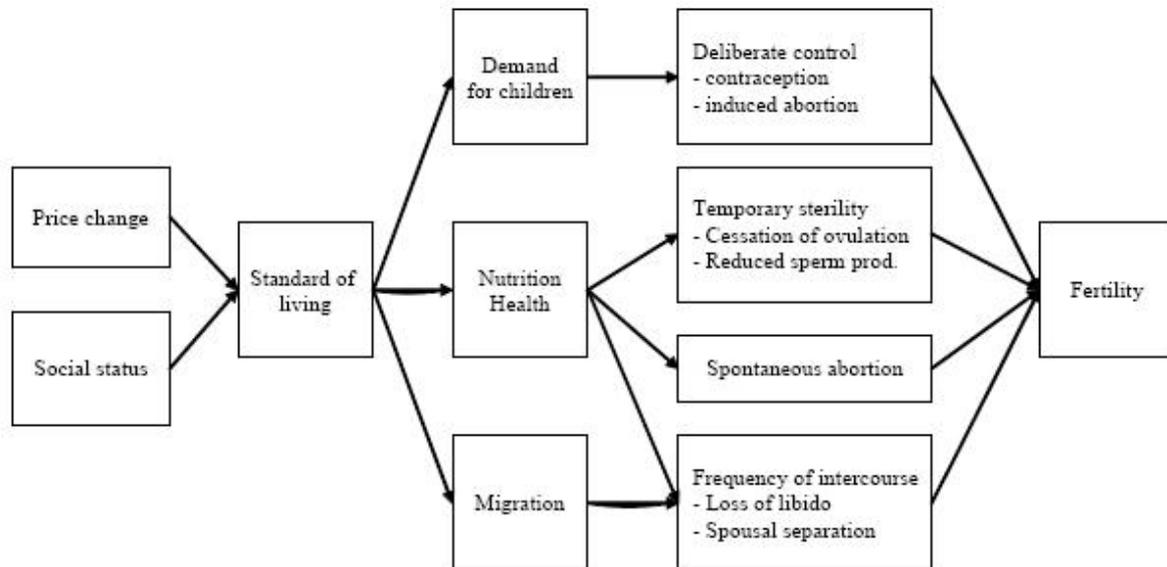


Figure 6: Model of Marital Fertility Responses to Economic Stress
 Source: Bengtsson and Martin 2008

In the table above, extended model for marital fertility responses to economic stress can be seen. According to Bengtsson and Dribe⁴², in this model, the fertility response to economic crisis can be explained by three main ways. First of all, postponement of childbirth; in the times of economic stress, hardships forced families to change their plans about childbirth and to avoid from having birth by several contraception ways and as a result, in the times of economic stress, the number of births decreased automatically. Second explanation is the malnutrition problems in the times of economic stress, high food prices reduced the amount of calories that people took for a day and this incident might reduce the fecundability of persons and make people more vulnerable to diseases. And last of all, economic crisis might cause unemployment and force people to migrate other parts of world to search for work and this could separate the couples while men were working far from home. Consequently, because of separate couples, fertility rates might decrease in the times of economic crisis.

To research the relationship between marital fertility and economic crisis, we will also employ this framework. When we consider the explanation methods of fertility responses; it can be found in the literature that the postponement theory has been proven by Bengtsson and Dribe⁴³ and other authors⁴⁴ several times. The fertility response and price changes periodically analyzed and it was shown that the changes in human behaviors point the postponement theories. On the other hand, the second way of explanation is the fertility decline caused by

⁴² Bengtsson T. and Dribe M., Fertility Response to Short-Term Economic Stress: Deliberate Control or Reduced Fecundability, 2002

⁴³ Bengtsson T. and Dribe M., Fertility Response to Short-Term Economic Stress: Deliberate Control or Reduced Fecundability, 2002

⁴⁴ See, e.g., Anderton and Bean 1985, David and Sanderson 1986

malnutrition in the times of economic stress; these fecundability problems were only proven for temporary and harsh periods⁴⁵. For instance in the study of Bongaarts⁴⁶, Dutch Famine in Second World War was analyzed and the outcomes proved that the fecundability problems happen in the very harsh and temporary malnutrition periods⁴⁷. In addition, according to Bongaarts, moderate chronic malnutrition has only a minor effect on fecundity, and the resulting decrease in fertility is very small⁴⁸.

In this part, theoretical explanations of demographic responses and more specifically, fertility response to economic stress were shown to understand better the causal link among them. These significant findings from previous researches make it easier to interpret our research's results for us. In the following part, information about selected data will be given.

3. DATA

3.1 Source Material

In this chapter, the sources of data and definition of variables will be indicated in two parts. It is important that to point out the accepted data sources for authors and readers to make the research more reliable. In our case, there will be two kinds of data, which will be used to measure the effect of economic crisis on marital fertility in the paper. One of them is the micro demographic data, which defines number of births, date of births, date of marriage, occupation of individual, socio-economic status, region, etc. and the source of the information is demographic and health surveys, which offer many variables in both areas. The other one is the macro economic data, which indicates the economic condition of country for the selected time period and will be used to measure the economic crisis and short term fluctuations. Both demographic and economic data are collected from reliable and accepted sources.

The demographic data is taken from the website of demographic and health surveys⁴⁹. The provider of data, which is "Measure DHS" is an organization who has provided technical assistance to more than 200 surveys in 75 countries in the world, and from their experiences, it could be understood that the information from surveys are reliable enough to employ the datasets for research purpose. In addition to this, the datasets for all countries are available for public use. As a result, there are many cases of researches that the authors used DHS datasets to analyze different subjects. For Turkey, the DHS organization managed four surveys in sixteen years however; the one that the information was collected in 2008 has not been published yet in DHS website. According to DHS website, computerizing the information has not been finished and the dataset will be published at end of the 2009. Because of this delay, we will use three of surveys to collect information about individuals. Regarding to surveys that will be used; to analyze the effect of economic crisis on marital fertility deeper, the information from 1993, 1998 and 2003 surveys was combined and changed to longitudinal

⁴⁵ See, e.g., Bongaarts 1980 and Menken 1981

⁴⁶ Bongaarts J., Does Malnutrition Affect Fecundity? A Summary of Evidence, Science Mag., 1980

⁴⁷ Bengtsson T. and Dribe M., Fertility Response to Short-Term Economic Stress: Deliberate Control or Reduced Fecundability, 2002

⁴⁸ Bongaarts J., Does Malnutrition Affect Fecundity? A Summary of Evidence, American Association for the Advancement of Science 1980, pp. 568

⁴⁹ Source: www.measuredhs.com

data form. More specifically, to apply history event analysis, the information from surveys should be converted to longitudinal data form. However, in the first place, the data was raw and datasets included many types of information about participants such as; contraception methods, disease history, socio economic status, birth history, and so on. As a result, it was essential to remove the unnecessary information from datasets to make the preparation process of data easier. After the elimination of unnecessary information, the datasets were merged to one file; nonetheless datasets still had compatibility problems because of collecting and recoding differences. To avoid possible problems in the future, mutual information from all datasets was protected and the others were removed. On the other hand, some of the participants were optionally eliminated to make the conclusion more reliable. For instance, to analyze the marital fertility, the participants who are not married and are married more than once were restricted from dataset.

The necessary information that we will use is including the birth and marriage dates, regional and socio economic knowledge, and so on. This specific information was chosen to measure the fertility response to economic crisis in different types of social characters and areas. As it was mentioned before, there is a considerable difference in fertility rates between east and west part of Turkey. The social differences between regions are observed many times by authors and researchers however, the study of fertility responses to economic crisis has not done yet by any authors and there is no previous example in the literature, so when we consider the special condition of country, the selection of variables should be made carefully. It is important to select accurate variables to analyze the subject that you want, and it is also important to prepare the dataset for accurate statistical model. For our case, we employed history event analysis to investigate the relationship between economic crisis and marital fertility. It is also possible to measure the fertility response to economic crisis with linear regression and OLS models. However, according to Winkelmann and Boes⁵⁰, there are two points, which explain why it is better to use history event analysis instead of linear regression models in the analyzing fertility responses. First, censoring is ubiquitous in duration data. Second, and more importantly, the expected duration is often of less substantive interest than a related concept, the conditional exit rate, or hazard rate⁵¹. And more importantly, analyzing the macro level data with linear regression models is not appropriate to measure the responses for specific group, age, genders. The outcomes from this type of data and regression models can only give you the average information for large populations. Because of these reasons, data was selected at individual level to make the study at individual level and deeper for specific social groups.

Second of all, GDP per capita was chosen to show the fluctuations in the economic indicators for this study. In addition, the GDP per capita data was collected from the website of Groningen Growth and Development Center⁵². The previous researches indicated that to measure the economic crisis effects, rates of economic indicators should fluctuate over time. However, for recent time period, it is hard to indicate the economic fluctuations, which affected human beings social lives and demographic behaviors, since the trend of GDP per capita rates continually increase for selected time period. In order to avoid this problem, GDP per capita data was converted to functional form. More specifically, for event history analysis purpose, and to show short term fluctuations, the moving average of economic indicator should be calculated and the difference between the observed value and the corresponding value on moving average line should be taken into account. In our case, the moving average

⁵⁰ Winkelmann R., and Boes S., *Analysis of Microdata*, Springer-Verlag, Berlin Heidelberg 2006

⁵¹ Winkelmann R., and Boes S., *Analysis of Microdata*, Springer-Verlag, Berlin Heidelberg 2006, pp.254

⁵² www.ggdc.net

of GDP per capita was calculated for 7 year and 11 year and after this process, the differences between moving averages lines' and actual line's values were estimated to analyze the effect of economic fluctuations on marital fertility.

3.2 Preparation of Data

In this part, the preparation of data process will be shown for readers to explain the sample size in the dataset. As you all know, information for the longitudinal data is generally collected from surveys and administrative records. So, besides research purposes, the reasons of collecting individual level data can be very different from one source to another, since the data collectors decide which questions should be asked or how the question should be answered. Working on longitudinal data means that if you are not the person in charge, you should prepare the data first to answer your research question. Moreover, to reach significant results in statistical analysis, the preparation and selection of information from raw data should be done cautiously.

In our case, information from three different demographic and health surveys was used to create one dataset. First of all, we eliminated the unnecessary information for our study in the datasets. After collecting the essential variables, several problems occurred in the process of combining the datasets. Asked question differences and coding differences in the surveys forced us to eliminate beneficial information from datasets. For instance, information about husband's occupation was available for one survey; however this information was unavailable in the other surveys, so we were forced to drop this possible socio economic status variable from our dataset. Furthermore, there were information for unmarried women in the one dataset; since the demographic indicator that we want to study is marital fertility; we eliminated the women who are unmarried at survey time from our sample size. Besides these restrictions, we also exclude the women who were married more than once because there were no information that indicated the timing of divorce and remarriage in the datasets. Basically, we protect the women who were married once, geographical information, husband's education, type of place that individual live (rural or urban), children's birth dates, marriage information.

In addition to the selection of variables, the form of data was prepared for the analysis of event history. The original data was in the wide format that analyzing the number of events for related individuals was impossible. First, we reshaped the data wide to long format and it became functional form for our analyze aim. However, the data was still not ready for statistical analysis. If we need to explain the event history analysis briefly; in the model, there should be a duration variable and number of occurrence variable, which is defined as a particular event in a given time period.

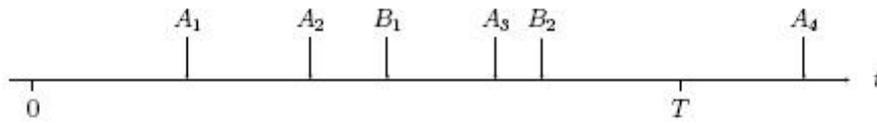


Figure 7: Example of Individual Event History
 Source: Winkelmann and Boes, *Analysis of Microdata*

In the figure above, example of individual event history can be seen, however one could ask the explanation of letters and numbers. In order to explain them; “A and B” are the occurred events for different individuals, for instance; “A₁” is the first birth and “A₂” is the second birth for same person. Furthermore, “0 to T” is the time interval that events occur in, for our case, the event starts with marriage since we focus on marital fertility and ends with time of survey, age of 44, and birth of sixth child (which occurs first). More specifically, we are censoring the data for T+n time. The rationale of this could be un-optional that in the example of survey time, lack of knowledge for this time period (following years of survey) forces us to censor the data. And the other explanation could be caused by human nature. Furthermore, in our case, we use age of 44 to censor the data because when we consider the fertility of women, it is not impossible but hard to childbirth at this age. So, we predicted that after the age of 44, the possibility of childbirth is zero. Finally, using the birth of sixth child as a censoring time; this type of censoring can be optional, therefore the fertility trend of country, cultural behavior, and so on. is taken into account and decision can be made from these findings. In our case, we decided to use sixth birth for censoring time since the proportion of sixth births was high enough to consider. In the following chapters, deeper information about empirical and statistical model will be given.

4. METHODS

4.1 Statistical Model

In this part, the statistical model that we are using for statistical analysis will be theoretically indicated. In addition to this, we will also refer to the previous studies that the same statistical models are used in. In the following, specification of model will be given to understand better the relation between selected variables. In the second part of this chapter, we will define the selected variables, and prepare the readers to next chapter. First of all, besides the preparation of variables, selecting the accurate statistical model for analyze purpose is also important process for authors. To avoid possible problems, we examined the models and its results in previous researches. Our aim is to employed theoretically accepted and statistically proven model to apply survival analysis in our research. To investigate the relationship between marital fertility response and economic crisis at individual level, it is essential to use survival models. Besides the other studies with survival analysis, applications of Bengtsson’s

combined method⁵³ showed the benefits of this method to explain the demographic responses for specific groups. In the books of Bengtsson^{54 55} and in the articles of Bengtsson and Dribe^{56 57} these clear connections have been proven by combining micro demographic data with macro economic data. In Bengtsson and Dribe's studies, one of the models that was employed is Cox Proportional Hazard Model. After the examination of the outcomes from these studies and comparisons of different models' results from other sources⁵⁸ convinced us to use this model for our statistical analyze part. Moreover, in our research, we also combined micro demographic data with macro economic data, to analyze the fertility responses to economic fluctuations and measure the magnitudes of these effects on specific groups like; regional, age, socio economic status, etc. for this purpose; Cox Proportional Hazards Model⁵⁹ is employed for our study. The advantage of this model is that the regression parameters of this model can be estimated by partial likelihood methods without even specifying a functional form for the hazard function^{60 61}. More specifically, the theoretical model that we will use is;

$$r(t) = h(t)\exp(A(t)\alpha)$$

The transition rate, $r(t)$, is the product of an unspecified baseline rate, $h(t)$, and a second term specifying the possible influences of a covariate vector $A(t)$ on the transition rate⁶². And the model for analyze the marital fertility response to economic fluctuations is;

$$h_i(a) = h_0(a)\exp[\beta_1 X_1 + \beta_2 X_2 + \dots + \gamma Z(t)]$$

$h_i(a)$ is the hazard of the event for last birth time, and $h_0(a)$ is hazard function, for instance it takes 1 for the birth event and it takes 0 for the ending period of event, we will use this function to measure the responses for different groups. β_n s are the parameters for the individual covariates (X_1, X_2, \dots), and γ is the parameter of external covariate.

Furthermore, in our analysis, we defined the marriage as starting point of time interval for all individuals and on the other hand, for ending point of time interval; survey of year, birth of sixth child and age of 44 are used for censoring. We organized the necessary variables for survival analysis to measure the probability of birth in the times of economic stress for intervals between marriages to first births, second births to first births and so on. With this

⁵³ Bengtsson 1989 and 1993

⁵⁴ Bengtsson, T. and Saito O., Population and Economy, From Hunger to Modern Economic Growth, Oxford, Oxford University Pres, 2000

⁵⁵ Bengtsson T., Campbell C., Lee J., et all. Life Under Pressure Mortality and Living Standards in Europe and Asia 1700-1900 The MIT Pres London England 2004

⁵⁶ Bengtsson T. and Dribe M., New Evidence on the Standard of Living in Sweden During the 18th and 19th Centuries 2002

⁵⁷ Bengtsson T. and Dribe M., Fertility Response to Short-Term Economic Stress: Deliberate Control or Reduced Fecundability, 2002

⁵⁸ Blossfeld, H.P., Event History Analysis with Stata, 2007

⁵⁹ See, e.g., Cox 1972 and Collett 1994

⁶⁰ Winkelmann R., and Boes S., Analysis of Microdata, 2006, pp. 270

⁶¹ See also e.g., Kalbfleisch and Prentice 2002

⁶² Blossfeld, H.P., Event History Analysis with Stata, 2007, pp.223

way, we will have the ability to analyze the childbirth decisions between the periods of events. In the following part, we will define the variables that will be used in the model.

4.2 Definition of Variables

After the selection of statistical model, we prepared the data for analysis purpose, for certain specific groups, we created dummy variables to analyze the fertility responses to economic fluctuations individually. Furthermore, we created economic indicator variables to analyze the effect of economic fluctuations on probability of childbirth. To create this dummy, we calculated GDP per capita rates' seven and eleven years of moving averages and take the difference between GDP per capita values and moving average values to define the bad and good years economically. In addition, we divided these results with the value of moving averages to convert these values percentage form. After that process, these values for selected years combined to dataset for individuals' time of events.

In the below, definition of all selected variables can be seen;

Type of Place

Urban = Dummy for Type of place that individuals live (= 0 for rural, = 1 for urban)

Age Groups

Age1 = Dummy for Individuals at 15 - 24 years old

Age2 = Dummy for Individuals at 30 - 34 years old

Age3 = Dummy for Individuals at 35 - 39 years old

Age4 = Dummy for Individuals at 40 - 44 years old

Age5 = Dummy for Individuals at 45 - 50 years old

Reference Group = Individuals at 25 - 29 years old

*Regional Group*⁶³

Gd1 = Dummy for Central of Turkey

Gd2 = Dummy For East of Turkey

Gd3 = Dummy for North of Turkey

Gd4 = Dummy for South of Turkey

Reference Group = West of Turkey

Education of Husband

Educ1 = Dummy for Secondary Level

Educ2 = Dummy for High School Level

Educ3 = Dummy for No education and unknown information

Reference Group = Primary Level

Economic Indicator

Gdp7 = The percentage of difference between the values of GDP per capita and its 7 year moving average values.

Gdp11 = The percentage of difference between the values of GDP per capita and its 11 year moving average values.

⁶³ To further information look at appendix

5. Empirical Analysis

5.1 Statistical Results and Discussion

In this part, results of statistical analysis will be indicated and interpreted, and in the following, these outcomes will be compared with theory and previous researches to measure the reliability of this research. To analyze the marital fertility responses we used Cox Proportional Hazards Model, we prepared two main models, which the differences in first births and these models' two sub models for GDP per capita moving average difference; in the first sub model, difference of GDP per capita and seven year moving average of GDP per capita is used and in the second sub model it was eleven year moving average. In the table below, coefficient estimations and hazard rates of covariates, z values and percentages of grouped variables are given. In the following, besides numeric results, we will also indicate graphical results to make the results more understandable for inexperienced readers.

<i>Covariates</i>	<i>Hazard Ratio 1</i>	<i>z</i>	<i>Hazard Ratio 2</i>	<i>z</i>	<i>Average</i>
<i>Type of Place</i>					
<i>Urban</i>	1.00	<i>Ref.</i>	1.00	<i>Ref.</i>	66.06%
<i>Rural</i>	1.09 *	9.61	1.10 *	9.33	33.94%
<i>Age Groups</i>					
<i>15 – 24</i>	1.18 *	8.78	1.18 *	8.65	11.24%
<i>25 – 29</i>	1.00	<i>Ref.</i>	1.00	<i>Ref.</i>	16.47%
<i>30 – 34</i>	0.90 *	-6.59	0.91 *	-6.60	19.47%
<i>35 – 39</i>	0.86 *	-10.16	0.85 *	-10.35	19.84%
<i>40 – 44</i>	0.86 *	-9.76	0.85 *	-10.35	17.95%
<i>45 – 50</i>	0.88 *	-8.02	0.86 *	-8.94	15.03%
<i>Regions</i>					
<i>West</i>	1.00	<i>Ref.</i>	1.00	<i>Ref.</i>	24.98%
<i>Central</i>	1.13 *	9.23	1.13 *	9.12	20.13%
<i>East</i>	1.42 *	26.51	1.43 *	27.05	23.66%
<i>North</i>	1.15 *	8.94	1.14 *	8.81	13.75%
<i>South</i>	1.17 *	11.49	1.17 *	11.30	17.48%
<i>Husband's Educ.</i>					
<i>Primary</i>	1.00	<i>Ref.</i>	1.00	<i>Ref.</i>	53.98%
<i>Secondary</i>	0.88 *	-12.40	0.88 *	-12.01	29.09%
<i>High</i>	0.79 *	-13.39	0.79 *	-13.04	8.24%
<i>No Educ, unknown</i>	1.13 *	7.65	1.12 *	7.19	8.37%
<i>Economic Ind.</i>					
<i>GPD per cap.(7)</i>	1.93 *	6.21			
<i>GDP per cap.(11)</i>			3.54 *	15.07	

Events:	70416		70416		
Overall P-value:	0.0000		0.0000		
Chi-square test:	1981.57		2170.73		
Log-Likelihood:	-527567.15		-527472.57		

Note: * $P < 0.01$

Table 2: Estimations for Model 1

Source: Author's estimations

In the table above, the hazard ratios of covariates⁶⁴ are given for 7 year moving average and 11 year moving average optioned GDP per capita; according to these results, it is obvious that decrease in the economic indicator is affecting the marital fertility negatively. However, it is essential to indicate that, the hazard ratio of eleven year calculated economic indicator, shows higher negative effects on the probability of marital fertility. The reason behind this, the difference between actual GDP per capita line and moving average line is higher in the eleven year calculated moving average. In addition, with eleven year moving average GDP per capita rates, strong fluctuations in economic indicator can be reflected more sufficiently. Except this difference in the magnitudes, the estimates have ability to indicate the negative relationship between economic fluctuations and marital fertility properly. For instance, let's say, increase in GDP per capita for good year occurs 6% and for bad years -4%; when we consider the coefficient of GDP⁶⁵ per capita; the interaction of coefficient and occurred increase rate gives us positive number. In addition, this means, increase in GDP per capita is affecting the possibility of childbirth positively. On the other hand, negative result from interaction of coefficient and decrease rate of economic indicator, prove the negative relation between economic crisis and decline in marital fertility. As a result, estimation results indicate that, the relation between marital fertility and economic crisis is negative, and when we consider the previous researches, it could be seen that the outcomes about the relation between marital fertility and economic fluctuations from our study are also proven theoretically.

Second of all, for selected age groups, estimated hazard ratios and their magnitudes occur as we expected except one age group. In addition, we have selected 25 – 29 years old individuals as a reference group since the average age of childbirth for Turkish women is around 22 – 23⁶⁶ for 2003. However, we also added information from 1998 and 1993 demographic and health surveys to our dataset. Therefore higher childbirth probability for 15 – 24 age groups was not surprising due to the shifting in the age of childbirth over time. For other age groups, the probability of childbirth occurs lower than reference group's probability of childbirth. Moreover, this relation occurred as expected and as in the theory; however, it is important to indicate that, the hazard ratio of 44 – 50 age group is estimated higher than 35 – 39 and 40 – 44 groups', this unexpected results led us to investigate the problem; after a brief investigation due to short time period, we come up with one possible explanation, which is related to the censoring process for the last events. More specifically, we censored the births, which are higher than six, and regarding to this the possible age groups for the seven, eight and following births could be 35 – 39 and 40 – 44 age groups since we dropped these childbirths, we could not draw an exact conclusion. In addition, these estimations are still

⁶⁴ Not: Coefficient estimation tables are also given in table 4.

⁶⁵ Note: For seven year moving average option, for further information look at table 4

⁶⁶ Source: Turkey Demographic and Health Survey

acceptable since the fertility decreases in older age compared to the younger ages. However, this unexpected response from older ages motivated us for further researches.

Furthermore, as we mentioned before in the background chapter, the regional differences have significant effects on individuals' lives. In our case, we analyze the marital fertility behavior and its response to economic fluctuations. The estimations indicated that the fertility of east part has the highest rate in the Turkey. We defined the west part of Turkey as a reference group, and according to statistical estimates, the lowest fertility occurs in the Western Turkey. The other parts of Turkey show almost same fertility rates but they are still higher than west part's fertility rate but lower than east part's rate. The biggest difference occurs between Western and Eastern Turkey, as we mentioned before socio economic condition, low education level and terrorism related low living standards shape the fertility behavior of this part. Since, our dataset available for analyzing the relation between education and regional fertility rate; we added the new variable, which is formed by interaction of high education and east region. The estimates⁶⁷ for this new variable show that, the coefficient of this interacted variable has negative sign; this means having higher education in the east part of Turkey affects the fertility negatively. Further studies could be made to analyze this topic, since the aim of this paper is to investigate the relationship between marital fertility and economic fluctuations, we will not give deeper information about education and fertility relation. These considerable differences among east and west parts should not be left unexplained; effect of education on fertility can be understood however, it is obvious that the differences are not only caused by educational differentiation between west and east parts. To clarify the reasons, deeper analysis should be made among these specific regions.

Furthermore, other expected estimates are encountered in the husband's education group; we defined primary education as a reference variable in the group. As we mentioned before, lack of information in women education status and husband's occupation in one survey data forced us to use husband's education status in our statistical analysis to define socio economic status. In addition, previous researches⁶⁸ indicated that the fertility behaviors are also related with husband's education. These findings encouraged us to use husband's education information as a socioeconomic status indicator. As expected, the probability of childbirth occurred lower for higher and secondary education (reference group: primary education); on the other hand, the probability of childbirth for individuals, who have uneducated husband occurred higher than other groups including the reference group. As a result, it has been proven that the education has also significant effects on fertility behavior.

Finally, we also added the type of place variable to our statistical model to analyze the effect of living in rural or urban areas on marital fertility. Besides the proportion differences in urban and rural residents; regression analysis indicated rational estimates, which the probability of childbirth is higher for the residents of rural areas. We explained this relation with integration of women to work life thought; since the proportion of working women in rural area is low due to scarce job opportunities, it is reasonable that living in rural areas affects the probability of childbirth positively.

To show the difference in probability of childbirth, we also prepared graphs from estimations for specific groups, besides the regression estimations, these graphs also help us to realize the fertility differences among different characteristics.

⁶⁷ Coefficient for interaction variable for gd2 and educ2 : -0.0823181 P-value: 0.061

⁶⁸ See, e.g., Martin and Juarez 1995, Breierova and Duflo 2002

In these graphs, smoothed hazard functions for differences in times of events are drawn for education, age and region groups. In the graph below, smoothed hazard function is demonstrated for different age groups, the graph indicates that the smoothed hazard function in differences of event timings is higher for 15 – 24 age group. The second smoothed hazard function is indicating the reference age group, which is 25 – 29 age group. As you can see, other age groups' smoothed hazard functions are located at slightly different values.

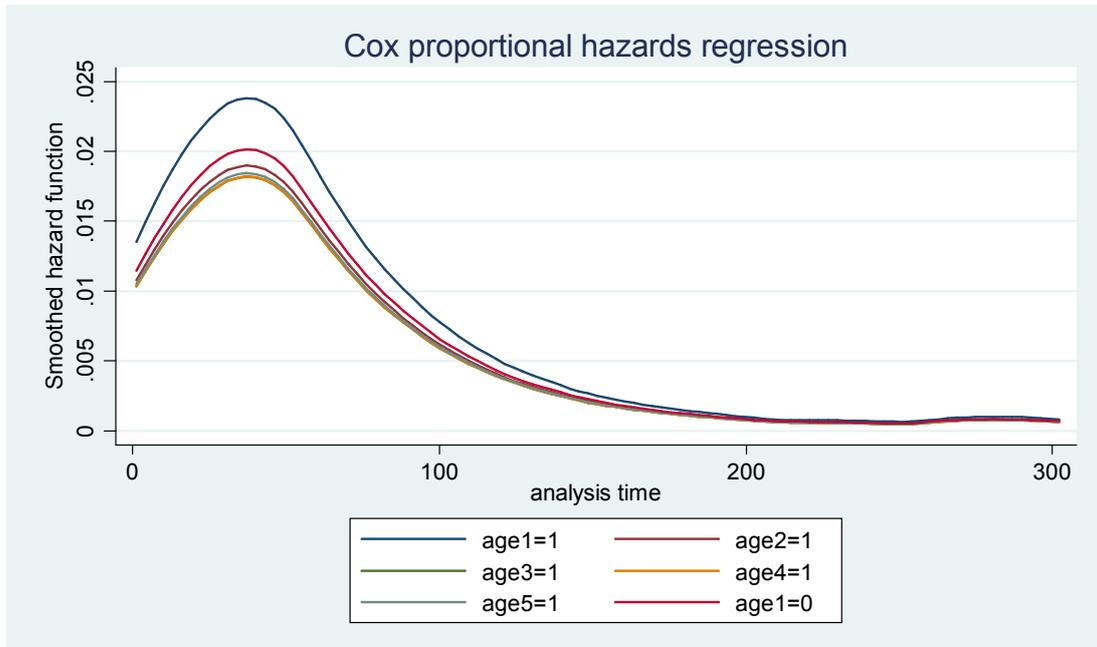


Figure 8: Smoothed hazard function for age groups
 Source: Author's estimations

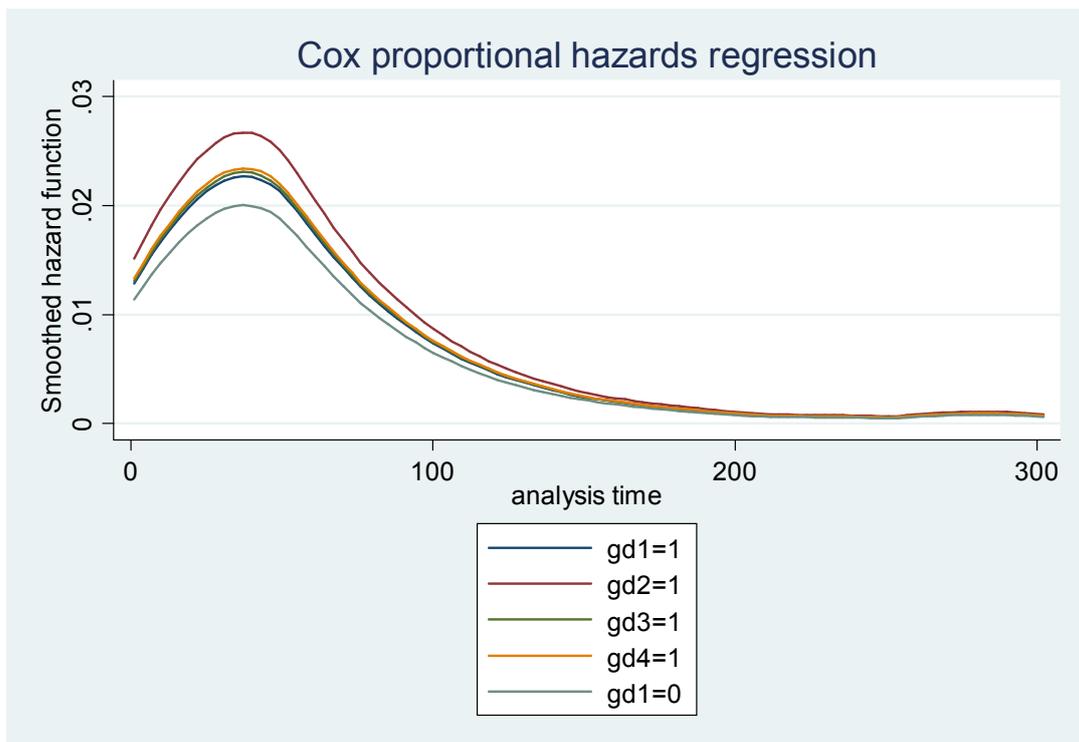


Figure 9: Smoothed hazard function for regional groups

Source: Author's estimations

In the above graph, we drew smoothed hazard function for individuals who live in different regions. As it concluded before, the big difference in marital fertility between east and west part of Turkey can be readily seen from different aspect. Smoothed hazard function for the east part ($gd2 = 1$) is considerable higher than other regional groups. Another remarkable difference in functions occurs for west part, the hazard function ($gd1 = 0$) with the lowest values is drawn for western residents.

In addition to hazard functions, when we consider analysis time in the graphs, it indicates the differences in times of events, which are most likely to locate at left side of graph in our case. In the event history analysis, this was explained with left truncated observation situations. More specifically, most of the differences among intervals are between 0 and 100 in this dataset. (For our case, these numbers symbolize the months, for instance occurred months between first and second births or second and third births.)

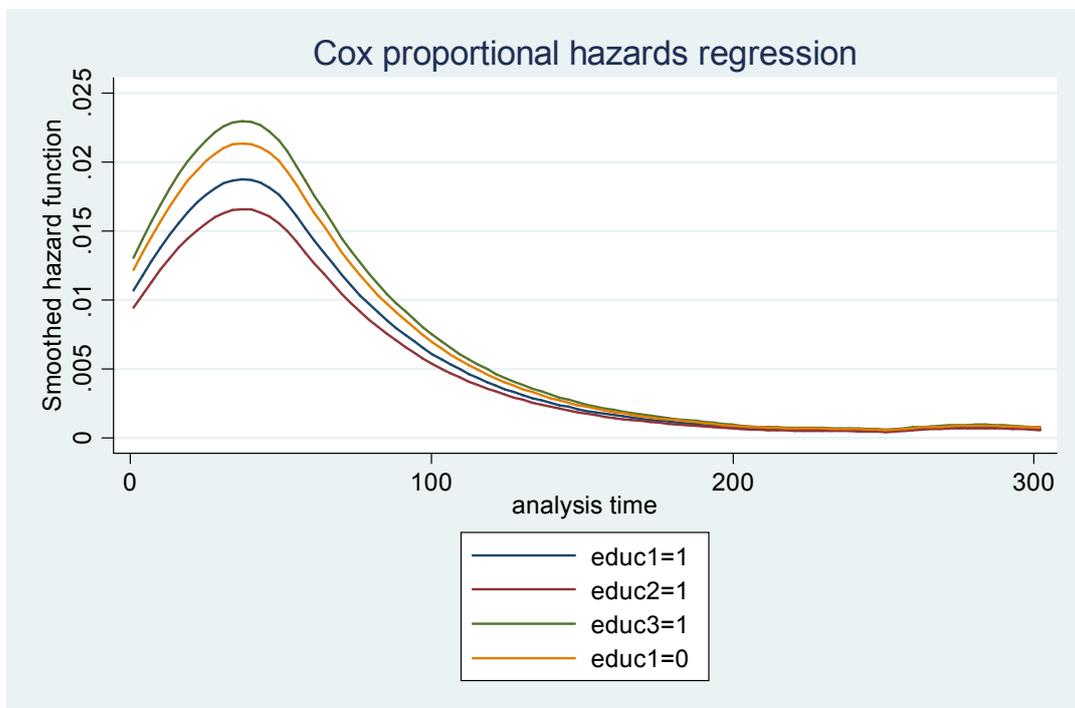


Figure 10: Smoothed hazard function for education groups

Source: Author's estimations

Finally, in the last graph above, smoothed hazard function for education groups can be seen, the negative effect of husband's education on marital fertility is shown again with graphical method. In addition, educ3 coded variable represent the ones whose husband has no education and, educ2 represent the higher educated husbands. For other education groups, hazard function occurs as expected; it is higher for primary education ($educ1=0$) than secondary education ($educ1$) in the same value of differences between time of events.

To show the marital fertility response to economic fluctuations from different specification, we also prepared alternative model, which the statistical method is same but the specification of intervals is different. In this alternative model, more specifically; we excluded the first births from dataset and prepared the necessary time variables for this purpose. In other words,

we took the difference between time of marriage and time of second birth as the first time interval. According to Bengtsson and Dribe, the first births are connected as much with marriage as with decision on fertility, and thus needs somewhat different models and deserve a separate analysis⁶⁹. Because of this reason, we establish new model without first births and its timings to analyze the marital fertility and economic fluctuations relation from this aspect.

<i>Covariates</i>	<i>Hazard Ratio 1</i>	<i>z</i>	<i>Hazard ratio 2</i>	<i>z</i>	<i>Average</i>
<i>Type of Place</i>					
<i>Urban</i>	1.00	<i>Ref.</i>	1.00	<i>Ref.</i>	65.20%
<i>Rural</i>	1.18 *	13.80	1.18 *	13.55	34.80%
<i>Age Groups</i>					
<i>15 – 24</i>	0.96	-1.41	0.96	-1.45	10.01%
<i>25 – 29</i>	1.00	<i>Ref.</i>	1.00	<i>Ref.</i>	15.95%
<i>30 – 34</i>	0.97	-1.48	0.97	-1.48	19.38%
<i>35 – 39</i>	0.94 *	-3.20	0.94 *	-3.32	20.04%
<i>40 – 44</i>	0.96 **	-1.83	0.96 **	-2.15	18.79%
<i>45 – 50</i>	1.01	0.51	1.00	0.08	15.94%
<i>Regions</i>					
<i>West</i>	1.00	<i>Ref.</i>	1.00	<i>Ref.</i>	23.98%
<i>Central</i>	1.28 *	14.54	1.28 *	14.48	20.02%
<i>East</i>	1.98 *	41.32	1.99 *	41.78	24.65%
<i>North</i>	1.30 *	13.68	1.30 *	13.61	13.79%
<i>South</i>	1.38 *	17.97	1.37 *	17.83	17.56%
<i>Husband's Educ.</i>					
<i>Primary</i>	1.00		1.00		55.02%
<i>Secondary</i>	0.75 *	-21.17	0.75 *	-20.87	27.92%
<i>High</i>	0.58 *	-22.19	0.59 *	-21.96	7.62%
<i>No Educ, unknown</i>	1.27 *	12.79	1.26 *	12.33	7.76%
<i>Economic Ind.</i>					
<i>GPD per cap.(7)</i>	1.26 **	1.77			
<i>GDP per cap.(11)</i>			2.59 *	9.11	
<i>Events:</i>	52530		52530		
<i>Overall P-value:</i>	0.0000		0.0000		
<i>Chi-square test:</i>	3880.34		3960.50		
<i>Log-Likelihood:</i>	-328902.43		-328862.35		

Note: * $P < 0.01$, ** $P < 0.10$

Table 3: Estimations for Model 2

Source: Author's estimations

⁶⁹ Bengtsson T. and Dribe M., Fertility Response to Short-Term Economic Stress: Deliberate Control or Reduced Fecundability, 2002 pp. 12

In the table above, estimated hazard ratios for covariates⁷⁰ are given for second model. First of all, there are considerable differences in the hazard ratios of variables compared to the first model. Especially, for the age groups; all estimated hazard ratios were statistically significant in the first model, however, excluding first births affected the estimations, and thus we have only two statistically significant variables left in the age groups. The dummy for 45 – 50 ages group is highly insignificant that the magnitude of hazard ratio also theoretically meaningless. Furthermore, if we consider the regional group estimated hazard ratios, it can be seen that the second model's pattern for probability of childbirth is identical with first model; however it is noticeable that the magnitudes of hazard ratios are stronger in the second model when they are compared with reference variable in the group. This means that the proportion of individuals who have only one child is higher for Western Turkey than other regional parts. From here, it can be also understood that the proportion of one child families is lowest in the east part of Turkey. Furthermore, hazard ratios' magnitudes are also higher for education group in the second model. More specifically, for high education group, the magnitude of hazard ratio is more than twice of first model's high education hazard ratio. This also means that the proportion of individuals who have one child is higher for this characteristic group, thus negative effect of education on second birth considerably increased in the second model. Moreover, other substantial difference occurs in our economic indicator variable. Hazard ratio of the GDP per capita variable with seven years moving average option is only statistically significant at ten percent level. On the other hand, variable for eleven years moving average is still consistent, if we compare its hazard ratio with first model's estimation; its magnitude has slightly declined.

To sum up, we prepared two different statistical specifications to analyze the effect of economic crisis on marital fertility. In the first model, analyzed events were starting from marriage and including the first childbirths of individuals. In addition, the ending events for interval were the year of survey; since we could not collect information of individuals after the surveys, age of 44; since the biological clock of women is likely to stop at this ages, we do not need to analyze the probability of childbirth for this group, and birth date of sixth children; it was decided to use date of sixth birth when we consider the distribution of children in the dataset, there were significant decline in the proportion of seventh births after the sixth births. In addition to this, estimations for first model were statistically significant; but the only problem was in 45 – 50 age groups, according to calculations, the probability of childbirth of this age group was higher than 40 – 44 and 35 – 39 age groups' probabilities. Therefore to explain this problem, we pointed out sixth birth censoring process. Unfortunately, due limited time period and resources, we could not find an exact solution for this incident but it motivated us to investigate it deeper. On the other hand, further estimations occurred as we expected, briefly; the probability of childbirth was highest in rural areas, in east part of Turkey and for uneducated persons' spouses, and from other aspect, it was lowest in urban areas, in west part and for high educated persons' spouses.

In the second model, we exclude the first births since the first births are more likely to be related with marriage than fertility. We set the first interval between marriage and second birth, the others are left identical with first model. The censored events are also same in the second model. However, results from statistical analysis indicated us; there are significant differences for variables in the model. The most noticeable ones were the age group variables; some of them were statistically insignificant and some of them were also theoretically

⁷⁰ Not: Coefficient estimation tables are also given in the table 5.

meaningless. For other groups of variables, the magnitudes of probabilities were higher than the first model's estimations. We explained this relation with high amount one childed families in the reference groups. Besides these findings, the negative connection between marital fertility and economic crisis has been proven again for individuals, who have different social characteristics. The aim of this paper was to investigate the marital fertility responses to economic fluctuations. Using the micro demographic data with macro economic data, and employing event history analysis, gave us the opportunity to analyze the marital fertility response at individual level. Findings from two models generally approved the theoretical considerations, and the ones were left unexplained motivated us to further researches.

6. Conclusion

The purpose of this research paper was to investigate the marital fertility responses to economic fluctuations for Turkey. In the first place, lack of studies those investigates this demographic and economic connection for Turkey in the literature motivated us to research this topic. To study this relation at individual level, we collected necessary information from three different demographic and health surveys. In this process, we also encountered some problems in the process of preparation, for instance; the sample size could be bigger in this research and we could investigate longer time periods; unfortunately, provider of survey data did not response to our requests for datasets. Thus, we prepared our dataset from three different demographic and health surveys to research the relation between marital fertility and economic fluctuations. Furthermore, Bengtsson and Dribe's micro studies in the literature lead us to analyze this relationship at individual level. Combining micro demographic data with macro economic data gave us the ability to analyze the marital fertility response to economic fluctuation for different age groups, regions, education levels, and so on. With this type of study, considerable differences were found in the marital fertility response to economic fluctuations among specific characteristics, since the macro approach was insufficient for analyzing the responses for different characteristics. With this research, we also realized the importance of event history analysis to analyze the micro level data.

To analyze this relation, two models were used in this paper; one model were including all births except higher than sixth births as an event in our dataset. And in the other model, we restricted the first births since the relationship of this event seems more likely to relate with marriage than fertility. The outcomes from statistical analysis were satisfactory, except age groups; there were also differences between two models estimations, however; the pattern for regional, education and type of place characteristics were same in the two model. More over, these differences in magnitudes of coefficients were understandable; on the other hand, the unexplainable 44 – 50 age group responses motivated us for deeper researches in the future. According to results, it is essential to indicate that the fertility difference between Eastern and Western Turkey was considerable. Besides this, the education level was also low in the east part of Turkey. These differences lead us to add new interaction variable for eastern residents who has high education, to the model; the result of estimations occurred as expected, the sign of the coefficient was negative; it meant, high educated people from east part of Turkey are likely to have fewer children. However, it was not our purpose of this research the relation between education and fertility among regions but considerable differences in statistical estimations made this relation questionable and created new ideas for future researches.

As a conclusion, working with micro demographic data provided priceless information about individuals in different characteristics. We understood how the macro level studies for large populations might be insufficient to explain relations for specific groups. We analyzed the effect of economic fluctuations on marital fertility for Turkey, estimated the responses for individuals who have different characteristics. Most of the outcomes were occurred as we expected in our statistical analysis. Besides these findings, it is still hard to explain the relations those are related to human beings; from early times of civilization to now, philosophers, historians, demographers, and so on. have tried to explain human being related phenomenon but could find exact same pattern for all human beings. It is impossible that to consider a group of human beings as one characteristic person, at this point; micro studies provide priceless information, however it is still hard to draw exact conclusion since the micro dataset we have only samples of whole population. In other words, the best method to explain the relationship between marital fertility and economic fluctuations is the micro data analysis. We employed and espoused this method for our research and reached mostly expected results. As a result, the ones left unexplained generated our destinations for research purpose.

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Appendix

Coefficient Tables for Estimated Models

<i>Covariates</i>	<i>Coefficient 1</i>	<i>z</i>	<i>Coefficient 2</i>	<i>z</i>	<i>Average</i>
<i>Type of Place</i>					
<i>Urban</i>	<i>Reference</i>	<i>Ref.</i>	<i>Reference</i>	<i>Ref.</i>	66.06%
<i>Rural</i>	0.0937473 *	9.61	0.0910228 *	9.33	33.94%
<i>Age Groups</i>					
<i>15 – 24</i>	0.16888 *	8.78	0.166432 *	8.65	11.24%
<i>25 – 29</i>	<i>Reference</i>	<i>Ref.</i>	<i>Reference</i>	<i>Ref.</i>	16.47%
<i>30 – 34</i>	-0.0998769 *	-6.59	-0.0999839 *	-6.60	19.47%
<i>35 – 39</i>	-0.1528574 *	-10.16	-0.1557407 *	-10.35	19.84%
<i>40 – 44</i>	-0.1502007 *	-9.76	-0.1593811 *	-10.35	17.95%
<i>45 – 50</i>	-0.1289632 *	-8.02	-0.1441732 *	-8.94	15.03%
<i>Regions</i>					
<i>West</i>	<i>Reference</i>	<i>Ref.</i>	<i>Reference</i>	<i>Ref.</i>	24.98%
<i>Central</i>	0.1248895 *	9.23	0.1233757 *	9.12	20.13%
<i>East</i>	0.3487824 *	26.51	0.3558943 *	27.05	23.66%
<i>North</i>	0.135691 *	8.94	0.1337609 *	8.81	13.75%
<i>South</i>	0.1613067 *	11.49	0.1586388 *	11.30	17.48%
<i>Husband's Educ.</i>					
<i>Primary</i>	<i>Reference</i>	<i>Ref.</i>	<i>Reference</i>	<i>Ref.</i>	53.98%
<i>Secondary</i>	-0.1322039 *	-12.40	-0.1281633 *	-12.01	29.09%
<i>High</i>	-0.2380318 *	-13.39	-0.2319544 *	-13.04	8.24%
<i>No Educ, unknown</i>	0.1228148 *	7.65	0.1154415 *	7.19	8.37%
<i>Economic Ind.</i>					
<i>GPD per cap.(7)</i>	0.6594368 *	6.21			
<i>GDP per cap.(11)</i>			1.264846 *	15.07	
<i>Events:</i>	70416		70416		
<i>Overall P-value:</i>	0.0000		0.0000		
<i>Chi-square test:</i>	1981.57		2170.73		
<i>Log-Likelihood:</i>	-527567.15		-527472.57		

Note: * $P < 0.01$

Table 4: Estimations for Model 1

Source: Author's estimations

Covariates	Coefficient 1	z	Coefficient 2	z	Average
Type of Place					
Urban	<i>Reference</i>	<i>Ref.</i>	<i>Reference</i>	<i>Ref.</i>	65.20%
Rural	0.1649821 *	13.80	0.1619261*	13.55	34.80%
Age Groups					
15 – 24	-0.0421937	-1.41	-0.0434184	-1.45	10.01%
25 – 29	<i>Reference</i>	<i>Ref.</i>	<i>Reference</i>	<i>Ref.</i>	15.95%
30 – 34	-0.0292102	-1.48	-0.0292255	-1.48	19.38%
35 – 39	-0.0619453 *	-3.20	-0.0643238 *	-3.32	20.04%
40 – 44	-0.0360493 **	-1.83	-0.0422412 **	-2.15	18.79%
45 – 50	0.0102751	0.51	0.0016286	0.08	15.94%
Regions					
West	<i>Reference</i>	<i>Ref.</i>	<i>Reference</i>	<i>Ref.</i>	23.98%
Central	0.2511013 *	14.54	0.2499891*	14.48	20.02%
East	0.6831377 *	41.32	0.6908015*	41.78	24.65%
North	0.2624784 *	13.68	0.2609666*	13.61	13.79%
South	0.3197739 *	17.97	0.3172144 *	17.83	17.56%
Husband's Educ.					
Primary	<i>Reference</i>		<i>Reference</i>		55.02%
Secondary	-0.2888207 *	-21.17	-0.2848665 *	-20.87	27.92%
High	-0.5390887 *	-22.19	-0.5336029*	-21.96	7.62%
No Educ, unknown	0.2387413 *	12.79	0.2302766*	12.33	7.76%
Economic Ind.					
GPD per cap.(7)	0.2348944 **	1.77			
GDP per cap.(11)			0.9533238 *	9.11	
Events:	52530		52530		
Overall P-value:	0.0000		0.0000		
Chi-square test:	3880.34		3960.50		
Log-Likelihood:	-328902.43		-328862.35		

Note: * $P < 0.01$, ** $P < 0.10$

Table 5: Estimations for Model 2

Source: Author's estimations

Turkey Map with 5 Regions

