UEİP
http://dergipark.org.tr/ueip

Uluslararası Ekonomi, İşletme ve Politika Dergisi
International Journal of Economics, Business and Politics
2022, 6 (2), 338-351

Araştırma Makalesi / Research Article

SOCIOECONOMIC ASPECT OF REGIONAL DIFFERENCES IN DECLINING FERTILITY BEHAVIOR IN TURKEY

Özlem DÜNDAR[1]

Abstract

Although the fertility rate in Turkey has decreased in recent years, it continues to differ according to the regions. For this reason in the study, it is aimed to determine the socioeconomic factors that affect the probability of fertility behavior in regions with a fertility rate above the average. In this context, the socioeconomic dimension of fertility behavior was investigated by logistic panel regression analysis using the second level (26 subregions of Turkey) Nomenclature of Units for Territorial Statistics (NUTS2) data of the Turkish Statistical Institute (TSI) for the period 2009-2020. According to the results of the analysis, women's employment rate, per capita gross domestic product, inflation rate and the number of high school graduate women have a negative effect on the probability of fertility behavior in regions with a fertility rate above the average. While the number of women who graduated from college and faculties and the rate of urbanization have a positive effect on the probability of fertility behavior in these regions, the average age at first marriage of women has no effect.

Keywords: *Fertility Behavior, Regional Differential, Socioeconomic Factors, Logistic Panel Regression Analysis*

TÜRKİYE'DE DOĞURGANLIK DAVRANIŞININ AZALMASINDA BÖLGESEL FARKLILIKLARIN SOSYOEKONOMİK BOYUTU

Öz

Türkiye'de doğurganlık hızı son yıllarda azalış göstersede bölgelere göre farklılık göstermeye devam etmektedir. Bu nedenle çalışmada, doğurganlık hızı ortalamanın üzerinde olan bölgelerde doğurganlık davranışı olasılığını etkileyen sosyoekonomik faktörlerin belirlenmesi amaçlanmaktadır. Bu kapsamda çalışmada doğurganlık davranışının sosyoekonomik boyutu, 2009-2020 dönemi için Türkiye İstatistik Kurumu'nun ikinci düzey İstatistiki Bölge Birimleri Sınıflandırması (İBBS2) verileri (Türkiye'nin 26 alt bölgesi) kullanılarak lojistik panel regresyon analiziyle araştırılmıştır. Analiz sonucuna göre doğurganlık hızı ortalamanın üzerinde olan bölgelerde doğurganlık davranışında bulunma olasılığına kadınların istihdam oranı, kişi başına gayri safi yurt içi hasıla, enflasyon oranı ve lise mezunu kadınların sayısının negatif yönde etkisi bulunmaktadır. Söz konusu bölgelerde doğurganlık davranışında bulunma olasılığına yüksekokul ve fakülte mezunu kadınların sayısı ve kentleşme oranının pozitif yönde etkisi bulunmaktayken, kadınların ortalama ilk evlenme yaşının etkisi bulunmamaktadır.

Anahtar Kelimeler: *Doğurganlık Davranışı, Bölgesel Farklılıklar, Sosyoekonomik Faktörler, Lojistik Panel Regresyon Analizi*

[1] *Asst. Prof. Dr., Hitit University, Faculty of Economics and Administrative Sciences, Department of Labour Economics and Industrial Relations, ozlemdundar@hitit.edu.tr, orcid.org/0000-0002-3091-1433*

Geliş Tarihi / Received:02.08.2022 *Kabul Tarihi / Accepted:30.09.2022*

1. Introduction

The fertility rate is related to the socioeconomic structures of the countries. A high rate of increase or decrease in the fertility rate causes different socioeconomic problems in countries. While the continuous decrease in the fertility rate causes a decrease in the active population, at the same time, the increase in the ratio of the elderly population to the total population will create an increase in the dependent population. The continuous increase in the fertility rate will create inadequacy in resources due to unlimited needs. Thus, the national income and welfare level of the country will decrease. For these reasons, the fertility rate is important for the country's economy.

The fertility rate differs according to the socioeconomic structures of the countries, as well as according to the socioeconomic structures of the regions of a country. Indicators such as gross domestic product per capita, unemployment, employment, inflation and education level in a country are the most important indicators of a country's socioeconomic structure. The improvement of these indicators can be accepted as an indicator of the socioeconomic development of societies.

As a result of economic and social development, the position of women in society and family has changed in cities where modernization has been observed. There has been an increase in women's employment and education levels. Women spend more time in order to achieve success in business and education life, and they do not have much time for childcare at home. The fact that women take more part in business and education life may cause a decrease in fertility behavior. Thus, the number of children married couples have decreased. Even if a woman with a high education level works for a high wage, her expenditure for the education and care of the child has increases in direct proportion to her wages. For these reasons, the cost of the child to the family does not decrease, but there is a decrease in fertility behavior. Again, with the effect of urbanization and modernization, there may be a decrease in fertility behavior as a result of the increase in the average age at first marriage.

Some women do not work because they do not accept the current working conditions and minimum wage level. Some women continue their lives as housewives. Some of these women participate in business life due to bad economic conditions and the fact that only the man's salary is not sufficient in the family. These women mostly have a low level of education and income, and their working hours are long. Therefore, they can spend less on the care of their children. They can spend less time with their children. Since the children of these women will have a high cost to the family, there will be a decrease in their fertility behavior.

These socioeconomic effects differ according to regions and periods. According to the 2008 report of the Turkey Demographic and Health Survey (TDHS), a pronatalist population policy was followed until the end of the 1950s. Structural changes were seen after 1980 emerged with the effect of liberalization in the economy. The change in economic policies also changed the demographic structure, and the effects of urbanization and modernization were predominantly felt in this period. The study, it was aimed to determine which socioeconomic

conditions affected on fertility behavior in regions with high fertility rates during the analysis period (2009-2020). In the analysis period, it was aimed to determine whether modernization or economic conditions were more effective in decreasing fertility behavior. It was aimed to determine whether there were differences according to periods in the reason for the decrease in fertility behavior in Turkey. Although fertility behavior decreases in some regions, it has been investigated which factors are effective in its higher rate compared to other regions. For this, first of all, domestic and foreign studies on the subject were examined, the analysis method was explained and the analysis results were interpreted.

In the few studies conducted for Turkey on the subject, no studies using the logistic panel regression method were found for 26 sub-regions of Turkey. The method in question was used by Hofmann and Hofmann (2013) in their studies on the subject of Germany. Bhaumik and Nugent (2005) conducted research on the subject for Germany by using a random-effect probit model, such as the logit model, in which the dependent variable is used qualitatively. There were no studies (in Turkey or countries other than Turkey) in which the inflation rate, which is an indicator of the cost of living, was used as an independent variable in the analysis. Cost of living is one of the most effective factors in the decrease in fertility in Turkey in recent years. A few studies on the subject of Turkey have generally not been done recently. For this reason, the fact that the inflation rate is included in the analysis makes the study different from other studies in Turkey. In addition, although there is a decrease in fertility in Turkey, there were found no studies investigating the reason for the regional differential in fertility. The results of the analysis show that even though fertility decreased in all regions during the analysis period, the most effective factor in the fact that it is higher in some regions compared to others is economic factors. For these reasons, the study will contribute to the literature.

2. Fertility According to Economic Theories

According to Willis (1973), economists in the 1960s argued that fertility analysis was not within the scope of economic theory. The economic reasons for fertility have been neglected as fertility is difficult to incorporate into the traditional theory of consumer choice. It has been stated that the main problem in making the economic analysis of fertility behavior is the conceptual definition of the cost and satisfaction measures of children towards their parents. As a result of developments in economic theory, household behaviors have begun to be explained outside of traditional consumer theory. Thus, fertility behavior is explained by associating it with economic factors (such as income, consumption, savings and labor behavior) (Willis, 1973: 15-17).

There are various views on economic theories about fertility. According to Malthus (1798), there is a negative relationship between economic difficulties and fertility. Malthus (1798) suggested that as economic difficulties increase, there will be a decrease in fertility and marriage behaviors, and thus the rate of population growth will also decrease. According to Malthus (1798), there is a positive relationship between income level and fertility rate. When income rises, a decrease

in child mortality (if the decrease in births does not offset the decrease in child mortality) and an increase in early marriage may increase the birth rate (Malthus, 1798: 58-89; Becker, 1960: 212). According to the neoclassical theory income level, unemployment rate, youth unemployment rate, irregular employment rate, women's labor force participation rate, women's education level, infant mortality rate, industrialization rate, developments in the social security system and the cost of raising children have a negative effect on fertility behavior (Bhaumik ve Nugent, 2005: 5; Kreyenfeld, 2005: 4-6). According to this theory while women's wage increases decrease fertility increasing the opportunity cost of childbearing (Winkelmann ve Zimmermann, 1994: 213).

Becker (1960) carried out his economic analysis of fertility by relating Malthus (1798)'s theory of population to the number and quality of children. Becker (1960) argues that the fact that families see their children as a source of income and satisfaction causes the child to be assumed as durable consumer goods in economics terminology. Therefore, similar to durable consumer goods, children can benefit and incur costs. When there is an increase in the income level, there will be an increase in the demand for children and expenditures, like the increase in the demand for durable goods. While expenditures made by families for their children (such as education and course expenses) create costs, they also increase the quality of children. According to Becker (1992), the relationship between income level and fertility is determined by the income effect (number of children) and substitution effect (child quality). Becker (1992) hypothesized that an increase in the income level creates a greater increase in the quality of the child than the number of children. In the literature, these effects differ according to the level of development of the countries. In developed countries, the increase in income creates a substitution effect and there has been an increase in the quality of the child. In developing countries, the increase in income creates an income effect and there has an increase in the number of children. Becker (1992) argued that there is a negative relationship between the social security system and fertility. Accordingly, the increase in the state support given to the elderly population as a result of the developments in the social security systems will reduce the dependency ratio of the elderly population to their children, thus reducing fertility (Becker, 1960: 210-212; Becker, 1992:199).

3. Literature Review

Adsera and Menendez (2011) investigated the relationship of fertility with economic shocks and labor market (economic uncertainties) for 18 Latin American countries with micro and macro analysis. In the study, an unbalanced panel data analysis was performed because the data of the variables differed according to the years. In the analysis, Generalized Least Squares (GLS) method with macro data and Cox Proportional Hazard Models (CPHM) with microdata were used. According to the results of the analysis, there is a positive relationship between the economic conjuncture and the changes in fertility. Unemployment and poor economic conditions reduce fertility. There is a positive relationship between the delayed fertility of educated young women and bad economic conditions.

Başkaya and Özkılıç (2017) investigated the socioeconomic and cultural reasons of the difference in fertility rates at the provincial and regional level in

Turkey by interpreting TUIK data. According to the results of the study, the fertility rate is high in the Eastern and Southeastern Anatolia regions due to the socioeconomic development level, the low age at first marriage and the high desire for male children. In the Aegean and Marmara regions, the fertility rate is low due to the high of socioeconomic development level, industrialization level, age at first marriage, labor force participation rate, urbanization rate, education level and the rate of immigration received by the region.

Bhaumik and Nugent (2005) investigated the effect of economic uncertainty on fertility using the survey data for the period 1992-2002 for East Germany and the survey data for the period 1984-2002 for West Germany with the random effect probit model method. According to the results of the analysis, the fact that employment uncertainty is higher in East Germany than in West Germany has created an extraordinary decrease in fertility.

Deliktas et al. (2008) investigated the effect of industrialization level, schooling rate, per capita income and urbanization rate on the fertility rate in Turkey with Path analysis. According to the results of the analysis, industrialization level, per capita income and schooling rate have a negative effect on the fertility rate, while the urbanization rate has a direct positive and an indirect negative effect. The total effect (direct and indirect) of all independent variables on the fertility rate is positive.

Hofmann and Hofmann (2013) investigated the effect of economic uncertainty on fertility behavior in Germany with logistic regression analysis using the 2000-2005 survey data. According to the results of the analysis, there is a negative significant relationship between economic problems and fertility in women aged 26-44.

İğdeli (2019) investigated the relationship between fertility and economic uncertainty in Turkey with Autoregressive Distributed Lag (ARDL) analysis using data from 1990-2017. Economic uncertainty has been measured with the GARCH analysis, which is derived from income fluctuations, using conditional expectation operators and unemployment rates. According to the results of the analysis, economic uncertainty and unemployment rates have a negative effect on the fertility rate.

Kreyenfeld (2005) investigated the relationship between economic uncertainty (unemployment, fixed term employment contract, low income) and the first birth decision for Germany by using event the history method using data from 1984-2016. According to the results of the analysis economic uncertainty reduces fertility by delaying parenthood. Highly educated women delay parenting when they are unemployed. Low educated women, on the other hand, are ready to become parents when there is insecurity in the market.

Kohler and Kohler (2002) investigated the reasons for the decline in fertility in Russia in the early and mid 1990s. According to the results of the research, there has been a decrease in fertility due to the economic difficulties encountered with the transition to the market economy after 1989. According to the Russia

longitudinal research, there is a positive relationship between fertility, labor market crisis and labor market uncertainty. In the study, it was stated that this positive relationship was accepted as a surprising situation in terms of the economic theory of fertility.

Kutlar et al. (2012) investigated the relationship between female labor force participation rate, wage, divorce rate and fertility in Turkey in the period of 1988-2009 by using the Granger causality test, cointegration analysis and impulse response analysis. According to the cointegration analysis results, there is a positive relationship between fertility and wage. According to the Granger causality test results, divorce and wages are the Granger cause of fertility. According to impulse response analysis, the response of fertility to the change in wage level (such as the fear of wage cut and decrease or such as wage increase) and the change in female labor force participation rate is negative.

Örsal and Goldstein (2010) investigated whether there is a short term change in the effect of economic conditions on fertility for OECD countries by using panel data analysis using the 1976-2008 period data. In the study, it has been suggested that there is high fertility when economic conditions are good, and low fertility in recession periods. According to the results of the analysis, fertility is positively associated with good economic conditions.

Özgür (2004) investigated the reasons for the regional differential in the fertility rate in Turkey using the spatial distribution method (by creating a map with the ArcGIS 8.3 program). According to the results of the research, as the employment rate of women in the nonagricultural sector, the level of education and urbanization rate increases, fertility decreases. The fertility rate is high in the Southeastern Anatolia region.

Ranjan (1999) investigated the decline in birth rates in the former Soviet republics and Eastern Europe using a two period theoretical stochastic model. In the study, it was concluded that childbearing was delayed during periods of increased income uncertainty. While individuals above the threshold income level want to have children, those below the threshold income level expect income uncertainty to decrease.

Schneider (2015) investigated the relationship between fertility and poor economic conditions in the United States with fixed effect panel data analysis using state level data for 2001-2012 and county level for 2001-2010. According to the results of the analysis (for both models), there is a strong negative relationship between bad economic conditions (such as unemployment during the economic recession) and fertility. There is a negative relationship between unemployment, economic uncertainty and fertility. There is a positive relationship between consumer confidence and fertility.

Selim and Bilgin (2021) investigated the effect of migration on the fertility rate in Turkey with the Robust Poisson Regression model based on the selectivity hypothesis. In the analysis, 2013-year Turkey Demographic and Health Survey data were used. According to the results of the analysis, the variables (women's education level, woman's age at marriage, man's age, woman's age at first birth, household welfare level) that affect the fertility of women living in urban and rural

areas do not affect the fertility of women who migrate from the city to the countryside. This is an indication that the selectivity hypothesis is not valid for women migrating from the city to the countryside.

Selim and Üçdoğruk (2003) investigated the factors affecting fertility (number of children) for 7 provinces of Turkey (One province was selected from each region where fertility differs. These provinces are İstanbul, İzmir, Adana, Samsun, Ankara, Malatya and Diyarbakır) using the Poisson Quasi Maximum Likelihood method. According to the results of the analysis the education level, employment and income level of women have a negative effect on fertility. Total income in the household has a positive effect on fertility. The number of children is higher in all provinces except Istanbul.

Selim ve Üçdoğruk (2005) investigated the factors affecting fertility in Turkey with the Poisson Quasi Maximum Likelihood method based on the quality quantity approach proposed by Becker (1960) and developed by Becker and Lewis (1973) and Willis (1973). According to the results of the analysis, the education level of women and men, female labor force participation rate affect fertility negatively. The male labor force participation rate has a positive effect on fertility.

Song and Kuang (2021) investigated the fertility behavior of people with different cultural degrees in China with linear regression analysis. In the analysis, data from China, China's Guangdong province, and China's Shanghai municipality were used. The hypothesis of the study is that fertility rate is negatively correlated with cultural degree. According to the results of the analysis, while there is a positive relationship between the age at first childbearing and the education period, there is a negative relationship between the education period and the fertility rate.

Vignoli (2020) theoretically investigated the relationship between fertility and economic uncertainty in European countries. According to the results of the study, global economic uncertainty reduces fertility. Parents expect their employment to be stable in their childbearing decisions.

Werding (2014) investigated different economic fertility models. According to the results of the research, there are limitations in economic fertility models. Everything that is theoretically challenging cannot be investigated empirically. It has been determined that the studies examining the economic aspect of fertility are mostly theoretical. In the study, it is recommended to conduct joint research on fertility, which is interdisciplinary.

4. Data Set and Method

In this study, fertility behavior based on economic factors was investigated by logistic panel regression analysis using the data of the Turkish Statistical Institute (TSI) for the period 2009-2020 according to the second level (26 subregions of Turkey) Nomenclature of Units for Territorial Statistics (NUTS2).

Fertility rate (number of children per mother in the age group 15-49 years) was used as the dependent variable in the analysis. Women's employment rate,

age (15-54 age groups), gross domestic product per capita, inflation rate (consumer price index), the number of high school and faculty graduate women (according to the age groups of 15-54), the number of high school graduate women (according to the age groups of 15-54), average age at first marriage for women and urbanization rate were used as independent variables.

The fact that the fertility rate data started in 2009 and the per capita gross domestic product data were not available after 2020 were effective in determining the analysis period. The data of all the variables in the analysis were obtained from the regional statistics of the Turkish Statistical Institute. Empirical findings were obtained using the Stata 16.0 package program.

The analysis, it was aimed to determine the regions where the fertility rate is above the average compared to the 26 subregions. Since the data set of the fertility rate variable showed a normal distribution, the average value of the fertility rate was determined as (2.13) according to the 26 subregions. The dependent variable was turned into a qualitative variable by giving "1" to the regions[2] with values above the mentioned value and "0" to the others. Thus, the dependent variable was made suitable for logistic panel regression analysis.

While the cross sectional data expresses the number of observations of more than one unit (such as an individual, company, country, region, or province) in a year, the time series expresses the number of observations of a unit (such as a country, a province) in a certain period. Panel data, on the other hand, refers to the number of observations of more than one unit (such as more than one individual, company, country, region, province) in a certain period. The panel data consists of cross section and time series.

In the regression analyses made with the aforementioned data, dummy variables can be dependent as well as independent variables. Dependent dummy variables can take two values (such as 1-0) or multiple values (such as 1-2-3-4-5). It can indicate preference when the dependent variable is in the qualitative state. For this reason, these models are called qualitative preference models. The parameters of the linear probability model from qualitative preference models can be estimated using the least squares method. However, in this case, the basic assumptions about the error term (constant variance and normality assumption of the error term are not valid) may not be valid. In the linear probability model, the coefficient of determination may be small and the theoretical values may go out of the range of 0-1. For these reasons, the use of linear probability models with panel data should not be preferred. In the literature, it is seen that panel logit (logistics panel regression) and panel probit (logistics probit regression) models are mostly used (Güriş ve Çağlayan, 2013: 374-376; Tatoğlu, 2013:161-162).

In logistic panel regression models, which are also expressed as non-linear panel data models or models with limited dependent variables, the dependent

[2] *The fertility rate of Konya, Karaman (TR10), Adana, Mersin (TR12), Hatay, Kahramanmaraş, Osmaniye (TR13), Kırıkkale, Aksaray, Niğde, Nevşehir (TR14), Kayseri, Sivas, Yozgat (TR15), Erzurum, Erzincan, Bayburt (TR20), Ağrı, Kars, Iğdır, Ardahan (TR21), Van, Muş, Bitlis, Hakkâri (TR23), Gaziantep, Adıyaman, Kilis (TR24), Şanlıurfa, Diyarbakır (TR25), Mardin, Batman, Şırnak, Siirt (TR26) regions (compared to most years in the 2009-2020 period) is above the average fertility rate of the 26 subregions.*

variable (for the i. unit at t. time) takes the value of 1 if the event has occurred, and 0 if it has not. In logistic panel regression models, which are also expressed as non-linear panel data models or models with limited dependent variables, the dependent variable (for the i. unit at t. time) takes the value of 1 if the event has occurred, and 0 if it has not. The ratio of the probability of an event occurring to the probability of the event not occurring is called the odds ratio (odds ratio). Independent variables with odds ratio greater than one have a significant effect on the dependent variable. Logistic models are created by taking the natural logarithm of the odds ratio. In these models, the coefficients are interpreted according to the marginal effects (Gujarati, 2004: 596; Tatoğlu, 2013: 161-175).

As in panel data analysis, fixed and random effect models are seen in logistic panel regression analyses. In fixed-effect logistic panel regression models, changes due to units, units and time only change the constant of the model. The Maximum Likelihood Method is used to estimate these models. In random effect logistic panel regression models, units, differences according to units and time are included in the model as a component of the random error term. Wald Test is used to estimate these models. In random effect logistic panel regression models, there is no relationship between explanatory variables and error terms, while there is a relationship in fixed effect logistic panel regression models. The choice between fixed-effect logistic panel regression models and random-effect logistic panel regression models is made with the Hausman test. If the error term of the random effect logistic panel regression model is related to the explanatory variables, the null hypothesis is rejected. In this case, the fixed effect logistic panel regression model is valid. If the error term of the random effect logistic panel regression model is not related to the explanatory variables, the null hypothesis is accepted. In this case, the random effect logistic panel regression model is valid (Hausman, 1978: 1260-1270; Peracchi, 2001: 399; Tatoğlu, 2013: 166-177).

5. Findings and Results

The variables in Table 1, which includes the analysis results below, have been abbreviated within the scope of Table 1. According to this, fertility rate (*fr*), women employment rate (*wer*), gross domestic product per capita (gdppc), consumer price index (*cpi*), the number of women graduated from college and faculties (*cfgw*), the number of high school graduate women (*hsgw*), average age at first marriage of women (*afmw*) and urbanization rate (*ur*) as abbreviated. Descriptive statistics (standard deviation and mean) of the variables included in the analysis are given in the appendix at the end of the study.

Table 1: Random Effects Logistic Panel Regression Analysis Results

Dependent Variable: Fertility Rate (fr) **Period:** 2009-2020 **Cross Section Number:** 26 **Observation Number:** 312						
Variables	**Coefficients**	**Standard Error**	**Z Table Value**	**P Probability Value**	**Marginal Effects**	**Odds Ratio**
wer	-0. 3242430	0. 0786427	-4.12	0.000***	-0.0051346	0.7230745
gdppc	-0. 0006882	0.0002133	-3.23	0.001***	-0.0000109	0. 9993120
cpi	-0. 7672837	0. 2758479	-2.78	0.005***	-0.0121503	0.4642725
cfgw	0.0002138	0. 0000368	5.80	0.000***	3.3900006	1.0002140
hsgw	-0.0001624	0. 0000265	-6.13	0.000***	-2.5700006	0. 9998377
afmw	-3.0632170	2.3327380	-1.31	0.18900	-0.0485076	0.0467371
ur	0. 2769790	0. 1291133	2.15	0.032**	0.0043861	1.3191390
Hausman test: 7.76 (0.1008)						
Wald test: 41.63 (0.000)						
LR test: 86.31 (0.000)						
Jarque-Bera test: 102.9 (4.400023)						
Fertility Rate Average Value: 2.13						
Note: *** 0.01; ** 0.05; * 0.10 They express the statistical significance level.						

Logistic panel regression analysis was performed for both fixed and random effect models. It was seen that the coefficients were not significant in the results of the fixed effect logistic panel regression analysis. In addition according to the Hausman test result (the random effect logistic panel regression model was valid. For this reason, only the results of the random effect logistic panel regression model are included in the study. The random effect logistic panel regression model is significant, as can be seen from the Wald and LR test results in Table 1.

According to the random effect logistic regression model result, the employment rate of women, per capita gross domestic product, consumer price index and the number of high school graduate women have a negative effect on the probability of fertility behavior. While the number of college and faculty graduate women and the rate of urbanization have a positive effect on the probability of fertility behavior, the average age of women at first marriage have not effect on the probability of fertility behavior.

The coefficients were interpreted according to the marginal effects seen in Table 1. Accordingly, a one-unit increase in women's employment rate, per capita gross domestic product, consumer price index and the number of high school graduate women reduces the probability of fertility behavior by 0.0051346, 0.0000109, 0.0121503, 2.5700006, respectively. The number of college and faculty graduate women and a one-unit increase in the rate of urbanization increase the probability of engaging in fertility behavior by 3.3900006 and

0.0043861 respectively. According to the results of odds ratio, the number of women graduated from college and faculty and the rate of urbanization (these variables are statistically significant at 0.01 and 0.05) have a greater effect on the probability of women's fertility behavior than (because they have a value greater than 1) other variables.

6. Conclusion

Fertility behavior differs according to the period and place (such as country, region, province). Fertility behavior in Turkey has changed according to the region (such as eastern and western regions), province, location (urban and rural settlement) and time, and socioeconomic factors have affected this change. This effect differs according to the socioeconomic conditions of the research period. According to the analysis period of the study, the results of the analysis show that especially economic factors are effective on fertility behavior. It is expected that the increase in women's employment, education level and average age at first marriage will decrease fertility behavior in regions where modernization and per capita gross domestic product are high. It is thought that to this situation is caused by the inflation rate in regions where the fertility rate is low recently in Turkey. It is predicted that there is a decrease in fertility behavior as the cost of living increases. Women with low education levels also start to have fewer children by working in part-time, insecure and informal jobs, since the salary of the man in the family is not enough.

Although there is a general decrease in the fertility rate in all regions, this rate is relatively higher in some regions. The reason for this situation was investigated in the study. According to the results of the analysis the gross domestic product per capita, women's employment rate, the number of high school graduate women and the consumer price index in regions with a high fertility rate affect negatively the fertility behavior. The fact that the fertility rate is high in these regions compared to other regions, especially the low level of gross domestic product per capita and the employment rate of women compared to other regions has an effect. When the living conditions in these regions are compared with the living conditions in some metropolitan regions (such as Istanbul, Ankara and Izmir), the impact of inflation is felt less in these regions. Because the expenditures made for transportation, food (because almost all of the food needs are met by purchasing), education, social and cultural activities in metropolitan areas are higher than the expenditures made for these areas in other regions. Therefore, although inflation reduces the fertility behavior since the effect of inflation is felt relatively less, the fertility behavior is higher compared to other regions.

The positive effect of the number of college and faculty graduate women on fertility behavior is based on the lack of qualified and highly paid job opportunities in these regions. College and faculty graduate women do not work when they cannot find a job that suits their qualifications and has a high wage level or they migrate to regions where job opportunities are better. Some college and faculty graduate women, who can find a job at high wages, can increase their fertility due

to their good economic conditions. In this case, relatively few women employed in the region can consist mostly of high school graduate women. As women employment decreases, fertility increases in the region and the increase in the number of high school graduate women reduces fertility. Considering that women with high school graduates will generally be employed with low wages, it can be accepted that fertility will decrease due to bad economic conditions.

Again, the positive effect of urbanization on fertility behavior made us think that the effect of modernization as a result of urbanization was not seen very much in these regions. Because in regions where fertility is lower, fertility behavior decreases with the effect of modernization as a result of urbanization. Although the average age at first marriage for women in these regions is higher than in previous periods, it is thought to be lower than in western regions. Therefore, the average age at first marriage of women has no effect on fertility behavior. Although the variables that negatively affect the fertility behavior in the analysis decrease the fertility behavior, the fertility behavior is relatively higher due to the aforementioned reasons when it is encountered with other regions. It can be said that the difference in fertility behavior between regions is due to socioeconomic differences between regions.

A high increase in fertility behavior will lead to a lack of resources and job opportunities, unemployment and a decrease in production. When the high rate reduction in fertility behavior and the increase in average life expectancy of the elderly population are seen together, the institutional care needs of the elderly population will have to be met with the improvement of the social security system, and this will create a cost for the country. Although there are regional differences in fertility behavior, the decrease in fertility behavior seen in all regions can be accepted as an indicator of an increase in the cost of the child to the family.

Statement of Support and Appreciation: No external support was received in the preparation of this research.

Researchers' Contribution Rate Statement: As the author of the research, my contribution to the study is 100%.

Conflict of Interest Statement: As the author of the research, I do not have any conflict of interest statement.

Research and Publication Ethics Statement: All the rules specified in the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were complied with at every stage of this research. None of the actions specified under the heading "Actions Contrary to Scientific Research and Publication Ethics" of the Directive have been carried out. During the writing process of this study, citations were made in accordance with the ethical rules and a bibliography was created. The work has been checked for plagiarism.

Ethics Committee Permission: In the analysis of the research, logistic panel regression analysis was performed using the TSI data set. Therefore, the study is among the studies that do not require ethics committee approval.

References

Adsera, A. and Menendez, A. (2011). Fertility Changes in Latin America in Periods of Economic Uncertainty. *Population Studies*, 65(1), 37–56.

Başkaya, Z. ve Özkılıç, F. (2017). Türkiye'de Doğurganlıkta Meydana Gelen Değişimler (1980-2013). *Uluslararası Sosyal Araştırmalar Dergisi*, 10(54), 404-423.

Becker, G. S. (1960). An Economic Analysis of Fertility. Universities National Bureau (Ed.), in Demographic and Economic Change in Developed Countries (209-240 pp.). New York: Columbia University Press.

Becker, G. S. (1992). Fertility and The Economy. *Journal of Population Economics*. 5(3), 185-201.

Bhaumik, S. K. and Nugent, J. B. (2005). Does Economic Uncertainty Affect the Decision to Bear Children? Evidence from East and West Germany. *Institute for the Study of Labor (IZA)* Discussion Papers No 1746, 2-27.

Deliktaş, E., Usta, S., Bozkurt, S. ve Helvacı, B. (2008). Türkiye'de Kentlerde Doğurganlık Hızını Etkileyen Faktörler: Path Analizi Yaklaşımı. *Ege Akademik Bakış,* 8(2), 877-895.

Gujarati, D. N. (2004). *Basic Econometrics*. New York: The McGraw-Hill Companies.

Güriş, S., Çağlayan, E. ve Güriş, B. (2013). *Eviews İle Temel Ekonometri.* İstanbul: Der Yayınları.

Hacettepe Üniversitesi Açık Erişim Sistemi. (2008). *Türkiye Nüfus Ve Sağlık Araştırması Raporu 2008*. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, Sağlık Bakanlığı Ana Çocuk Sağlığı ve Aile Planlaması Genel Müdürlüğü, Başbakanlık Devlet Planlama Teşkilatı Müsteşarlığı, Türkiye Bilimsel ve Teknolojik Araştırma Kurumu Yayın No: NEE-HÜ.09.01, Ankara.

Hausman, J. A. (1978). Specification Tests in Econometrics. *Econometrica,* 46(6), 1251-1271.

Hofmann, B. and Hohmeyer, K. (2013). Perceived Economic Uncertainty and Fertility: Evidence from A Labor Market Reform. *Journal of Marriage and Family* 75(2), 503-521.

İğdeli, A. (2019). Ekonomik Belirsizlik ve Doğurganlık Hızı Arasındaki İlişki: Türkiye İçin ARDL Analizi. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi*, 8(1), 359-381.

Kohler, H. P. and Kohler, I. (2002). Fertility Decline in Russia in The Early and Mid 1990s: The Role of Economic Uncertainty and Labour Market Crises. *European Journal of Population*, 18, 233–262.

Kreyenfeld, M. (2005). Economic Uncertainty and Fertility Postponement: Evidence from German Panel Data. *Max Planck Institute for Demographic Research (MPIDR)* Working Paper WP-2005-034, 2-32.

Kutlar, A., Erdem, E. ve Aydın, F. F. (2012). Kadınların İşgücüne Katılması ile Doğurganlık, Boşanma ve Ücret Haddi Arasındaki İlişki: Türkiye Üzerine Bir Araştırma. *Bilgi Ekonomisi ve Yönetimi Dergisi*, 3(1) 149- 168.

Malthus, T. (1798). *An Essay on The Principle of Population as It Affects the Future Improvement of Society with Remarks on The Speculations of Mr. Godwin, M. Condorcet and Other Writers*. London: St. Paul's Church-Yard.

Örsal-Karaman, D. D. ve Goldstein, J. R. (2010). The Increasing Importance of Economic Conditions on Fertility. *Max Planck Institute for Demographic Research (MPIDR),* Working paper no WP-2010-014, 1-15.

Öztürk, L. (2012). Türkiye'de İllerin Yoksulluk Nedeni Olarak Toplam Doğurganlık Hızları: Yatay Kesit Bir Analiz, 1990-2000. *Uludağ Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 31(1), 193-210.

Peracchi, F. (2001). *Econometrics*. England: John Wiley&Sons.

Ranjan, P. (1999). Fertility Behaviour Under Income Uncertainty. *European Journal of Population.* 15(1), 25–43.

Schneider, D. (2015). The Great Recession, Fertility, and Uncertainty: Evidence from The United States. *Journal of Marriage and Family*, 77(5), 1144–1156.

Selim, S. ve Bilgin, D. (2021). Türkiye'de Doğurganlık, Göç ve Mekânsal Etkileşim: Seçicilik Hipotezi Kapsamında Bir Analiz. *Coğrafya Dergisi*, 43, 111-125.

Selim, S. ve Üçdoğruk, Ş. (2003). Sayma Veri Modelleri İle Çocuk Sayısı Belirleyicileri: Türkiye'deki Seçilmiş İller İçin Sosyoekonomik Analizler. *Dokuz Eylül Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 18(2), 13-31.

Selim, S. ve Üçdoğruk, Ş. (2005). Türkiye'de Doğurganlık: Kalite-Miktar Yaklaşımı. *Nüfusbilim Dergisi*, 27(1), 49-66.

Song, J. and Kuang, Y. (2021). An Analysis on Female Education Level, Income and Fertility Rate in China. International Conference on Tourism, Economy and Environmental Sustainability, *E3S Web of Conferences*, 251(1088), 1-4.

Tatoğlu, F. Y. (2013). *İleri Panel Veri Analizi Stata Uygulamalı*. İstanbul: Beta Yayınları.

Vignoli, D., Guetto, R., Bazzani, G., Pirani, E. and Minello, A. (2020). A Reflection on Economic Uncertainty and Fertility in Europe: The Narrative Framework. *Genus*, 76(28), 2-27.

Werding, M. (2014). Children Are Costly, But Raising Them May Pay: The Economic Approach to Fertility. *Demographic Research,* 30(8), 253-276.

Willis, R. J. (1973). A New Approach to The Economic Theory of Fertility Behavior. *Journal of Political Economy*, 81(2), 14-64.

Winkelmann, R. and Zimmermann, K. F. (1994). Count Data Models for Demographic Data. *Mathematical Population Studies*, 4(3), 205-222.

Appendix 1: Descriptive Statistics

Variables	Standard Deviation	Mean
wer	25.57787	92.57564
gdppc	15930.46	26297.53
cpi	4.247732	10.32468
cfgw	302351.4	255111.5
hsgw	436819.6	455205.6
afmw	1.107878	23.68494
ur	15.98343	80.7041