THE IMPACT OF SOCIAL AND ECONOMIC FACTORS ON FERTILITY FEATURES: A CROSS-COUNTRY ANALYSIS[1] [2]

Kafkas University
Economics and Administrative Sciences Faculty
KAUJEASF
Vol. 13, Issue 26, 2022
ISSN: 1309 – 4289
E – ISSN: 2149-9136

Article Submission Date: 14.09.2022 *Accepted Date: 22.11.2022*

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ABSTRACT

Fertility behavior poses a significant impact on people's lives throughout the world, which has become even more observable especially in the last thirty years. The decision to give birth in a household is influenced by many economic and social variables such as the time cost of the raised child, social structure, the employment status of women and total family income. The aim of our study is to reveal how fertility characteristics are affected by social and economic variables. Our model was applied to three groups in 49 countries within the period of 1990-2018 focusing on the income levels of these countries. The outcomes of the study reveal that fertility characteristics are affected more by economic variables than social variables in all country groups, signifying that a positive increase in economic variables improves the quality of human capital in high-income countries while a positive increase in economic variables in low-income countries increases the number of human capital.

Keywords: *Fertility, human capital, social variables*
JEL Codes: *J24, J13, D71*

Scope: *Economics*
Type: *Research*

DOI: 10.36543/kauiibfd.2022.041

Cite this article: Kuloğlu, Ş., Kızılırmak, A. & Kuloğlu, A. (2022). The impact of social and economic factors on fertility features: A cross-country analysis. *KAÜİİBFD, 13*(26), 993-1012.

[1] It has been declared that the relevant study complies with the ethical rules.
[2] This study was produced from the master thesis of the first author under the supervision of the second and third authors.

SOSYAL VE EKONOMİK FAKTÖRLERİN DOĞURGANLIK ÖZELLİKLERİ ÜZERİNDEKİ ETKİSİ: ÜLKELER ARASI ANALİZ

Kafkas Üniversitesi
İktisadi ve İdari Bilimler Fakültesi
KAÜİİBFD
Cilt, 13, Sayı 26, 2022
ISSN: 1309 – 4289
E – ISSN: 2149-9136

Makale Gönderim Tarihi:14.09.2022 *Yayına Kabul Tarihi: 22.11.2022*

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ÖZ | Doğurganlık davranışı, özellikle son otuz yılda daha da gözlemlenebilir duruma gelerek tüm dünyada insanların yaşamları üzerinde önemli bir etki oluşturmaktadır. Bir hanede doğum yapma kararı, yetiştirilen çocuğun zaman maliyeti, sosyal yapı, kadının istihdam durumu ve toplam aile geliri gibi birçok ekonomik ve sosyal değişkenden etkilenmektedir. Çalışmamızın amacı doğurganlık özelliklerinin sosyal ve ekonomik değişkenlerden nasıl etkilendiğini ortaya koymaktır. Modelimiz 1990-2018 döneminde 49 ülke gelir düzeylerine göre üç gruba ayrılarak uygulanmıştır. Çalışmanın sonuçları, doğurganlık özelliklerinin tüm ülke gruplarında sosyal değişkenlerden daha fazla ekonomik değişkenlerden etkilendiğini ortaya koymakta ve ekonomik değişkenlerde meydana gelen bir artış düşük gelirli ülkeler beşeri sermaye sayısını artırırken yüksek gelirli ülkelerde beşeri sermayenin kalitesini iyileştirmektedir. Sağlık değişkeni bütün ülke gruplarında doğurganlık üzerinde pozitif etkiye sahiptir.

Anahtar Kelimeler: *Doğurganlık, beşeri sermaye, sosyal değişkenler*
JEL Kodları*: J24, J13, D71*

Alan: *İktisat*
Türü: *Araştırma*

1. INTRODUCTION

Fertility is a concept reflecting the reproductive ability of public and the reproductive experiences of society and the number of live births in society in terms of early, demographic and health statistics. The drop in fertility rate in developed and developing countries has attracted the attention of economists. The reasons for the decrease in the fertility rate are generally stated to be the decrease in infant mortality rates, the increase in women's employment, the development of the social security system, the cost of raising children, economic growth and economic uncertainties (Becker, 1992).

The sources of economic growth have long been one of the most important discussion topics of both economists and politicians. The main issue regarded as one of the basic components of economic development is human capital. The phenomenon of human capital, which is considered as quality education and qualified workforce, has been accepted as the main dynamics of economic growth since the late 1980s (Becker, 2009).

The relationship between human capital and economic growth is among the topics that have been explored in the literature. In most studies, it has been concluded that the relationship between the two sizes is positive (Fashina et al, 2018; Su & Liu, 2016; Siddiqui & Rehman, 2017). The relationship between fertility rate and economic growth is an important issue. Total fertility rate has a negative impact on economic growth in the current period of time. In a society with a limited amount of human capital, people are in favour of higher fertility rates, tending to invest very little in each child (Siddiqui & Rehman, 2017).

Many studies have been carried out in the literature on fertility characteristics and the factors determining these characteristics. The main factors affecting fertility in these studies have been foregrounded as education, economic growth, women's participation in the workforce, income growth, society structure, gender equality, socio-economic structure, belief system, tradition-customs, the presentation and accessibility of healthcare services, marriage, the perspective on having children, geographical region, the age of men and women, political discourses and population policies. The first major contribution to the fertility literature was made by Becker in 1960. Within the framework of durable goods theory, Becker (1960) tried to find the source of the demand for the number of children by abstracting the satisfaction of the parents with the children. Later, Becker and Lewis (1973) and Willis (1973) found a negative relationship between the quality and quantity of children by developing the quality - quantity theory.

The motivating question of the present study is whether fertility characteristics are more affected by social or economic variables. When the

studies having been carried out in this respect are examined, many of them have been found to adapt the quality quantity approach. These studies conducted analyze the effects of economic and social variables on fertility characteristics. However, it has been observed that these studies have not specified which fertility characteristics are mostly influenced by which variables. In this regard, the main question of our study is which fertility characteristics are affected more by social factors which by economic factors. Seeing that the decision of families to make children is influenced by economic factors or sociological factors, the purpose of our study is to reveal which fertility characteristics are affected by social and which fertility characteristics are affected by economic variables in developed and developing countries. The main research hypotheses of our study are as follows; H1: Families' decisions to have a child are more affected by economic variables than social variables; H2: The improvement in the economic factors of countries according to income groups has different effects on human capital; H3: Health has a significant positive effect on fertility.

The impact of social and economic variables on fertility characteristics will be examined in 49 countries and the groups of high-income, upper-middle-income and low-middle-income countries within the time-span of 1990-2018. In the grouping of countries, the income classification of the world bank has been taken as a basis. The following parts of our study are as follows;

The second section consists of theoretical framework and literature summary; the method and methodology to be followed are included in the third section; empirical findings are provided in the fourth section; and conclusion and policy recommendations are involved in the last section.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The theoretical structure for modeling studies related to fertility was basically put forward by Becker and Lewis (1973) and Willis (1973). These studies are theoretically based on benefit maximization, addressing to the quality-quantity approach. According to this approach, families not only demand the number of children, but also demand that these children have certain qualities.

In the neoclassical economic theory, Becker (1960) stated that children were treated as a long-lasting commodity, and the quality of children was determined by expenditure per child. Becker (1960) dismissed the explanations claiming that children were second-degree, inferior goods and that high-income families who spent more on children had lower fertility to provide for their higher-priced children. According to Becker (1960), for most families, children were a source of physical income and satisfaction. The costs or satisfaction

associated with children were similar to other durable goods. Becker (1960), comparing the demand structure for children to the demand structure of other durable goods, stated that the increase in income required more expenditure per child and more children. According to the balance condition concept introduced to the realm of fertility studies by Becker (1960), the marginal benefit obtained by spending one unit more on the number of children should be equal to the marginal benefit obtained by spending one unit more on their quality.

A distinct approach in the work of Becker and Lewis (1973) was that high-income families spent more per child and the number of children would increase the shadow price. In addition, Becker and Lewis (1973) 's quality-quantity approach assumed that there was a substitution effect inflicted by household quantity on quality through increasing household income. The increase in quality per child caused an increase in the cost of children raised, and therefore fertility decreased.

Easterlin (1961) explained the relationship between fertility behavior and absolute income after World War II. This fertility model followed a forty-year cycle, according to Easterlin. The generation born at a high birth rate made fewer children, and the generation born at a lower birth rate appeared to produce more children. In fact, fertility movements are closely linked to the relative employment indicator and long-term unemployment rate. The relative employment indicator reflects young people's experience in the labor market and shows the current average unemployment rate. The long-term unemployment rate reflects the experiences of the parents in the labor market and shows the expectations of the youth. This ratio, which is the result of the relative comparison of situations, manages the decision of couples to have more or less children.

Berker and Barro (1986) examined the effects of parents' income and the cost of raising their children on the economic approach of fertility behavior. In this model, fertility depends on intergenerational growth rate; however, it is negatively related to the growth between its consumption and consumption per capita in the next generation. Changing the cost of having children in the model brings about unexpected results with respect to the demand for children. In this model, a temporary change in the cost of children in one generation fluctuates that generation and the next. However, when there is a permanent change, only the fertility of that generation is affected. A permanent decrease in fertility requires a continuous increase in the cost of children.

Caldwell's model states that there is a relationship between the cultural, social and economic structure of the family and fertility. According to Caldwell's model, there are two large different family structures in terms of intergenerational wealth flow. In traditional societies, the net wealth flow is from the young

generation up to the older generation, and individual interests are captured by institutional interests. In developed societies, the family structure is arranged downward in terms of wealth flow, and parents are expected to ensure the well-being of their children. The transition to low fertility in the world is the result of a top-down change in the net family flow. The model, similar to other models, establishes a relationship between the change in the cost of raising the child and the change in the parent's perception of fertility (Caldwell, 1976).

Boldrin and Jones (2002) exerted efforts to account for the effect of the change in government pension plans on fertility through a theoretical model that covered two different models. These two models are based on reverse assumptions about intergenerational sacrifice and intergenerational transfer. In the fertility selection model of Boldrin and Jones, parents consider children as an investment tool; the number of children desired depends on how much money they transfer to their parents in adulthood and how much they cost until they have become adults. If the assurance of the old age is dominant in the fertility selection, the increase in the size of the public pension system decreases fertility.

In studies on fertility, it was stated that one of the most important factors affecting fertility was the education level of women. They found that women's education had a significant negative impact on fertility (Kalwij, 2000; Lam & Duryea, 1999; Nguyen-Dinh, 1997). The negative relationship between education and fertility explains much of the fertility difference in a particular country, as well as the fertility difference between countries (Schultz, 2005). The relationship between education level and fertility is usually determined by the education level of the woman because child care is generally attended by women, the opportunity cost is more dominant for women (Preston & Hartnett, 2010). In addition to that, it is not equally easy to determine in what ways education affects fertility. Increasing education level increases labor force participation and wages, and as a result, fertility may decrease (Jain, 1981). Diebolt, Menard and Perrin (2017) hypothesized that a decrease in Fertility was strongly associated with more schooling in France in the 19th century. Chicoine (2020) revealed that removing school fees led to increased schooling rates for Ethiopian women and reduced fertility each additional year of education. Bhat (2002) stated that although literacy education in India had a negative effect on the fertility of women, it decreased fertility and changed the reproductive behavior among illiterate people in the long term. Moreover, the study revealed that illiterate people had their children get more education and tried to produce qualified children.

The impact of education levels on income and employment can vary in different countries, since the return on education is related with the wages of the educated segment. Therefore, the effect of education on fertility can vary in line

with the level of education and the economic structure and development level of countries. While there is a strong negative relationship between education and fertility in developed countries, this relationship is weak in less developed countries (Weinberger, 1987). Güneş (2015) examined how the relationship between female education and fertility changed in the countries having adapted compulsory education systems. She found that that it reduced the rate of young fertility.

The factors such as household income and women's wages, the time expenditure of having a child is effective on the family's fertility decisions. One of the pioneering studies to examine the relationship between socioeconomic development and population growth is Malthus's (1872) paper on classical population growth. According to this study, there is a positive relationship between individuals' fertility behavior and socioeconomic development; in other words, as the income per capita of an economically developing family increases, the fertility rate will increase as well.

However, looking into the recent studies, the impact of household income on fertility has been ambiguous. The increase in income causes income and substitution effects, and the magnitude of these effects determines fertility (Freedman & Thornton, 1982). The relationship regarded to be positive between income and fertility is considered negative in empirical studies. This is owing to the existence of many correlations between income and factors affecting fertility (Borg, 1989; Simon, 1969). Therefore, the relationship between income and fertility may emerge in different ways for different countries and different sources of income.

The impact of industrialization on fertility is largely determined by the relationship between the child's cost and economic return. Generally, increasing child costs reduce fertility, while an increase in the child's economic return increases fertility. The employment that shifts towards large factories in the stages where industrialization is increasing rapidly raises women's employment; and migration to industrialized regions increases the cost of a child and decreases fertility. Studies have shown that there is a negative relationship between industrialization and fertility (Wanamaker, 2012; Franck & Galor, 2015).

Another factor affecting fertility characteristics is urbanization. As a result of urbanization, changes regarding the expenditures on people may occur. The impact of urbanization on fertility depends on the speed and characteristics of urbanization, which has emerged as a common opinion of the studies carried out in many countries where urbanization reduces fertility (White et al., 2008; Guo Wu, Schimmele & Li, 2012).

When the literature studies are examined in general, there are many social and economic variables that affect fertility. Depending on the economic, social and cultural situation of the countries, these variables have different degrees of influence on fertility. On the theoretical basis of Becker and Lewis (1973) and Willis (1973) studies, it is stated that families follow utility maximization, but it has not been sufficiently demonstrated empirically from which variables this benefit will mostly be obtained. Therefore, there is a need to reveal which variable group is more affected by fertility in our study.

3. MODEL AND METHODOLOGY

The major research question of the study probes which fertility characteristics are affected more by the economic and which by the social factors. In this regard, we will build our model on three basic variables in the empirical part of our study; the variables representing fertility characteristics; the economic variables and the social variables.

The decision to have children is directly or indirectly determined by many social variables. However, since social variables are the variables that cannot be measured easily, we have to implement a limited number of social variables.

Our model will be created based on the model applied in the research carried out by Wang and Sun (2016). The difference of our model from that applied in this study is that we will reduce several variables to a single variable (fertility variable, economic variable and social variable) using the principal component analysis. In the research by Wang and Sun (2016), which follows a similar model to the present research, economic and social variables were not evaluated as a whole; unlike other studies, they were included in the models of political freedom variable in their study.

Our study will make an important contribution to the literature in several ways. First, unlike the previous studies, we will reduce social variables, economic variables and health variables to a single index variable. Then, we will examine the effect posed by this index on fertility characteristics. Secondly, we will investigate how fertility traits are affected by economic and social variables and whether fertility is an economic or social decision. Finally, A comprehensive study will be presented by taking the largest lengths in terms of data set, variable set and time scale.

In our study, the variable representing fertility characteristics is Total fertility rate. Health variables are Infant Mortality rate and Life expectancy at Birth. Economic variables are Labor force (female), Unemployment (total), Unemployment (male), GDP per capita and Household final consumption expenditure. Social Variables are Women Business and the Law Index Score,

Urban population growth, Rural population growth and Primary education (pupils). The information about the variables, data sets, time range, definitions, variables synonym and sources applied in the model are listed in Table 1.
The linear model we will follow in all country groups in the study is stated below. Fertility is the dependent variable in our model. On the other hand, EcoINX is the index representing economic variables, SocialINX is the index representing social variables, and HealthINX is the index representing health variables. These indices are indexes formed by combining the relevant variables via principal component analysis. The baseline model is formulated as follows:

$$\mathbf{Fert_{it}} = \boldsymbol{\delta_0} + \boldsymbol{\beta_1}\mathbf{EcoINX_{it}} + \boldsymbol{\beta_2}\mathbf{SocialINX_{it}} + \boldsymbol{\beta_3}\mathbf{HealthINX_{it}} + \boldsymbol{\beta_4}\mathbf{GDPpC_{it}} + \boldsymbol{\varepsilon_{it}}$$

where t refers to year, i refers to countries, ε_{it} refers to error term, β_i refers to coefficient parameters.

Table 1: Data Definition and Source

	Variable	Synonym	Definition	Time	Source
Fertility Variables	Total fertility rate	Fert	"Total fertility rate comprises the number of children a woman would give birth to up to the end of her childbearing age and bear children at current age-specific fertility rates."(WDI)	1990-2018	(WDI)
	Infant Mortality rate	Mort	"Infant mortality rate reports the number of infants' death before turning to one year of age, per 1,000 live births during a given year."(WDI)	1990-2018	(WDI)
	Life expectancy at birth, female (years)	LifeEx	"Life expectancy at birth indicates the number of years a new-born would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life."(WDI)	1990-2018	(WDI)
Economic Variables	GDP per capita growth (annual %)	GDPpC	"Annual percentage growth rate of GDP per capita based on constant local currency. Aggregates are based on constant 2010 U.S. dollars." (WDI)	1990-2018	(WDI)
	Labor force, female (% of total labor force)	LabForF	"Female labor force as a percentage of the total show the extent to which women are active in the labor force. Labor force comprises people ages 15 and older who supply labor for the production of goods and services during a specified period." (WDI)	1990-2018	(WDI)

	Variable	Synonym	Definition	Time	Source
	Unemployment, total (% of total labor force)	UnemT	"Unemployment refers to the share of the labor force that is without work but available for and seeking employment."(WDI)	1990-2018	(WDI)
	Unemployment, male (% of male labor force)	UnemM	"Unemployment refers to the share of the labor force that is without work but available for and seeking employment."(WDI)	1990-2018	(WDI)
	Household final consumption expenditure (annual % growth)	HouCon	"Annual percentage growth of household final consumption expenditure based on constant local currency. Aggregates are based on constant 2010 U.S. dollars." (WDI)	1990-2018	(WDI)
Soacial Variables	Urban population growth (annual %)	UrbP	"Urban population refers to people living in urban areas as defined by national statistical offices. It is calculated using World Bank population estimates and urban ratios from the United Nations World Urbanization Prospects."(WDI)	1990-2018	(WDI)
	Rural population growth (annual %)	RulP	"Rural population refers to people living in rural areas as defined by national statistical offices. It is calculated as the difference between total population and urban population."(WDI)	1990-2018	(WDI)
	Women Business and the Law Index Score (scale 1-100)	WomenIn	"The index measures how laws and regulations affect women's economic opportunity. Overall scores are calculated by taking the average score of each of the eight areas with 100 representing the highest possible score."(WDI)	1990-2018	(WDI)
	Primary education, pupils (% female)	PriEd	"Female pupils as a percentage of total pupils at primary level include enrollments in public and private schools."(WDI)	1990-2018	(WDI)

References: Worldbank, Indicators, 2021.

Countries have been selected according to the World Bank income classification based on the determined models and variables are given in Table 2. A total number of 49 countries including 25 high-income countries, 16 Upper-middle-income countries and 8 low-middle-income countries are covered in the model.

Table 2: List of Countries

High Income	Upper Middle Income (UM)	Lower Middle Income
Australia	Algeria	Bolivia
Austria	Belize	Egypt, Arab Rep.
Bahamas, The	Bulgaria	El Salvador
Belgium	Colombia	Indonesia
Canada	Costa Rica	Morocco
Chile	Ecuador	Pakistan
Denmark	Iran, Islamic Rep.	Philippines
Finland	Jordan	Tunisia
France	Malaysia	
Greece	Mexico	
Iceland	Paraguay	
Ireland	Peru	
Israel	South Africa	
Italy	Sri Lanka	
Luxembourg	Thailand	
Netherlands	Turkey	
New Zealand		
Norway		
Panama	Lower Middle Income (LM)	1,036 - 4,045
Portugal	Upper Middle Income (UM)	4,046 - 12,535
Spain	High Income (H)	> 12,535
Sweden		
Switzerland	*Note: (1)Income classifications are set each year on July 1 for all World Bank member economies	
United Kingdom	(2)Countries classified according to 2018 data.	
Uruguay	(3) GNI per capita in US$	

References: World Development Index, Classifying countries by income, 2021.

The descriptive statistical values of the variables to be made use of in the model are shown in Table 3. Before the series were put into the regression model, the stationarity analyzes were made; and the results are given in Table 4. Principal Component Analysis (PCA) method was employed to obtain the index variables to be used in the model.

The oldest and most well-known multivariate analysis technique is principal component analysis (Jolliffe, 1986). The technique, first used by Pearson (1901, pp. 559–572), was later independently developed by Hotelling (1933, pp. 228–252). The fundamental idea underlying this technique is to reduce the size of a data set containing many interrelated variables using the covariance between these data while maintaining as large variances in the data set as possible (Jolliffe, 1986). This is accomplished by the linear transformation of the data to be orthogonal to each other. Principal Components Analysis (PCA) can be done using the original values or the standardized values of the data.

Table 3: Descriptive Statistics

Variable	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
High Income Countries									
LabForF	725	43,911	0,140	3,772	31,267	42,008	45,200	46,751	49,123
GDPpC	725	1,686	0,102	2,749	-8,998	0,433	1,739	3,117	23,986
HouCon	725	2,495	0,114	3,072	-12,646	1,057	2,366	3,911	18,523
UnemT	725	7,726	0,154	4,141	1,448	4,789	6,993	9,580	27,466
UnemM	725	7,355	0,142	3,833	1,128	4,768	6,605	9,056	25,601
Fert	725	1,8168	0,0152	0,4081	1,1300	1,5254	1,7600	1,9600	3,1100
Mort	725	5,950	0,155	4,183	1,400	3,500	4,700	6,600	25,600
LifeEx	725	81,485	0,0915	2,464	73,678	80,195	81,700	83,300	86,300
UrbP	725	1,1453	0,0284	0,7656	-0,3451	0,5936	1,0465	1,5818	6,1321
RulP	725	-0,3117	0,0522	1,4069	-5,9933	-1,0393	-0,1043	0,6459	4,9323
WomenIn	725	84,959	0,408	10,978	54,400	76,900	85,600	95,000	100,000
PriEd	725	48,637	0,0143	0,385	47,423	48,451	48,623	48,793	50,722
Upper Middle Income Countries									
LabForF	464	34,084	0,475	10,230	10,423	30,127	37,044	41,087	48,348
GDPpC	464	2,181	0,164	3,529	-13,669	0,133	2,296	4,335	12,186
HouCon	464	4,413	0,294	6,341	-32,406	2,012	4,052	6,497	75,506
UnemT	464	9,606	0,329	7,092	0,489	4,273	8,494	12,130	33,473
UnemM	464	8,548	0,302	6,512	0,309	3,622	6,952	10,526	33,872
Fert	464	2,6418	0,0366	0,7874	1,0900	2,1245	2,5390	3,0423	5,5210
Mort	464	21,202	0,521	11,224	5,900	12,825	18,300	27,400	56,900
LifeEx	464	74,666	0,208	4,490	55,927	72,993	75,262	77,792	82,730
UrbP	464	2,3720	0,0611	1,3162	-1,6544	1,7994	2,2781	2,9571	7,1222
RulP	464	0,0152	0,0602	1,2966	-3,8046	-0,7179	0,0742	0,8048	4,2231
WomenIn	464	64,439	0,897	19,332	23,800	50,000	67,200	79,400	95,000

PriEd	464	48,462	0,0352	0,757	44,661	48,260	48,569	48,886	52,591
Lower Middle Income Countries									
LabForF	232	30,994	0,594	9,054	12,218	23,316	30,806	38,916	44,189
GDPpC	232	2,401	0,161	2,456	-14,351	1,233	2,553	3,841	10,756
HouCon	232	4,482	0,210	3,194	-6,690	3,050	4,211	5,757	26,988
UnemT	232	6,955	0,309	4,712	0,398	3,073	5,965	10,745	18,334
UnemM	232	7,108	0,269	4,097	0,396	3,876	6,106	9,466	18,730
Fert	232	3,2465	0,0592	0,9020	1,9910	2,5170	3,1135	3,8077	6,1640
Mort	232	39,42	1,42	21,68	11,80	23,85	32,50	50,42	106,30
LifeEx	232	70,848	0,307	4,677	57,637	67,539	71,777	74,240	78,536
UrbP	232	2,4377	0,0550	0,8373	1,2804	1,8235	2,1817	2,9282	5,0808
RulP	232	0,6703	0,0817	1,2448	-2,2142	-0,0888	0,4028	1,8625	2,6622
WomenIn	232	58,52	1,01	15,46	30,00	44,40	61,30	71,88	88,80
PriEd	232	46,680	0,207	3,153	33,506	46,446	47,875	48,495	49,538

Table 4: Unit Root Test Results

	Variables		**Fert**	**GDPpC**	**EcoINX**	**SocialINX**	**HealthINX**
High Income	**LL**	**C**	-6.2547	-9.9164	-5.5951	-4.4276	-8.5874
			(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
		T	-4.8564	-8.3485	-13.405	-3.4154	-7.5748
			(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	IPS	**C**	-7.2587	-8.9386	0.5038	-0.4338	-6.5246
			(0.0000)	(0.0000)	**(0.6223)**	**(0.1282)**	(0.0000)
		T	-5.2365	-9.4910	3.1362	-1.4883	-7.4872
			(0.0000)	(0.0000)	**(0.8819)**	(0.0048)	(0.0000)
Upper Middle Income	**LL**	**C**	-7.2563	-6.9806	-10.6667	-3.5241	-8.1256
			(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
		T	-5.8563	-5.3456	-21.246	-2.1245	-6.5478
			(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	IPS	**C**	-6.2536	-8.9715	-13.1090	-1.4427	-7.6355
			(0.0000)	(0.0000)	(0.0000)	(0.0615)	(0.0000)
		T	-5.7536	-9.0994	2.8535	-2.1273	-8.0974
			(0.0000)	(0.0000)	(0.0000)	(0.0002)	(0.0000)
Lower Middle Income	**LL**	**C**	-4.4863	-3.9336	-10.1867	-1.1482	-3.7376
			(0.0000)	(0.0000)	(0.0000)	**(0.1142)**	(0.0000)
		T	-3.2134	-3.3198	-15.7953	-0.7468	-2.9697
			(0.0000)	(0.0000)	(0.0000)	**(0.1205)**	(0.0000)
	IPS	**C**	-6.2486	-6.1356	-6.5075	-1.1441	-7.1853
			(0.0000)	(0.0000)	(0.0000)	**(0.1348)**	(0.0000)
		T	-4.9635	-6.9686	3.9423	-3.4549	-5.9686
			(0.0000)	(0.0000)	(0.0008)	(0.0004)	(0.0000)

The indices created by Principal Component Analysis are as follows; EcoINX [GDP per capita growth (annual %), Labor force, female (% of total labor force), Unemployment, total (% of total labor force), Unemployment, male (% of male labor force), Household final consumption expenditure (annual % growth)], SocialINX [Urban population growth (annual %), Rural population growth (annual %), Women Business and the Law Index Score (scale 1-100), Primary education, pupils (% female)], HealthINX [Infant Mortality rate, Life expectancy at birth, female]. While obtaining the index variables, it is necessary to use the same directional variables as the dependent variable. So, the variables that are not in the same direction as the dependent variable are divided by 1. While creating the Economic variable index with PCA, Unemployment, total (% of total labor force) and Unemployment, male (% of male labor force) variables are divided by 1. While obtaining the social index variable, the variable obtained by dividing the Rural population growth (annual%) variable diveded by 1 is included in the index. Since the other variables are in the same direction, they join the model without changing.

Average group estimation method was used in the study (Pesaran & Smith, 1995). In the mean group estimation method (MGE), the long-run parameter is obtained by using the average of the long-term parameters of the autoregressive distributed lag models (ARDL) created for the units. As a result, long-term parameters in MGE method may vary according to units. The results gathered through the mean group estimator are given in Table 5.

Table 5: Estimation Results

Lower Middle Income Countries					
Fert	**Coef.**	**Std. Err.**	**P>z**	**[95% Conf. Interval]**	
EcoINX	0.6003164	0.4726927	0.204	-0.3261443	1.526.777
SocialINX	0.0188613	0.0765389	0.805	-0.1311522	0.1688747
HealthINX	0.0670544	0.1392037	0.000	-0.9433781	-0.3977098
GDPpC	0.0162423	0.0122779	0.186	-0.0403064	0.0078219
_cons	3.265.328	0.2507807	0.000	2.773.807	3.756.849
Upper Middle Income Countries					
Fert	**Coef.**	**Std. Err.**	**P>z**	**[95% Conf. Interval]**	
EcoINX	0.0932953	0.4499717	0.836	-0.7886331	0.9752237
SocialINX	-0.0044917	0.0774134	0.954	-0.1562193	0.1472358
HealthINX	0.5786013	0.1430331	0.000	-0.8589411	-0.2982615

GDPpC	0.0165885	0.0112585	0.141	-0.0386549	0.0054778
cons	2.843.404	0.1993195	0.000	2.452.745	3.234.063
High Income Countries					
Fert	**Coef.**	**Std. Err.**	**P>z**	**[95% Conf. Interval]**	
EcoINX	0.0235292	0.0123873	0.058	-.0007495	0.0478079
SocialINX	0.0125768	0.0183386	0.493	-0.0233663	0.0485198
HealthINX	0.0445548	0.0299793	0.137	-0.1033131	0.0142035
GDPpC	0.0065203	0.0021858	0.003	-0.0108044	-0.0022361
_cons	174.564	0.0926491	0.000	1.564.051	1.927.229

Note: The principal component analysis results of the index variables obtained are not given. Those who want to see the results can send an e-mail to the author.

4. EMPIRICAL FINDINGS

According to the basic equation we have established for low-middle-income countries, the health index variable poses a significant and positive effect upon fertility. It is observed that a one-unit change in the health index variable increases fertility by 6 percent. In addition to that, the economic index variable has a positive and significant effect on fertility. One unit additional increase in the index variable has a 60 percent effect on fertility. Nevertheless, Social index variable does not have a significant effect on fertility. The per capita income variable also has the same explanatory power as the economic index variable. It is observed that economic variables have an effect on fertility in countries with low income levels, since the economic index variable and the income per capita variable in low-income countries have similar effects. As a result, it is seen that the health index variable and economic variables are effective upon the fertility decision in the countries with low income levels. This result supports that fertility is an economic decision rather than a social decision.

In Upper Middle-income countries, the health index variable preeminently explains fertility. One unit increase in the health index variable has a 57 percent effect on fertility. This variable is followed by the per capita income variable. An additional one unit increase in per capita income increases fertility by 1 percent. It is noted that other index variables are not significant due to their high probe values. As a result, fertility is affected by the variable of health index and per capita income in upper middle income countries.

In high-income countries, the per capita income variable and the economic index variable have a significant effect on fertility. These variables are followed by the health index variable. In countries with high income levels, economic variables are meaningful in more models than other country groups. As in other country groups, the social index variable is not significant in the model. Therefore,

fertility is considered an economic decision rather than a social decision in high-income countries.

Low-income societies generally consider having a new child as an additional labor gain, as they generally operate in labor-intensive sectors (Berger and Black, 1992). In addition, the health index variable is significant in all country groups and positively affects fertility. The health index variable, which is one of the main factors of fertility, brings forth similar results to the literature. Since only the variable of per capita income is meaningful in upper middle income countries, the fertility in these countries varies depending on the income level. Although other economic index variables are not significant in the model, the fact that the income per capita variable is significant is considered an economic decision of fertility. The significance of the economic index variable and income per capita variable in high-income country groups reveals that there is a high relationship between fertility and economic variables.

5. CONCLUSIONS

The preeminent question of our study is which one of the social and economic variables affects fertility characteristics more. For this purpose, three country groups covering 49 countries within the period of 1990-2018 were formed based on the world bank income classification. Fertility characteristics were analyzed by obtaining new series (EcoINX, SocialINX and HealthINX) via the principal component analysis of 11 variables. The series obtained were regressed on fertility after stationarity analysis had been performed.

Empirical findings indicate that the health index variable has a significant and positive effect on fertility in all country groups (Strulik, 2004). On the other hand, the social index variable appears to be meaningless in all country groups. It shows that fertility decision is an economic behavior, since both the economic index variable and the income per capita variable are significant and positive in high-income country groups. There is a strong relationship between fertility and economic variables in high-income country groups. Similarly, the effect of economic variables on fertility is significant and positive in low-middle-income country groups. In upper middle income countries, only the per capita income variable has a significant and positive effect. As a result, it is pointed out that fertility is affected by economic factors rather than social variables due to the significance of economic variables in all country groups.

According to our findings, the positive increase in economic variables in low-income countries affects fertility by 60%, in middle-high-income countries 10%, and in high-income countries 2%. Although an increase in fertility is expected for individuals in high-income countries, its impact is small due to the

welfare variable. Ridker and Muscat (1973) declare that fertility has a negative impact on family well-being due to labor force participation, children's health, education, etc. Increasing the income of individuals has a positive effect on fertility. However, the increase in the income of individuals who do not want to lose their welfare in high-income countries does not increase fertility sufficiently. Since low-income countries do not take the welfare variable into account sufficiently, income growth has a high impact on fertility. In addition, the positive increase in economic variables causes a limited birth increase in high-income countries due to the quality of human capital. In high-income countries, the increase in fertility causes qualitative increase due to welfare and human capital quality, but quantitative increase in low-income countries.

The results we obtained within the framework of the study are consistent with the literature (Silva, 2014). Fertility has more than halved in the last century in the world, but the standard of living has more than doubled. The main reason for this is due to women's labor force participation and liquidity constraints (Chatterjee & Vogl, 2018). Economic growth leads to an increase in the quality of human capital and a decrease in fertility (Ashraf at al., 2013). However, the increase in the household income of families causes an increase in fertility (Silva, 2014). Becker at al. (1990) state that societies with low human capital are in more fertility. Based on these results, policies should be developed to increase the economic conditions in order to increase the quality and health of human capital.

Economic factors are more than social variables in the fertility decisions of families, and economic factors have a significant impact on the quality and quantity of human capital. In our research, time and country restrictions were applied due to the problems of accessing data sources. In future studies, it is recommended that researchers examine the groups that countries are members of in the OECD, EU, NAFTA or other social-economic unions.

6. CONFLICT OF INTEREST STATEMENT

There is no conflict of interest between the authors.

7. FUNDING ACKNOWLEDGEMENTS

No funding was received from any institution for his study.

8. AUTHOR CONTRIBUTIONS

ŞK, AK: Idea;
ŞK, AK, AK: Design;
ŞK: Inspection;
ŞK: Data collection;

ŞK, AK: Analysis;
AK: Literature review;
ŞK, AK, AK: Critical review.

9. ETHICS COMMITTEE STATEMENT AND INTELLECTUAL PROPERTY COPYRIGHTS

Ethical principles were followed in the study, and necessary permissions were obtained following the intellectual property and copyright principles.

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