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Are Children a Normal Good or an Inferior Good? The Case of Turkey and France

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Abstract

This study investigates the neoclassical theory on the demand for children. The neoclassical theory takes child demand in the utility function, like any other commodities. But, the demand for children is different from things which increase our utility. In this study, Auto Regressive Distributed Lag (ARDL) bounds testing approach was used to examine the relationship between real GDP and fertility rate for the 1968-2018 periods of Turkey and France's economy. The purpose of this relationship is to observe if the child demand is a normal good. If children were normal goods, then their parents would demand more children when they get richer. According to the ARDL model, it was found that there was no any long-term relationship between real GDP and fertility rate in Turkey. However, a long-term relationship between real GDP and fertility for France has been found. But, in this case, the GDP coefficient is not statistically significant.

Keywords: Demand for Children, Desired Family Size, Neo-Classical Approach

1. Introduction

This study aims to raise awareness that the tools of neo-classical approach cannot be implemented in each field. According to Neo-classical approach, the determination of goods, outputs, and income distributions in markets is based on supply and demand conditions. Supply and demand together determine equilibrium price and quantity. If all other things being equal, the higher the price of a good, the less people will demand that goods. Also, neo-classical economics rest on rational choice theory, in which individuals strive utility maximization with constrained income; firms struggle to realize profit maximization with given production costs, and people act independently on the basis of full and relevant information. In neo-classical theory, there is a certain justification of any act of firms or individuals; for example, a firm's layoff decisions are based on a balance between the benefits of laying off an additional worker and the costs associated with this behavior. From the neo-classical point of view, there is rationality behind the decision of a student who has to work and thus cannot regularly attend to the class and thus passes with a low grade. Like firms' layoff decision, a student's nonattendance to class is based on rationality. A theory which assumes that a student's nonattendance decision is based on a balance between the benefits of working in a job and the costs associated with that action will be a neo-classical theory. Thus, rationality can be defined as all means to achieve ends.

This study emphasize that some human behavior may not be explained in the context of the framework of neoclassical economics because all the results of human actions cannot be calculated precisely, meaning that benefits and costs of all human actions cannot be determined as explained above. However, there are studies in the literature that explain the behavior of some human actions; for example, fertility in consumer theory. Becker (1960) and Leibenstein (1974) have the pioneering works in the area of microeconomic theory of fertility. These economists applied microeconomic tools in order to understand fertility behavior and demand for children. The basic question is that whether the decline in child demand is a result of income growth or from an increase in the absolute or relative cost of children. If we claim that the demand for children has fallen as a result of the increase in income, we also accept that the demand for children is different from normal goods demand, that is, it is inferior goods.

Studies that examine household behavior generally take into account expenditure and savings of households, factors which determine household expenditure and savings or factors that determine investments. However, this study analyzes the household's demand for children. The emphasis is that the demand for children is strictly different from that of goods and services.

It is a fact that child demand and fertility rate have been declined, but this fact does not mean that child demand and goods demand have the same law and rules. With the increase in the level of education, the increase in the age of marriage has caused people to have fewer children. When this situation is expressed in terms of the microeconomic context, the fertility rate has decreased with the increase in the relative cost of children and result in an appropriate adjustment in decreasing child demand.

For the last 50 years, many demographers have expected that industrialization would decrease fertility rates, thus family sizes fell with industrialization. Graph 1 shows that fertility rates are falling steadily since 1960. Also, Graph 2 shows GDP per capita with current US dollars has increased regularly, except for certain years, such as currency crises and depression years. According to this explanation, the following hypothesis can be set up:

> *If it is assumed that all other things being constant, the more a country has higher GDP, the lower the fertility rate she has.*

This hypothesis ignores some assumptions; for example, it does not consider increasing the number of years that women are in school delays marriage, which in turn reduces the time duration that women are exposed to the possibility of conception. Also, women’s labor participation has been increased with education and the age of marriage has risen compared to previous years; for example, In Turkey, the age of marriage is 31 for men, while the age of marriage for women is 28. In the 1960’s, It is a normal result that fertility was high when the age of marriage was 15 for women and 18 for men. In addition to change in marriage age and duration of education, contraception and necessity of birth control increased with education. All these changes have caused women to have fewer children. What should be noted here is that women have fewer children than they desire. That is, as the level of income increases, the hypothesis that fewer children are demanded can be evaluated as being correct without examining other factors, but the decline in fertility and decrease in child demand depend on increase in education level and the delay of marriages, meaning less demand for children is as a result of demographic and social change in society.

Dixon- Mueller (1993) suggests that women's participation in the labor market has given women a new identity and economic power. Thus, the dependence of women on men and children has been reduced. Dixon-Mueller concludes that women's level of education and women's labor participation, together with other commonly considered socioeconomic variables, including percentage of married couples using contraception, are important in quantifying the variation in total fertility rate.

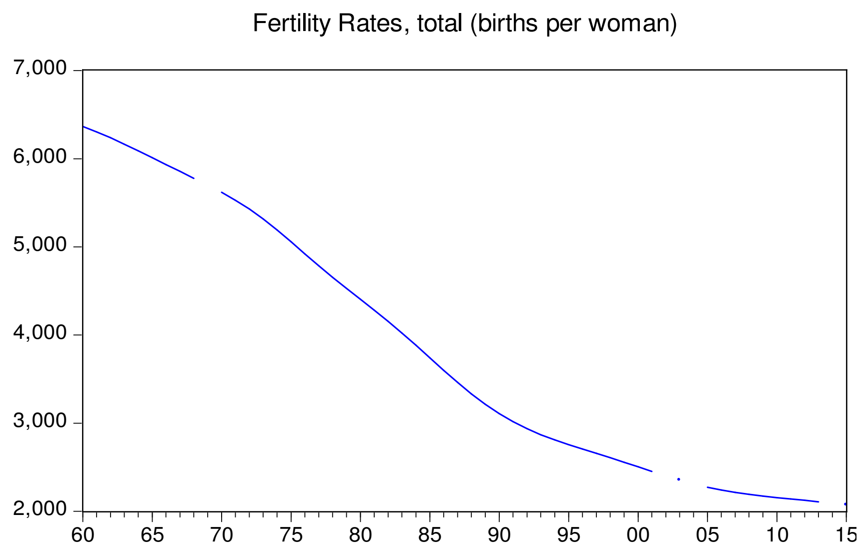
Thus, can we make the following hypothesis?

Industrialization has reduced the demand for children.

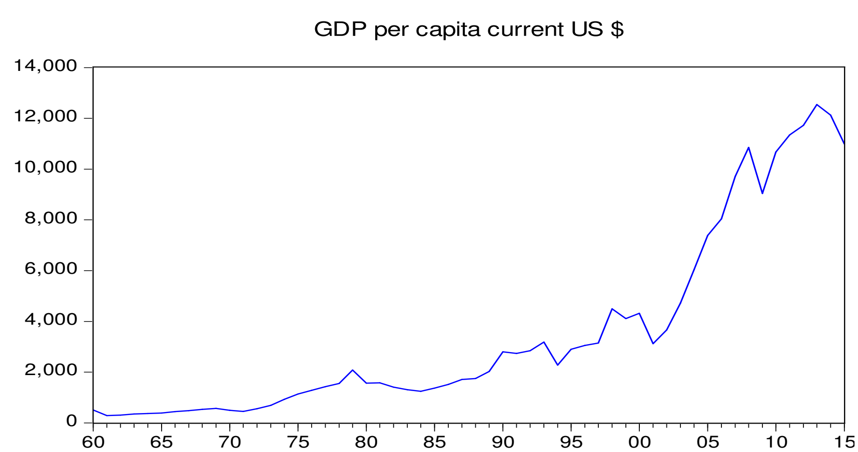
There are two facts: The first is that the industrialization reduces demand for children, and the second is that children do not become inferior goods with increase in income. As the hypothesis implies, the increase in the level of education of women and the increase in their participation in the labor market lead to a decrease in the dependence of them on men and children. Industrialization and economic growth raise the cost of children due the time spent on child care becoming more valuable. This may not be true in the whole country. For example, rural fertility can be higher because the cost of rearing when children contribute work to maintaining the farm is lower than in the city.

Turkey is considered as one of the emerging economy for several decades. Recently, we witnessed that Turkey has elevated its status to an emerging power. Thus, it is important to see changes in fertility rates and GDP in Turkey. Graph 1shows that fertility rates in Turkey have been significantly decreasing since 1960's. On the other hand, as shown in graph 2, GDP per capita in Turkey with current US dollar has been increasing since 1960's.

Graph 1: Fertility Rate in Turkey



Graph 2: GDP per capita in Turkey

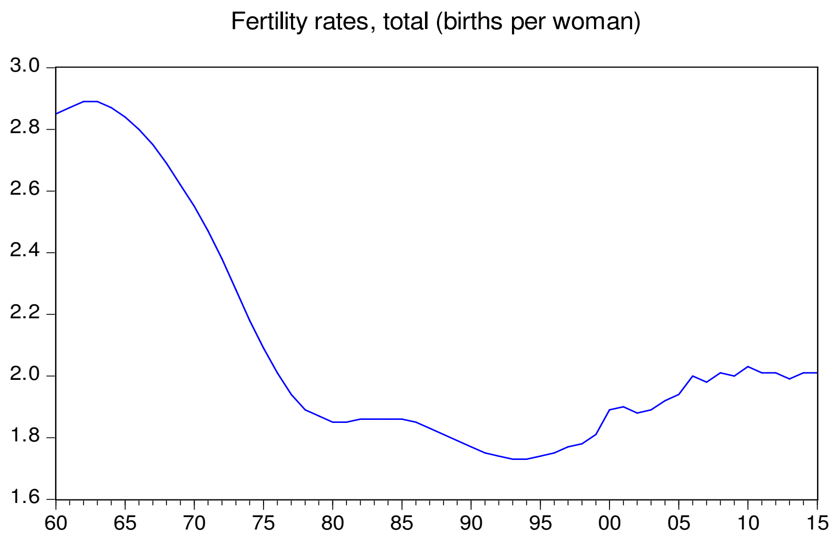


Since the decline of the fertility rate started in France earlier than other countries, France has been selected to represent the relationship between population growth and GDP in developed countries. The reason for choosing France is the increase in fertility rate due to the longstanding family policies implemented in recent year. Thus, France stands out from many European countries because of its relatively high and stable fertility.

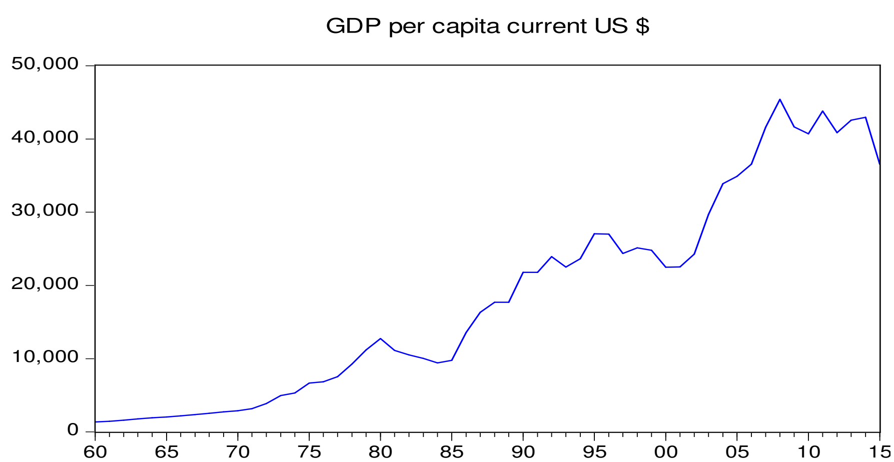
With the economic development of France and the rise in income levels, birth rates and population growth rates have slowed down significantly since 1975. French government has begun to take measures to increase birth rates in order to prevent the negative consequences of this situation. Posters that families should have more children could be seen almost all over the country at that time. In addition to these incentives, the French government allowed the migration of foreign workers from other countries, especially Algeria, Morocco and Tunisia, in order to meet the labor needs.

Graph 3 and 4 show the fertility rate and the per capita income in France, respectively In France as well, the fertility rate steadily declined from 1960 to 1995. But, per capita income has continuously increased, except during periods of crisis. We can also make interpretation what we did for Turkey to France. Although the child demand seems to have fallen with the increase in income, behind this, there are some factors which are mentioned above such as the increase in education level, the delay of marriage and the increase of women's participation in the labor market.

Graph 3: Fertility Rate in France



Graph 4: GDP per capita in France



The explicit application of micro-economic methods to the analysis of child demand began in the late 1950's and early 1960's when Leibenstein, Okun, Becker and others attempted to explain the effect of the level of income and economic development on a family's child demand (Cochrane, 1975).

An answer to what factors determine the number of children people will demand is given by Becker who places family-size goals in the framework of economic theory by treating children as a consumption good analogous to cars, houses, and refrigerators (Blake, 1968).

Using the term 'the economic approach' to human behavior, Gary Becker and other neo-classical economists forcefully argue that economic efficiency determines household behavior.[1] They assume that household seeks to maximize exogenously given joint utility functions, like any firm behavior to maximize its profit, and they hypothesize that differences in household behavior represents efficient responses to differences in prices and incomes which households face (Folbre, 1984). As it is known that the theory of the firm assumes a profit maximization objective. Similarly, the theory of the consumer effectively assumes utility maximization, with many restrictions on what provides utility. Neoclassical economics focuses on prices, outputs, and income distributions in markets determined by demand and supply.

According to Becker and other neoclassical economists, there must be a relationship between child demand and income or standards of living. They state that as the rate of return to human capital and education level increase, the cost of rearing children goes up. On the other hand, the opportunity cost of mother's time goes up as higher wages draw women out of the household into labor market, and finally increase the cost of children. Therefore, the demand for children decreases and fertility level gradually adjust as wages paid to women increase.

Also, in an article named 'Child Endowments, and Quantity and Quality of Children', Becker and Tomes (1976) include social interactions and special relation between quantity and quality of children. And, Becker and Tomes conclude that large increase in expenditures on children would reduce the demand for them because the cost of each child is directly related to the expenditure on each child.

In sum, it can be concluded that neoclassical theory states a negative relationship between the quality of children and their size in the family since after a point, which shows the optimum child demand, demand for children decreases.

2. Theoretical Model

In this section, a child demand model will be created by using neoclassical tools. As it is known, the concept of marginal change has an important meaning in neoclassical theory. Therefore, neoclassical economists have been described as marginalists for a long time.

Since the neoclassical theory treats children as a commodity which is bought and sold and they also have a price; thus, children can be included in the utility function.

$$U = u(C, X, Y, L)$$

where U is utility of an individual, C is demand for children, X demand for X commodity, Y is income, and L is leisure.

$$Y = wW$$

where w is wage rate, and W is working hours.

$$Y = P_i X_i + P_c C$$

where P_i is the average price of commodities consumed by i.

$$T = W + L + C$$

where T is time spent on working, leisure, and on children.

In these conditions, what does determine child demand?

[1] It is known that the primary goal of neo-classical economics is to provide efficient allocation of scarce resources.

For this purpose, we need to reorganize the utility function and to get the derivative of the utility function according to the child. Our aim is to find out how individual i's utility changes when his/her child demand changes?

$$U_{i} = u(C, \frac{Y-P_c}{P_i}C, P_i X_{i} + P_c C, T - W - C)$$

To find the ideal child demand, it needs to be taken derivatives with respect to child and equal those derivatives to zero.

$$\partial U/\partial C = \partial U/\partial C + \partial U/\partial X_i(-P_c/P_i) + \partial U/\partial Y(P_c) + \partial U/\partial L(-1) = 0$$

According to this model, child demand is a function of child price[2] (P_c) commodity price(P_i), income(Y), and leisure (L). This demand function can be expressed as followed:

$$C^* = f(P_c, P_i, Y, L$$

Now, suppose that consumer i's wage rate increases. How does demand for children affected from this increasing in wage rates?

In economic theory, income is a sole determinant to decide a good is a normal or an inferior one because an inferior good is a good that is bought in smaller quantities as an individual's income rises. According to this definition, if children were normal goods, then their parents would demand more children when they get richer. Thus, how the changes in wages and incomes affect child demand is important. Therefore, only the effect of income change on child demand has been considered in the model.

$$U_i = u(C, \frac{wW - P_c C}{P_i}, wW, T - C - \frac{Y}{w})$$

$$\partial U/\partial C = \partial U/\partial C + \partial U/\partial X_i(-\frac{P_c}{P_i}) + \partial U/\partial Y(P_c) + \partial U/\partial L(-1) = 0 \equiv H$$

If the equation above is called as H, the implicit function theorem can be used to answer the question.

$$\frac{\partial C^*}{\partial w} = -\frac{\partial H/\partial w}{\partial H/\partial C^*}$$

As it has been seen above, the implicit function consists of two parts, namely the numerator and the denominator.

The numerator:

$$\frac{\partial H}{\partial w} = \frac{\partial^2 U}{\partial C \partial X}\left(\frac{W}{P_i}\right) + \frac{\partial^2 U}{\partial C \partial Y}W + \frac{\partial^2 U}{\partial X^2}\left(\frac{W}{P_i}\right)\left(-\frac{P_c}{P_i}\right) + \frac{\partial^2 U}{\partial Y^2}W\ (P_c)$$

Sign: (+) (+) (-) (-) (+)

The sign of the numerator is positive.

Now, the denominator can be found as follows:

$$\frac{\partial H}{\partial C} = \frac{\partial^2 U}{\partial C^2} + \frac{\partial^2 U}{\partial C \partial X}\left(-\frac{P_c}{P_i}\right) + \frac{\partial^2 U}{\partial C \partial L}(-1) + \frac{\partial^2 U}{\partial X^2}\left(-\frac{P_c}{P_i}\right)\left(-\frac{P_c}{P_i}\right) + \frac{\partial^2 U}{\partial X \partial L}\left(-\frac{P_c}{P_i}\right) + \frac{\partial^2 U}{\partial L^2}$$

Sign: ? + - - - + + - -

The main problem is to determine the sign of $\partial^2 U/\partial C^2$ because the sign of the second derivative is ambiguous. If the second derivative of the utility function with respect to child demand is negative, the sign of the denominator will be negative and this means that there is a positive

[2] The price of the child includes all expenses incurred to the child and the time allocated to him or her.

relationship between income and child demand. Thus, the derivative of child demand with respect to income has been found positive. On the other hand, this result is completely different from the graph showing the increase in income and the increase in population. Again, if the sign of $\partial^2 U/\partial C^2$is accepted as positive, result will be indeterminate.

$$\frac{\partial C^*}{\partial w} = -\frac{\partial H/\partial w}{\partial H/\partial C^*} = -\frac{+}{-}$$

If it is accepted that the quality of children will be decreased as the number of children increase, the sign of the second derivative will be negative, it means that after a point, it will be less to have children as it is in the consumption of goods and services. Who determines that point? This is a crucial question. When you decide to have another child, nobody can say anything about whether utility from children will be decreased because of this new born, on the other hand, nobody can measure the quality of your children. Therefore, we cannot mention about the equilibrium of child demand since children are not a commodity whose values are determined by demand and supply conditions. The answer of the question of how many children people will have is related to socio-cultural things.

Unlike the explanations of neo-classical economists, it is possible to express why the poor countries in real life as having more children as follows:

There are multiple reasons why less developed countries have higher fertility rate. For example, in a primarily agricultural or herding society, children represent family's wealth (they're low-cost workers who can do simple tasks). Also, children provide old-age security in societies where they're expected to look after their parents. In countries where infant mortality are high, parents do not expect that all of their children will survive, thus they are more likely to have children than they really want.

3. Data and Model

In this study, the relations between fertility rate and real GDP is analyzed with Autoregressive Distributed Lag (ARDL) model which was developed by Pesaran and Shin (1999) and Pesaran, et al. (2001) for Turkey and France. The data was collected from World Bank World Development Indicators. The main reasons for choosing the ARDL method are that short and long-term coefficients can be estimated at the same time; long-run relationships between variables can be predicted independently of the degree of stationary, meaning that each variable in the model can be given a different lag length; and the ARDL model can be applied to small samples (Pesaran and Pesaran, 1997: 302-303; Narayan, 2005).

The relationships between in variables in ARDL model are examined in two stages. Firstly, it is tested if there is a long-run relationship exists between variables. Having established the existence of long-run relationship among the variables using the ARDL bound test, the short and long-run estimates are presented using the ARDL method in the second stage. Before applying the model, an unrestricted error correction model is created. Thus, model can be estimated as follows:

$$fert = \alpha_0 + t\sum_{i=1}^{p} \alpha_1 \Delta fert_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta GDP_{t-i} + \alpha_3 fert_{t-1} + \alpha_4 GDP_{t-1} + u_t \quad (1)$$

where *p* represents the number of the lag which is determined by Akaike (AIC) or Schwarz (SC) information criteria.

4. Econometric Tests and Results

4.1. Unit Root Tests

Although the ARDL method allows variables with different degrees of stationary to take part in the same model and test long-run relationship, it requires that the variables are not *I (2)* (Narayan and Narayan, 2004). Thus, it is a necessity to perform unit root tests. The stationary of the variables has firstly been analyzed using the Augmented Dickey Fuller (ADF) test and then the Phillips-Perron (PP)

(1988) test has been applied in order to compare the results. These tests have been conducted under the assumption of an intercept, intercept and deterministic trend. If the test included only intercept is stationary, the test including the intercept and trend have been applied. Thus, all deterministic and stochastic properties are taken into account in determining the stationary of the series, which are fertility rate and real GDP.

According to the Table 1, real GDP series have unit root both ADF and PP tests. But, when the first difference of the real GDP variable is taken, the stationary hypothesis is accepted. Thus, the result is that the real GDP is I(1). On the other hand, it is observed that fertility rate does not include unit root according to both test results. The fertility rate is stationary at the level and it is I(0). These results show that the relationship between fertility rate and real GDP should be analyzed by ARDL model instead of traditional method.

Table 2 presents unit root test result of fertility rate and real GDP for France by using both ADF and PP tests. Similar to the Turkish case, real GDP variable has unit root both ADF and PP tests. However, when the first difference of the real GDP variable is taken, the stationary hypothesis is accepted. Thus, the result is that the real GDP is I(1). On the other hand, it is observed that fertility rate does not include unit root and it is stationary at the level and it is I(0). These results show that the relationship between fertility rate and real GDP should be analyzed by ARDL model instead of traditional method.

Table 1: Unit Root Test Results: The Turkish Case

ADF Test Results

	Level			**First Difference**			
Variables	***Test Format****	***Test Statistics***	***Critical Value** (%5)***	***Test Format****	***Test Statistics***	***Critical Value (%5)***	***Conclusion***
Fert	*(c, t)*	***-3.327224***	***-2.919952***	-	-	-	***I(0)***
GDP	*(c, t)*	2.742807	-2.912631	*(c, t)*	-6.497844	-2.913549	***I(1)***
PP Test Results							
	Level			**First Difference**			
	Test Format*	***Test Statistics***	***Critical Value** (%5)***	***Test Format****	***Test Statistics***	***Critical Value (%5)***	***Conclusion***
Fert	*(c)*	-7.164596	-1.946654	**-**	-	**-**	***I(0)***
GDP	***(c, t)***	6.574677	-1.946549	***(c, t)***	***-5.139952***	***-1.946654***	***I(1)***

* Expressions used in parenthesis represent constant terms and trends respectively.
** denotes the critical value of McKinnon (1996)

Table 2: Unit Root Test Results: The France Case

	Level			**First Difference**			
Variables	**Test Format***	***Test Statistics***	***Critical Value**(%5)***	***Test Format****	***Test Statistics***	***Critical Value (%5)***	***Conclusion***
Fert	*(c)*	***-3.741288***	***-2.915522***	**-**	**-**	**-**	***I(0)***
GDP	*(c, t)*	-1.648848	-3.490662	*(c, t)*	***-5.772552***	***-3.490662***	***I(1)***
PP Test Results							
	Level			**First Difference**			
	Test Format*	***Test Statistics***	***Critical Value**(%5)***	***Test Format***	***Test Statistics***	***Critical Value (%5)***	***Conclusion***
Fert	*(c)*	***-3.2139***	***-2.913549***	-	**-**	**-**	***I(0)***
GDP	*(c, t)*	-1.2489	-3.489228	*(c, t)*	***-5.67938***	***-3.49066***	***I(1)***

* Expressions used in parenthesis represent constant terms and trends respectively.
** denotes the critical value of McKinnon (1996)

4.2. Optimal Lag Selection

The optimal lag is selected according to the lowest value of the AIC or the SC. Lag length test result of the model 1 is presented in the Table 3. The maximum lag length has been accepted as 8 and the optimal lag length has been found as 3 for the equation 1. Table 3 presents the optimal lag selection for Turkish case. The optimal lag was determined as 3 since in this lag there is no serial correlation.

Table 3: Optimal Lag Length for Turkish Series

ARDL (3,0)			
p	**AIC**	**LM-Stat.**	**Prob.**
1	10.00395	68.2679	0.0000
2	6.857760	26.85805	0.0000
3	**5.515628**	5.318697	**0.2561**
4	5.534183	11.63163	0.0203
5	5.004438	18.81793	0.0009
6	4.930710	29.87779	0.0000
7	4.844453	26.07761	0.0000
8	4.859133	13.12307	0.0107

Having determined the appropriate lag, the ARDL model estimation results can be presented. In the Table 4, the ARDL estimation results are illustrated.

Table 4: ARDL (3,0) Estimation Results for Turkey

Dependent Variable: fert				
Variable	***Coefficient***	***Std.Error***	***t-Statistic***	***Prob.***
fert(-1)	2.83654	0.070703	40.11209	**0.0000**
fert(-2)	-2.708715	0.140682	-19.25420	**0.0000**
fert(-3)	0.872424	0.070830	12.31723	**0.0000**
GDP	2.88E-07	3.03E-07	0.950306	0.3465
C	-0.003834	0.004724	-0.811737	0.4208

Diagnostic Test

R^2 = 0.99, Adjusted R^2 = 0.99, *F-stat: 4349648, DW: 2.3645*

***Heteroskedasticity Test**: **Breusch-Pagan-Godfrey**: Null hypothesis: There is no heteroskedasticity*

F-stat: 1.8999, Prob: 0.1252,

*Obs*R-squared:7.253, Prob. 0.1231 Result: No heteroskedasticity.*

Stability Test: Ramsey Reset Test: $x_1^2 = -0.03352[0.1135]$ *No stability problem.*

***NormalityTest:** Skewness: -0.331, Kurtosis: 2.5956, Jarque-Bera: 1.380 (0.502): Residuals have normal distribution.*

Note: Expressions used in parenthesis shows probability.

In order to determine long-term relationship between fertility rate and real GDP in the ARDL method, the lagged coefficients of the dependent and independent variables in the equation 1 are equalized to zero. $(H_0 = \alpha_3 = \alpha_4 = 0)$. To test the existence of a long-run relationship, the *F-test* is applied. Then, the ARDL bound test is used to decide whether there is a long-run relationship among the variables comparing calculated *F*-statistic values with critical values on Pesaran, et al. (2001). If *F-statistic* value is greater than the upper critical value, it can be said that there is a long-run relationship between variables and that the variables are co-integrated. Bound test results are presented in the Table 5.

Table 5 shows that calculated F-statistic value is lower than Pesaran critical values, thus it is concluded that there is no long-run relationship between real GDP and fertility rate for Turkey.

Table 5: Bound Test Results for Turkey

Model: ARDL (3, 0)							
F-statistic	**k**	**Critical Values**					
		%1		**%5**		**%10**	
		I(0)	***I(1)***	***I(0)***	***I(1)***	***I(0)***	***I(1)***
2.662986	**1**	**6.84**	**7.84**	**4.94**	**5.73**	**4.04**	**4.78**

Table 6: Optimal Lag Length for France Series

ARDL (3,0)			
p	**AIC**	**LM-Stat.**	**Prob.**
1	10.78958	13.27839	0.0100
2	10.59965	5.488892	0.2407
3	**10.56551**	3.234091	**0.5194**
4	10.71223	5.065044	0.2807
5	10.78486	3.869776	0.4239
6	10.89475	7.697732	0.1033
7	10.90002	23.81047	0.0001
8	10.70491	4.303317	0.3665

According to Table 6, the lowest AIC value is received in lag 3; there is no serial correlation in this lag. Thus, the ARDL model can be used to analyze the relationship between fertility and real GDP for France.

Table 7: ARDL (3,0) Estimation Results for France

Dependent Variable: fert				
Variable	***Coefficient***	***Std.Error***	***t-Statistic***	***Prob.***
fert(-1)	1.301576	0.126537	10.28615	**0.0000**
fert(-2)	0.071625	0.227998	0.314158	**0.7547**
fert(-3)	-0.407905	0.123557	-3.301360	**0.0018**
GDP	-7.78E-08	5.80E-07	-0.134164	0.8938
C	0.068704	0.041173	1.668666	0.1014

Diagnostic Test

R^2 = 0.996043, Adjusted R^2 = 0.995726, *F-stat: 3146, DW: 2.05*

Breusch-Godfrey Serial Correlation LM Test: *Null hypothesis: There is no serial correlation*

$x_1^2 = 3.68[0.1591]$ Thus, there is no serial correlation.

Stability Test: Ramsey Reset Test: *Ramsey RESET Test:* $x_1^2 = -0.541163[0.4511]$ *No stability problem.*

NormalityTest: *Skewness: 0.112940, Kurtosis:4.300161, Jarque-Bera:3.990801 (0.135959): Residuals have normal distribution.*

Note: Expressions used in parenthesis shows probability

Having taken the ARDL estimation result, long-run relationship between fertility rate and real GDP can be analyzed for France. For this purpose, the ARDL bound testing method will be used, which can be applied for testing long-run relationships irrespective of whether the variables are stationary at the same or different orders i.e. I (0) or I (1) as stated before. Bound test results are shown in Table 8.

Table 8: Bound Test Results for France

Model: ARDL (3, 0)							
F-statistic	**k**	**Critical Values**					
		%1		**%5**		**%10**	
		I(0)	***I(1)***	***I(0)***	***I(1)***	***I(0)***	***I(1)***
6.895187	**1**	**6.84**	**7.84**	**4.94**	**5.73**	**4.04**	**4.78**

According to the results, since the calculated F-statistic value is greater than the upper critical value at 5% confidence interval, there is a long-run relationship between fertility rate and real GDP in France. Thus, long-term coefficients of the ARDL model can be summarized as follows:

Table 9: Long-Run Coefficients of the ARDL Model

Model: ARDL (3, 0)				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
GDP	-0.000002	0.000016	-0.138758	0.892
C	1.979816	0.570432	3.470731	0.0011

According to Table 9, there is an inverse relationship between real GDP and fertility rate, but the coefficient is not significant.

Table 10: Short-Run Coefficients of the ARDL Model

Model: ARDL (3, 0)				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
D(fert(-1))	0.336278	0.124176	2.708080	**0.0092**
D(fert(-2))	0.407905	0.123557	3.301360	**0.0018**
D(GDP)	-0.000000	0.000001	-0.134164	0.8938
*CointEq(-1)**	-0.034702	0.012572	-2.760371	0.0081

It is observed that the short-term coefficient of the model is in harmony with the long-run results. Table 10 shows that lagged changes in fertility rate can lead to increased fertility rate, but the coefficient of real GDP is not significant, meaning that real GDP cannot affect fertility rate in the short-run as in the long-term. The short-term dynamics of the model in the ARDL method is presented by the error correction mechanism. The coefficient of the error correction term has been found as negative and significant. This means that the short-run imbalances are eliminated in the long-term and the system is converging to the long-run equilibrium.

5. Summary and Concluding Remarks

The neoclassical theory takes child demand in the utility function, like any other commodities. But, the demand for children is different from things which increase our utility; such as car, refrigerator, elevator, and other goods and services, whose price is determined in the market through its sellers and buyers. However, demand for children is determined by socio-cultural things. we cannot take child demand in a utility function like any commodity and services.

In this study, the ARDL model was used to investigate the relationship between real GDP and fertility rate, which was accepted as a proxy for child demand, for Turkey and France. In the section of the theoretical background, we saw that there is no any certain relationship between child demand and real GDP. This conclusion was supported with the ARDL method. According to the ARDL model, it was found that there was no any long-term relationship between real GDP and fertility rate in Turkey. However, according to the ARDL model, there is a long-term relationship between real GDP and fertility for France. But, in this case, the GDP coefficient is not statistically significant. As a result, the ARDL method used in this study supports the theoretical structure.

As a result, we cannot say that fertility increases as income increases as the demand for goods and services. Thus, the child demand cannot be called normal goods or inferior goods as in economics textbook. But, we can say that child demand is determined by socio-cultural things. Even if per capita income in Turkey and in France has increased compared to 40 years ago, fertility rate was decreased since raising the cost of children because of the time spent on child care becoming more valuable, meaning alternative cost of having children has increased. Thus, this inverse relationship between real GDP and fertility rate do not refer to "child demand is an inferior good".

Disclosure Statement

The authors declare no conflict of interest

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