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THE ANALYSIS OF THE EFFECT OF WOMEN'S PARTICIPATION IN THE LABOR MARKET ON FERTILITY IN EUROPEAN UNION COUNTRIES USING WELFARE STATE MODELS

Abstract. *Recent decades have been characterized by an increase in female labor market participation rate and a decrease of fertility rate, in the most of developed countries. On one hand, female labor market is important in helping to pay pension obligations to current retirees which averting poverty, especially among women, while on the other, the declining population levels make it less likely that the current European pension systems can be sustained. This research assesses the effect of the evolution of female employment rate on the variation of total fertility rate. The research was performed applying panel data analysis. The data treatment was carried out using SPSS and E-Views software. The data which was collected for the member countries of the European Union corresponds to the time period 2002-2012.*

The results show the existence of the relationship between the female employment rate and the total fertility rate. The relationship between the two variables behaves differently among the EU countries due to the welfare state model adopted, specific labor market characteristics, including political regimes and geographical aspects.

Key words: *Welfare state, Female employment rate, Total fertility rate, Panel Data Analysis.*

JEL Classification: J21, J13, C23, J16

1. Introduction

Women's participation in the labor market plays an important role in the variation in fertility levels within and between countries. Over the last decades, in the most developed countries, labor market participation of women increased, while fertility declined (Del Boca, 2002). This relationship between female participation and fertility was theoretically established by Becker and Lewis (1973) and Willis (1973) and empirically documented by Butz and Ward (1979) and Mincer (1985) on a cross-country basis. Recent analysis show that, with the mid 1980s, the sign of the cross-country correlation changed. After 1985, female labor market participation rate continued to increase in all countries, but fertility rate started to decline at a lower level rate or, in some countries, began to grow again. The countries that currently have the lowest level of fertility are those with relatively low levels of female employment rate (Spain, Italy, and Greece), while the countries with high fertility rate, have also relatively high female labor market participation rate (Denmark, France). This relationship is manifesting different, according to geographical aspects and welfare state models adopted by countries. The Northern European countries have the highest total fertility rate compared to the other groups, while Southern European countries register the lowest fertility rates, since 2007.

In this study we aim to verify the hypothesis that the relationship between fertility rate and female employment behaves differently by groups of countries defined according to welfare state models. We study how this relationship reacts between and within groups of countries that are member states of the EU. In this purpose, the panel data analysis is applied.

The overall structure of the research takes the form of five sections, including this introduction. Section two lays out the theoretical background regarding both the relationship between female employment rate and the total fertility rate, and the welfare state concept. The third section covers the methodology used for this study. The fourth section presents the findings of the research, focusing on the existence of the relationship between female employment rate and total fertility rate. Finally, the conclusion gives a brief summary and critique of the findings.

2. Theoretical Background

The relationship between female employment rate and the total fertility rate has been widely studied in demographic, economic and sociological literature (Bowen and Finegan, 1969; Cramer, 1980; Cattani, 1991; Brewster and Rindfuss, 2000; Kogel, 2004)

The economic approach took into account female wages, which represent the opportunity cost of childbearing, as a determinant of fertility. This approach suggests that an increase in female employment rate has a negative effect on total

fertility rate, if female who are in the workforce put off having children because of the opportunity cost of having children. The opportunity cost may take the form of income foregone from giving up paid employment if the female needs to leave the workforce to look after the children or switch from full-time to part-time employment. The opportunity cost of having children could also take the form of an interruption to the female's career path, manifest in the loss of a higher potential future income stream and non-pecuniary benefits including recognition and status associated with a more senior position in her chosen profession (Mincer, 1963; Collier et al, 1994; Cleveland et al., 1996).

The socio-demographic approach focuses on the ability of women to combine childbirth and work, which is determined by the complex of social and economic institutions in a given society. According to this perspective, female employment is inversely related to fertility, due to the presumed conflict between women's work and their reproductive roles (Spitze, 1988; Shockaert, 2005). Sociologists have emphasized the emotional bond between mother and her child, which make the mother reluctant to leave her child to re/enter the workforce (Stolzenberg and Waite, 1977; Lehrer and Nerlove, 1986).

The cross-country correlation between female employment rate and the total fertility rate, in most developed countries, found a shift from a negative value before the 1980s to a positive value thereafter (Ahn and Mira, 2002; Brewster and Rindfuss, 2000). This finding has given rise to the societal response hypothesis that posits societal level responses such as changing social attitudes towards mothers in the workplace, increased availability of childcare and state-mandated paid maternity. This have relaxed the incompatibility between having children and remaining in paid employment, in most developed countries (Bowen and Finegan, 1969; Garfinkel et al., 1990; Kreyenfeld and Karsten, 2000; Adsera, 2004; Engelhardt et al., 2004). Labor market specificities and changes over time affect the relationship between female employment rate and total fertility rate. There are several policies that may be responsible for the finding that there is a negative equilibrium relationship between female employment rate and total fertility rate (Adsera, 2004).

Other researches on the interrelation between fertility and women's employment emphasizes the existence of a negative impact of female employment on childbearing for the majority of Western industrialized economies. It also demonstrates that the negative association between women's employment and childbearing is particularly evident among mothers, likely because the opportunity cost for mothers are higher than for childless women or because the deterioration of women's position in the labor market after childbirth, which make them more vulnerable and reduces their bargaining power at home (Matysiak and Vignoli, 2013; Neyer, 2003).

We chose to evaluate the relationship between female employment and fertility rates since there are relatively few studies, in the literature, that have explicitly examined the issue between female employment rate and the total fertility rate using time series data (Cheng, 1997; Del Boca, 2002)

In order to quantify and analyze the relationship between the two variables, the female employment rate and the total fertility rate, we took into consideration the 27 European Member States grouped by the set of interventions organized by the state which are aimed at guaranteeing the provision of a minimum level of services to the population via a system of social protection, known as the welfare state.

A welfare state is a concept of government in which the state plays a key role in the protection and promotion of the economic and social well-being of its citizens. It is based on the principles of equality of opportunity, equitable distribution of wealth, and public responsibility for those unable to avail themselves of the minimal provisions for a good life (OECD, 2011). Esping-Andersen (1999) classified the most developed welfare state systems into three categories: Social Democratic, Conservative, and Liberal. The welfare state involves a transfer of funds from the state, to the services provided such as healthcare and education, as well as directly to individuals, through benefits.

The fall of the communist block and the process of its integration within the market economy have generated a series of new types of welfare state in Central and Eastern Europe, which are still in the process of definition (Fenger, 2007; Tache and Dumitrache, 2012).

In the liberal regime countries, working is encouraged, based on modest benefits and strict eligibility criteria. The beneficiaries are often stigmatized. The conservative welfare state regime is characterized by its differentiating welfare programs according to the social status, in which benefits are often earnings-related. These are administered through the employer and oriented towards keeping existing social patterns. The role of the family is also emphasized and the redistributive impact is minimal. The social democratic regime is the smallest regime cluster. In this case welfare provision involves universal generous benefits, a commitment to full employment and income protection, and a strongly interventionist state, used to promote equality through a redistributive social security system (Esping-Andersen, 1999).

Sapir (2006) identified four models which cover four different geographical areas: the Nordic social democratic model, the Anglo-Saxon liberal model, the Continental (corporatist) model, and the Mediterranean model. Nordic countries (Denmark, Finland and Sweden, plus the Netherlands) have the highest levels of social protection expenditures and universal welfare provision. The emphasis on social redistribution is illustrated by the share of taxes in GDP, which is above 45%. There is extensive fiscal intervention in labor markets, based on a variety of active policy instruments. The Nordic model believes that flexibility and

security are mutually supportive (the Danish model-flexicurity). Flexicurity consists of a flexible labor market with fewer restrictions on hiring and firing, a high level of social security and an active labor market policy. The continental corporatist model (France, Germany, Austria, Belgium and Luxembourg) has a strong emphasis on the role of labor law and collective bargaining. These countries rely extensively on insurance-based, non-employment benefits and old-age pensions. Although their membership is declining, unions remain strong as regulations extend the coverage of collective bargaining to non-unionized workers. Anglo-Saxon countries (Ireland and the UK) are characterized by predominant role of markets, minimal role of the state and low degree of regulation. They feature relatively large social assistance of the last resort. Cash transfers are primarily oriented to people in working age. This model displays a mixture of weak unions, comparatively wide and increasing wage dispersion, and relatively high incidence of low-paid employment. The Mediterranean Model is primarily used in Italy, Greece, Portugal and Spain, and concentrates the social spending on old-age pensions. Its social welfare system typically draws on employment protection and early retirement provisions to exempt segments of the working age population from participation in the labor market. This system is family-centered and retains some characteristics of agrarian, paternalistic societies.

The post-communist welfare states cannot be reduced to any of these or any other well-known types (Fenger, 2007). This author's empirical investigation does not show a distinct, specific type of post-communist welfare state. He remarks three groups: a group of former-USSR countries, a group of rather successful Central and Eastern European countries including Poland and the Czech Republic and a group of developing welfare states, including Romania.

No new EU member state has opted for a pure social model, and there is a clear differentiation among these states, which classifies into two groups:

Group A: Baltic states, Slovakia and two southeast European members (Bulgaria and Romania). This group has adopted a more neo-liberal (Anglo-Saxon) social model;

Group B: other new member states (Czech Republic, Hungary, Poland, and Slovenia). This group resembles the Continental model.

It is noteworthy that no post-communist country adopted the Nordic model. Probably, the balance between equity and efficiency cannot be achieved at low general levels of prosperity. Additionally, there are other disruptive factors in East European countries as: corruption, rent-seeking, anti-social behavior (Tache and Dumitrache 2012). The restructuring and European integration of these countries (both groups A and B) has undergone two phases so far: recession (in the first years of transition), followed by recovery (within the last 5 years, on average). In both phases, the chances of socially inclusive politics have been low. In the first phase, these chances were limited by the negative macroeconomic consequences of

recession and by the conditionality imposed by the international financial organizations (the International Monetary Fund and the World Bank).

3. Method

In order to analyze the relationship between fertility and female employment, in this study, we use panel data analysis, by groups of countries defined in accordance with welfare state models.

3.1. Population and variables

The population concerned in this research is represented by the member states of the European Union, excluding Croatia due to lack of data available for this country.

According to welfare state model, the EU countries are clustered in four groups using the classifications used in the literature (Esping-Anderson, 1999; Sapir, 2006; Fenger, 2007; Tache and Dumitrache, 2012):

- Group 1 (Nordic social model): Denmark, Finland, Sweden, and Netherlands;
- Group 2 (Continental social model): France, Germany, Belgium, Austria, Luxembourg, Hungary, Slovenia, Czech Republic, and Poland;
- Group 3 (Anglo-Saxon social model): Ireland, UK, Estonia, Latvia, Lithuania, Slovakia, Bulgaria, and Romania;
- Group 4 (Mediterranean social model): Italy, Greece, Spain, Portugal, Cyprus, and Malta.

The variables considered in this study are the following:

- Total fertility rate (*TFR*), the dependent variable *Y*. *TFR* represents the average number of children that would be born alive to a woman during her lifetime if she experiences a given set of age-specific fertility rate observed in a population during a given year.
- Female employment rate (15 to 24 years), the independent variable X_1 ;
- Female employment rate (25 to 54 years), the independent variable X_2 ;
- Female part-time employment rate (Part-time workers in % of total employment), the independent variable X_3 ;
- Gross Domestic Product (Volume indices of real expenditure per capita in PPS, EU27=100), the independent variable X_4 .

The data are available from the Eurostat data base, at country level, during the period 2002-2012. Because the observed data are cross-sectional and time series, they are panel data.

The total number of observation is equal to $N = nT = 297$ observations, where n is the number of countries ($n=27$ countries) and T represents the number of time periods, 1 through t time period, ($T = 11$ years). All countries have measurements in all years; therefore the panel data are balanced.

3.2. Models used in the analysis

In order to analyze the influence of female employment rate on TFR a cross-sectional and longitudinal analysis was used.

The pooled regression model has the following form:

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + v_{it}$$

where:

Y_{it} – the dependent variable (*TFR*) for country i at time t ;

X_{kit} – the independent variable X_k for country i at time t ;

v_{it} – errors are independent identically distributed;

β_k – the effect of the independent variable X_k on the dependent variable.

The considered pooled regression model between TFR and the explanatory variables does not consider heterogeneity across groups. Therefore, panel data models with fixed or random effects control for country effects and assume that the time series association between TFR and explanatory variables is the same across countries.

The fixed effects model examines country differences in intercepts, assuming the same slopes and constant variance across countries. The fixed effect model has the following functional form:

$$Y_{it} = (\alpha + u_i) + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + v_{it}$$

where:

u_i – the country effect, it is time invariant and considered a part of the intercept;

v_{it} – errors are independent identically distributed;

The country effect u_i is allowed to be correlated to other independent variables. The country-specific effects are absorbed by including dummy variables in the model. In a fixed effect model, dummy variables are considered as a part of the intercept (Brüderl, 2005; Torres-Reyna, 2011).

The random effect model assumes the variation across countries to be random and uncorrelated with the explanatory variables. It estimates variance components for countries and error, assuming the same intercept and slopes (Hun, 2009).

The random effects model is:

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + (u_i + v_{it})$$

where:

u_i – the between – countries error (country-specific time-constant unobserved heterogeneity); are assumed independent of v_{it} and X_{it} , which are also independent of each other for all i and t ;

v_{it} – the within – countries error (idiosyncratic error).

$u_i \sim IID(0, \sigma_u^2)$ and $v_{it} \sim IID(0, \sigma_v^2)$

The random effect model is suitable to highlight the influence of differences across countries on the dependent variable. The difference among countries lies in their variance of the error term, not in their intercepts.

In order to identify the most appropriate model among the three specified models, a set of tests can be used. The Hausman test allows verifying if the random effects model is preferred to the fixed effects model. The null hypothesis is that unique errors (u_i – the individual effects) are uncorrelated with the explanatory variables.

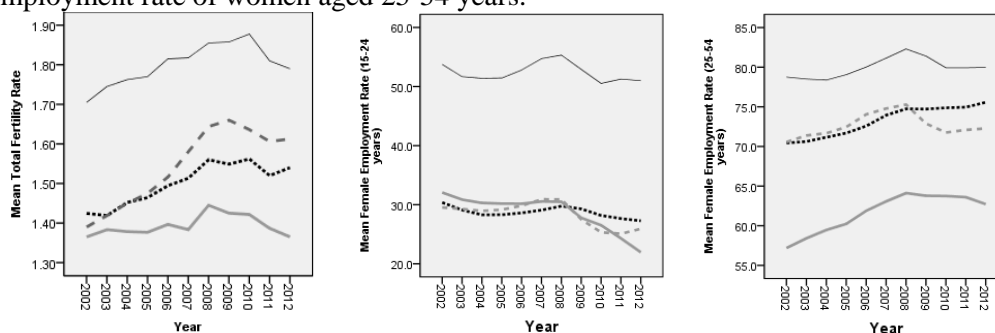
The Breusch-Pagan Lagrange multiplier (LM) test is designed to test random effects. The null hypothesis of the one-way random group effect model is that individual-specific or time-series error variances are zero. If the null hypothesis is not rejected, the pooled regression model is appropriate.

4. RESULTS

Total fertility rate (TFR) increased in most of the European countries, though there is variation between groups of countries defined by welfare state model. Over the period 2002-2012, among the four groups of countries, the countries from the Nordic social model group have the highest TFR and also the highest female participation on the labor market. The lowest fertility rates can be noticed for the Mediterranean social model group. The most important discrepancy between Nordic social model group of countries and the other groups is evident with regard to employment rate of young women aged 15-24 years and female part-time employment rate.

The reason for high fertility and also high employment of women in Nordic countries relies on social policies that facilitate mothers' employment and access to childcare.

Moreover, there can be seen some convergence between the Nordic social model and the Continental social model groups of countries in relation to employment rate of women aged 25-54 years.



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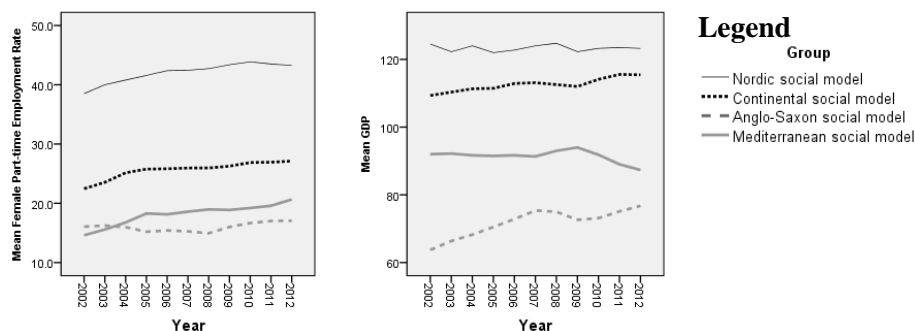


Figure 1. The evolution of the *TFR* and of the explanatory variables, by groups of countries, between 2002 and 2012

The period of time 2002-2012 is relevant for the three main events that had an important impact on the relationship between female employment rate and fertility rate: introduction of Euro notes and coins, which facilitated the free movement of goods, services, people and capital (2002); financial crisis, with a representative year (2008); beginning of investments in green technologies along with closer European cooperation (2012). The effects of the crisis on both *TFR* and female employment rate can be observed in the dropping values of these indicators for 2012 as compared to 2008. The Continental social model group is an exception with regards to employment rate of women as it is higher in 2012 than in 2008.

The variation within each group of countries is graphically represented by the error bars considering the interval defined by the mean ± 2 standard deviations (Fig. 2).

The highest variations among countries with respect to *TFR* can be noticed within the Continental and Anglo-Saxon social models groups of countries.

There is much diversity in country experiences in terms of the share of women holding part-time jobs. In the countries from the Mediterranean cluster part-time jobs among women are less common, while in the Nordic countries, a large proportion of women work in part-time jobs.

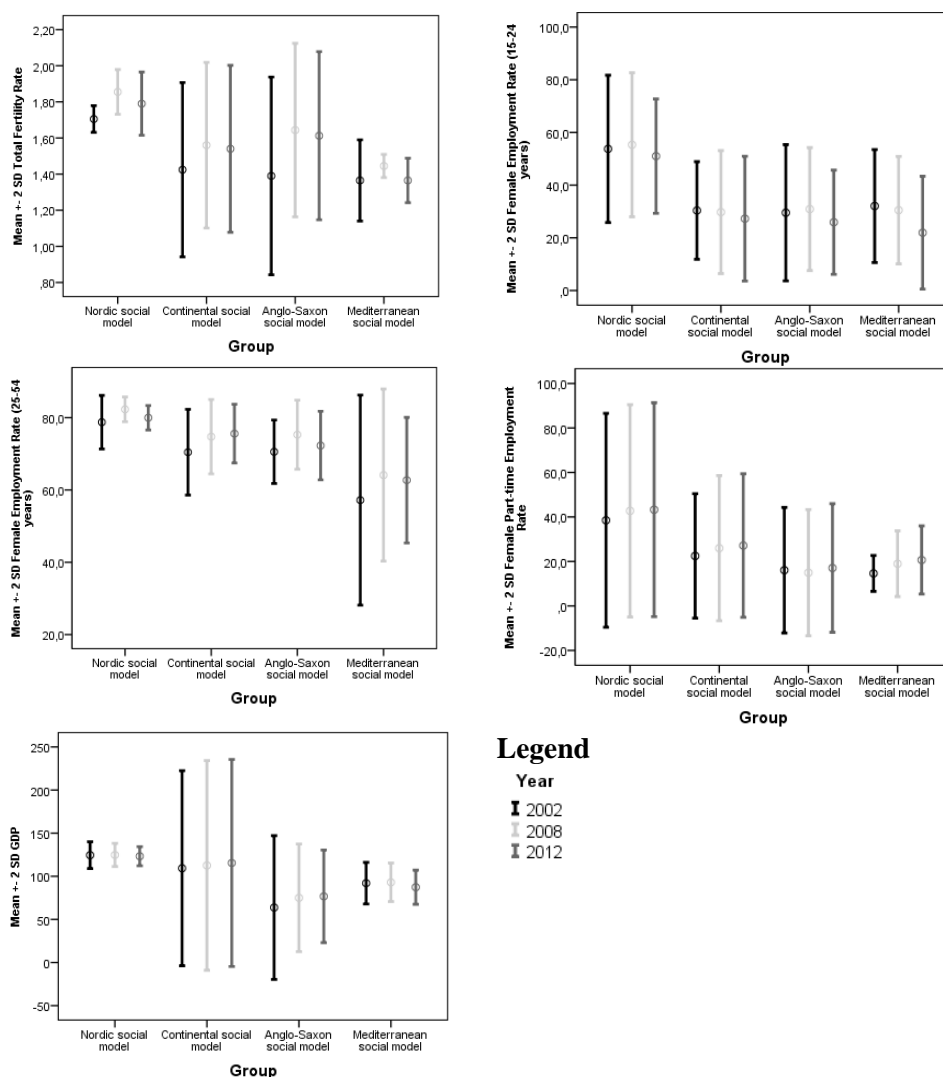


Figure 2. The variation of TFR and of the explanatory variables, among European countries, by groups of countries, in 2002, 2008 and 2012

As regards the employment rate of women aged 25 to 54 years, it can be noticed that Mediterranean social model group is the most heterogeneous, while the Nordic countries are the most homogeneous.

In order to explain the variation of fertility rate under the influence of female labor market participation, we apply panel data analysis. We estimated three models, namely the pooled *OLS* model, the random effects model (*RE*), and

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the fixed effects model (*FE*). For each model, the coefficients and the standard errors are estimated (Table 1).

Table 1. The estimated coefficients with standard errors in parentheses for the overall sample of countries

<i>Variables</i>	<i>Pooled OLS</i>	<i>Country RE</i>	<i>Country FE</i>
<i>C</i>	0.8307** (9.277)	0.5958** (4.583)	0.4980** (3.4656)
<i>Female Employment Rate (15-24 years)</i>	0.0023 (1.912)	-0.0012 (-0.831)	-0.0015 (-0.8991)
<i>Female Employment Rate (25-54 years)</i>	0.0059** (4.717)	0.0090** (5.083)	0.0083** (3.8863)
<i>Female Employment Rate (Part-time)</i>	0.0035** (3.023)	0.0046** (2.703)	0.0060* (2.2402)
<i>GDP</i>	0.0013** (4.033)	0.0023** (3.461)	0.0036** (3.6905)
No. of cross-sections	27	27	27
No. of time periods	11	11	11
Hausman Test (Probability)		4.75805 (0.313)	
Breusch-Pagan Test (Probability)	972.2091 (0.0000)		

**($p < 0.01$), *($p < 0.05$)

The Hausman test compares FE and RE models. The null hypothesis is not rejected; therefore the random effect model is better than its fixed counterpart. The Breusch-Pagan *LM* test for random effects is significant, consequently the null hypothesis is rejected, the random effect model is appropriate.

The random effect model for *TFR* assumes that the unobserved country-specific heterogeneity is the realization of a random process and uncorrelated with the included variables. The independent variables Female employment rate (25 to 54 years), Female part-time employment rate and GDP have a significant influence on *TFR*. Nevertheless, the influence of Female employment rate (15-24 years) on *TFR* is not significant.

In order to analyze the differences in the influence of female labor market participation on the *TFR* by groups of countries defined in accordance with their characteristic social model, we estimated three panel data models (pooled *OLS* model, the random effect model and the fixed effect model) for each of the four groups of countries. For the Nordic social model group, the random effects model was not estimated due to the small number of cross-sections.

Table 2. The estimated coefficients with standard errors in parentheses for the Nordic social model and the Continental social model groups of countries

Cluster Variables	Nordic social model group		Continental social model group		
	<i>Pooled OLS</i>	<i>Country FE</i>	<i>Pooled OLS</i>	<i>Country RE</i>	<i>Country FE</i>
<i>C</i>	0.8893 (0.4585)	-0.02297 (0.5832)	0.2009 (0.2485)	0.7463** (0.2414)	0.8865** (0.2689)
<i>Female Employment Rate (15-24 years)</i>	-0.0009 (0.0013)	0.0081* (0.0038)	-0.0223** (0.0025)	-0.004 (0.0029)	-0.0051 (0.0037)
<i>Female Employment Rate (25-54 years)</i>	0.0169** (0.0049)	0.0013 (0.0052)	0.0217** (0.0037)	0.0103** (0.0033)	0.0146** (0.0040)
<i>Female Employment Rate (Part-time)</i>	0.0008 (0.0010)	0.0257** (0.0040)	0.0166** (0.0018)	0.0066* (0.0030)	0.0045 (0.0041)
<i>GDP</i>	-0.00352 (0.0038)	0.0016 (0.0039)	-0.001 (0.0004)	-0.0003 (0.0010)	-0.00383 (0.0021)
No. of cross-sections (<i>n</i>)	4	4	9	9	9
No. of time periods (<i>T</i>)	11	11	11	11	11
Hausman Test (Probability)				10.1700 (0.0377)	
Breusch Pagan Test (Probability)	1.9187 (0.166)		171.801 (0.0000)		

**($p < 0.01$), *($p < 0.05$)

For the Nordic social model and the Continental social model groups, the results of the Hausman test show that the fixed effect model is preferred to the random effect model (Table 2). In the *FE* models, the unobserved country-specific effect does not embody elements that are correlated with the explanatory variables. Therefore, such models assess the predictors' net effect. The coefficient of X_k indicates how much *TFR* changes overtime, on average per country (controlling by differences in countries), when X_k changes by one unit.

In the case of Nordic social model countries, we can notice that *TFR* is explained by the female part-time employment rate and the employment rate of young women. Both variables have a positive significant influence on *TFR*. On the contrary, for the Continental social model countries, *TFR* is explained by the employment rate of women aged 25 to 54 years. The effect of the female employment rate on *TFR* is positive.

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As regards the Anglo-Saxon social model and the Mediterranean social model groups, the random effect model is more appropriate (Table 3).

Table 3. The estimated coefficients for the Anglo-Saxon social model and Mediterranean social model groups of countries

Region Variables	Anglo-Saxon social model			Mediterranean social model		
	Pooled OLS	Country RE	Country FE	Pooled OLS	Country RE	Country FE
C	1.0902** (0.2396)	-0.4538 (0.3354)	-0.66423 (0.4113)	1.2212** (0.1087)	1.1079** (0.1627)	1.1281** (0.2034)
Female Employment Rate (15-24 years)	-0.0025 (0.0031)	-0.0098** (0.0026)	-0.0122** (0.0030)	0.0022** (0.0010)	0.0042** (0.0017)	0.0064** (0.0022)
Female Employment Rate (25-54 years)	0.0010 (0.0032)	0.0232** (0.0047)	0.0286** (0.0053)	0.0016* (0.0008)	0.0035* (0.0016)	0.0033 (0.0034)
Female Employment Rate (Part-time)	0.0062* (0.0028)	0.0076* (0.0037)	0.0026 (0.0076)	0.0007 (0.0015)	0.0066** (0.0025)	0.0088 (0.0048)
GDP	0.0048** (0.0009)	0.0067** (0.0011)	0.0060** (0.0013)	-0.0001 (0.0009)	-0.0019 (0.0017)	-0.0031 (0.0031)
No. of cross- sections	8	8	8	6	6	6
No. of time periods	11	11	11	11	11	11
Hausman (Probability)		8.7831 (0.0668)			5.2276 (0.2647)	
Breusch-Pagan Test (Probability)	65.6175 (0.0004)			12.7023 (0.0004)		

**($p < 0.01$), **($p < 0.05$)

The coefficient of X_k represents the average effect of the independent variable over TFR when X_k changes across time and between countries by one unit.

For the Anglo-Saxon countries, the variables that influence TFR are female employment rate and GDP. While the employment rate of women aged 25-54 years has a positive effect on TFR , the effect of the employment rate of young women on TFR is negative. Moreover, GDP has also a positive effect on TFR in Anglo-Saxon countries.

For the Mediterranean countries, all the variables related to female employment have a positive significant influence on TFR ; however, the effect of GDP on TFR is not significant for this group of countries.

5. Conclusions

Women's employment is recognized to play an important role in the variation in fertility levels within and between countries. The ability of women to combine childbirth and work is determined by various social and economic institutions..

This research examined the effect of female employment on the variation of total fertility rate across the European Union countries over the period 2002-2012.

The results of this study have proven that, in EU, women's participation on labor market has a significant positive effect on total fertility rate, when considering in the analysis the employment rate of women aged 25-54 years. This finding may be explained by the necessity for women to seek employment in order to increase the household's income.

However, the relationship between young women's employment and fertility rate is different among the groups of countries defined by the characteristics of the welfare state models. Contrary to the other groups, for the Anglo-Saxon social model group of countries, the relationship between young women employment rate and total fertility rate is negative. Therefore, for the countries in this group, the social policies offering large assistance may be responsible for the negative equilibrium relationship between employment rate of young women and fertility rate. Young women are not motivated to enter or re-enter the labor market due to reduced state-funded child care facilities.

For the Continental social model group, neither young women employment rate nor female part-time employment has a significant effect on fertility rate.

Moreover, the influence of GDP on fertility rate is highly significant and positive for the Anglo-Saxon social model group of countries. On the opposite side, for the Continental social model groups of countries, the effect of GDP on fertility is negative.

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