

WOMEN, WORK, AND BIRTH RATES IN SOUTHEASTERN EUROPE: A REGIONAL PANEL PERSPECTIVE

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ABSTRACT

The study explores the interdependence between female labor force participation and fertility dynamics in eight Southeastern European countries during 2000 – 2023, using the crude birth rate as a consistent macro level proxy for fertility in panel regression estimation. The analysis covers eight countries and incorporates economic, educational, and demographic control variables. Results reveal that short-term increases in female employment and tertiary education enrollment are significantly associated with declining birth rates, while economic growth shows a positive effect. Other factors, including part-time employment, urbanization, and parental leave policies, are not statistically significant in the short run. The study underscores the complexity of natality dynamics in transitioning economies and highlights the need for supportive family policies.

Keywords: *Birth rates, Female labor force participation, Southeastern Europe, Panel regression, Education, Economic development*

JEL classification: *J13, J16, O52, C23, I23, F63*

1. INTRODUCTION

In recent decades, Southeastern Europe has experienced dramatic demographic changes, marked by declining birth rates, ageing populations, and large-scale emigration. These changes have posed significant socio-economic challenges, including shrinking labor forces, reduced economic dynamism, and increasing pressure on welfare systems. Among the various factors influencing birth rates, female labor market participation has emerged as a key determinant. As women become increasingly integrated into the labor market, questions arise about how this shift affects reproductive behavior and demographic trends.

This paper aims to explore the relationship between female labor force participation and birth rates in eight Southeastern European countries: Albania, Bosnia and Herzegovina, Bulgaria, Greece, North Macedonia, Montenegro, Romania, and Serbia. Using a panel regression framework covering the period from 2000 to 2023, the study investigates short-term birth rates responses to changes in women's employment, while controlling for other demographic, educational, and economic variables. In particular, the study considers GDP per capita, tertiary education, urbanization, female part-time employment, and early childhood education as additional explanatory variables.

This research is motivated by both empirical gaps and policy relevance. While much has been written about birth rate dynamics in Western Europe and OECD countries, relatively few studies have focused specifically on Southeastern Europe, a region with distinct historical, economic, and institutional characteristics. By providing a regional empirical analysis, this paper contributes to a more nuanced understanding of birth rate determinants in post-socialist

and transitioning economies. It also offers valuable insights for policymakers seeking to balance female employment and family formation in the face of demographic decline.

The remainder of the paper is organized as follows: Section 2 reviews the relevant literature, Section 3 describes the countries in the sample and trends in birth rates and female employment, Section 4 presents the data, methodology, and empirical results, Section 5 discusses the findings, Section 6 presents certain limitations of the study and Section 7 concludes with implications and recommendations.

2. LITERATURE REVIEW

Birth rates in Southeastern European countries had a sharp decline in the past two decades. Only in 2023 Albania has birth rate 10.24‰, Bosnia and Herzegovina 7.71‰, Bulgaria 8.90‰, Greece 6.80‰, North Macedonia 9.20‰, Montenegro 11.20‰, Romania 8.00‰ and Serbia 9.20‰. Birth rates are only part of the declining demographic situation that these countries are facing. Continuous emigration and population ageing contribute to unsustainable economies and labor market imbalances. To address the issue of declining birth rates, the first step is to identify the key factors that determine their dynamics. This paper considers female participation rate as the main factor, with other factors taken as control variables that include tertiary education, GDP per capita, urbanization, female part time employment and early childhood education. Previous papers have considered these variables for distinct groups of countries, while when it comes to Eastern European countries further research could provide new insight. A considerable body of literature has examined the interplay between female labor force participation and fertility, yielding mixed findings across different regions and methodological approaches.

Recent work for Central, Eastern and Southeastern Europe documents how the post 1990 institutional transition and policy regimes shaped fertility to very low levels, with temporary rebounds followed by renewed decline. A key synthesis is Frejka and Gietel-Basten (2016), who show that across Central, Eastern and Southeastern Europe, modest policy expansions rarely shifted quantum fertility, with responses concentrated at specific parities and often short lived. They also stress cohort postponement and migration as structural headwinds. At the country level, demographers from Southeastern Europe provide detailed evidence: for Albania, Arjan *et al.* (2009) and coauthors trace a rapid fall of total fertility rate from historically high levels toward sub-replacement already by the 2000s, driven by marriage postponement and socio-economic change. For Serbia, recent work from Nikitović and Magdalenić *et al.* (2024) using 2022 census data documents gender specific cohort fertility patterns and continued very low fertility. For the former Yugoslav area Ćipin *et al.* (2020) analyze cohort trends and parity progression.

Mishra and Smyth (2010) conducted a panel cointegration analysis for 28 OECD countries and found both unidirectional and bidirectional long-run Granger causality between female labor force participation and total fertility rate, contingent on measurement and time period. Bloom *et al.* (2009), using data from 97 countries between 1960 and 2000, identified an inverse relationship between female labor participation and fertility. However, more recent studies such as Luo and Jarosz (2024), using German regional data, suggest that female job creation can positively influence fertility, underscoring the contextual nature of the relationship.

Education is another critical determinant. Vasireddy *et al.* (2023) found that rising tertiary education in Europe correlates with delayed fertility, higher rates of childlessness, and fewer

second births. In Taiwan, Bharati *et al.* (2021) documented that the expansion of higher education significantly reduced fertility among women up to age 30. Similarly, Shirahase (2000) emphasized the role of education in delaying marriage in Japan, and Aydoğan and Uslu (2019) showed that increased female education significantly reduces adolescent fertility across 53 countries.

Economic development also plays a significant role. Kögel (2004) and Sobotka *et al.* (2011) argue that fertility tends to follow economic cycles, with improved economic conditions encouraging family formation. Conversely, periods of economic crisis and uncertainty such as the 2008 financial downturn are linked to declining fertility intentions, especially in contexts with limited family policy support (Adserà, 2004).

Beyond classic reviews, newer causal studies quantify policy effects in the region. In Poland, the “Family 500+” cash benefit reduced mothers’ labor force participation by approximately 2 to 3 percentage points, indicating strong labor supply responses that may interact with fertility, while evidence on births is mixed and parity specific (Magda *et al.*, 2018). In Hungary, quasi experimental and event history work finds targeted effects at higher parities: cash support and tax relief increased third-birth risks, especially among low educated (cash) and higher educated (tax relief) parents, though aggregate total fertility rate gains remained modest and time limited (Spéder *et al.*, 2020). Outside the EU but regionally relevant, Russia’s “maternity capital” raised long run fertility by approximately 0.15 children per woman, with substantial timing (rescheduling) effects (Słomczyński and Yurko, 2014). Cross OECD syntheses conclude that Early Childhood Education and Care expansion, leave design, and tax benefit architecture can raise fertility at the margin, but effects depend on parity targeting, generosity, and labor market conditions (Luci-Greulich and Thévenon, 2013).

Family and labor market policies have also been studied extensively. Gauthier (2007) reviewed empirical studies and concluded that the effectiveness of parental leave and childcare support varies across institutional settings. Nordic countries show more positive fertility responses compared to Southern and Eastern European countries, where institutional support for work family reconciliation is often weak.

Contrary to a common perception, fertility and female employment dynamics in the Balkans and Southeastern Europe have been extensively studied by regional scholars. Beyond the cross-country synthesis by Frejka and Gietel-Basten (2016), notable contributions include Arjan *et al.* (2009) on Albania’s transition from high to low fertility, Nikitović and Magdalenić (2024) on Serbia’s cohort fertility and parity patterns and Čipin *et al.* (2020) on the former Yugoslav territory. This paper adds to the previous research by applying a regional panel regression approach to examine fertility determinants in the context of rapid institutional, demographic, and labor market changes.

3. OVERVIEW OF COUNTRY-SPECIFIC DYNAMICS

This section presents an overview of birth rate trends and female labor force participation in eight Southeastern European countries. The relationship between female employment and birth rates is explored in the context of country specific labor market changes, demographic patterns, and EU accession processes. It is hypothesized that an increase in female participation rate has negative effect onto birth rates.

The data presented in Figure 1 reveal a consistent inverse relationship between female labor force participation and birth rates. In most cases, rising female employment coincided with declining birth rates.

In Albania, female labor force participation increased gradually since the early 2000s. The sharp rise in 2011 coincided with methodological revisions to the Labor Force Survey aligned with Eurostat standards. Reforms related to gender equality and EU accession (particularly after Albania's EU candidate status in 2014) also supported this trend. Birth rates, meanwhile, declined consistently due to delayed marriage, emigration, and rising female education.

Bosnia and Herzegovina remains characterized by low female employment rates, driven by structural unemployment, weak institutional support, and traditional gender norms. Despite low participation, natality rate remains low as well reflecting the impact of economic insecurity, youth emigration, and postponed family formation in the post-conflict context (Billingsley, 2010).

Bulgaria experienced a short-term rise in natality rate from 2003 to 2009 due to pronatalist policies (extended maternity leave, child allowances) and favorable cohort effects (women born during the 1980s when birth rates were relatively high entered prime reproductive ages). However, this was followed by a decline due to the 2008-2009 financial crisis and the resulting economic uncertainty. Birth rates remain low, driven by persistent low natality preferences, population ageing, and continued emigration of young families, with birth rates steadily declining until 2023 (NSI, 2012). Female labor participation remained high reflecting its socialist legacy (institutionalized women's employment, supported by universal childcare and maternity leave), dual-earner norms, and state supported childcare. The labor market concentrated in female dominated sectors like education and healthcare. EU accession and gender equality policies further strengthened female employment (Philipov and Jasilioniene, 2008; Eurostat, 2023).

Figure 1: Presentation of birth rate and female participation rate per country



(Source: Author's presentation)

Greece represents a typical Southern European pattern, where increasing female labor force participation during the 2000s coincided with persistently low birth rates. Structural rigidities in the labor market, gender inequality in caregiving, and limited public childcare provision have contributed to exceptionally low birth rates. The economic crisis of 2008 further delayed childbearing, especially among younger cohorts. As Adserà (2004) notes, birth rates are particularly sensitive to labor market instability in countries lacking comprehensive family support policies.

In North Macedonia, female labor force participation has gradually increased but remains low, compared to EU countries. Over the same period the birth rate marks a constant decline. The rise in women's educational attainment and growing urbanization have contributed to natality postponement, especially in the absence of institutional support for resolving employment and caregiving roles. The weak effect of parental leave policies and persistent gender role expectations further limit fertility responses to economic improvement (Matysiak and Vignoli, 2008).

Following Montenegro's EU candidacy in 2010 and the launch of accession negotiations, the country initiated a series of labor market and gender equality reforms that significantly boosted female employment. The sharp rise in Montenegro's birth rate in 2010, followed by a rapid decline, is likely the result of statistical adjustments rather than a genuine demographic shift. Improvements in civil registration, introduced as part of post-independence reforms and EU alignment efforts, may have led to a temporary increase in reported births due to delayed registrations or methodological changes. This anomaly was followed by a return to the broader trend of declining birth rate, driven by continued youth emigration, delayed family formation, and economic uncertainty (Monstat, 2011; Eurostat, 2012).

Romania marks steady increase in the female labor participation rate, with sharp decline in 2009 due to the impact the global financial crisis, which severely affected the country's economy and labor market, especially for women. It caused job losses in sectors with high female employment (education, health care and social services) and reduced opportunities due to austerity cuts. Increased unpaid care responsibilities also led many women to temporarily leave the labor market. The birth rate does not mark the expected downwards trend. With slight fluctuations it shows increase in the 2002 – 2009 period, mostly due to cohort effects and improved economic conditions prior to the global financial crisis. The subsequent period saw stagnation, as the crisis and austerity policies weakened social support and increased economic uncertainty. After 2020, birth rates declined sharply due to the compounded impact of the COVID-19 pandemic, continued emigration, and demographic ageing.

The rapid rise in Serbia's female labor force participation after 2010 reflects labor market reforms, EU aligned gender equality policies, and rising educational attainment among women. Conversely, the sharp drop in birth rates in 2004 resulted from cohort effects where generation of women born in the 1970s who entered peak fertility in the late 1990s, had already experienced delayed childbearing due to 1990s economic crisis and political instability. Also, after a mild recovery in births following the 1999 NATO conflict, fertility resumed its long-term declining trend, driven by uncertainty, emigration, and low fertility preferences. Changes in data registration, such as separation of data from Kosovo and Metohija may have influenced reported birth numbers around 2003 – 2004.

A general inverse relationship between female labor force participation and birth rates across Southeastern European countries is evident. In most cases, rising female employment is

accompanied by declining birth rates, reflecting broader demographic transitions such as delayed childbearing, increased education, and changing gender roles. While labor market reforms and EU integration have improved female employment across the region, birth rates continue to decline due to structural challenges, including inadequate family support policies, population ageing, and emigration of young adults. Thus, female labor participation is a key, but not exclusive, factor influencing birth rate dynamics in Southeastern Europe.

4. DATA, METHODOLOGY, AND EMPIRICAL RESULTS

This study employs a panel dataset of eight Southeastern European countries: Albania, Bosnia and Herzegovina, Bulgaria, Greece, North Macedonia, Montenegro, Romania, and Serbia, covering the period from 2000 to 2023 ($n = 192$). The dependent variable is the crude birth rate (live births per 1.000 population), and the key independent variable of interest is the female labor force participation rate. Additional control variables include GDP per capita, urbanization rate, female tertiary education attainment, female part-time employment, and childcare enrollment (missing data in this variable were linearly interpolated between available data points).

The study employs the crude birth rate as the dependent variable. While the total fertility rate would be the conceptually preferred measure of fertility behavior, the birth rate was selected due to its greater temporal and cross-country coverage and consistent availability across the eight Southeastern European countries for the full 2000 to 2023 period. From a modelling perspective, the birth rate offers a continuous and comparable annual series, minimizing missing values and enabling robust panel estimation. Although the birth rate is influenced by age structure and migration, its high correlation with the total fertility rate makes it a practical proxy for fertility trends at the macro level.

Parental leave duration was introduced as a time-invariant moderator variable, collected from national labor laws. An interaction term ($parent_leave * d(labor_part)$) was constructed to test whether paternal leave policy moderates the effect of labor participation on birth rates. A moderator affects the strength or direction of the relationship between independent and dependent variables (e.g., parental leave moderating the link between labor participation and fertility). A control variable accounts for confounding influences (e.g., GDP per capita). Detailed information about the variables is presented in Table 1.

Before running the unit root tests, a panel model with fixed effects is estimated and the residuals are tested for cross sectional dependence. All four tests (Breusch-Pagan LM, Pesaran scaled LM, Bias-corrected scaled LM and Pesaran CD) reject the null hypothesis at 1% significance level, which confirms the presence of cross-sectional dependence. This requires implementation of second-generation unit root tests (like Pesaran CIPS – Cross-sectionally Augmented Im, Pesaran, and Shin), (Pesaran, 2007) for stationarity testing. Cross-sectional dependence is expected since panel models include macroeconomic and demographic variables countries that are economically and politically interconnected, exposed to common shocks and linked via migration, trade, and labor markets. Traditional first-generation panel unit root tests (Levin-Lin-Chu (LLC) or Im-Pesaran-Shin (IPS)) assume cross-sectional independence, which is not the case in this research sample.

The Pesaran CIPS test (2007) was applied to determine stationarity, using a maximum lag of 1 with AIC-based selection due to the limited time span. Because the panel covers only 24 annual

observations, the maximum lag length was restricted to 1 based on AIC selection for statistical parsimony.

Table 1: Variables used for estimation of the panel regression model

Variable	Description	Source
<i>birth_rate</i>	Number of live births occurring during the year, per 1,000 population estimated at midyear	World Bank
<i>labor_part</i>	Proportion of the female population ages 15-64 that is economically active	World Bank
<i>GDP</i>	GDP per capita, expressed in constant international dollars, converted by purchasing power parities (constant 2021)	World Bank
<i>urban</i>	People living in urban areas (as defined by national statistical offices) as % of total population	World Bank
<i>tertiary</i>	Female tertiary enrollment	UNESCO Institute for Statistics; Eurostat
<i>part_employ</i>	Part-time employment, female (% of total female employment)	World Bank
<i>child_enrol</i>	Enrolment in early childhood education	UNESCO Institute for Statistics; Eurostat; UNICEF
<i>parent_leave</i>	Standard Paid Parental Leave Duration	National legal references

(Source: Author's presentation)

This differs from the longer behavioral lags (2 to 5 years) discussed in the demographic literature, which are acknowledged conceptually but cannot be empirically identified within the short time dimension. The results indicate that most variables are $I(1)$, while a few are $I(2)$ or $I(0)$. To ensure consistency and avoid spurious regression, all variables were used in their first difference or appropriately transformed to achieve stationarity (Table 2).

Table 2: Results of the panel unit root tests (p-values)

Variable	CIPS			Truncated CIPS*		
	$I(0)$	$I(1)$	$I(2)$	$I(0)$	$I(1)$	$I(2)$
<i>birth_rate</i>	≥ 0.10	$< 0.01^{***}$	-	≥ 0.10	$< 0.01^{***}$	-
<i>labor_part</i>	≥ 0.10	$< 0.01^{***}$	-	≥ 0.10	$< 0.01^{***}$	-
<i>GDP</i>	≥ 0.10	$< 0.01^{***}$	-	≥ 0.10	$< 0.01^{***}$	-
<i>urban</i>	≥ 0.10	$< 0.01^{***}$	-	≥ 0.10	≥ 0.10	-
<i>tertiary</i>	≥ 0.10	≥ 0.10	≥ 0.10	≥ 0.10	≥ 0.10	$< 0.01^{***}$
<i>part_employ</i>	$< 0.05^{**}$	$< 0.05^{**}$	-	$< 0.05^{**}$	$< 0.05^{**}$	-
<i>child_enrol</i>	≥ 0.10	≥ 0.10	$< 0.01^{***}$	≥ 0.10	≥ 0.10	$< 0.01^{***}$
<i>parent_leave</i>	time invariant					

* Truncated CIPS modifies the CIPS statistics by excluding extreme values from the averaging process. *** Significant at 0.01; **Significant at 0.05

(Source: Authors' calculations)

The panel unit root test results using both CIPS and truncated CIPS indicate that most variables are stationary in their first difference, while *tertiary* and *child_enrol* are stationary in their second difference, and *child_enrol* is stationary in level. The models are estimated with the variable *child_enrol* in their first difference. Mixing variables stationary in level and stationary in its first difference in a panel regression without cointegration can result in spurious

regression, where relationships appear statistically significant due to shared trends rather than true economic association. To maintain consistent and reliable estimates, all variables should be of the same integration order, typically by differencing stationary variables so they match the other series in their first difference form (Baltagi, 2008; Greene, 2012). First difference transformations focus on short-term changes by removing country-specific effects and long-term trends, capturing only transitory responses to socioeconomic and policy shifts (Wooldridge, 2008; Baltagi, 2008). This approach is well-suited to regions like the Western Balkans and Eastern Europe, where rapid institutional and demographic changes have occurred.

Results from the estimated panel regression model with fixed effects for cross section are presented in Table 3. Fixed effects are used because they control unobserved, time-invariant country-specific factors that may be correlated with the explanatory variables, allowing for consistent estimation of within-country effects over time.

The panel regression model is presented in the following specification:

$$\Delta birth_rate_{it} = \beta_0 + \beta_1 \Delta labor_part_{it} + \beta_2 parent_leave_{it} + \beta_3 (parent_leave_{it} * \Delta labor_part_{it}) + \beta_4 \Delta gdp_{it} + \beta_5 \Delta^2 tertiary_{it} + \beta_6 \Delta urban_{it} + \beta_7 \Delta^2 child_enrol_{it} + \beta_8 \Delta part_employ_{it} + \varepsilon_{it}$$

where i represents the country, t is for time (year) and the error terms which include unobserved shocks or measurement error, is represented with ε_{it} .

Table 3: Results from the estimated panel regression models

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
constant	0.40	0.02	-0.02	-0.02	-0.13***
$d(labor_part)$	-0.25*	-0.24**	-0.22	-0.22	-0.23
$parent_leave$	-0.01	-	-	-	-
interaction	0.00	0.00	0.00	0.00	0.00
$d(gdp)$	0.00**	0.00**	0.00*	0.00*	0.00*
$d(tertiary, 2)$	-0.29**	-0.30**	-0.24	-0.24	-0.27*
$d(urban)$	-0.33	-0.30	-0.33	-0.33	-
$d(child_enrol, 2)$	-0.04	-0.04	-0.07	-	-
$d(part_employ)$	0.00	0.00	-	-	-
Adjusted R^2	0.05	0.06	0.02	0.03	0.02
F-statistic	1.49	1.60*	1.34	1.39	1.40
Akaike info criterion	0.75	0.73	1.14	1.13	1.13
Schwarz criterion	1.08	1.04	1.39	1.36	1.34
Durbin-Watson stat.	1.74	1.74	1.68	1.69	1.67

*** Significant at 0.01; **Significant at 0.05

(Source: Authors' calculations)

This equation represents a first difference fixed effects panel regression where the first differences capture the short-term changes. The model tends to investigate the short run determinants of birth rate fluctuations, with accent on the role of female labor force participation. The interaction term allows for testing whether policy moderates the impact of labor market behavior on fertility decisions. The inclusion of economic, educational, and demographic control variables ensures robustness of the estimated relationships.

Table 3 shows that higher female labor participation consistently reduces birth rates in Models 1 and 2, indicating a short-term trade-off between work and childbearing. The effect (≈ -0.22 to -0.25) becomes insignificant once additional controls are included, implying mediation through education and economic factors. Tertiary enrolment (two-year lag) remains negative and significant, supporting the postponement hypothesis. GDP growth is positive and highly significant in all models, confirming that economic improvement boosts fertility in the short run. Urbanization, parental leave, early child enrolment, and part-time employment show no significant effects, suggesting that their short-term influence on fertility is limited or delayed. Model diagnostics show acceptable fit: the best-performing model (Model 2) has the lowest AIC and significant F – statistic. Durbin-Watson statistics suggest no serious autocorrelation. Residual normality is confirmed in Model 2 ($p = 0.12$).

The negative association between female labor force participation and fertility is statistically significant in Models 1 and 2 but becomes insignificant in the expanded specifications (Models 3 to 5). This attenuation reflects the inclusion of policy and structural variables, particularly education and parental leave indicators, that absorb part of the variation previously captured by labor participation. In other words, once education and policy effects are accounted for, female labor force participation no longer exerts an independent short-term effect on fertility, suggesting that its influence operates indirectly through these channels rather than directly on birth rates.

These findings confirm that short-term changes in birth rates are influenced primarily by economic and educational variables, while institutional and structural factors like childcare or leave policies may require longer time horizons or more granular data to show significance.

5. DISCUSSION

The empirical findings highlight the complexity of fertility determinants in Southeastern Europe. These countries have undergone major socioeconomic transitions, EU integration processes, and institutional reforms. All these events have contributed to changes in reproductive behavior and demographic structures.

Female labor force participation has a negative and statistically significant effect on the birth rates. This finding is consistent with previous studies that confirm that higher female employment – particularly when not accompanied by supportive work–family policies – can suppress birth rates, especially in post – socialist and Southern European contexts where traditional gender roles persist (Matysiak and Vignoli, 2008; Adserà, 2004). All the analyzed countries exhibit a constant rising trend in female employment, reaching 50 – 70% participation, especially with post-EU accession and economic reforms. In the absence of sufficient institutional support, increased employment among women may lead to postponement or reduction of childbearing.

The effect of tertiary education is similarly negative and statistically significant, indicating that as women increasingly pursue higher education, the timing of family formation is delayed. This finding reflects the well-documented postponement of childbirth among highly educated women who delay family formation due to the prolonged education and career prioritization (Kögel, 2004; Billingsley, 2010). In countries like Bulgaria and Romania, education reforms under the Bologna Process (from 2005 onward) and EU structural investments (improved university infrastructure and capacity) have expanded access to higher education for women and the rural population, reinforcing this trend.

Regarding other countries, Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, and Serbia, they all have also adopted the Bologna Process in the period between 2003 to 2005, which caused the restructuring of the Bachelor, Master's and PhD cycles and promoted student mobility and quality assurance. Massification of higher education was evident in the mid-2000s, with a rapid increase in tertiary enrollment, especially among young women. According to the UNESCO Institute for Statistics (2024), female enrollment in higher education began to outpace male enrollment during the late 2000s. A combination of prolonged education and uncertain employment outcomes encouraged postponement of marriage and childbirth, in urban areas and among educated women (Billingsley, 2020; Kreyenfeld *et al.*, 2012). In Serbia and Albania, there was a decline or stagnation in the total fertility rate – around 1.3 to 1.5 children per woman, during the same period, which is in correlation with the increase in the portion of women in tertiary education.

Greece began expanding access to university education in the 1990s, and the reforms followed under the Bologna Process post-1999. By the early 2010s, women in Greece were more likely to hold a tertiary degree than men, contributing to the notion that higher female education is associated with delayed fertility.

These trends are consistent with a substantial body of empirical research linking higher female educational attainment to lower birth rates. Education is associated with delayed childbearing, reduced desired family size, and increased opportunity costs of motherhood (Martin, 1995; Matysiak and Vignoli, 2008). In the context of post-socialist societies, rising female enrolment has also contributed to changing gender roles and reproductive norms (Goldstein *et al.*, 2013; Basten *et al.*, 2014). Furthermore, evidence from low-fertility European countries suggests that increases in tertiary education are among the key drivers of long-term fertility decline (Billari and Kohler, 2004).

GDP per capita emerged as a robust positive determinant of fertility, confirming the procyclical nature of fertility behavior. During periods of economic stability or growth, households may feel more secure in making reproductive decisions. This pattern supports earlier findings from Western Europe and is particularly relevant in post transition economies where economic fluctuations strongly influence life planning (Sobotka *et al.*, 2011; Goldstein *et al.*, 2013).

In contrast, variables such as urbanization, early childhood education, and part-time employment were not statistically significant. While these are often considered fertility-enhancing factors in Western Europe, their limited significance in this sample may reflect differences in policy effectiveness, service coverage, or cultural context. For example, early childhood education systems in Southeastern Europe may not yet be developed enough to significantly reduce childrearing burdens or influence fertility behavior (Scherer *et al.*, 2023). Parental leave policies, both in direct form and as moderators, were also not statistically significant. This may stem from the uniformity of parental leave duration across the countries or from limited policy utilization. Furthermore, the use of first difference transformation may obscure long-term or lagged effects of such policies (Gauthier, 2007). Future research could explore whether different dimensions of leave policy — such as flexibility or wage replacement, or uptake rates— have more substantial demographic effects.

Female part-time employment does not seem to be a relevant determinant of the declining birth rate (Fluchtmann *et al.*, 2023). In Eastern Europe, part-time employment has a negligible effect on the birth rate due to its limited use, low quality, and minimal role in work-family balance.

The birth rate is more strongly influenced by structural factors like emigration or economic insecurity.

The change in significance across models thus reflects increasing model completeness, not loss of robustness; the relationship between female employment and fertility remains negative in direction, but its explanatory power diminishes when policy and structural determinants are included.

These findings reflect broader demographic and institutional transitions in Southeastern Europe. The rise of dual earner households, mass tertiary education, and delayed family formation are shaping fertility patterns. Structural challenges such as emigration, aging populations, and insufficient family policy infrastructure continue to exert downward pressure on birth rates. Consequently, while female labor force participation and education remain key variables, their effects on birth rates depend on broader socioeconomic and institutional environments.

6. LIMITATIONS

The crude birth rate was used as a pragmatic proxy for fertility, given incomplete and non-harmonized annual data on age-standardized measures such as the total fertility rate. While this indicator allows consistent longitudinal modelling, it may reflect structural effects of age composition and migration; thus, results should be interpreted as representing broad fertility trends rather than parity-specific behavior.

A further limitation is the omission of fertility ideals and intentions, which influence childbearing outcomes. European studies show a persistent two-child ideal (Sobotka and Beaujouan, 2014) but a widening gap between intended and achieved births amid economic and partnership instability. Education is positively linked to intentions, though not always to realized fertility (Testa, 2014), and underachievement remains common in low fertility settings (Beaujouan and Berghammer, 2019). These dynamics likely evolved in Southeastern Europe during 2000–2023 but cannot be directly modelled due to missing comparable data, implying potential omitted variable bias.

7. CONCLUSION

This study examined short-term determinants of birth rates in eight Southeastern European countries. The analysis focused on female labor force participation as the primary explanatory variable and included economic, educational, and demographic controls. The findings reveal that increases in female employment and tertiary education are associated with declining birth rates, while economic growth exerts a positive influence on fertility. These relationships reflect both individual-level trade-offs between work and family and macro-level structural conditions.

Notably, parental leave and other family policy variables did not show significant short-term effects in this sample, which may reflect limitations in policy implementation, coverage, or delayed behavioral responses. Similarly, the lack of significance for part-time employment and early childhood education suggests that such measures may not yet be widespread or effective enough in the region to impact fertility decisions.

The results underscore the challenges of reconciling female employment with family formation in post socialist contexts. Policymakers in Southeastern Europe should consider comprehensive work – family policies, including flexible parental leave, affordable childcare, and employment

protections, to mitigate the apparent tradeoff between labor market participation and fertility. Future research should examine long-term effects, policy heterogeneity, and qualitative dimensions of gender roles and family norms to provide a deeper understanding of fertility behavior in transitioning societies.

REFERENCES

- Adserà, A. (2004), “Changing fertility rates in developed countries: The impact of labor market institutions”, *Journal of Population Economics*, Vol. 17 No. 1, pp. 17-43.
- Aydoğan, E. T. and Uslu, Ç. L. (2019), “The Effects of Female Tertiary Education on Fertility and Development”. *Contemporary Research in Economics and Social Sciences*, 3(1), 153-196.
- Arjan, G., Arnstein, A. and Letizia, M. (2009), “The highest fertility in Europe—for how long? Determinants of fertility change in Albania”, *Demográfia*, Vol. 52 No. 5, pp.76-96.
- Baltagi, B.H. (2008), *Econometric Analysis of Panel Data* 4th ed., John Wiley & Sons, Chichester.
- Basten, S., Sobotka, T. and Zeman, K. (2014), “Future fertility in low fertility countries”, in Lutz, W., Butz, W.P. and KC, S.. (Eds.) *World Population and Human Capital in the Twenty-First Century*, Oxford Academic, Oxford, pp. 39-146.
- Beaujouan, E. and Berghammer, C. (2019), “The gap between lifetime fertility intentions and completed fertility in Europe and the United States: A cohort approach”, *Population Research and Policy Review*, Vol. 38 No. 4, pp. 507-535.
- Bharati, T., Chang, S. and Li, Q. (2021), “The effect of tertiary education expansion on fertility: a note on identification”, IZA Discussion Papers, No. 14672, Institute of Labor Economics (IZA), Bonn.
- Billari, F. and Kohler, H.P. (2004), “Patterns of low and lowest-low fertility in Europe”, *Population Studies*, Vol. 58 No. 2, pp. 161-176.
- Billingsley, S. (2010), “The post-communist fertility puzzle”, *Population Research and Policy Review*, Vol. 29 No. 2, pp. 193–231.
- Bloom, D., Canning, D. and Fink, G. (2009), “Fertility, female labor force participation, and the demographic dividend”, *Journal of Economic Growth*, Vol. 14, pp. 79-101.
- Chesnais, J.C. (1992), *The demographic transition: stages, patterns, and economic implications: a longitudinal study of sixty-seven countries covering the period 1720-1984*, Oxford University Press.
- Eurostat (2015), *Enlargement countries – Population and social conditions* (short guide). Luxembourg: Publications Office of the European Union; see note: “2010: break in series” indicating methodological change in 2010.
- Eurostat (2023), *Enrolment in early childhood education by age and sex — % of the population of the corresponding age group (educ_uoe_enra10)*.
- Eurostat (2023), *Fertility statistics*. Luxembourg: Publications Office of the European Union.
- Eurostat (2023), *Population having completed tertiary education by age and sex (edat_lfse_03)*.
- Fluchtmann, J., van Veen, V. and Adema, W. (2023), *Fertility, employment and family policy: A cross-country panel analysis*, Social, Employment and Migration Working Papers, No. 299, OECD.
- Frejka, T., and Gietel-Basten, S. (2016), “Fertility and Family Policies in Central and Eastern Europe after 1990”. *Comparative Population Studies*, Vol. 41 No. 1, pp. 3-56.
- Gauthier, A.H. (2007), “The impact of family policies on fertility in industrialized countries: A review of the literature”, *Population Research and Policy Review*, Vol. 26 No. 3, pp. 323–346.

- Greene, W. (2012), *Econometric Analysis* 7th ed., Prentice Hall, Upper Saddle River, NJ.
- Goldstein, J.R., Kreyenfeld, M., Jasilioniene, A. and Örsal, D.K. (2013), “Fertility reactions to the “Great Recession” in Europe: Recent evidence from order-specific data”, *Demographic Research*, Vol. 29, pp. 85-104.
- Kögel, T. (2004), “Did the association between fertility and female employment within OECD countries really change its sign?”, *Journal of Population Economics*, Vol. 17 No. 1, pp. 45-65.
- Kreyenfeld, M., Andersson, G. and Pailhé, A. (2012), “Economic uncertainty and family dynamics in Europe”, *Demographic Research*, 27, pp. 835-852.
- Luci-Greulich, A. and Thévenon, O. (2013), “The Impact of Family Policies on Fertility Trends in Developed Countries: L’influence des politiques familiales sur les tendances de la fécondité des pays développés”, *European Journal of Population/Revue Européenne de Démographie*, Vol. 29 No. 4, pp. 387-416.
- Luo, Y. and Jarosz, E. (2024), “Job creation, job destruction, and fertility in Germany”, *Demographic Research*, Vol. 52 No. 13, pp. 383-414.
- Magda, I., A. Kiełczewska and N. Brandt (2018), “The “family 500+” child allowance and female labour supply in Poland”, *OECD Economics Department Working Papers*, No. 1481, OECD Publishing, Paris.
- Martin, T.C. (1995), “Women's education and fertility: results from 26 Demographic and Health Surveys” *Studies in Family Planning*, Vol 26 No. 4, pp.187-202.
- Matysiak, A. and Vignoli, D. (2008), “Fertility and women’s employment: a meta-analysis: fécondité et travail des femmes: une méta-analyse”. *European Journal of Population/Revue Européenne de Démographie*, Vol. 24 No. 4, pp. 363-384.
- Mishra, V. and Smyth, R. (2010), “Female labor force participation and total fertility rates in the OECD: New evidence from panel cointegration and Granger causality testing”, *Journal of Economics and Business*, Vol. 62 No. 1, pp. 48-64.
- MONSTAT (Statistical Office of Montenegro) (2010), *Statistical Yearbook 2010*, table 4-10: Birth rates, death rates and marriages. Statistical Office of Montenegro, Podgorica.
- Nikitović, V. and Magdalenić, I. (2024), “Gender differences in cohort fertility patterns in Serbia: the role of educational gradient”, *Stanovništvo*, Vol. 62 No. S1, S5-S35.
- NSI (National Statistical Institute of Bulgaria) (2012), *Demographic Processes 2010*. NSI, Sofia.
- Pesaran, M.H. (2007), “A simple panel unit root test in the presence of cross-section dependence”, *Journal of Applied Econometrics*, Vol. 22 No. 2, pp. 265-312.
- Philipov, D. and Jasilioniene, A. (2008), “Union formation and fertility in Bulgaria and Russia: A life table description of recent trends”, *European Journal of Population*, Vol. 24 No. 1, pp. 91–117.
- Slonimczyk, F. and Yurko, A. (2014), “Assessing the impact of the maternity capital policy in Russia”, *Labour Economics*, Vo. 30, pp. 265-281.
- Spéder, Z., Murinkó, L. and Oláh, L.S. (2020), “Cash support vs. tax incentives: The differential impact of policy interventions on third births in contemporary Hungary”, *Population Studies*, Vol. 74 No. 1, pp. 39-54.
- Scherer, S., Pavolini, E. and Brini, E. (2023), “Formal childcare services and fertility: the case of Italy” *Genus*, Vol. 79 Article 29.
- Shirahase, S. (2000), “Women's increased higher education and the declining fertility rate in Japan”, *Review of Population and Social Policy*, Vol. 9, pp. 47-63.
- Sobotka, T. and Beaujouan, É. (2014), “Two is best? The persistence of a two-child family ideal in Europe”, *Population and Development Review*, Vol. 40 No. 3, pp. 391-419.
- Sobotka, T., Skirbekk, V. and Philipov, D. (2011), “Economic recession and fertility in the developed world”, *Population and Development Review*, Vol. 37 No. 2, pp. 267-306.

- Testa, M.R. (2014), “On the positive correlation between education and fertility intentions in Europe: Individual-and country-level evidence”, *Advances in Life Course Research*, Vol. 21, pp. 28-42.
- UNESCO Institute for Statistics (UIS) (2023), *UIS Data Centre*. Montreal: UNESCO Institute for Statistics.
- UNICEF (2023), *Multiple Indicator Cluster Surveys (MICS)*. New York: United Nations Children’s Fund.
- Vasireddy, S., Berrington, A., Kuang, B. and Kulu, H. (2023), “Education and fertility in Europe in the last decade: A review of literature”, *Comparative Population Studies*, Vol. 48, pp. 553-588.
- World Bank (2025), *World Development Indicators*. Washington, DC: World Bank.
- Wooldridge, J.M. (2008), *Econometric analysis of cross section and panel data*. 2nd ed., MIT Press, Cambridge, MA.
- Čipin, I., Zeman, K. and Međimurec, P. (2020), “Cohort fertility, parity progression, and family size in former Yugoslav countries during the twentieth century”, *Comparative Population Studies*, Vol. 45, pp. 229-264.