INTERNATIONAL MONETARY FUND

Lost Generations? Fertility and Economic Growth in Europe

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WP/25/55

2025
MAR

WORKING PAPER

 WP/25/55

IMF Working Paper

European Department

Lost Generations?

Fertility and Economic Growth in Europe

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Authorized for distribution by Jan Kees Martijn

March 2025

Abstract

The total fertility rate—the average number of births per woman—in Europe is already at 1.46, which is significantly below the replacement rate of 2.1, where fertility compensates for mortality and thereby the population replaces itself from one generation to the next. Falling fertility rates will have far-reaching social and economic consequences, and therefore it is a critical empirical exercise to estimate the impact of below-replacement fertility on income growth and test quantitatively for the existence of mitigating factors that could inform appropriate policy responses. In this paper, I address the endogeneity bias caused by reverse causality by implementing an instrumental variable approach and use exogenous variation in the comparative abortion index as an instrument for the total fertility rate. These results show that fertility has a significant positive effect on real GDP per capita growth in a sample of 42 European countries over the period 1960–2022. This means that the downward fertility transition across Europe, accompanied by fast-aging population, is a significant drag on income per capita growth.

JEL Classification Numbers:	J10; J13; J22; O40; O47
Keywords:	Fertility; demographic trends; economic growth; Europe

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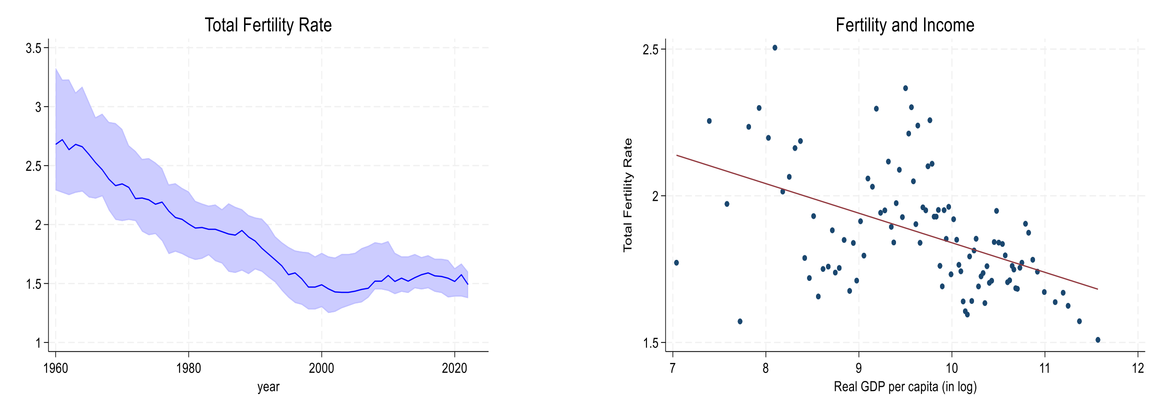
[1] The author would like to thank Stephan Danniger, David Koll, Jan Kees Martijn, Kazuko Shirono, and Maryam Vaziri for helpful comments and suggestions, and Sadhna Naik and Can Ugur for excellent research assistance.

I. Introduction

Falling fertility rates will have far-reaching economic and social consequences across the world. Globally, the total fertility rate—the average number of births per woman—has halved to 2.2 over the past 50 years. In Europe, however, it is already at an average of 1.46—significantly below the approximate replacement rate of 2.18, where fertility compensates for mortality and thereby the population replaces itself from one generation to the next (Figure 1). Fertility transitions are projected to accelerate over the course of this century, resulting in a shrinking population and sharp increase in the share of elderly population.[2] Although lower fertility is usually associated with higher female labor force participation in economic activity, these demographic changes are also shown to have detrimental effects on innovation and productivity, which in turn leads to lower income growth and living standards and undermines the state of public finances (Becker, Murphy, and Tamura, 1990; Romer, 1990; Aghion and Howitt, 1992; Jones, 1995; Greenwood and Seshadri, 2002; Doepke, 2004; Bloom and Canning, 2008; Ashraf, Weil, and Wilde, 2013; Prettner, Bloom, and Strulik, 2013; Cervellati and Sunde, 2015; Sasaki and Hoshida, 2017; Cooley and Henriksen, 2018; Aksoy *et al.*, 2019; de Silva and Tenreyno, 2020; Peters and Walsh, 2021; Cevik, 2024; Huang, 2024; Karahan, Pugsley, and Şahin, 2024).

Fertility rates in Europe are already consistent with negative long-run population growth, but there is still significant variation in below-replacement fertility across countries—ranging from 1.79 in France to 1.08 in Malta.[3] Therefore, it is an important exercise to estimate the impact of ultra-low fertility on real GDP per capita growth and test quantitatively for the existence of mitigating factors that could inform appropriate policy responses. In this context, an important consideration is the problem of endogeneity, which could occur when the explanatory variable

Figure 1. Fertility and Income in Europe



Source: World Bank; author's calculations.

[2] The total fertility rate in Europe is projected to decline to an average of 1.37 by 2100 (Bhattacharjee *et al.*, 2024), due to a multitude of factors ranging from economic, institutional and social disincentives for childbearing as well as the quantity-quality tradeoff in favor of smaller families with greater economic means (Bongaarts and Bulatao, 1999; Bilari and Kohler, 2004; Garrido and Malo, 2005; Kohler, 2006; Lesthaeghe, 2020; Doepke *et al.*, 2023; Bloom, Kuhn, and Prettner, 2024).

[3] A total fertility rate below 1.5 is considered to be "very low" and below 1.3 is classified as "ultra-low".

(fertility) is jointly determined with the dependent variable (real GDP per capita growth) through several channels: (i) high fertility dilutes capital stock and consequently lowers real GDP per capita; (ii) lower fertility initially reduces youth dependency and increase output per capita, but the eventual increase in old-age dependency leads to lower output per capita as a country evolves through the demographic transition.

There is compelling evidence that women's labor force participation and higher levels of income alter the quantity-quality tradeoff in fertility choices and consequently reduce fertility (Barro and Becker, 1989; Simon, 1989; Becker, Murphy, and Tamura, 1990; Browning, 1992; Winegarden and Wheeler, 1992; Tamura, 1996; Eckstein, Mira, and Wolpin, 1999; Galor, 2005; Guinnane, 2011; Herzer, Strulik, and Vollmer, 2012; Lovenheim and Mumford, 2013; Chatterjee and Vogl, 2018; Gallego and Lafortune, 2021; Kokkinen, Obstbaum, and Mäki-Fränti, 2021), but this relationship is complex and the monotonic negative correlation disappears with higher income levels over time (Bar *et al*., 2018; Doepke *et al*., 2023; Strulik, 2024). In other words, fertility is not likely to be exogenous, and income tends to exhibit persistence over time. Accordingly, to neutralize the potential endogeneity of fertility and income and thereby credibly obtain causal inference beyond a simple correlation between fertility behavior and real GDP per capita growth, I implement an instrumental variable (IV) approach and use plausibly exogenous variation in the comparative abortion index as an instrument for the total fertility rate. The application of the IV method in this context is motivated by the leading studies by Rosenzweig and Wolfin (1980) and Angrist and Evans (1998) that pave the way for a new stream of research including Klerman (1999), Chun and Oh (2002), Bailey (2006), Bloom *et al*. (2009), de Silva and Tenreyno (2020), Hailemariam (2024) and Huang (2024), among others.

In a panel of 42 countries in Europe over the period 1960–2022, the estimated coefficient on the total fertility rate via the ordinary least squares (OLS) regression with fixed effects is negative and statistically significant, before and after controlling for economic, demographic, social and political factors. However, this result might be misleading due to the endogeneity bias caused by reverse causality. When I estimate the model using the IV approach with the comparative abortion index as an instrument for fertility, I obtain a statistically significant positive coefficient on the total fertility rate. Moreover, the absolute magnitude of this effect in the IV estimations appears to be nearly twice as large relative to the OLS estimates. These findings indicate that the endogeneity bias on the OLS estimations is particularly severe in the context of fertility and real GDP per capita growth. Hence, instrumenting the total fertility rate with the comparative abortion index reveals completely different dynamics that higher fertility makes a strong positive contribution to economic activity. This means that the downward fertility transition in Europe, accompanied by fast-aging population, is a drag on income per capita growth.

Building on this cross-country analysis and following Ashraf, Weil, and Wilde (2013) and Karra, Canning, and Wilde (2017), I also develop a macrosimulation model to examine the impact of fertility on real GDP per capita growth in Lithuania—a transition economy that has experienced momentous demographic and economic changes. Although projecting a dynamic system is extremely challenging, the macrosimulation model—taking into account changes in the population age structure and female labor force participation—shows that a reduction in fertility lowers the level of population and the share of working-age adults in the population and the level of income per capita in Lithuania as much as 17.6 percent under the low-fertility scenario relative to the baseline over the course of the next 75 years.

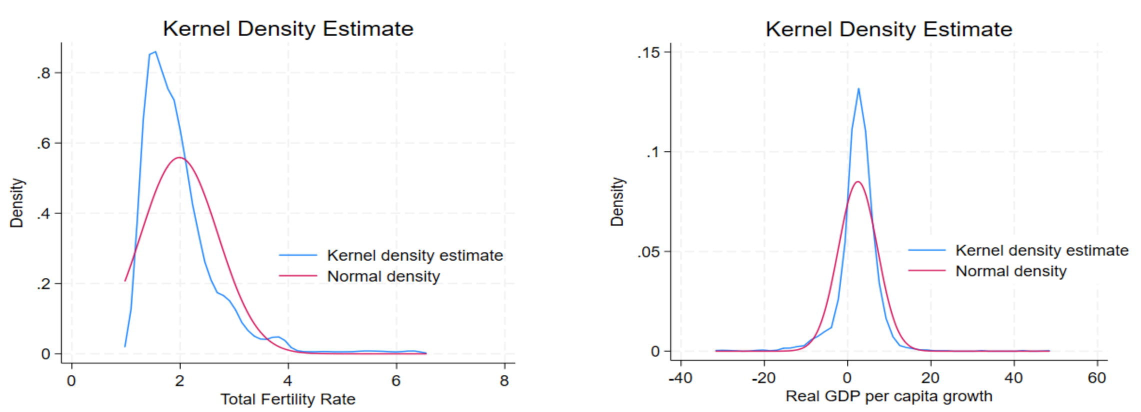
In aging countries, boosting fertility can help lessen the decline in labor force and raise growth potential. But there are no quick fixes to ultra-low fertility in Europe—and beyond, as social norms and reproductive preferences change slowly over time. International experience provides little hope for demographic reversal in the short run, but demography is still not destiny. Policymakers can pursue family-friendly interventions to raise fertility rates and alter the negative relationship between fertility and economic growth. Studies show that the most successful measure to increase fertility and reverse the negative impact of fertility on economic growth is the cost of education and the provision of childcare facilities (Bauernschuster, Hener, and Rainer, 2016; Sobotka, Matysiak, and Brzozowska, 2019; UN, 2021; Zhang *et al*., 2023). Similarly, labor market reforms are essential to increase flexibility through teleworking and alternative working hour arrangements that would help better gender-balance the contribution to childcare and increase labor force participation of women with children. Last but not the least, immigration can play a decisive role in increasing fertility, expanding the workforce and thereby in boosting potential growth in an aging society, especially when appropriate migrant integration policies are in place (Bove and Elia, 2017; Mitaritonna, Orefice, and Peri, 2017; Dustmann and Preston, 2019; Tabellini, 2020).

The remainder of this paper is structured as follows. Section II provides an overview of the data used in the empirical analysis. Section III describes the econometric methodology and presents the findings. Finally, Section IV summarizes and provides concluding remarks.

II. Data Overview

The empirical analysis presented in this paper is based on a panel dataset of annual observations covering 42 countries in Europe over the period 1960–2022, as shown in Appendix Figure A1. The dependent variable is economic growth as measured by annual percent change in real GDP per

Figure 2. Distribution of Fertility Rates and Economic Growth



Source: World Bank; author's calculations.

capita. The key explanatory variable of interest in this analysis is the total fertility rate defined as the average number of births per woman through the end of her reproductive life span, which is instrumented by the comparative abortion index. The country-level abortion index—drawn from the Quality of Government database—is built by Forman-Rabinovici and Sommer (2018) to quantify the permissiveness of abortion policies based on worldwide data compiled by the UN Department of Social and Economic Affairs. Countries are assigned a score on a scale of 0 to 1, where 0 represents countries in which there are no conditions for legal abortion, and 1 represents a country that accepts all criteria for abortion, including on request. The Forman-Rabinovici and Sommer (2018) dataset covers 192 countries from 1992 to 2013. This broad coverage is essential for a study of this scope, allowing for a robust analysis of the impact of fertility on growth across a large, heterogeneous sample of countries. In this paper, to maximize the sample size for the empirical analysis, I use the comparative abortion index's 1992 value to represent the prior period and its 2013 value for the period afterwards. Although this approach assumes temporal stability in the comparative abortion index for these years, it is reasonable because abortion behavior tends to evolve slowly over time.[4]

To control for the influence of other factors, I introduce an array of economic, demographic, social and political variables, including the level of real GDP per capita, the share of industry in GDP, trade openness as measured by the share of exports and imports in GDP, population, educational attainments measured by average years of schooling, the infant mortality rate measured by the number of deaths under 1 year of age per thousand births, the female labor force participation rate in percent of female population ages 15 and above, and a composite index of government stability, which are obtained from the World Bank and the International Country Risk Guide (ICRG).

Table 1 provides a detailed description of the variables that are used in the empirical analysis. There is a substantial degree of dispersion across countries and over time in terms of real GDP per capita growth. The sample average for economic growth is 2.5 percent, with a minimum of -31.2 percent to a maximum of 48 percent. The total fertility rate also exhibits considerable cross-

Table 1. Descriptive Statistics

Variable	Observations	Mean	Std. dev.	Minimum	Maximum
Real GDP per capita growth	2,063	2.5	4.7	-31.2	48.0
Total fertility rate	2,644	2.0	0.7	1.1	6.5
Comparative abortion index	2,148	0.9	0.2	0.0	1.0
Real GDP per capita	2,105	23,398.6	19,943.3	698.2	112,417.9
Share of industry	1,842	30.5	7.8	11.4	58.3
Trade openness	1,882	92.7	53.3	5.7	394.2
Population	2,688	18,200,000.0	27,900,000.0	175,574.0	149,000,000.0
Educational attainments	1,358	10.7	1.9	4.5	14.3
Infant mortality	2,406	14.1	16.1	1.5	171.4
Female labor force participation	1,568	50.0	11.3	13.5	85.5
Government stability	1,413	7.6	1.7	2.0	11.5

Source: ICRG; Quality of Government; World Bank; author's calculations.

[4] Estimation results remain broadly unchanged when I alternatively use the period 1992–2013.

country heterogeneity during the period 1960–2022. With a downward trend in the average number of births per woman, the mean value of fertility is 2, with a minimum of 1.1 and a maximum of 6.5. Similarly, the comparative abortion index—the instrument I use for fertility—varies between 0 and 1, with a sample mean of 0.9. Other explanatory variables show analogous patterns of considerable variation across countries, highlighting the potential importance of economic, demographic, social and political differences.

III. Empirical Strategy and Results

The empirical objective of this paper is to identify the impact of fertility choices on income growth in 42 European countries over the period 1960–2022. Taking advantage of the panel structure in the data, I start with a basic OLS estimation with fixed effects according to the following specification:

$$\Delta y_{it} = \beta_1 + \beta_2 \Delta tfr_{it-1} + \beta_3 X_{it} + \eta_i + \mu_t + \varepsilon_{it}$$

where y_{it} denotes real GDP per capita in country i and time t; tfr_{it-1} is the total fertility rate; X_{it} represents a vector of control variables including the lagged real GDP per capita, the share of industry in GDP, trade openness, population, educational attainments, infant mortality rate, female labor force participation rate, and government stability. The η_i and μ_t coefficients denote the time-invariant country-specific effects and the time effects controlling for common shocks that may affect real GDP per capita growth across all countries in a given year, respectively. ε_{it} is the idiosyncratic error term. To account for possible heteroskedasticity, robust standard errors are clustered at the country level.

However, as discussed above, estimating the impact of fertility on real GDP per capita growth is difficult due to potential endogeneity caused by reverse causality. Changes in fertility could affect income growth through a number of channels such as the dilution of capital stock and an increase in female labor force participation. But it is also highly plausible that real GDP per capita growth affects fertility behavior during the demographic transition. The risk of reverse causality therefore necessitates isolating the direction of causality and obtaining consistent and unbiased estimates of the impact of fertility. The IV regression is the best empirical strategy to address omitted variable bias and account for the possibility of endogenous regressors.

The challenge is to find an appropriate time-varying IV, which must be strongly correlated with the endogenous variable (fertility in this case), but exogenous and unrelated with the error term in the regression equation. In order to be valid, the comparative abortion index used as an instrument in this analysis must satisfy the condition that it should influence fertility, but not directly economic growth. The comparative abortion index can influence fertility behavior yet is not directly related to economic performance. The first-stage estimates are presented in Appendix Table A1, indicating that the comparative abortion index is a statistically significant predictor of the total fertility rate. As expected, an increase in the abortion index leads to a decline in fertility. The Kleibergen Paap F-statistics is significantly above 10, which exceeds the 1 percent critical value and thereby confirms the validity of the instrument, as suggested by Staiger and Stock (1997). Accordingly, I use the comparative abortion index as an instrument and implement the two-stage least squares (2SLS) methodology to identify the causal effects of fertility on real GDP per capita growth across 42 countries during the period 1960–2022.

Empirical studies generally find that higher fertility has a negative effect on real GDP per capita growth. That is exactly what the OLS model shows in this paper. As presented in Table 2, an increase in the total fertility rate is associated with a reduction in the growth rate of real GDP per capita. The coefficient on fertility is negative and statistically significant at the 1 percent level, before and after controlling for a range of economic, demographic, social and political factors. This result, however, could be misleading due to the endogeneity bias in estimations caused by reverse causality as discussed above.

Accordingly, to deal with the potential endogeneity of fertility and real GDP per capita growth, I estimate the model using the 2SLS-IV approach with the comparative abortion index as an external instrument for the total fertility rate. This approach provides credible causal inference

Table 2. Fertility and Economic Growth

	OLS	OLS	2SLS-IV
Total fertility rate	-1.928***	-2.290***	4.023*
	[0.471]	[0.648]	[1.538]
Real GDP per capita	-4.831***	-7.460***	-1.720***
	[1.042]	[0.981]	[0.360]
Share of industry		0.102*	0.068***
		[0.038]	[0.018]
Trade openness		0.026***	0.012**
		[0.006]	[0.003]
Population		-7.652***	0.004
		[1.643]	[0.151]
Educational attainments		0.639*	0.243*
		[0.246]	[0.076]
Infant mortality		-0.179***	-0.201*
		[0.045]	[0.074]
Female labor force participation		0.068*	0.058***
		[0.026]	[0.015]
Government stability		0.347***	0.267**
		[0.080]	[0.084]
Number of observations	2,061	1,140	1,107
Number of countries	42	42	42
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
R^2	0.36	0.48	0.42

Note: The dependent variable is economic growth as measured by real GDP per capita growth. In the 2SLS-IV estimation, the total fertility rate is instrumented with the comparative abortion index. Robust standard errors are reported in brackets. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Source: Author's estimations.

beyond a simple correlation between fertility behavior and real GDP per capita growth. In the third column of Table 2, I report the second-stage results of the 2SLS-IV estimation with fixed effects and control variables. The estimated coefficient on fertility (instrumented with the comparative abortion index) turns positive and statistically significant. Furthermore, the absolute magnitude of this effect estimated with the 2SLS-IV method appears to be nearly twice as large relative to the OLS estimations. These findings indicate that the endogeneity bias on the OLS estimates is particularly severe in the context of fertility and real GDP per capita growth. Another source of endogeneity is measurement error, which may attenuate the OLS estimates and is corrected by instrumentation. Hence, instrumenting the total fertility rate with the comparative abortion index reveals completely different dynamics that higher fertility makes a strong positive contribution to real GDP per capita growth.

With regards to control variables, I obtain consistent and intuitive estimation results with the 2SLS-IV approach. The lagged real GDP per capita is negatively and significantly associated with economic growth, confirming income convergence across countries. The magnitude of this effect is considerably smaller in the 2SLS-IV estimations than the OLS results, corroborating the severity of the endogeneity bias in the OLS estimations. Both the share of industry and trade openness—measures of economic development and international integration—have positive effects that are statistically highly significant. Population does not appear to be an important factor in explaining differences in economic growth, but educational attainments make a significant positive contribution to income per capita growth as expected. Infant mortality—an indicator of overall health conditions in a country—is negatively associated with economic growth, while higher female labor force participation leads to higher growth. Finally, the composite index of political stability and government effectiveness has the expected and statistically significant positive effect on real GDP per capita growth.

To obtain a better understanding of how the level of economic development influences the impact of fertility on real GDP per capita growth, I also estimate the model with the 2SLS-IV approach separately for different income groups—advanced economies and developing countries in Europe.[5] Even with a lower number of observations in country subsamples, this disaggregation reveals important differences in how fertility affects income per capita growth in advanced and emerging market economies. The estimated coefficients on fertility show a similar pattern of positive effects on real GDP per capita growth across all country groups, but this impact is statistically significant only in advanced economies. Although the magnitude of the coefficient on fertility (instrumented with the comparative abortion index) is much greater in developing countries, it is not statistically significant at conventional levels.

Building on this cross-country analysis and following Ashraf, Weil, and Wilde (2013) and Karra, Canning, and Wilde (2017), I also develop a macrosimulation model to examine the impact of fertility on income per capita growth in Lithuania—a transition economy that has experienced momentous demographic and economic changes over the past three decades. The total fertility

[5] I also estimate the model for the period excluding the COVID-19 pandemic, which may have influence fertility choices. These results, available upon request, remain consistent with the baseline 2SLS-IV estimations.

rate in Lithuania declined by 37.4 percent from 2.03 to 1.27 births per woman between 1990 and 2023. It is now one of the lowest fertility rates in Europe and set to decline to 0.88 births per woman by 2050. Consequently, Lithuania's population is projected to shrink from 3.7 million in 1990 and 2.8 million in 2023 to less than 2.3 million by 2050, with old-age dependency rate rising from 16.5 percent to 57.9 percent over the same period.

Parameterized using country-specific data and estimations, the macrosimulation model assumes fertility behavior to be exogenous and takes into account the dynamic evolution of population age structure and female labor force participation. These simulations, presented in Figure 3, show that a reduction in fertility lowers the level of population and the share of working-age adults in the population over the course of the next 75 years. The extent of these demographic shifts is significantly more pronounced in the low-variant scenario, which assumes that fertility will remain 0.5 children below the fertility in the medium variant over the projection period. Consequently, the ratio of real GDP per capita under the low-variant scenario to that under the medium-variant scenario declines from the peak of 1.1242 in 2055 to 0.9481 by 2100. In other words, income per capita is projected to fall by 17.6 percent with lower fertility relative to the baseline. This means that a shrinking labor force due to low fertility and population aging will turn the contribution of labor to economic growth negative and thereby make productivity improvements the key factor in growth dynamics.

Figure 3. Simulating Demographics and Income in Lithuania

Source: Author's calculations based on UN data and the Ashraf, Weil, and Wilde (2013) methodology.

With rapid population aging, it is also important to consider the impact of long-term caregiving on labor supply and income growth.[6] The old-age dependency ratio—defined a population aged 65 and over as a share of the population aged 20–64—already accounts for 37.3 percent in Europe and it is projected to 55.2 percent by 2050 and 59.1 percent by 2070. Much of the growing demand for long-term care is met by unpaid family caregivers, putting pressure (especially on women) to exit the labor force.

IV. CONCLUSION

Europe is in the midst of a major demographic transition with ultra-low fertility rates that create opportunities for socioeconomic advancement as well significant challenges by altering population dynamics and age distribution. Although empirical studies generally find that higher fertility has a negative effect on real GDP per capita growth, this result might be misleading due to the endogeneity bias in estimations caused by reverse causality between fertility and economic growth. In this paper, I address this major methodological problem by using the comparative abortion index as an instrument for the total fertility rate and thereby obtain credible causal inference beyond a simple correlation between fertility behavior and income growth. These results show that fertility has a significant positive effect on real GDP per capita growth, after controlling for economic, demographic, social and political factors, in a sample of 42 European countries over the period 1960–2022. This means that the downward fertility transition in Europe, coupled with fast-aging population, is a drag on income per capita growth.

Building on this cross-country analysis, I also develop a macrosimulation model to examine the impact of fertility on economic growth in Lithuania—a transition economy that has experienced momentous demographic and economic changes over the past three decades. The total fertility rate in Lithuania declined by 37.4 percent from 2.03 to 1.27 births per woman between 1990 and 2023. It is now one of the lowest fertility rates in Europe and set to decline to 0.88 births per woman by 2050. Consequently, Lithuania's population is projected to shrink from 3.7 million in 1990 and 2.8 million in 2023 to less than 2.3 million by 2050, with old-age dependency rate rising from 16.5 percent to 57.9 percent over the same period. Parameterized using country-specific data and estimations, the macrosimulation model assumes fertility behavior to be exogenous and takes into account the dynamic evolution of population age structure and female labor force participation. These simulations show that a reduction in fertility lowers the level of population and the share of working-age adults in the population and the level of income per capita in Lithuania as much as 17.6 percent under the low-fertility scenario relative to the baseline over the course of the next 75 years.

In fast-aging countries, boosting fertility can help lessen the decline in labor force and raise growth potential. But there are no quick fixes to ultra-low fertility in Europe—and beyond, as social norms and reproductive preferences change slowly over time. Although international experience provides little hope for demographic reversal in the short run, demography is still not

[6] There is a nascent literature on this issue, including Carmichael and Charles (2003), Bolin, Lindgren, and Lundborg (2008), Carmichael, Charles, and Hulme (2010), Schmitz and Westphal (2017), Mozhaeva (2021), Labbas and Stanfors (2022), Pena-Longobardo and Olivia-Moreno (2022), and Maestas, Messel, and Truskinovsky (2023).

destiny. Although it beyond the scope of this paper, other studies show that “family-friendly” policy interventions—aimed at reducing the cost of education and improving the provision of childcare facilities—can help raise fertility rates and alter the negative relationship between fertility behavior and economic growth. There is also evidence that labor market reforms to increase flexibility through teleworking and alternative working hour arrangements could help better gender-balance the contribution to childcare and boost labor force participation of women with children. Last but not the least, immigration is found to play an important role in increasing fertility, expanding the workforce and thereby in boosting potential growth in an aging society.

Appendix Table A1. First-Stage 2SLS-IV Regression Summary Statistics

	R^2	Adjusted R^2	F-test statistic
Comparative abortion index	0.3969	0.3737	53.1437

Source: Author's estimations.

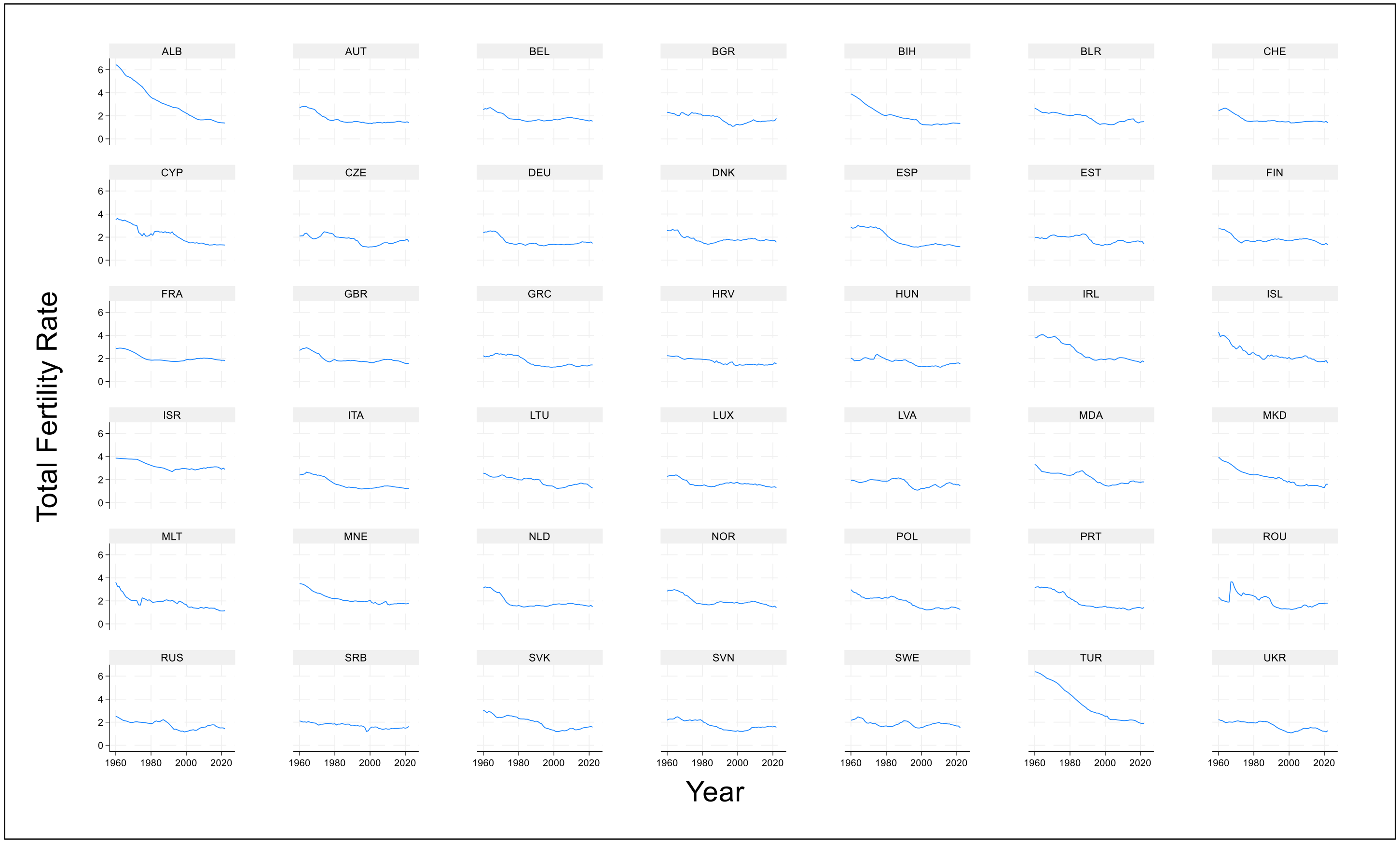
Appendix Table A2. Fertility and Economic Growth—2SLS-IV: AE vs EM

	All	AE	EM
Total fertility rate	4.023*	2.301*	16.487
	[1.538]	[0.846]	[10.538]
Real GDP per capita	-1.720***	-1.269***	-1.129***
	[0.360]	[0.282]	[0.247]
Share of industry	0.068***	0.093***	0.208***
	[0.018]	[0.016]	[0.022]
Trade openness	0.012**	0.012***	0.012
	[0.003]	[0.003]	[0.018]
Population	0.004	0.001	-0.361
	[0.151]	[0.108]	[0.372]
Educational attainments	0.243*	0.052	2.266*
	[0.076]	[0.081]	[0.855]
Infant mortality	-0.201*	-0.334***	-0.221*
	[0.074]	[0.095]	[0.084]
Female labor force participation	0.058***	0.004	0.075***
	[0.015]	[0.016]	[0.014]
Government stability	0.267**	0.148	0.084**
	[0.084]	[0.082]	[0.014]
Number of observations	1,107	808	299
Number of countries	42	27	15
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
R^2	0.42	0.57	0.26

Note: The dependent variable is economic growth as measured by real GDP per capita growth. In the 2SLS-IV estimation, the total fertility rate is instrumented with the comparative abortion index. Robust standard errors are reported in brackets. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Source: Author's estimations.

APPENDIX FIGURE A1. TOTAL FERTILITY RATE BY COUNTRY



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