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Fertility and the Business Cycle: The European Case

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Abstract: This paper analyzes the role of the business cycle in fertility, using data from 30 European countries for the period 1991 to 2013. We find that the unemployment rate, utilized as a proxy for the evolution of the business cycle, negatively affects the fertility rate, at least in the short term. This is maintained even when we control for the welfare generosity of the European countries, and for other socio-economic variables and unobservable characteristics that can vary by country and/or over time. Our results suggest that fertility decisions behave in a pro-cyclical way, although the effect of the business cycle variations is quite moderate. By age of women, we observe differences in the response of the fertility rate, with the impact of economic problems being lower for those who are at the end of their childbearing years. Supplementary analysis, developed to explore the impact of the business cycle on the entire distribution of the fertility rate, indicates that the effect of the unemployment rate varies considerably, having a strong effect on the fertility rate at higher quantiles, corresponding with higher fertility rates.

Keywords: Fertility, unemployment, business cycle.

JEL: C14, C23, J13, J64.

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1. Introduction

In recent years, Europe has endured a severe economic crisis, although this is not the only current European crisis.¹ In the late 1990s through the early 2000s, the fertility rates of most European countries fell dramatically, dropping to the lowest levels of fertility of the 20th century (Kohler et al. 2002). That was followed by a decade of increasing fertility rates (Source: Eurostat), which could have indicated that Europe had accomplished a reversion of the decreasing trend observed since the 1960s, rising above the once-worrying levels of low fertility (Goldstein et al. 2009). However, within a few years, and coinciding with the economic crisis, the fertility rate again experienced a sharp decline that threatened a generational change. Low levels of fertility may entail demographic, economic, and social consequences, such as an aging population, and even a decline in the total population (Bloom et al. 2010), both of which are of serious concern to politicians and researchers. Prior research on fertility issues encompassed a broad range of topics, searching for the determinants of its evolution (see, for a review, Feyrer et al. 2008): the decline in child mortality (Doepke 2005), the reforms affecting the legality of abortion and the contraceptive pill (Ananat et al. 2007; Goldin and Katz 2000; 2002), the increasing incorporation of women into the labor market (Ahn and Mira 2002), and the changes in divorce laws introduced across European countries (Bellido and Marcén 2014). In this paper, we explore whether the business cycle plays a role in determining the evolution of fertility rates, within a framework of low levels of fertility coupled with the generous welfare systems of Europe.

We are not the first to analyze the impact of the business cycle on fertility (see, for a review, Sobotka et al. 2011), but the bulk of the existing literature focuses on the United States (Ananat et al. 2013; Butz and Ward 1979; Cherlin et al. 2013; Mocan 1990; Ogburn and Thomas 1922; Rindfuss et al. 1988; Schneider 2015; Schneider and Hastings 2015). The empirical evidence on the issue is mixed, with some papers showing a negative relationship between business cycle fluctuations and the fertility rate (Rindfuss et al. 1988), while others find a positive association (Butz and Ward 1979). More recently, research has concentrated on the effect of the last Great Recession on fertility in the US. In this case, the evidence appears to point to a negative relationship between the economic crisis and fertility (Ananat et al. 2013; Cherlin et al. 2013;

¹ “Europe’s other crisis” Recession is bringing Europe’s brief fertility rally to a shuddering halt, *The Economist*, Jun 30th 2012, <http://www.economist.com/node/21557774>

Schneider 2015; Schneider and Hastings 2015). There are also studies of other countries, such as the work of Adsera and Menendez (2011), who find that childbearing follows a pro-cyclical pattern of behavior in Latin America, decreasing during economic downturns. Kravdal (2002), studying the case of Norway, concludes that unemployment has a negative but moderate impact on fertility, while Andersson (2000) determines that fertility experiences a pro-cyclical evolution in the case of Sweden. We contribute to the literature by exploring the issue for a panel of 30 European countries.

The impact of business cycle changes on fertility, from a theoretical point of view, is not clear. On the one hand, during an economic crisis, the economic constraints increase, making the costs of having a child more difficult to afford (Morgan et al., 2011). Thus, we would expect a pro-cyclical response of the fertility rate to the business cycle fluctuations that is consistent with a framework where income effects are dominant during economic hard times. In the case of Europe, this approach could be less relevant than in other parts of the world, such as the US, due to the greater generosity of the welfare systems of most European countries (Alesina et al. 2001), which can reduce the effects of economic downturns. On the other hand, since the average age at which women have their first child is relatively advanced in the case of European women (Sobotka 2004), the postponement of fertility decisions is less possible in an economic crisis because of the limitation imposed by the approaching end of their childbearing years (the so-called biological clock). So, in this case, no effect of the economic downturns (or much more moderate negative impact) on fertility would be expected, compared to countries where women have their children earlier in life. Additionally, for women, who are normally the main caretakers, children would be less expensive to rear during economic recessions because the opportunity costs are lower in those periods, encouraging fertility (Butz and Ward 1979). If this were the dominant behavior, the fertility response would be counter-cyclical. Then, from this theoretical overview, it is not possible to determine an a priori clear relationship between business cycle variations and fertility, with this being even more the case in Europe, so an empirical analysis is needed to analyze which one of these perspectives dominates.

To examine this issue, we utilize European data on the General Fertility Rate (GFR) from 1991 to 2013, measured at the country level, which covers the most acute and recent European economic crisis (data from Eurostat). The GFR is calculated as the number of live births within a country in a year, divided by the number of women aged

15 to 44 residing in the country in the same year, and multiplied by 1,000. In order to measure the business cycle, we use information on the national unemployment rate in the countries included in our research during the same period. Although, as described above, theoretically, the relationship between the business cycle and fertility is unclear, our results suggest that unemployment and fertility are negatively associated, but that the effect is quite moderate, which is similar to that observed, for example, using US data (Schneider 2015). An increase of one percentage-point in the unemployment rate involves only 0.346 fewer live births per thousand women aged 15 to 44. This result is maintained even after including controls for unobservable characteristics that can vary at the country level and/or over time. Our findings do not vary when we incorporate controls for observable characteristics measured at the country level that may affect fertility decisions, such as family policies (Gauthier 2007), female education (Leon 2004), religion (McQuillan 2004), infant mortality (Sah 1991), and marital differences (Breierova and Duflo 2004). Our findings are also unchanged when we utilize different sub-samples considering the political, institutional, and economic changes occurring in some of the countries included in our analysis.

The analysis is also run after taking into account possible differences in the response to the business cycle fluctuations by age of the mother. As mentioned above, the average age at which women have their first child is quite high in the case of most European countries (Sobotka 2004). This fact makes the postponement of a fertility decision quite difficult in an unemployment situation or in a situation of economic uncertainty. Additionally, economic constraints cannot be the same in the early stages of women's lives than when they are older. Regardless of the age of women, all our results point to a pro-cyclical response of fertility to business cycle fluctuations in Europe during the last decades of the 20th century and the first decade of the 21st century, but the differences by age of mother are remarkable. What is clearly detected is that, for those women towards the end of their childbearing years, the unemployment rate has a low impact. However, in the early years of fertility, there are differences by age. This is also observed when the youth unemployment rate is utilized as a measure of the economic constraints on young women.

In the short-term, even when women are close to the end of their childbearing years, couples may react to changes in labor market conditions by putting off their fertility decisions. In these circumstances, there can be a lag in the impact of the

unemployment rate on fertility. For this reason, we include in our study lagged unemployment rates. We consider lags from 1 to 2 years, although the duration of the lag is not clear (as we discuss below). We find evidence pointing to an effect of the contemporaneous unemployment rate, and of the unemployment rate lagged one year on the fertility rate.

We also contribute to the existing literature by exploring the possible non-linear response of fertility decisions to variations in the business cycle. We examine the impact of the business cycle on the entire distribution of the fertility rate, not merely its conditional mean, by using quantile regressions. We consider that this is necessary since part of the variation in fertility rates may reflect the fact that the influence of certain country characteristics, particularly the unemployment rate, is not uniform across the distribution of the variable. The response of women to changes in economic circumstances may not be the same in a framework of higher fertility rates, where each woman is more likely to have more than one child, than in a framework where women are more likely to have just one child. Results suggest that the effect of the unemployment rate is much more moderate at lower quantiles, low fertility rates, than at higher quantiles, high fertility rates.

The remainder of the paper is organized as follows. Section 2 presents the data used. In Section 3, we describe the methodology. Section 4 shows our main results. Section 5 presents the lag specifications. The non-linear analysis is conducted in Section 6, and Section 7 concludes.

2. Data

The fertility data covers 30 European countries from 1991 to 2013. This information is publicly available from Eurostat.² We consider in our main analysis the GFR, calculated as the number of live births within a country in a year, divided by the number of women

² Our sample includes 27 European countries that were European Union (EU) members in 2013 (the accession of Croatia took place on 1st July 2013, so this country is not included in the analysis). We have also added 3 more countries to the analysis: Iceland, Norway, and Switzerland. Iceland and Norway were not EU members but were part, as the rest of EU countries, of the European Economic Area (EEA), which allowed them to be part of the EU's single market. Switzerland was neither an EU nor an EEA member but was part of the single market. All nationals of those countries have the same rights to live and work in other EEA countries. Liechtenstein was also part of the European Economic Area, but it is not incorporated because of problems of availability of information.

aged 15 to 44 residing in the country in the same year, multiplied by 1,000.³ This is a common measure of fertility that allows us to analyze the reaction of fertility decisions in the short term (Schneider 2015).⁴ This is not the only standard measure of fertility considered. We have also re-run all the analysis using other definitions of the fertility rate, such as the Crude Birth Rate (defined as the annual number of births per 100 inhabitants) and the Total Fertility Rate (defined as the mean number of children that would be born alive to a woman during her lifetime if she were to pass through her childbearing years conforming to the fertility rates, by age, of a given year). Results do not vary and are available upon request. This is not surprising since these measures of fertility have a similar pattern to that of the GFR (Bellido and Marcén 2014).

To measure business cycle variations, we utilize country-level unemployment rates obtained from the World Data Bank.⁵ Unemployment refers to the share of the labor force that is without work but is available for and seeking employment. The unemployment rate is calculated as the percentage of unemployed individuals in the labor force. This rate includes changes in both labor demand and labor supply. It is a common indicator of economic conditions, which picks up not only the effects of individual job losses, but also variations in economic uncertainty (Schaller 2013). It is useful in our analysis, since this aggregate variable is less likely to be endogenous to fertility decisions than other income or employment measures, such as own wages. Of course, we recognize that this variable presents some problems, since it can understate the magnitude of a recession by failing to incorporate discouraged workers, and because it can be a lagged indicator of economic recession. Nonetheless, the use of a lagged indicator of economic variations could be appropriate because our measure of fertility is also a lagged proxy of fertility decisions. The fertility decisions normally take place several months before childbirth; then, the unemployment rate can be a good indicator of the economic conditions when couples considered having a child. Despite its weaknesses, the unemployment rate is the best available proxy to pick up changes in labor market conditions (Schaller 2013).

³ Note that for the case of France, we use information for metropolitan France from Eurostat due to the scarcity of data available in that dataset for the whole of France in the period considered. Results do not vary substantially when we use the somewhat scarce information for the whole of France publicly available in Eurostat. Data for the year 2013 is obtained from the INSEE dataset in the case of metropolitan France.

⁴ To study the long-term effects of the current economic crisis, we must wait some time in order to have the completed fertility rates of those women who can now still have children.

⁵ All the analysis has been repeated using male and female unemployment rates. We revisit this issue below.

Table 1 presents the average GFR and unemployment rates for the sample period (1991 – 2013), for the 30 countries included in our analysis, ordered from high to low average unemployment rates. As can be seen, there are significant differences in the average unemployment and fertility rates across countries. Although it is quite difficult to discern a relationship between these two variables, the tails of the unemployment rate distributions show that, in those low-unemployment-rate countries, fertility rates are high, whereas those with relatively high unemployment rates show fertility rates that are quite low. For the countries with an unemployment rate 2 percentage points above and below the average rate for the whole of Europe (around 8%), no clear relationship can be established. Neither a geographical pattern nor a religion pattern can explain the differences in fertility and in the association between the unemployment rate and the fertility rate across countries.

A quick glance at the temporal evolution of the average GFR for the whole of Europe, and that of the unemployment rate, does not reveal a clear relationship between unemployment changes and fertility variations, although some movements of those rates may indicate a possible pro-cyclical response of the fertility rate to the unemployment rate (see Figure 1). Our sample begins with a sharp decline in the average GFR, coinciding with a period of pronounced increases in the unemployment rate. After that, the drop in the unemployment rate until 1998 corresponds to a smooth decline in the fertility rate. Then, the unemployment rate stabilizes around 8% and the fertility rate, in a stable economic situation, begins to increase. The same movement of the fertility rate is detected when the unemployment rate falls from 2004 to 2007, but the rise in the fertility rate again stabilizes when the unemployment rate increases suddenly during the onset of the Great Recession of 2008 to 2009. Of course, this is not a conclusive analysis. In the following sections, we examine the possible relationship between fertility and unemployment more closely.

3. Methodology

In our main analysis, we estimate the following equation:

$$GFR_{it} = \alpha + \beta Unemp_{it} + \Pi' T_{it} + \phi \eta_i + \varepsilon_{it}, \quad (1)$$

with GFR_{it} being the fertility rate of country i in year t and $Unemp_{it}$ being the unemployment rate of country i in the year t . η_i is a vector of country fixed effects

$(\sum_{i=1}^{n-1} Country_i)$, picking up the effect of unobserved characteristics that vary at the country level. T_{it} is a matrix of time variables that incorporates: year fixed effects $(\sum_{t=1}^{t-1} Year_t)$, country-specific linear time trends $(\sum_{i=1}^{n-1} Country_i \cdot Time_t)$, and country-specific quadratic time trends $(\sum_{i=1}^{n-1} Country_i \cdot Time_t^2)$, that allow us to capture the effect of unobserved characteristics that vary over time. ε_{it} is the error term.

Following the methodology utilized in prior studies of the impact of the business cycle on socio-demographic variables (Marcén and González-Val 2015; Schaller 2013; Schneider 2015; among others), we use country-level unemployment variations to identify the relationship between unemployment and fertility rates, given that these variations are considered exogenous. As in prior works, there are some concerns on this issue. For example, women may decide to change their participation in the labor market after bearing a child, especially in the first years following childbirth, which will affect unemployment rates. We revisit this issue below, following the approach proposed by Schaller (2013). With respect to the expected impact of unemployment on fertility, as explained above, the effect, from a theoretical point of view, is not clear. The sign of the β coefficient, which captures the reaction of fertility to unemployment, could be positive (counter-cyclical behavior) or negative (pro-cyclical behavior).

4. Results

4.1 Baseline results

Table 2 reports the results for Eq. (1), with all of the regressions weighted by country population, and robust standard errors clustered by country. In Column (1), which does not include controls, a one-percentage-point increase in the unemployment rate involves a decrease of the GFR of almost 0.534. This negative relationship is also seen when we add controls for country and year fixed effects, country-specific linear and quadratic time trends in Columns (2) and (3), although the magnitude of the effect decreases in absolute value to 0.346. This may occur because, in those specifications, we are not only removing country fixed characteristics, but also time-variant unobservable factors that could bias the results presented in Column (1) (as suggested by Schneider 2015). The response of the fertility rate to the unemployment rate appears to be moderate,

given that the range of variation in the average unemployment rate in the period considered was only between 6% and 10%, whereas in the case of the GFR was between 50 and 60 live births per thousand women aged 15 to 44. In any case, an increase in the unemployment rate from 6% to around 10%, similar to that observed during the last Great Recession, would be associated with 1.384 fewer live births per thousand women aged 15 to 44, which almost corresponds with the variation in the average GFR since 2008. Our results are maintained when the GFR is measured in logarithm in Column (4).⁶

One concern with these results arises from the possibility that the variations in the unemployment rates are driven by changes in the GFR, which could generate problems with the assumption of exogeneity. Since many women modify their participation in the labor market after giving birth (Bloom et al. 2009), if fewer women have children, then more women may be participating in the labor market. However, as Schaller (2013) claims, the relationship between variations in women's participation in the labor market and changes in the overall unemployment rate is not clear. In any case, to tackle this issue, we repeat this analysis using the male unemployment rate as the variable of interest.⁷ We use this strategy, following Schaller (2013) and González-Val and Marcén (2015), because men are less likely to change their participation in the labor market due to fertility issues. As pointed out by the European Commission in its Female Labor Market Participation Report, having children may affect more the time devoted by women to the labor market, than the time devoted by men. Results are presented in Column (5) of Table 2. The association between male unemployment and the fertility rate remains negative and statistically significant, with the magnitude of the effect being quite similar to that observed when we use the overall unemployment rate. Even being aware of the problems of using the female unemployment rate, we have also incorporated in our main specification the female unemployment rate, rather than the overall unemployment rate. As can be seen in Column (6) of Table 2, results are unchanged. These findings suggest a pro-cyclical behavior of fertility, regardless of the measure of the unemployment rate considered.

⁶ For robustness purposes, we repeat all of the estimates with/without population weights, with/without women population weights, and with/without clustering the standard errors, and our results do not vary. In addition, we repeat all estimates removing each country one at a time and removing at the same time those countries with low and high fertility rates and unemployment rates, finding very similar results to those shown in Table 2.

⁷ Results are quite similar whether we use the overall unemployment rate or the male unemployment rate. For this reason, in the rest of the analysis, we have only included as explanatory variable the overall unemployment rate. The rest of the estimates are available upon request.

One can also argue that it is the unemployment rate of the young, rather than the overall unemployment rate, that really determines the evolution of fertility decisions. Women have limitations on having children, in that their childbearing years are time-sensitive. In addition, young women get pregnant more easily and they are less likely to have problems during pregnancy. Thus, it is possible to surmise that it is the unemployment rate of their counterparts in the early stages of their life that matters in the decision to have a child or not. In fact, the last Great Recession has hit the young across Europe very hard, particularly in Southern Europe. For example, in the cases of France and Italy, one out of four of the young is unemployed, while the overall unemployment rate is much lower, and in Spain, this ratio greatly exceeds 40% (Scarpetta et al. 2010).

To examine this issue, we study the relationship between the unemployment rate of young individuals and the fertility rate of women, with that rate defined by age of the women. We use as dependent variables the GFR by age of the mother (Source: Eurostat), from ages 15 to 19, 20 to 24, 25 to 29, 30 to 34, and 40 to 44, calculated as the number of live births per thousand women in the same age interval. The youth unemployment rate includes young active people between 15 and 24 years old who want to work, and are actively seeking a job. Results are displayed in Figure 2. As in the case of the US (Schneider 2015), for Europe, we observe certain variations depending on the age of women, with the youth unemployment rate having a greater impact in the case of those aged 20 to 24. The low impact of unemployment in the case of those aged 15 to 19 years old is not unexpected, since much of teen motherhood is unplanned and/or responds to cultural issues (Bellido et al. 2016), so it is less likely to be due to variations in the business cycle. For the other age groups, those women older than 24, we have run the analysis with the youth unemployment rate as well as with the overall unemployment rate. Note that both rates are highly correlated at the country level, with those countries having high unemployment rates also presenting high youth unemployment rates. As can be expected, the pattern of response of the fertility rates is quite similar to both measures of unemployment. What is surprising is the low estimated response, in absolute value, of the fertility rate of those aged 25 to 29, as even in the case of the overall unemployment rate, this coefficient is not statistically significant. One possible explanation for this particular age group is the fact that the average age at first birth in Europe is under 29 years old (Eurostat News Release 2015). Then, although young women under 25 years old may react to economic constraints by

postponing childbirth, that decision cannot be deferred for many years, because of ‘the ticking of the biological clock’, regardless of the economic situation. This issue is even more important for those women who want to have several children, and their first child early in life. Thus, women can postpone their first child when they are young, but when they are between 25 to 29 they would be more likely to have their children for reasons unrelated to economic conditions. Educational issues can also play a role. We revisit this issue below. With respect to other age groups, it is clearly observed that the older the women, the lower the impact of unemployment, which is consistent with the notion of the approaching end of their childbearing years. In any case, even for older women, we find empirical evidence of some responsiveness of fertility rates to economic changes.

4.2. More Robustness Checks

Children are usually considered as marriage-specific capital investments (Becker et al. 1977, and Stevenson 2007). This can be relevant in our analysis if, for example, those countries having high unemployment rates are those with low marriage rates and consequently fewer children. Then, one can argue that the differences in marriage rates are driving our results, rather than differences in unemployment rates. To explore this issue, we include in the analysis the crude marriage rate measured at the country level, and defined as the ratio of the number of marriages during the year to the average population in that year, and expressed per 1,000 inhabitants (Source: Eurostat). The estimated coefficients are presented in Column (1) of Table 3. In the case of the marriage rate, as expected, the higher the crude marriage rate, the greater the number of live births per thousand women aged 15 to 44. No effect is observed when the crude divorce rate (Source: Eurostat), incorporated as a measure of marital behavior at the country level, is added to the specification in Column (2). The coefficients picking up the relationship between unemployment and fertility are again negative and statistically significant, Columns (1) and (2), pointing to the pro-cyclical response of fertility to the business cycle. To capture the marital behavior of individuals in Europe, we also include as controls the average age at first marriage of both men and women (Source: Eurostat), since those women who marry earlier can have more children (Bumpass and Mburugu 1977), see Columns (3) and (4). As previously, if, for example, those countries having low unemployment rates are also those in which individuals marry earlier, we could hypothesize that our estimates are confounding the impact of the unemployment rate and that of a culture of marrying young. Adding these controls, we observe the same pattern of behavior of the GFR to changes in unemployment. To

provide more convincing empirical evidence, we replicate our analysis distinguishing between children born within and outside of marriage. Since children increase the value of marriage (Stevenson 2007), and a job loss introduces instability (Doiron and Mendolia 2012), some couples may decide to have children to reinforce the marriage and make it more difficult to break. Then, we would expect a different response to the unemployment situation for a married couple than for a single mother. Results are in Columns (5) and (6). We use as dependent variable the number of live births within marriage per 1,000 married women, and the number of live births per thousand non-married women. In the case of the fertility rate of the married women, we still see a clearly negative reaction of the fertility rate to variations in the unemployment rate. Nevertheless, although the impact of the unemployment rate is statistically significant and negative for those births out of marriage, the magnitude of the effect is considerable lower, in absolute value. Although it is comforting that our results are quite similar, these last estimates should be taken with caution, since we not only consider here those children of single women, but also those of less traditional family compositions (cohabitation, unmarried parenthood) that are becoming more common (Kiernan 2004). The impact of a job loss implies fewer available resources for a single mother than for a non-married couple. Then, that coefficient is difficult to interpret. For all this, we prefer to use as the dependent variable, in the rest of the analysis, the fertility rate for all women (married or not). Additionally, it is also common that, after pregnancy, non-married couples decide to marry, the so-called ‘shot-gun’ marriages, which generates endogeneity concerns on the use of the marriage rate. Taking this into account, we have not incorporated all those controls in the rest of the analysis.⁸

Political, institutional, and economic differences at the country level may also affect our previous estimates. One can argue that fertility behavior may vary depending on whether the individuals live in a poor or rich country. In poor countries, the cost of bearing a child during economic crisis will be higher than in rich countries, for example because rich countries are more likely to have generous welfare systems that help the unemployed, or pregnant women. If this were the case, the response of the GFR to variations in the unemployment rate may differ, depending on the economic situation of the countries, rather than on variations in the business cycle. This can bias our estimates

⁸ We have repeated the analysis with all the controls considered in this work and results do not vary substantially. Note that the differences in the number of observations are due to problems of availability of information on those controls for several countries, see the notes for each table. We have also repeated the analysis by filling in the gaps in the controls by linear interpolation and results do not change.

if the poorer countries are, for example, more likely to have higher unemployment rates. Then, it could be argued that the variation in the fertility rate is due to differences in the general macro-economic situation of the countries, rather than on business cycle fluctuations. In the case of Europe, this is not expected to be important, since, following the classification of the World Bank, all but two countries of our sample are classified as “high-income level countries”. The exceptions are Bulgaria and Romania, which are classified as “upper-middle income countries”. To show that this issue does not affect our findings, we repeat our analysis excluding those two countries (see Table 4, Column 1). We can observe that, for our sample of high-income level countries, the estimated relationship between the unemployment rate and the GFR remains negative and statistically significant, and the magnitude of the impact barely changes.

In the baseline results, we do not consider relevant political and institutional changes that occurred in some countries of our main sample. One of these changes is the process of independence obtained by six of the European countries considered in this work (Estonia, Latvia, Lithuania, Czech Republic, Slovakia, and Slovenia) during the 1990s (Source: The World Factbook of the CIA). If the uncertainty produced by those political and institutional changes had any effect on the reproductive behavior of women, our results could be biased. To face this issue, we exclude those countries and re-run the analysis, as in Column (2) of Table 4. Our results remain unchanged: the pro-cyclical behavior of fertility appears to be quite robust to those subsample selections. Other political, institutional, and economic changes that occurred in the period considered are the process of incorporation to the European Union and the adoption of the Euro. As before, all these processes can generate uncertainties that could affect our estimates. To deal with this, we include a dummy variable that takes the value “1” from the year in which a country became a member of the European Union and the value “0” otherwise.⁹ We also introduce in our estimates a dummy variable that takes the value “1” from the year in which a country became a member of the European Union that uses the Euro and the value “0” otherwise.¹⁰ We report the estimates in Table 4, Columns (3) to (5). Again, the effect of unemployment rates on the GFR is negative and statistically significant.

⁹ Fifteen countries joined the European Union during the sample period: in 1995 (Austria, Finland and Sweden), in 2004 (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia), and in 2007 (Bulgaria and Romania).

¹⁰ Seventeen countries adopted the Euro during the sample period: in 1999 (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain), in 2001 (Greece), in 2007 (Slovenia), in 2008 (Cyprus and Malta), in 2009 (Slovakia), and in 2011 (Estonia).

To reinforce the consistency of our results, we study whether our findings are affected by omitted economic and demographic variables. The impact of these variables correlated with the outcome of interest, if omitted, could be captured by the coefficients measuring the association between unemployment and fertility. We address this by including controls for several standard determinants of GFR, in Table 5. In Column (1), we first include the GDP per capita in logarithm. This control is calculated in US dollars at 2005 constant prices (data source: World Bank, World Development Indicators), and is used as a proxy for household income. It is arguable that not only the shock of job loss but also the impact of the evolution of the business cycle on household income, whether or not one individual is unemployed, may influence the fertility decision. Having a child can be more tempting for those individuals who can afford to maintain that child. Then, it follows that those who would endure greater economic constraints during an economic recession would be less likely to have a child. Results show a positive relationship between GDP per capita and fertility. The coefficient picking up the impact of unemployment does not change after the incorporation of the GDP in the specification. Our results show again a pro-cyclical behavior of fertility. In Column (2), we introduce the Infant Mortality Rate, since as suggested by Sah (1991), decreasing mortality rates lower the cost of having a surviving child, so it should have a positive impact on the GFR. On the other hand, the lower the mortality rate, the fewer children need to be replaced. After including this control, the effect of unemployment remains unchanged.

Columns (3) and (4) include controls for education and immigration, respectively. As mentioned above, educational attainment and/or the level of education may be relevant in this analysis. Increasing the participation of individuals in education may affect fertility by increasing the opportunity cost of time, or by increasing the age at marriage, especially in the case of women (Barro and Becker 1988; Breierova and Duflo 2004). But education can also be related to a possible job loss, since those individuals with a higher level of education are less likely to be unemployed (OECD 2012). Thus, our estimates may be picking up not only the effect of unemployment but also that of education. Although, to examine this issue, we would prefer to use as dependent variable the number of live births per women in primary, secondary and tertiary education, unfortunately, this information is quite limited and so we cannot obtain reliable results. As before, we can only introduce controls, in this case, for the annual

school gross enrolment ratios in primary, secondary and tertiary education by country.¹¹ After their inclusion, our conclusion on the relationship between unemployment and fertility does not change. Similarly, we would also prefer to include as dependent variable the number of live births per country of origin of women, but as in the case of education, this information is quite limited. The incorporation of the immigrant population to this analysis is relevant since their fertility behavior may be different from that of native-born women (Bellido et al. 2016; Kahn 1994) and there can also be differences in their response to an unemployment situation. With the limitation of the data, we can only address this issue by incorporating as control the annual percentage of immigrants over the total population in each country in Column (4) of Table 5. We find a positive impact of immigration on the GFR, but the pro-cyclical behavior of fertility is maintained.

Cultural differences can also affect fertility decision, as Bellido et al. (2016) explain. Beliefs about fertility behavior may be passed on through religion (McQuillan 2004). For example, the religious teachings on contraception and abortion may be important for the fertility behavior of women. The Roman Catholic Church, for example, opposes most forms of contraception and abortion (McQuillan 2004). Then, it can be surmised that those countries with a greater number of Catholics are more likely to behave differently in terms of fertility. It is more difficult to control pregnancy in a situation of unemployment for a woman who does not use any form of contraception, than for those using contraception. We explore this issue by examining the relationship between unemployment and fertility for a sample of Catholic countries. We utilize the observations of those countries whose population is recognized as Catholic in a percentage greater than 50%, with data from the CIA Factbook (Austria, Belgium, Ireland, Italy, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, and Spain). Even with that subsample, the effect of the unemployment rate on the GFR remains negative and statistically significant, Column (5) of Table 5.

As mentioned in our Introduction, the generosity of the welfare system in European countries can have an effect on the response of individuals to business cycle fluctuations. Public policies may account, at least to some extent, for fluctuations in fertility behavior (Lalive and Zweimüller 2009; Manuelli and Seshadri 2009). On the

¹¹ The gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Source: United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics

one hand, cash benefits received by unemployed individuals may mitigate the economic constraints of these individuals, making fertility more likely. To tackle this, we control for the annual cash benefits at the country level. Cash benefits are measured as public spending to compensate for unemployment, including redundancy payments from public funds, as well as the payment of pensions to beneficiaries before they reach the standard pensionable age, if these payments are made because the beneficiaries are out of work, or for other labor-market policy reasons (OECD dataset).¹² Cash benefits are calculated as a percentage of GDP, column (1) in Table 6, and per head, in constant 2005 US dollars, Column (2). Of course, a strong correlation exists between the unemployment rate and those measures of cash benefits, which can bias our estimates; however, even being aware of this problem, our results concerning the relationship between unemployment and fertility do not vary. On the other hand, European countries have public policies designed to encourage fertility by way of family allowances or paternity leave, which can affect the response of fertility to business cycle fluctuations. There are variations at the country level that we consider in Table 6, where we add several controls for such family policies.¹³ In Column (3), we control for the monthly family allowances received by the families for the first child. Columns (4) and (5) include the total number of weeks of maternity leave, and of parental leave, in each country. Column (6) includes the cash benefits during maternity leave, expressed as a percentage of female wages in manufacturing. Results suggest that the family policy with the greater effect on fertility is the total number of weeks of maternity leave, but cash benefits during maternity leave are also important. With respect to our variable of interest, the negative and significant effect of the unemployment rate on the GFR appears to be robust, regardless of the control introduced.

In sum, our findings suggest a pro-cyclical behavior of fertility, at least in the short term: the higher the unemployment rate, the lower the GFR. This is maintained regardless of the country and year fixed effects included in the analysis, the country-specific linear and quadratic time trends, as well as the introduction of a whole array of controls for potential determinants of fertility. The results are also unchanged when we

¹² Observations are not available for the whole sample. For this reason, we repeated the analysis with only that sample, and our results are the same.

¹³ The information on the controls used in this table comes from The Comparative Family Policy Database, by Anne H. Gauthier. Due to data availability, we only include 17 countries here (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom).

consider different sample selection. All of this reinforces the robustness and consistency of our findings.

4.3. Lag specification

Thus far, we have studied the contemporaneous effect of unemployment rates on fertility rates. However, as we previously explained, economic constraints and the uncertainty generated by job loss or by the economic crisis could lead couples to postpone their fertility decisions, simply because they cannot afford to have a child. In addition, fertility decisions normally take place several months before the birth, so it is possible to consider the lagged unemployment rate as an indicator of the economic conditions when couples actually considered having a child. It is worth noting that the potential concerns that the timing differences between business cycle variations and fertility decisions can generate, should be mitigated, in some way, since both the unemployment rate and the fertility rate can be considered as a lagged indicator of economic variations and a lagged proxy of fertility decisions, respectively. In any case, to explore this aspect, we include lagged unemployment rates in our analysis, which is a common strategy in this field of research (Ahn and Mira 2002; Kravdal 2002).

The duration of the lag is not clear. For this reason, we follow the prior literature, examining the lagged impact of unemployment on several demographic variables and add lags of from 1 to 2 years (Amato and Beattie 2011; González-Val and Marcén 2015; Schaller 2013). The estimated coefficients are reported in Table 7. Our results show an inverse relationship between the contemporaneous unemployment rate and the GFR, regardless of the measure of the unemployment rate used, Columns (1) to (3). The same is observed in the case of the unemployment rate lagged one period, although the magnitude of the effect is less than that observed in the case of the contemporaneous unemployment rate. This negative relationship can be explained by a postponement of fertility decisions. The unemployment rate lagged two periods does not appear to play a role, since the coefficient capturing the effect of this variable is not statistically significant. Even in these lagged specifications, fertility shows, once again, a procyclical behavior: the higher the unemployment rate, the lower the GFR.

5. Quantile Regression

In this section, we consider an alternative approach. All the previous conclusions are derived from an analysis of linear models; however, one could suggest that certain variables respond differently. In this case, part of the variation in the GFR may reflect the fact that the influence of certain country characteristics, particularly that of the unemployment rate, is not uniform across the distribution of this variable. It is possible to argue that a postponement of a fertility decision due to unemployment could be socially more acceptable in a country with low fertility rates, where individuals are less likely to have multiple children, than in a country with high fertility rates where women are expected to have several children. To explore this possible heterogeneous effect, we utilize quantile regressions (Koenker and Bassett 1978). The quantile regression version of the linear model shown in Equation (1) is:

$$GFR_{it} = \alpha(\tau) + \beta(\tau)Unemp_{it} + \Pi'(\tau)I_{it} + \phi(\tau)\eta_i + \zeta_{it}. \quad (2)$$

where the estimated parameters are τ -dependent, with τ being the corresponding quantile of the GFR. With this specification, we are able to analyze the impact of the unemployment rate on the entire distribution of the fertility rate and not merely its conditional mean. Quantile regressions take into account unobserved heterogeneity and allow for heteroskedasticity among the disturbances, non-normal errors, and are more robust to outliers than standard OLS regressions.¹⁴

Figure 3 shows the quantile regression results for the Equation (2). The graph presents the estimated coefficients and the 95% confidence intervals for the unemployment rate across the nine quantiles considered (ranges from 0.1 to 0.9). It also shows the estimated effect using the linear model and its correspondent 95% confidence interval. We have included as controls country fixed effects, country-specific linear and quadratic time trends, and year fixed effects. Our estimates are weighted by country population. Regardless of the quantile considered, we find a negative and statistically significant effect of unemployment on fertility, although there appear to be differences since the higher the quantile, the greater the impact of unemployment on fertility, conditional on the level of unemployment. The reaction of the fertility rate to unemployment is twice as high (in absolute value) in the top quantile (0.9) than in the bottom quantile (0.1), pointing to unemployment as a more important factor determining fertility behavior for those countries with high fertility rates. As mentioned

¹⁴ Moreover, quantile regressions are invariant to monotonic transformations of the dependent variable, such as logarithms.

previously, these results are conditional on the level of the unemployment rate, so it is possible to suggest that our estimations are being affected by the differences in unemployment rates at the country level. Those countries with relatively high unemployment rates could be driving the quantile regression estimation since they have low fertility rates. In order to test whether this is affecting our conclusions we have re-run the analysis by considering only those countries having unemployment rates lower than 20% (excluding the observations of Bulgaria, Greece, and Spain) and also unemployment rates lower than 15% during the period considered (excluding Bulgaria, Cyprus, Estonia, Finland, Greece, Ireland, Latvia, Lithuania, Poland, Portugal, Slovakia, and Spain). The regression coefficients are plotted in Figure 4. As can be seen in that figure, the pattern of the response does not change. In all quantiles, there is a negative and statistically significant effect of unemployment on fertility but we also detect a higher negative effect of the unemployment rate in the top quantiles of the GFR than in the lower quantiles, as in the case of the whole sample.

6. Conclusion

This paper examines the relationship between the business cycle and fertility behavior. We focus on the European case, since European countries present certain characteristics that can make the reaction of European individuals to the business cycle differ from those in other parts of the world. For instance, most European countries have quite generous welfare systems that can reduce the impact of economic downturns. Women living in those countries also tend to have their first child when older, which introduces difficulties with the postponement of fertility decisions as a reaction to an unexpected economic problem, because of the ‘ticking biological clock’. We use a sample of 30 European countries, with data from 1991 to 2013, which covers a larger number of countries than has been considered in prior studies, and includes the most acute part of the last Great Recession.

Following the existing literature on this issue, we use the unemployment rate to measure the business cycle, and the general fertility rate as an indicator of fertility. This allows us to examine the fertility response in the short term, but we cannot explore the impact on the completed fertility rate of women since, at this moment, their childbearing years have not yet ended. In any case, as suggested in the literature, a

postponement of their fertility decisions in the short term may have a negative impact on their completed fertility. Our results suggest that the fertility rate shows a procyclical behavior, at least in the short term: the higher the unemployment rate, the lower the fertility rate. The magnitude of the effect appears to be moderate, which may be related to the low fertility rates of many of the countries in our sample. We should note that the response of the fertility rate of other countries, such as that of the US (a country with a less generous welfare system) is quite similar to that of Europe, see, for example, the recent work of Schneider (2015).

Our findings are maintained even after including country and year fixed effects, and country-specific linear and quadratic time trends. It is also robust to the introduction of other country-level characteristics, such as per capita GDP, the infant mortality rate, education controls, the percentage of immigrants, different measures for the welfare system, and religion issues. Results are also unchanged when we use different subsamples, different measures of unemployment (including the male unemployment rate) and other measures of the fertility rate. Neither political changes nor the marital status of individuals drives our results. What is clearly observed is that the impact of the unemployment rate is lower (in absolute value) for older women. This behavior, as we suggest, may be related to the difficulties these women have in delaying their fertility decisions, or it could be due to the fact that older individuals are less likely to be affected by economic constraints, for instance, because their unemployment rate is lower than that of younger individuals during an economic recession. The lagged specification also reveals some expected results, since the job loss experienced by an individual may force them to postpone the fertility decision. We find that both the contemporaneous unemployment rate and the unemployment rate lagged one period negatively affect fertility decisions.

We also make use of an alternative approach to examine the relationship between unemployment and fertility, using quantile regressions. To the best of our knowledge, this approach has not been used before in this literature. Even if our findings indicate that the higher the unemployment rates normally associated with an economic crisis, the lower the fertility rate, the effect of the unemployment rate may be different across the distribution of the fertility rate. By studying this possibly heterogeneous relationship, we still find an inverse relationship between unemployment and fertility. However, we also observe that this negative relationship is more pronounced at the top quantiles of

the fertility rate, suggesting that, for those countries with low fertility rates, the business cycle is a less important factor in determining fertility decisions.

Compliance with Ethical Standards:

The authors declare that they have no conflict of interest.

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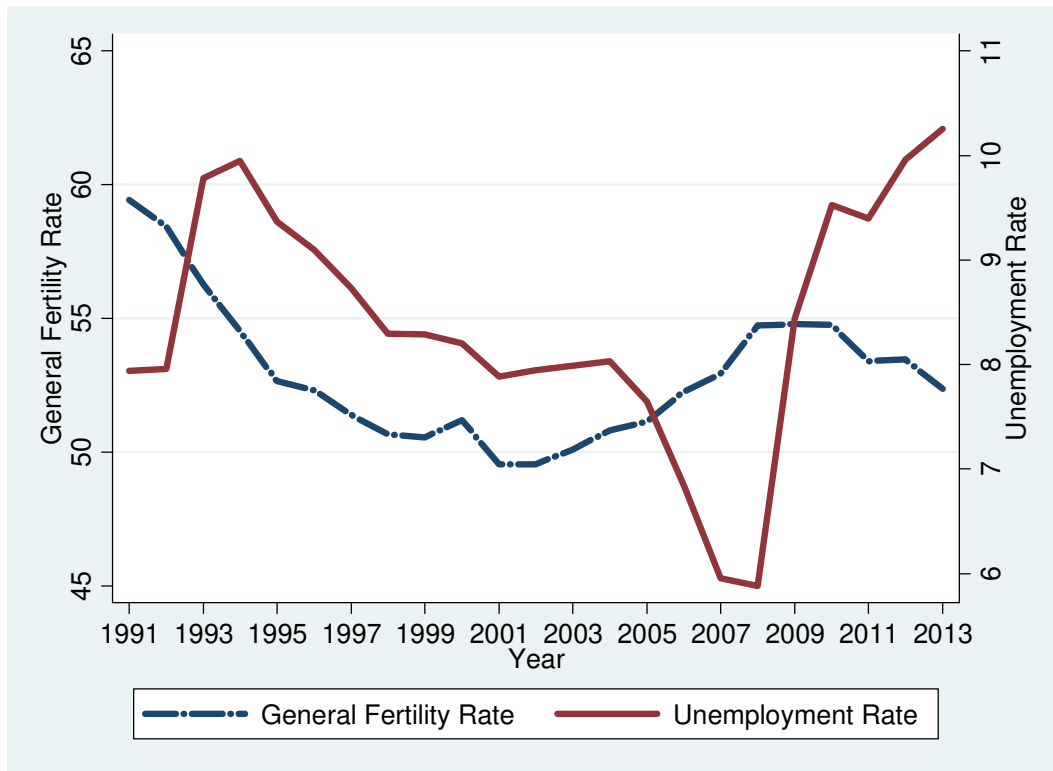
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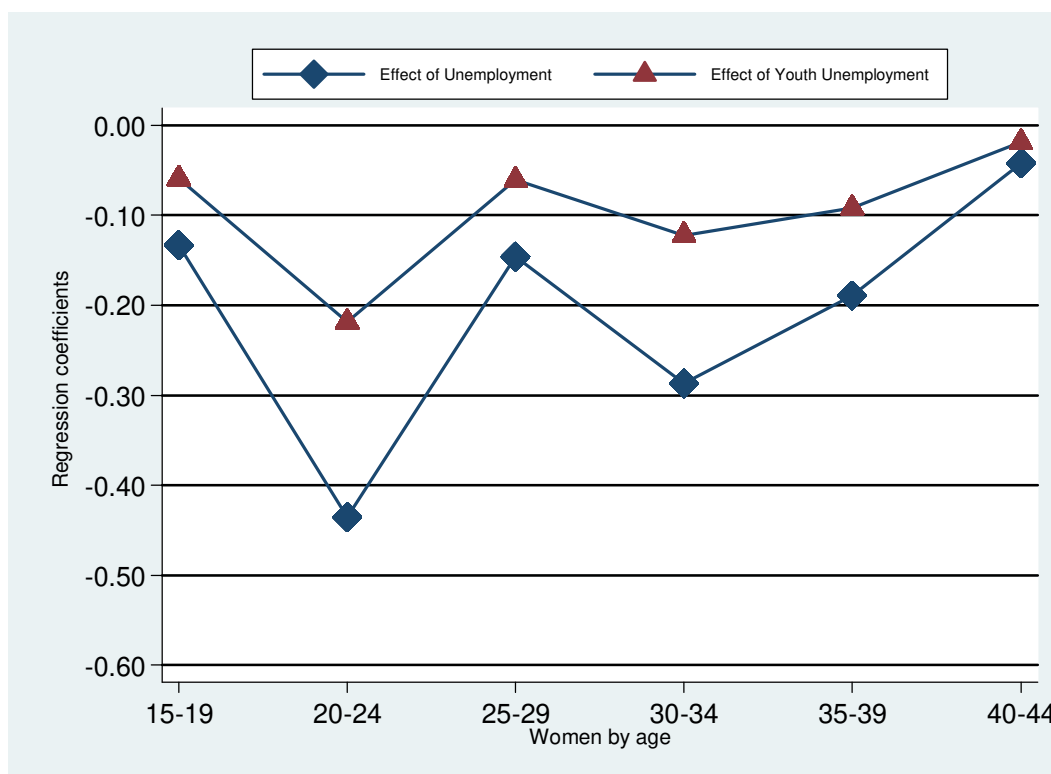
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Figure 1: Evolution of the GFR and Unemployment Rate in Europe (1991-2013)



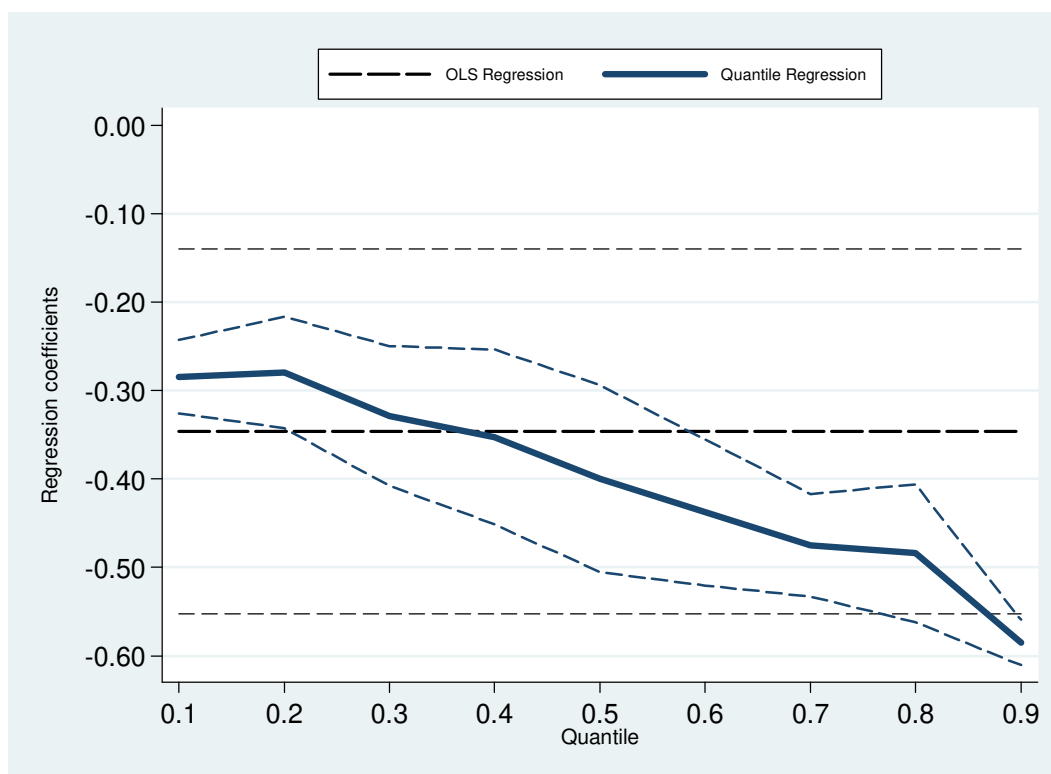
Sources: Unemployment rate data come from the World Development Indicators (The World Bank; Unemployment refers to the share of the labor force that is without work but available for and seeking employment). General Fertility Rates are calculated using data from Eurostat.

Figure 2: Response of GFR by age of Women (15-44)



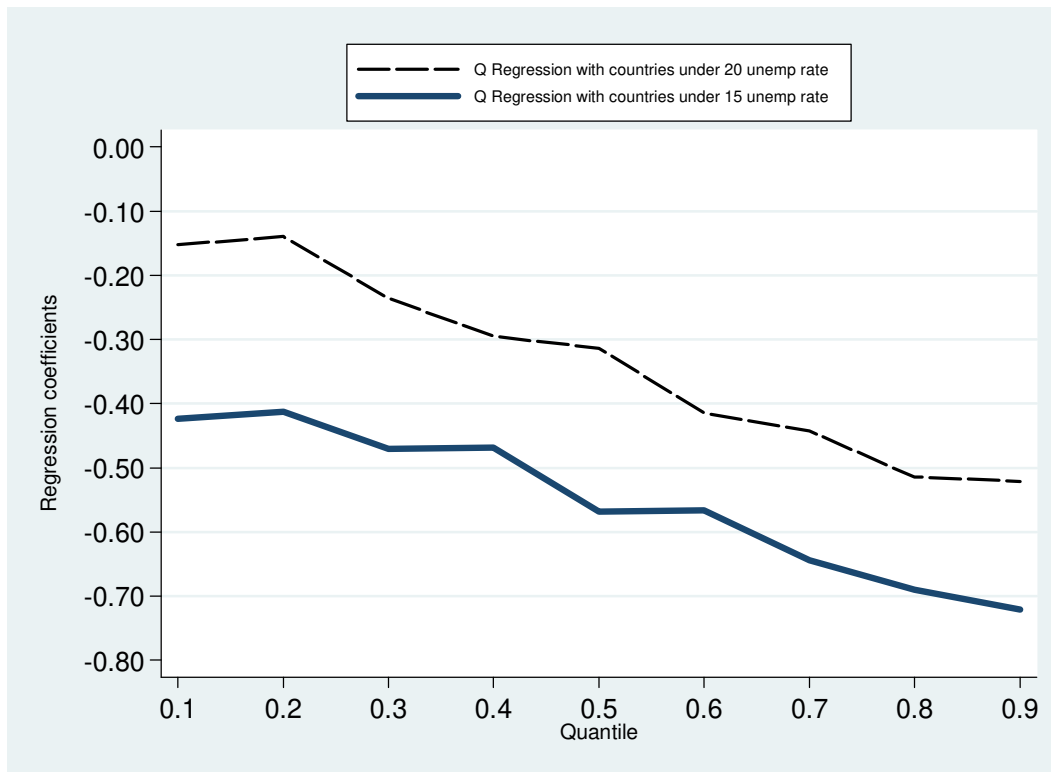
Notes: All coefficients are statistically significant at the 5% level with the exception of that capturing the effect of the overall unemployment on the fertility rate of women aged 25-29. The number of observations is 671. Robust standard errors clustered by country. All regressions are weighted by country population. Controls for country and year fixed effects as well as country-specific linear and quadratic time trends are added to all those specifications.

Figure 3: Response of GFR: Quantile Regression with the whole sample



Notes: Dependent variable: General Fertility Rate. The number of observations is 690. All regressions are weighted by country population. This graph plots the estimates on the impact of the unemployment rate on the general fertility rate obtained from an OLS specification, and from Quantile Regressions. Controls for country and year fixed effects as well as country-specific linear and quadratic trends are added to all those specifications.

Figure 4: Response of GFR: Quantile Regression with different subsamples



Notes: Dependent variable: General Fertility rate. All regressions are weighted by country population. This graph plots the estimates on the impact of the unemployment rate on the general fertility rate obtained from Quantile Regressions. Controls for country and year fixed effects as well as country-specific linear and quadratic time trends are added to all those specifications. All coefficients are statistically significant at least at the 5% level. The dashed line only incorporates the estimates for a sample of countries having an unemployment rate lower than 20% in the whole period. The number of observations is 621. Countries excluded are Bulgaria, Greece, and Spain. In the case of the solid line, the sample incorporates those countries having an unemployment rate lower than 15% in the whole period. The number of observations is 414. Countries excluded are Bulgaria, Cyprus, Estonia, Finland, Greece, Ireland, Latvia Lithuania, Poland, Portugal, Slovakia, and Spain.

Table 1.- Average GFR and Unemployment Rates by Country

Country	General Fertility Rate (1991-2013)	Unemployment Rate (1991-2013)
Spain	45.56	17.06
Slovakia	48.67	14.08
Bulgaria	45.92	13.37
Poland	48.46	13.13
Lithuania	48.29	12.83
Latvia	45.27	12.6
Greece	46.28	11.39
France	61.77	10.02
Finland	58.63	9.97
Italy	46.07	9.62
Ireland	66.58	9.44
Estonia	49.45	9.23
Hungary	47.19	8.74
Germany	44.64	8.07
Belgium	56.87	8.01
Sweden	60.15	7.44
Portugal	48.62	7.42
Romania	47.84	7.13
United Kingdom	59.94	6.97
Malta	53.85	6.83
Slovenia	45.5	6.81
Denmark	60.11	6.17
Czech Republic	47.51	6.16
Cyprus	57.92	5.63
Netherlands	56.94	4.7
Austria	47.72	4.16
Iceland	70.08	4.06
Norway	63.25	4
Switzerland	51.16	3.6
Luxembourg	57.48	3.59
Europe	52.92	8.41

Sources: Unemployment rates data come from the World Development Indicators (The World Bank; Unemployment refers to the share of the labor force that is without work but available for and seeking employment). General Fertility Rates are calculated using data from Eurostat.

Table 2: General Fertility Rate Models: Baseline Estimates

	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment Rate	-0.534*** (0.147)	-0.382*** (0.073)	-0.346*** (0.101)	-0.008*** (0.002)		
Male Unemployment Rate					-0.311*** (0.098)	
Female Unemployment Rate						-0.359*** (0.099)
Country fixed effects	N	Y	Y	Y	Y	Y
Year fixed effects	N	Y	Y	Y	Y	Y
Country x Time	N	Y	Y	Y	Y	Y
Country x Time ²	N	N	Y	Y	Y	Y
Observations	690	690	690	690	690	690
R ²	0.086	0.932	0.967	0.963	0.966	0.968

Notes: Dependent variable: GFR in Columns (1), (2), (3), (5), and (6), and the GFR in logarithm in Column (4). Robust standard errors clustered by country. All regressions are weighted by country population. ***Significant at the 1% level, **significant at the 5% level, *significant at the 10% level.

Table 3: Fertility Rate Models: The importance of Marital Status

	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment Rate	-0.307** (0.116)	-0.333*** (0.087)	-0.383*** (0.101)	-0.377*** (0.100)	-0.241*** (0.064)	-0.065** (0.024)
Crude Marriage Rate	1.602*** (0.540)					
Crude Divorce Rate		1.044 (0.651)				
Age at first marriage (Male)			-0.130 (0.452)			
Age at first marriage (Female)				-0.408 (0.489)		
Country fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
Country x Time	Y	Y	Y	Y	Y	Y
Country x Time ²	Y	Y	Y	Y	Y	Y
Observations	680	652	595	595	574	574
R ²	0.970	0.967	0.963	0.963	0.979	0.996

Notes: Dependent variable: General Fertility Rate in Columns (1) to (4), Total Live Births within marriage divided by the total number of married women by country and year in Column (5), and the Total Live Births outside of marriage divided by the total number of nonmarried women by country and year in Column (6). The differences in the number of observations are due to the lack of information for the whole period. Not all observations are available for the dependent variable in the case of: Austria, Belgium, Cyprus, Estonia, France, Iceland, Ireland, Italy, Romania, and United Kingdom in Column (5) and (6). Data come from Eurostat. There are not observations for the controls for the whole period in the cases of: Belgium, France, Iceland, Ireland, and United Kingdom, in Column (1); Austria, Belgium, Cyprus, France, Greece, Iceland, Ireland, Italy, Malta, and United Kingdom, in Column (2); Austria, Belgium, Bulgaria, Cyprus, Estonia, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia; Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Romania, Slovakia, Switzerland, and United Kingdom, in Column (3); Austria, Belgium, Bulgaria, Cyprus, Estonia, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia; Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Romania, Slovakia, Switzerland, and United Kingdom, in Column (4). Data on the controls come from Eurostat. Robust standard errors clustered by country. All regressions are weighted by country population. ***Significant at the 1% level, **significant at the 5% level, *significant at the 10% level.

Table 4.- General Fertility Rate Model Considering Political and Institutional Changes

	(1)	(2)	(3)	(4)	(5)
Unemployment rate	-0.373*** (0.109)	-0.365*** (0.108)	-0.338*** (0.100)	-0.346*** (0.122)	-0.341*** (0.120)
EU member			2.304* (1.249)		2.316* (1.312)
Adopted Euro				0.023 (1.712)	-0.147 (1.829)
Country fixed effects	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y
Country x Time	Y	Y	Y	Y	Y
Country x Time ²	Y	Y	Y	Y	Y
Observations	644	552	690	690	690
R ²	0.970	0.972	0.968	0.967	0.968

Notes: Dependent variable: GFR in all Columns. Robust standard errors clustered by country. All regressions are weighted by country population. Column (1) does not include the observations of the upper-middle-income economies (Bulgaria and Romania) following the classification of the World Bank. In Column (2), the observations from the countries that obtained independence from another country (Estonia, Latvia, Lithuania, Czech Republic, Slovakia, and Slovenia) are excluded from the sample. ***Significant at the 1% level, **significant at the 5% level, *significant at the 10% level.

Table 5.- General Fertility Rate Model Considering Country- Characteristics

	(1)	(2)	(3)	(4)	(5)
Unemployment rate	-0.248*** (0.087)	0.349*** (0.101)	-0.247*** (0.061)	-0.335*** (0.113)	-0.257*** (0.060)
Ln(GDP per capita)	15.332** (7.454)				
Infant Mortality Rate		-0.430 (0.494)			
Gross Enrolment ratio Primary			-0.027 (0.041)		
Gross Enrolment ratio Secondary			-0.033 (0.023)		
Gross Enrolment ratio Tertiary			0.118** (0.047)		
% Immigrants				1.874*** (0.659)	
Country fixed effects	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y
Country x Time	Y	Y	Y	Y	Y
Country x Time ²	Y	Y	Y	Y	Y
Observations	663	689	635	556	276
R ²	0.970	0.967	0.976	0.975	0.974

Notes: Dependent variable: GFR in all Columns. Controls included are GDP per capita in logarithm in Column (1) (some observations are not available for the case of Estonia, Latvia, Lithuania, Slovakia, and Slovenia); Infant Mortality Rate in Column (2) (there is no information for the case of France in the year 2013); the school gross enrolment ratio in primary, secondary and tertiary education in Column (3) (there are no data for the whole sample in the case of: Belgium, Cyprus, Denmark, Estonia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Romania Slovakia, Switzerland, and United Kingdom); the percentage of immigrants in Column (4) (there are no data for the whole sample in the case of: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Estonia, France, Germany, Greece, Hungary, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia, and Switzerland). Column 5 only includes the observations of those countries whose population is recognized as Catholic, in a percentage greater than 50%, using data from the CIA Factbook (those countries are Austria, Belgium, Ireland, Italy, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, and Spain) Robust standard errors clustered by country. All regressions are weighted by country population. ***Significant at the 1% level, **significant at the 5% level, *significant at the 10% level.

Table 6.- General Fertility Rate Model Controlling for Public Policies

	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment rate	-0.329** (0.132)	-0.326** (0.129)	-0.356*** (0.083)	-0.481*** (0.056)	-0.494*** (0.071)	-0.498*** (0.053)
Cash Benefits as % GDP	-0.008 (0.830)					
Cash Benefits per capita		-0.0004 (0.003)				
Monthly family allowance for the first child			0.014 (0.013)			
Total number of weeks of maternity leave				0.281*** (0.044)		
Total number of weeks of Parental leave					-0.026 (0.023)	
Cash benefits during Maternity leave						0.022* (0.012)
Country fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
Country x Time	Y	Y	Y	Y	Y	Y
Country x Time ²	Y	Y	Y	Y	Y	Y
Observations	486	486	306	339	339	339
R ²	0.978	0.978	0.985	0.986	0.985	0.985

Notes: Dependent variable: GFR in all Columns. Cash benefits are measured as public unemployment spending to compensate for unemployment. This factor includes redundancy payments from public funds, as well as the payment of pensions to beneficiaries before they reach the standard pensionable age, if these payments are made because the beneficiaries are out of work, or for other labor/market policy reasons (OECD dataset). Cash benefits are calculated as a percentage of GDP (column (1)) and per capita, in constant 2005 US dollars (columns (2)). This information is only available until 2011, and it is available for 24 countries. With respect to the Monthly family allowances for the first child, included in Column (3) as a control, the information is only available until 2008 for 17 countries. In the case of the Total number of weeks of maternity leave, and of parental leave included in Columns (4) and (5), as well as in the case of the Cash benefits during maternity leave, expressed as a percentage of female wages in manufacturing added in Column (6), the information is available until 2010 for 17 countries. Robust standard errors clustered by country. All regressions are weighted by country population. ***Significant at the 1% level, **significant at the 5% level, *significant at the 10% level.

Table 7.- General Fertility Rate Model: Including Lags for Unemployment

Model: OLS			
	(1)	(2)	(3)
Unemployment rate	-0.204** (0.087)		
Unemployment rate t-1	-0.155** (0.062)		
Unemployment rate t-2	-0.036 (0.138)		
Male Unemployment rate		-0.182** (0.077)	
Male Unemployment rate t-1		-0.125** (0.056)	
Male Unemployment rate t-2		-0.071 (0.154)	
Female Unemployment rate			-0.229*** (0.080)
Female Unemployment rate t-1			-0.161** (0.074)
Female Unemployment rate t-2			-0.003 (0.093)
Country fixed effects	Y	Y	Y
Year fixed effects	Y	Y	Y
Country x Time	Y	Y	Y
Country x Time ²	Y	Y	Y
R ²	630	630	630
Observations	0.970	0.970	0.971

Notes: Dependent variable: GFR in all Columns. Robust standard errors clustered by country. All regressions are weighted by country population. ***Significant at the 1% level, **significant at the 5% level, *significant at the 10% level.