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Job insecurity and fertility in Europe

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Abstract
This paper studies the extent to which the job insecurity brought about by the Great Recession has had an impact on fertility decisions across Europe. My results rely not only on objective measures of job insecurity (e.g., the unemployment rate or the ratio of workers made redundant in their last job), but also on aggregate perceptions of job precariousness (e.g., the percentage of workers who say they are looking for another job because they fear they will lose their current position, or the ratio of unemployed who say they are not seeking work because they believe there is none available). Main results indicate that unemployment, long-term unemployment and the impossibility of finding a full-time job are the three indicators with the strongest link to reduced fertility over the period. However, results vary by age group, gender, and especially income, immigrant origin and country cluster. More importantly, my findings show that the Great Recession made the chances of childbearing more unequal, depending on socio-economic background.

Keywords Job insecurity · Fertility · Perceptions · Europe · Great recession

1 Introduction

The Great Recession has had an impact on Europeans' lives far beyond the problems directly related to the labour market (Bell and Blanchflower 2011). Recent studies have evaluated the consequences of the economic downturn for different demographic aspects – for example, emancipation from the parental home (Becker et al. 2010; Matsudaira 2016), divorce (González-Val and Marcén 2017) or marriage (Berghammer and Sobotka 2016). This paper focuses on the potential impact of the

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high levels of job insecurity caused by the recession on fertility decisions across Europe.

From a theoretical point of view, the impact of an economic downturn on the probability of having children can be negative, positive or null. First, a bad economy could reduce fertility, because increased levels of job insecurity could exacerbate the economic constraints facing couples, making the cost of having a child more difficult to bear (Adsera 2005; Andersson 2000; Ben-Porath 1973; Lindo 2015; Macunovich 1995; Mincer 1963). Such a mechanism may be aggravated if an 'added-worker effect' is in place and women try to compensate in the labour market for their partners' loss of income (Starr 2014; Bredtmann et al. 2018). Moreover, the economic stress associated with high levels of job insecurity may result in a decision to postpone the decision to have a child, or not even consider it (Catalano et al. 2011; Sobotka et al. 2011). Economic uncertainty can also reduce relationship quality, rendering childbearing less likely (Schneider et al. 2016).[1] Furthermore, stress is found to make conception more difficult (Buck Louis et al. 2010) and to increase the possibility of miscarriage (Burton and Jauniaux 2004; Nepomnaschy et al. 2006). Thus, if such *income* and *economic stress* effects dominate, we should observe a negative association between the probability of having children and increasing job insecurity.[2]

Second, it is also true that the *opportunity cost* of having a child is much lower when the labour market has little to offer potential parents (Butz and Ward 1979). If this effect dominates, women could trade in low wages and few prospects in the labour market for the possibility of providing their own childcare. In this case, we could find a positive relationship between worsening economic conditions and the number of children being born. Moreover, because women's earnings are typically lower than men's, a bad economy may be viewed as a good moment to move away from the labour market (especially if the female unemployment rate is increasing more than the male). This may be especially the case where the welfare state is generous and benefits provide a high replacement rate (as in the Nordic countries within Europe). Furthermore, in countries where women are more likely to provide their own childcare (rather than rely on different childcare options or even a partner), such substitution effects can be strong, rendering a positive relationship between fertility and bad economic conditions.[3]

Finally, it could also be the case that a bad economy and the associated high levels of unemployment and job precariousness have no impact on fertility decisions. Given

[1] For example, Morrill and Pabilonia (2015) found that couples with children in the US spent less time together during the Great Recession.

[2] Bellido and Marcén (2016) argue that in the case of Europe, such an effect may be more mediated than in other contexts with less generous welfare states. See also Lalive and Zweimüller (2009) and Manuelli and Seshadri (2009).

[3] The lack of expectations and aspirations about the future brought about by an economic downturn (Giuliano and Spilimbergo 2013) has also been related to an increase in teenagers' sexual activity (Arkes 2007; Buhi and Goodson 2007; Carpenter 2005). For the United States in the period between 2003 and 2011, Pabilonia (2017) finds that Hispanic male teenagers (aged 15–17) engage in more sexual activity during poorer economic conditions, while black male teenagers engage in less. Ananat et al. (2013) also find evidence that job losses decrease the likelihood among black teenagers of having had two or more sexual partners, and increase the probability of their using birth control.

that in Europe, women tend to postpone their fertility much more than in other contexts, it is also possible that couples decide to move on with their childbearing choices, independently of the economic environment, once they feel that fertility cannot be postponed any longer. If this *ticking biological clock* effect is operating, we will not observe any impact of the Great Recession on fertility in Europe (Bellido and Marcén 2016).[4] All in all, and a priori, we cannot know which of the aforementioned effects is dominant, and so the impact of the Great Recession on fertility decisions in Europe is an empirical question that I address below.

Gaining a better understanding of the relationship between job insecurity and fertility in Europe is important, because it allows us to learn about the relationship between the business cycle and the number and quality of children.[5] It can also help with predictions for future tax revenue, the requirements of welfare programmes and the rhythm at which societies age. It enables us to learn more about labour force behaviour. And, among many other things, it allows understanding of the extent to which women can complete their fertility in relation to the economic environment.

My findings are based on data for 31 European countries from the European Union Labour Force Survey (EU-LFS) and the European Union - Statistics on Income and Living Conditions (EU-SILC) for the period 2004–2015. In a first stage of the analysis, I use the EU-LFS to build 10 indicators that can be thought of as *proxies* for the business cycle and/or the macroeconomic conditions. Five are intended as *objective* measures and include, for example, the unemployment rate, the percentage of individuals in a temporary contract and the ratio of jobless individuals who transited into unemployment because they were made redundant. However, given the complexity of the Great Recession and the uncertainty it generated, I also build five more indicators that may be said to capture *perceptions of economic insecurity* and serve as *proxies* for the economic environment where fertility decisions are taken. For example, I use the percentage of individuals with a temporary contract who state that they could not find a permanent job, the proportion of workers who are looking for a job while working because of the high risk of job loss, and the ratio of unemployed who have given up job-seeking because they believe no work is available.[6]

In a second stage, I aggregate the aforementioned indicators at the country and sub-country regional level for each of the years under analysis, and merge this information with individual data from the EU-SILC. This way, I take full advantage

[4] Evidence for inconclusive results between the business cycle and fertility can be found, for example, in Arkes and Klerman (2009) and Levine (2002). Note that finding no association could also be a result of the different mechanisms cancelling each other out.

[5] Brooks-Gunn et al. (2013), for example, investigate the relationship between different measures of the Great Recession (unemployment, home foreclosure and an index of consumer confidence) and child maltreatment among children aged nine years and find that the loss of consumer confidence in the United States is associated with a high frequency of maternal spanking between 2007 and 2010. Moreover, the authors find the association to be particularly strong for the most advantaged groups (measured by education and household income distance to the official poverty line).

[6] In this sense, the concept of job insecurity used in this paper differs from the concept of economic uncertainty, which mostly uses financial indicators (Comolli 2017).

of the rich information on the labour market contained in the EU-LFS, while being able to exploit the richness of individual and household characteristics of the EU-SILC.[7] To the best of my knowledge, this is the first study to combine both datasets in order to gain a more nuanced understanding of the relationship between fertility and job insecurity, while using a large number of indicators.

This paper contributes to the literature on the relationship between fertility and the Great Recession in Europe in several important ways. First, it is not based on aggregated data at the country level, as is the case with the vast majority of studies cited (see literature review below). My analysis is the first to rely on individual data, which allow the heterogeneity behind the trends observed at the aggregated level to be revealed. This is important in order to gain a more nuanced understanding of the impact of the local macroeconomic conditions on fertility behaviour.[8] Second, I not only rely on structural measures of the economic environment, but also consider perceptions of the state of the economy. Finally, I provide an analysis by subgroup, in order to understand if the impact of the Great Recession has been different for different groups and in different contexts.

The main results show that not all indicators of job insecurity have an unequivocally negative association with fertility. Unemployment, long-term unemployment and the impossibility of finding a full-time job are the three indicators that most clearly have a negative relationship with the probability of having a baby. However, the results differ by age, gender and especially country cluster, highlighting the large differences in institutional arrangements for childbearing across Europe. Moreover, the results show a social gradient in terms of the chances of starting a family (or expanding it), depending on socio-economic background: in particular, low-income households and those of non-EU immigrant origin have suffered the most from the Great Recession in terms of their fertility decisions.

After this introduction, the paper continues as follows. The next section reviews the literature on the influence of the business cycle on fertility decisions during the Great Recession. Section 3 presents the datasets and gives details of the different job insecurity indicators. Section 4 introduces the econometric technique used throughout the paper. Section 5 shows my main results, and finally, the conclusions briefly summarize the most important findings.

2 Literature review

The impact of the business cycle on fertility decisions during the Great Recession has been studied before in the literature, but most analyses have been devoted to the

[7] Fertility cannot be studied using the EU-LFS, because age is given to researchers only in five-year intervals, and so one cannot identify a newborn child.

[8] I study the impact of the economic environment on fertility decisions, while controlling for individual labour market status; but the aim of the paper is not to study the influence of the individual labour market status on the probability of having a child.

United States (Ananat et al. 2013; Schneider 2015; Schneider and Hastings 2015; Sobotka et al. 2011).[9] In that context, the large majority of recent studies have found a pro-cyclical relationship, by which higher levels of unemployment are associated with lower fertility. Schneider (2015), using a panel of state-level aggregated data, finds that a 1 percentage point increase in state-level unemployment was associated with a reduction of 0.67 percentage points in the general fertility rate (GFR) in the period 2001–2012. The author goes beyond analysis based solely on unemployment, and uses other measures of economic hardship and economic uncertainty: foreclosure (to proxy housing distress), consumer confidence and press coverage of the recession (to proxy public consciousness of the economic crisis). All the indicators have a negative relationship with fertility, though at different levels of magnitude and statistical significance.

Schaller (2016) takes a different approach and considers the association between fertility and improvements in men's and women's labour market opportunities between 1980 and 2009. Her results fit with Gary Becker's (1960, 1965) economic theory, by which an improvement in male labour market conditions is associated with an increase in fertility, while better labour market opportunities for females are associated with a decline in fertility.[10] Moreover, her analysis by subgroup reveals that high-school dropouts, younger women and blacks are less responsive to economic shocks—probably because they face stronger substitution effects, as they are less likely to purchase (or be able to afford) childcare and/or to share the responsibility with a partner. The negative effects are found to decrease in magnitude with educational attainment.

Ananat et al. (2013) study the association between the business cycle and teenage motherhood in North Carolina for the period 1990–2010. The authors use business closures and layoffs as an exogenous source of variation, and find that job losses reduce the birth rate among black teens (though little effect is found among white teenagers). The authors explain this racial difference by the fact that black teenagers may feel the economic effects of job losses more than whites, because their families are less able to buffer the economic consequences of job loss, and because they may be more worried about the future. The mechanisms behind these results include a reduction in sexual activity, and an increase in abortions and contraception usage. Moreover, the authors also find evidence that relatively advantaged black girls (those who made age-appropriate educational progress) are more likely to have an abortion when jobs are being shed (which implies that those children who are born are more likely to be born to disadvantaged black mothers).

As for recent evidence for Europe, Bellido and Marcén (2016) use aggregated data from 30 European countries for the period 1991–2013 to study the relationship between unemployment and fertility. They find that the unemployment rate affects the fertility rate negatively—although they conclude that the effect is quite moderate. An increase of 1 percentage point in the unemployment rate implies only 0.35 fewer

[9] Analysis of the relationship between the business cycle and fertility relative to periods prior to the Great Recession includes a larger variety of countries. See, for example, Adsera and Menendez (2011) for Latin America, Andersson (2000) for Sweden, Kravdal (2002) for Norway or Kreyenfeld (2010) for Germany.

[10] The author uses gender-education-specific shift-share indices of labour demand to instrument the unemployment rates and obtains stronger negative effects than those derived from simpler models.

live births per thousand women aged between 15 and 44. By age, they show that economic uncertainty has a smaller impact among women at the end of their childbearing years (who tend to have children despite the economic environment). Also, the authors show that the reaction of the fertility rate to unemployment is much more pronounced in those countries where fertility rates are high.

The closest work to this paper is by Comolli (2017) who, in turn, extends the analysis by Goldstein et al. (2013), which provided the first evidence that the Great Recession was leaving an imprint on European fertility patterns. In her analysis, Comolli (2017) not only looks at the relationship between fertility and structural labour market conditions, but also considers the fertility response to long-term sovereign risk, economic policy uncertainty, and consumer confidence changes. She finds that all the indicators used are associated with a decline in fertility rates (though of different magnitude and significance, depending on the indicator) and that perceived uncertainty affects fertility over and above the unemployment rate. The author concludes that 'structural conditions of the economy are strong predictors of fertility rates and strongly comparable across different contexts, while indicators of economic and financial uncertainty are more context-dependent, but nevertheless substantially related to fertility rates' (Comolli 2017: 1572).

Importantly, note that so far the studies devoted to Europe have studied changes in fertility in association with macroeconomic conditions, relying largely on the unemployment rate and solely on aggregated data. In this paper, I show that the use of other *proxies* for the business cycle and the economic environment, combined with the use of individual micro-data, is important to gain a more nuanced understanding of the effects of job insecurity and its potential impact on fertility.

3 Data

As explained in the Introduction, I use two sources of data: the EU-LFS and the cross-sectional component of the EU-SILC.[11] The EU-LFS contains very rich information on the labour market across Europe and is representative of the total population at the country and regional level. For this reason, I use this dataset first to compute 10 indicators of job insecurity that can serve as *proxies* for the business cycle and the economic environment. The first five indicators may be said to be *objective* measures of the macroeconomic conditions, while the rest can be regarded as *subjective* measures or perceptions. Brooks-Gunn et al. (2013) discuss the importance of using other *proxies*, beyond the unemployment rate (for example, consumer confidence indices) with the objective of also capturing, say, sentiment regarding the economy (see also Lugilde et al. 2018).

For the objective measures of job insecurity, I use:[12]

[11] The use of the longitudinal component of the EU-SILC was also considered. However, the large attrition problems of this data source (Jenkins and Van Kerm 2017) and the important differences in tracking rules across countries (Iacovou and Lynn 2013) are only two of the reasons why I disregard its use. Moreover, the cross-sectional component includes more countries and larger samples.

[12] The use of measures relative to productivity or economic growth is beyond the scope of this paper. However, it should be noted that previous studies have suggested that indicators other than GDP better capture the impact of the business cycle on fertility (Adsera and Menendez 2011; Sobotka et al. 2011).

1. The unemployment rate among those aged 15 years and over (labelled *unemployment*),
2. The percentage of employed individuals aged 15–64 on a temporary contract (labelled *temporary*),
3. The percentage of employed individuals aged 15–64 in part-time work (labelled *part-time*),
4. The percentage of unemployed who have been looking for a job for a year or more (labelled *long-term unemployed*), and
5. The percentage of unemployed who declare that the main reason for leaving their last job or business was because they were dismissed or made redundant (labelled *redundant*).[13]

And for the indicators on perceptions:

6. The percentage of part-time workers who state that they have such a contract because they cannot find a full-time job (labelled *not full-time*),
7. The percentage of workers in a temporary job who state that they have a contract of limited duration because they cannot find a permanent job (labelled *not permanent*),
8. The percentage of workers who state that they would generally like to work more than their current number of hours (labelled *wish more hours*),
9. Thepercentage of workers who say they are looking for a job and are doing so because of risk or uncertainty of loss or termination of their present job (labelled *risk job loss*), and
10. The percentage of unemployed who state that they are not seeking employment because they believe no work is available (labelled *no work*).[14]

Figures 1 and 2 show the evolution of the 10 indicators for each of the countries under study for four years: 2004, 2008, 2011 and 2014.[15] It is easily observable that there is large variation in terms of both the level of the different indicators and their evolution over time as a result of the diverse impact of the Great Recession in the countries of Europe. While, for example, in the case of the unemployment rate we can observe a large increase over the period for countries like Greece or Spain, the opposite is true for Germany and the Czech Republic. If we turn to the percentage of workers on a temporary contract, we can see a large drop in Spain (though it still has some of the largest ratios), but a large increase in Hungary, Luxembourg and the Netherlands. To take another example—the percentage of employees looking for another job because they fear losing their current position—we can see high

[13] The individuals who left their last employment or business because a job of limited duration ended are included in the denominator of the indicator (and not in the numerator). This way, the indicator intends to capture sudden or unexpected job loss rather than the precariousness of employment, which, to my way of thinking, is already present in other indicators.

[14] This indicator has not been used in the case of Belgium, due to large inconsistencies over time in the variable.

[15] Figures A.1 and A.2 in the Supplementary Material also show the variability of the 10 indicators across the countries analysed by means of box plots and Table A.3 details the mean, maximum and minimum values of each indicator by country.

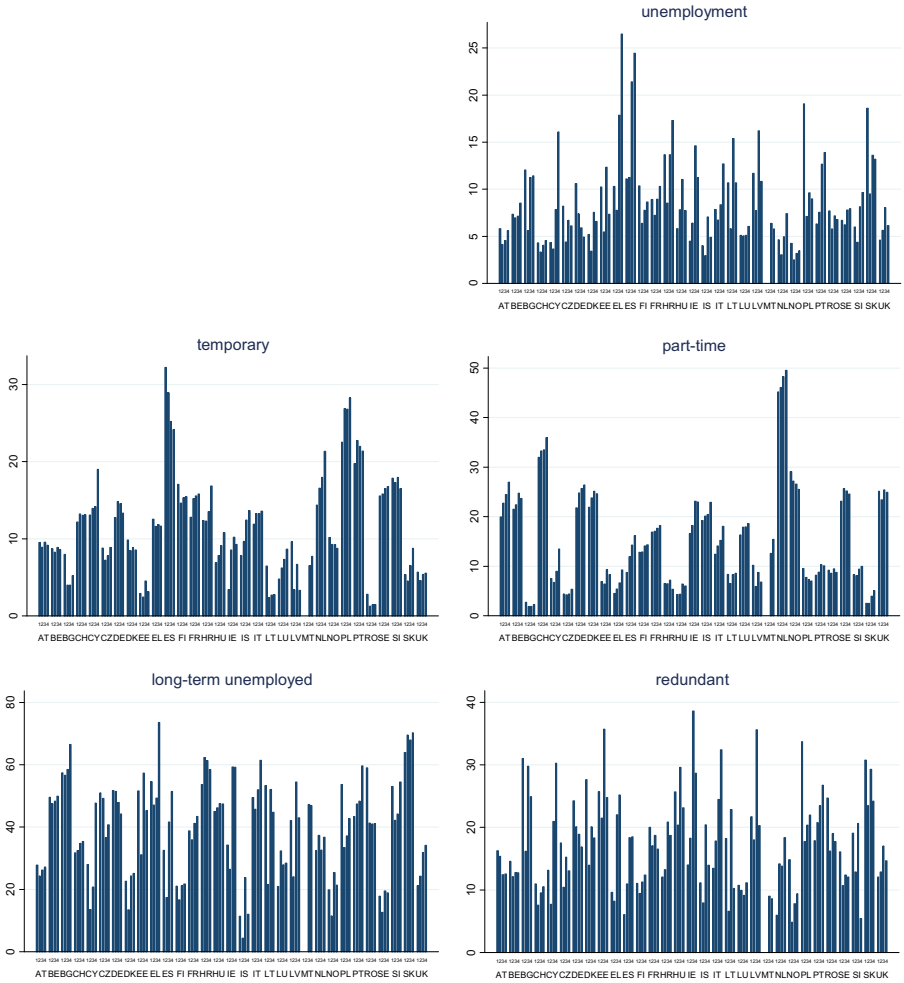

Fig. 1 Objective measures of job insecurity in Europe, 2004, 2008, 2011 and 2014 (in percentage). Source: EU Labour Force Survey, Eurostat. Note: In the graphs, 1 refers to the year 2004, 2 to 2008, 3 to 2011 and 4 to 2014. The missing bars in the graphs indicate that the country is not present in the analysis in that year either because it did not participate in the EU-LFS in that wave, the variable required for the indicator was missing or the indicator would have been drawn from fewer than 100 observations. Countries are displayed in alphabetical order according to their label

percentages in Bulgaria, Finland and Italy, which contrast with low ratios for Iceland, Latvia and Romania. The variability is even larger at the regional level (not shown).

Next, I proceed by aggregating the 10 indicators at the regional level for each of the years under study,[16] and I merge this data with the individual data of the EU-SILC, which contains very rich information about individual and household

[16] The EU-LFS indicators have been computed ignoring missing values. Moreover, I have disregarded region-year indicators if they are derived from fewer than 100 observations. For the same reason, I do not derive results by age group or gender, as they would have been drawn from too small a number of observations.

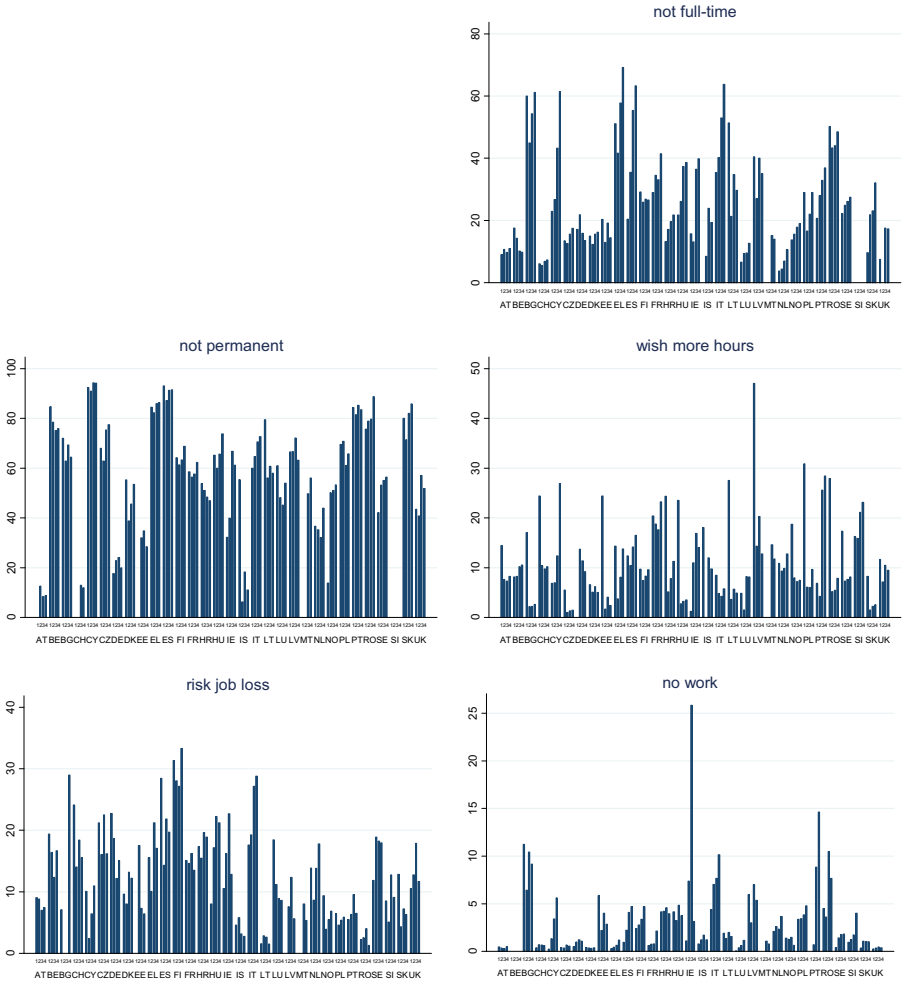

Fig. 2 Subjective measures (perceptions) of job insecurity in Europe, 2004, 2008, 2011 and 2014 (in percentage). Source: EU Labour Force Survey, Eurostat. Note: In the graphs, 1 refers to the year 2004, 2 to 2008, 3 to 2011 and 4 to 2014. The missing bars in the graphs indicate that the country is not present in the analysis in that year either because it did not participate in the EU-LFS in that wave, the variable required for the indicator was missing or the indicator would have been drawn from fewer than 100 observations. Countries are displayed in alphabetical order according to their label

characteristics relevant to an analysis of fertility. Data has also been aggregated at the country level in order to run robustness checks (see below). The period covered starts in 2004 and ends in 2015, though not all countries participated throughout the period —see further details in Table A.1 in the online Supplementary Material. In total, the sample contains 31 countries and 115 regions.[17] As for the information at the regional level, it is important to note that while the EU-LFS contains information at a

[17] Serbia participates in the EU-SILC, but not in the EU-LFS, and so the data for this country could not be used.

Table 1 Summary statistics

Variable	Mean	St. Dev.	Min.	Max.
Has a newborn child	0.041	0.198	0	1
Female	0.497	0.500	0	1
Age	33.368	6.999	17	44
Immigrant (non-EU)	0.073	0.26	0	1
Has a partner	0.606	0.489	0	1
Employed	0.776	0.417	0	1
Unemployed	0.110	0.313	0	1
Inactive	0.114	0.318	0	1
High-school dropout	0.215	0.411	0	1
High-school graduate	0.480	0.500	0	1
University graduate	0.305	0.461	0	1
1st household income quartile	0.228	0.419	0	1
2nd household income quartile	0.235	0.424	0	1
3rd household income quartile	0.266	0.442	0	1
4th household income quartile	0.271	0.445	0	1

Source: EU-SILC, 2004–2015. $N = 1{,}727{,}871$. Weighted results

more disaggregated level (NUTS-2, for the majority of countries), the EU-SILC only provides information at the NUTS-1 level, and so the regional variable of the EU-LFS had to be converted from NUTS-2 to NUTS-1, in order to allow the two data sources to be merged.[18] Moreover, because of their size, some countries have no such division (for example, in Luxembourg the three levels correspond to the entire country); thus, they were treated as a single region. The same strategy was adopted for countries that did not provide any regional information.[19] Finally, there are a few countries that did not provide regional information for the first years of participation in the EU-SILC (e.g., Sweden and the United Kingdom). These countries enter the sample in those years when regional information is provided (while for the robustness checks at the country level they enter throughout the period).

The sample does not include students between the ages of 17 and 44. Students have been excluded from the sample because only 1% of newborns have a student as a father or a mother—most of them in the Nordic countries. In all the specifications, the dependent variable is a dummy that takes value 1 if the individual has a newborn child (less than 1 year of age) and 0 otherwise. As shown in Table 1, the probability of having a newborn child is 4.1% in the sample.[20]

There are certain issues that need to be borne in mind when modelling the probability of having a newborn child with cross-sectional data. First, it is important to take into account that the probability of having a newborn child is likely to be underestimated if one only considers children born during the survey year. This is so,

[18] NUTS is the abbreviation for *Nomenclature of Territorial Units for Statistics*. There are three levels officially defined by the European Commission, with two levels of local administrative units (NUTS-1 and NUTS-2)—see an interactive map at http://ec.europa.eu/eurostat/web/nuts.

[19] The great majority of these cases are small countries, with the important exception of Germany.

[20] In the analysis, twin births have been treated in the same way as singletons.

because babies born after the household interview will not be recorded in the dataset. This is most likely to happen among children born in the last months of the year. For this reason, I have also considered newborn babies to be those born at *t−1*, if they were still 0 years of age at the time of interview (at *t*). This includes (i) children born in the second trimester of *t−1* with a household interview in the first trimester of *t*, (ii) children born in the third trimester of *t−1* with a household interview in the first or second trimesters of *t*, and (iii) children born in the fourth trimester of *t−1* with a household interview in the first, second or third trimesters of *t*. All of them are babies that will turn 1 during the survey year, but are 0 years of age when the household is interviewed.[21]

Second, it is important to take into account that those born in the second trimester of *t−1* with a household interview in the first trimester of *t* and those born in the third trimester of *t−1* with a household interview in the first or second trimesters of *t* were actually conceived during *t−2*, and that is the year that the job insecurity indicators refer to in the econometric modelling for these children. Table A.2 in the Supplementary Material summarizes the decisions taken while considering time of birth (B), time of interview (I) and time of conception (C) for children born at *t* and *t−1*.

Finally, six countries do not provide information on the trimester of birth (Germany, Ireland, Malta, Netherlands, Slovenia and the United Kingdom). In these cases, I have only considered children that are born during the survey year. However, it is important to keep in mind that the probability of having a newborn child is underestimated for these countries.

Table 1 details the sample's individual and household characteristics that have been used as controls in the econometric analysis. As shown, 49.7% are females; mean age is 33.4 years; 7.3% are of non-EU origin; and 60.6% have a partner. In addition, 77.6% are employed, 11.0% are unemployed and 11.4% are inactive. As for the educational level attained, 21.5% are high-school dropouts, 48.0% high-school graduates, and the rest hold a university degree (30.5%). Finally, 22.8% of the sample falls within the first equivalent income quartile, while the largest percentage (27.1%) belongs to the fourth quartile.[22]

4 Methodology

All the results contained in this paper are based on logit models with fixed effects, which I specify as follows:

$$Y_{irt} = \alpha + I_{rt-1}\beta + X_{irt}\gamma + R_r + T_t + \varepsilon_{irt} \tag{1}$$

where subscript *i* is for individuals, *r* is for region and *t* is for time. Y_{irt} accounts for the probability of an individual having a newborn child in region *r* at time *t*. β is the parameter of main interest, as it captures the relationship between changes in the job

[21] Note that exact age cannot be computed, as only the trimester of birth is reported.

[22] Household income, in most countries, refers to *t-1* and has been made equivalent using the modified OECD equivalence scale, which gives a weight of 1 to the first adult, 0.5 to all other adult members and 0.3 to children under the age of 14. The equivalence scale does not consider children born at *t*. The equivalent income quartiles have been defined using the whole distribution per country and year.

insecurity indicator at the time of conception ($t-1$) and fertility in the next year (t).[23] X_{irt} is the vector of control variables, and includes gender, age, age squared, labour market status, educational level, immigrant origin, having a partner, and a series of dummies accounting for household income quartile.[24] And ε_{irt} is the usual error term.

All regressions include a set of region and time fixed effects. With the inclusion of region fixed effects, I account for unobserved time-invariant characteristics of a given region that could affect fertility (e.g., cultural norms and attitudes towards childbearing or religiosity). With the inclusion of time fixed effects, I account for unobservable time characteristics that are stable across regions (e.g., the increased availability of fertility treatment). In other words, region and year fixed effects are identified from within-region changes in fertility over time coincident with within-region changes in the job insecurity indicators over time. The region dummies control for permanent differences across regions in unobservable factors that determine fertility, and the year dummies control for secular year-specific effects common to all countries in Europe. All the regressions have been weighted using the population weights.

Additionally, it is important to recognize that there are multiple mechanisms through which economic conditions can affect fertility, and that the level at which data are used (country vs. region) can influence the degree to which results capture these mechanisms (Lindo 2015). I opt to present detailed results from an analysis at the regional level, because, as I see it, it is at the more local level that economic conditions tend to influence the probability of having a child – for example, through effects on the availability or scarcity of childcare options or through effects on one's social and family network. Yet there are advantages and disadvantages of using data at such a disaggregated level. On the one hand, an analysis at the regional level is likely to provide more precise estimates, because it uses variation in economic conditions specific to a region, plus the variation driven by broader changes. Moreover, it is likely to have greater power, as it contains a larger number of fixed effects, which reduce unexplained variation in the outcome—which in turn reduces concerns over omitted variable bias. On the other hand, an analysis at the regional level does not capture spill-over effects between regions which are captured in analysis at the country level—as, for example, potential migration decisions. Also, job insecurity indicators at the regional level may suffer from larger measurement error, since they are drawn from a smaller number of observations. For all these reasons, and to assess the robustness of the results, I have run all regressions also at the country level and comment the results when relevant.

Finally, I follow the conventional approach to cluster standard errors at the same level as the analysis is carried out, yet I also consider country clusters for analysis at the regional level (and region clusters for analysis at the country level). This is important, because results are sensitive to the choice of clustering, and the literature has not yet reached consensus on this issue (see Abadie et al. 2017; Bertrand et al. 2004; Cameron and Miller 2015; Lindo 2015 and references within).

[23] As explained above, for a few babies the job insecurity indicator refers to *t-2*, depending on the trimester when the child was born and the family interviewed. See all the details in Table A.2 in the Appendix.

[24] Regressions without controls for labour market status (potentially endogenous) yield similar results to those presented here.

5 Results and discussion

5.1 Main results

Table 2 shows the results for the five *objective* indicators. The first column of the table contains the results for all individuals (excluding students) in the EU-SILC sample aged between 17 and 44, while the rest of the columns detail the results for men and women in the age groups 17–24, 25–34 and 35–44, respectively. Results

Table 2 Results of the logit models with fixed effects for the probability of having a newborn child, using objective measures of job insecurity, Europe, 2004–2015

Indicator	All sample	Males			Females		
		17–24	25–34	35–44	17–24	25–34	35–44
Unemployment							
Coeff.	−0.0168***	−0.0391	−0.0168***	−0.0269***	−0.0078	−0.0174***	−0.0246***
	(0.0044)	(0.0238)	(0.0054)	(0.0051)	(0.0123)	(0.0041)	(0.0071)
Marg.	−0.0006***	−0.0003*	−0.0008***	−0.0009***	−0.0002	−0.0010***	−0.0006***
	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0004)	(0.0002)	(0.0002)
	[rc]**	[rc]*	[rc]**	[rc]***	[rc]	[rc]**	[rc]***
Temporary							
Coeff.	0.0076	−0.0125	0.0059	0.0286***	−0.0331**	0.0051	0.0147
	(0.0076)	(0.0376)	(0.0096)	(0.0091)	(0.0162)	(0.0096)	(0.0090)
Marg.	0.0003	−0.0001	0.0003	0.0009***	−0.0010**	0.0003	0.0003
	(0.0003)	(0.0003)	(0.0004)	(0.0003)	(0.0005)	(0.0006)	(0.0002)
	[rc]	[rc]	[rc]	[rc]**	[rc]	[rc]	[rc]
Part-time							
Coeff.	−0.0251**	−0.0908**	−0.0330**	−0.0349**	−0.0449*	−0.0275**	−0.0276
	(0.0120)	(0.0434)	(0.0153)	(0.0148)	(0.0272)	(0.0122)	(0.0172)
Marg.	−0.0009**	−0.0007**	−0.0015**	−0.0011**	−0.0013*	−0.0016**	−0.0006
	(0.0004)	(0.0004)	(0.0007)	(0.0005)	(0.0008)	(0.0007)	(0.0004)
	[rc]	[rc]**	[rc]	[rc]	[rc]	[rc]	[rc]
Long-term unemployment							
Coeff.	−0.0053***	−0.0121	−0.0069***	−0.0076***	−0.0073	−0.0052***	−0.0083**
	(0.0020)	(0.0134)	(0.0025)	(0.0029)	(0.0054)	(0.0020)	(0.0038)
Marg.	−0.0002***	−0.0001	−0.0003***	−0.0002***	−0.0002	−0.0003***	−0.0002**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)
	[rc]*	[rc]	[rc]*	[rc]**	[rc]	[rc]**	[rc]
Redundant							
Coeff.	−0.0065*	−0.0300*	−0.0076*	−0.0095**	−0.0106	−0.0058*	−0.0135***
	(0.0034)	(0.0163)	(0.0042)	(0.0044)	(0.0069)	(0.0032)	(0.0047)
Marg.	−0.0002*	-0.0002*	−0.0004*	−0.0003**	−0.0003	−0.0003*	−0.0003***
	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0001)
	[rc]	[rc]**	[rc]	[rc]	[rc]	[rc]	[rc]*

Note: Individual controls include gender, age, age squared, labour market status, educational level, immigrant origin, having a partner, and a series of dummies for household income quartile. Regressions include year and region fixed effects. Standard errors are in parentheses and have been clustered at the regional level (or at country level when indicated by [rc])

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

show the coefficient and the marginal effect for the main regressions that have been run at the regional level, with standard errors also clustered at the regional level. For the sake of robustness, I have also included information on the level of significance for regressions that use country clusters ([rc]).

For the whole sample, three of the five indicators analysed are statistically significant at the 0.05 level and highlight a negative relationship with the probability of having a newborn child: unemployment, part-time work and long-term unemployment. This way, a 1 percentage point increase in the regional unemployment rate is associated with a 0.06 percentage point decrease in the probability of having a child; or, phrased differently, a decrease of 1.5%. Similarly, a 1 percentage point increase in the level of part-time work translates into 0.09 percentage points lower fertility. Importantly, while the results for unemployment are robust to any specification used, they are not confirmed for 'part-time' and 'long-term unemployment' when using country-level clusters. Given that the analysis at the country level considers spill-over effects across regions, it could be that there are mechanisms related to these two indicators that cancel out the negative effect found in the more disaggregated analysis.[25] The ratio of individuals on a temporary contract is the only indicator that is not statistically meaningful, and the percentage of individuals made redundant from their last job is only negatively associated with decreased fertility at the 0.1 significance level—though such a negative relationship is not confirmed in the other specifications.[26]

From the results broken down by age group and gender, we can see that regional unemployment affects the probability of having a newborn child for both males and females over the age of 24. For example, a 1 percentage point increase in the unemployment rate reduces fertility by 0.1 percentage points for females in the age group 25–34 and by 0.09 for males aged 35–44. These results are robust to any specification used. By contrast, youth (17–24) fertility decisions are not affected by the unemployment rate for females, and only weakly so among males. Similar results are also found in the case of long-term unemployment, with higher significance levels for the age group 25–44 and with the results particularly robust for males aged 35–44. Thus the negative relationship between unemployment and fertility is strongly confirmed in Europe for the period under analysis. On the other hand, the levels of job redundancy are only weakly related to fertility if we consider the whole sample, but a negative relationship, significant at the 0.05 level, can be established for both genders over the age of 34 when using analysis at the regional level. Finally, the results relative to part-time work yield some of the highest marginal effects and are mostly driven by males (if we pay attention to significance levels), while the

[25] Alternatively, it could also be that, since there are only 31 countries under analysis, the number of clusters is too small to yield significant estimates at the country level (Cameron and Miller 2015).

[26] Following the suggestion of a reviewer, I have run these main specifications while considering only those countries that have participated in the sample from 2004/2005, thus excluding those countries for which I do not have data from the beginning of the period analysed. The results are basically the same as those presented here (which serves to highlight the robustness of the latter). Also, the main results are conservative, compared to those from regressions that consider the deviation of each regional indicator from its trend (instead of the raw indicator).

Table 3 Results of the logit models with fixed effects for the probability of having a newborn child, using subjective measures of job insecurity, Europe, 2004–2015

Indicator	All sample	Males			Females		
		17–24	25–34	35–44	17–24	25–34	35–44
Not full-time							
Coeff.	−0.0107***	−0.0159	−0.0125***	−0.0129***	−0.0108*	−0.0105***	−0.0159***
	(0.0019)	(0.0142)	(0.0022)	(0.0026)	(0.0058)	(0.0021)	(0.0031)
Marg.	−0.0004***	−0.0001	−0.0006***	−0.0004***	−0.0003*	−0.0006***	−0.0004***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)
	[rc]***	[rc]	[rc]***	[rc]***	[rc]***	[rc]***	[rc]***
Not permanent							
Coeff.	−0.0055*	−0.0085	−0.0055	−0.0057	−0.0127**	−0.0052*	−0.0067
	(0.0032)	(0.0127)	(0.0037)	(0.0040)	(0.0056)	(0.0029)	(0.0045)
Marg.	−0.0002*	−0.0001	−0.0003	−0.0002	−0.0004**	−0.0003*	−0.0002
	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0001)
	[rc]	[rc]	[rc]	[rc]	[rc]**	[rc]	[rc]
Wish more hours							
Coeff.	−0.0023	−0.0094	−0.0020	−0.0102**	0.0063	−0.0011	−0.0127**
	(0.0037)	(0.0139)	(0.0037)	(0.0051)	(0.0059)	(0.0044)	(0.0062)
Marg.	−0.0001	−0.0001	−0.0001	−0.0003**	0.0002	−0.0001	−0.0003**
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0001)
	[rc]	[rc]	[rc]	[rc]	[rc]	[rc]	[rc]
Risk job loss							
Coeff.	0.0021	0.0195	0.0022	0.0011	0.0026	0.0028	−0.0044
	(0.0038)	(0.0153)	(0.0047)	(0.0038)	(0.0095)	(0.0041)	(0.0050)
Marg.	0.0001	0.0002	0.0001	0.0000	0.0001	0.0002	−0.0001
	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0003)	(0.0002)	(0.0001)
	[rc]	[rc]	[rc]	[rc]	[rc]	[rc]	[rc]
No work							
Coeff.	−0.0197*	−0.0752**	−0.0155	−0.0258*	−0.0337*	−0.0214*	−0.0233
	(0.0116)	(0.0346)	(0.0137)	(0.0141)	(0.0174)	(0.0117)	(0.0142)
Marg.	−0.0007*	−0.0006**	−0.0007	−0.0008*	−0.0010*	−0.0013*	−0.0005*
	(0.0004)	(0.0003)	(0.0006)	(0.0005)	(0.0005)	(0.0007)	(0.0003)
	[rc]	[rc]**	[rc]	[rc]	[rc]***	[rc]	[rc]

Note: Individual controls include gender, age, age squared, labour market status, educational level, immigrant origin, having a partner, and a series of dummies for household income quartile. Regressions include year and region fixed effects. Standard errors are in parentheses and have been clustered at the regional level (or at country level when indicated by [rc])

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

impact of temporary contracts is not relevant for fertility decisions in the whole sample, though a (robust) positive sign is found for males in the age group 35–44.[27]

Table 3 shows the results of the indicators that have to do with perceptions of job insecurity or precariousness in the labour market. The indicator with the most robust negative association with fertility is that of the percentage of individuals who work part time because of the impossibility of finding a full-time job. This way, a 1

[27] As shown later, this positive relationship is mostly driven by individuals in the Mediterranean countries, where an increase in temporary work (as opposed to joblessness) may be promoting childbearing.

percentage point increase in the regional ratio is associated with a decrease of 0.04 percentage points in the probability of having a newborn child (a reduction of nearly 1%). Results are strongly consistent when the analysis is run at the country level and regardless of the cluster used. Two other indicators are also associated with reduced fertility (albeit only significant at the 0.1 level) in the whole sample: the percentage of workers who are in a temporary job because they cannot find a permanent one, and the ratio of discouraged unemployed who have stopped looking for work because they believe none is available. Yet these results are not confirmed by all the specifications, and therefore need to be considered carefully.

Results by gender and age group indicate that the negative association between the percentage of part-time workers who want to have a full-time job and fertility is driven as much by men as by women, and by those over 25. Interestingly, the negative association between fertility and 'not permanent' is mostly driven by females in the age group 17–24, which could indicate that the general perception of lack of permanent jobs particularly affects the youngest youth in their childbearing decisions. The same is true for young males (and to a certain extent young females) in relation to the indicator that accounts for the ratio of unemployed who stop seeking work because they believe none is available. In addition, the percentage of workers who would like to be able to work more hours is also negatively related with fertility in the oldest cohort (35–44), though this result is not confirmed in the analysis at the country level.

In summary, the results confirm a decreased probability of having a newborn child in Europe in the wake of the poor economic conditions brought about by the Great Recession. The trend is particularly strong and robust for increases in unemployment and long-term unemployment when we look at structural measures, and the same goes for the level of discouragement among part-time workers when we take account of perceptions. While the effects of structural measures have had a similar impact on both genders and mostly at the prime childbearing age (over 25), perceptions related to lack of work available and lack of permanent work are more strongly linked to fertility decisions in the youngest group (17–24).

Does the effect of the aforementioned indicators persist net of the effect of the other indicators?[28] To answer this question, I ran regressions with all the possible combinations of two indicators. Several interesting findings emerged.[29] First, in regressions that considered 'unemployment' and each of the other nine indicators, 'unemployment' was statistically significant at the 0.01 level in all the specifications, while none of the other indicators had any explanatory power – with the important exception of 'not full-time'. In that case, 'not full-time' was statistically significant at the 0.01 level, while 'unemployment' was statistically insignificant. Second, in regressions that included 'long-term unemployment' and each of the other indicators, the former was statistically significant at the 0.1 or 0.05 level in all specifications, except with 'unemployment' and with 'not full-time', which were statistically

[28] I would like to thank a reviewer for suggesting that I include this analysis in the paper.

[29] Note that when statistically significant, coefficients are estimated at a very similar level as those presented in Tables 2 and 3, and are therefore not reported; however, they are available from the author on request. Moreover, results are confirmed when clustering standard errors at country level, though at different significance level.

significant at the 0.01 level and offset the effect of 'long-term unemployment'. Finally, the other combinations of indicators resulted in a loss of explanatory power, which often turned both indicators statistically insignificant.

To confirm previous findings, I also considered a regression that included 'unemployment', 'long-term unemployment' and 'not full-time' simultaneously. In this case, 'not full-time' was the only indicator statistically significant (at the 0.01 level), while the indicators related to unemployment were statistically insignificant. In our attempts to understand fertility in Europe, these results highlight the importance of not having a full-time job (even above the importance of unemployment). Future analyses, though, should investigate this question further, while dealing with the (potentially high) correlation between indicators.

5.2 Subgroup analysis

There are certain individual and household characteristics that can buffer or reinforce the impact of economic conditions on fertility decisions. To account for such heterogeneous impacts, I present subgroup analysis, considering household income, immigrant origin and educational attainment.[30] Results are drawn from separate regressions for each indicator, in order to disentangle whether effects that are null for the whole sample (potentially cancelling one another out between population subgroups or clusters of countries) are significant in these disaggregated analyses.

Table 4 shows the results when the sample is divided up by household equivalent income quartiles.[31] One important finding stands out: the Great Recession has made the chances of childbearing more unequal across the income distribution, as the indicators of job insecurity and precariousness have not reduced the probability of those at the highest end of the income distribution having a newborn child, as it has for those at the lowest. Note that none of the coefficients for the job insecurity indicators is statistically significant at the 0.05 level for individuals in the fourth quartile. On the contrary, there are two indicators that negatively affect the fertility decisions of all individuals from the first to the third quartile: unemployment and the perception among part-time workers of the impossibility of finding a full-time job; these results are also confirmed in the analysis at the country level. For example, for those in the first quartile, a 1 percentage point increase in the regional unemployment rate translated into a reduced probability of having a newborn child of 0.12 percentage points (that is a reduction of nearly 3%). Long-term unemployment also negatively affects the probability that adults have a newborn child up to the third quartile—yet country analyses do not always confirm these results. The same is true for the indicator on job redundancy, which negatively affects fertility for individuals in the first and second quartiles. All in all, the results point to a social gradient in the impact of the Great Recession on fertility decisions: some indicators show that the

[30] Following the suggestion of a reviewer, I have also considered separate regressions for married individuals: the findings are similar to those presented in the previous section, albeit with stronger marginal effects.

[31] For reasons of space, I do not show the results of analysis at the regional level using country cluster. However, all the results (also at the country level) are available from the author on request and are commented on in the text, when relevant.

Table 4 Results of the logit models with fixed effects for the probability of having a newborn child by income quartile, using objective and subjective measures of job insecurity, Europe, 2004–2015

Indicator	1st quartile	2nd quartile	3rd quartile	4th quartile
Objective measures of job insecurity				
Unemployment				
Coeff.	−0.0341***	−0.0204***	−0.0132**	−0.0074
	(0.0090)	(0.0054)	(0.0066)	(0.0061)
Marg.	−0.0012***	−0.0007***	−0.0005**	−0.0003
	(0.0003)	(0.0002)	(0.0002)	(0.0003)
Temporary				
Coeff.	0.0316**	0.0053	0.0021	0.0001
	(0.0145)	(0.0105)	(0.0098)	(0.0103)
Marg.	0.0011**	0.0002	0.0001	0.0000
	(0.0005)	(0.0004)	(0.0004)	(0.0004)
Part-time				
Coeff.	−0.0383	−0.0361**	−0.0218	−0.0100
	(0.0242)	(0.0164)	(0.0164)	(0.0135)
Marg.	−0.0013	−0.0012**	−0.0008	−0.0004
	(0.0008)	(0.0006)	(0.0006)	(0.0006)
Long-term unemployment				
Coeff.	−0.0110**	−0.0085***	−0.0066**	0.0006
	(0.0044)	(0.0027)	(0.0031)	(0.0026)
Marg.	−0.0004**	−0.0003***	−0.0002**	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Redundant				
Coeff.	−0.0156**	−0.0109**	−0.0055	0.0012
	(0.0068)	(0.0049)	(0.0042)	(0.0038)
Marg.	−0.0005**	−0.0004**	−0.0002	0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Subjective measures of job insecurity				
Not full-time				
Coeff.	−0.0200***	−0.0130***	−0.0111***	−0.0032
	(0.0034)	(0.0030)	(0.0030)	(0.0028)
Marg.	−0.0007***	−0.0004***	−0.0004***	−0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Not permanent				
Coeff.	−0.0052	−0.0059	−0.0078**	−0.0020
	(0.0048)	(0.0050)	(0.0039)	(0.0038)
Marg.	−0.0002	−0.0002	−0.0003**	−0.0001
	(0.0002)	(0.0002)	(0.0001)	(0.0002)
Wish more hours				
Coeff.	−0.0020	−0.0102*	−0.0010	0.0014
	(0.0081)	(0.0061)	(0.0040)	(0.0042)
Marg.	−0.0001	−0.0004*	−0.0000	0.0001
	(0.0003)	(0.0002)	(0.0001)	(0.0002)
Risk job loss				
Coeff.	−0.0060	0.0095	0.0078	−0.0016
	(0.0066)	(0.0068)	(0.0049)	(0.0040)

Table 4 continued

Indicator	1st quartile	2nd quartile	3rd quartile	4th quartile
Marg.	−0.0002	0.0003	0.0003	−0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
No work				
Coeff.	−0.0317	−0.0290	−0.0091	−0.0183*
	(0.0208)	(0.0182)	(0.0122)	(0.0093)
Marg.	−0.0011	−0.0010	−0.0003	−0.0008**
	(0.0007)	(0.0006)	(0.0004)	(0.0004)

Note: Individual controls include gender, age, age squared, labour market status, educational level, immigrant origin, having a partner, and a series of dummies for household income quartile. Regressions include year and region fixed effects. Standard errors are in parentheses and have been clustered at the regional level

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

differentials in the possibilities of childbearing that existed prior to the economic crisis have widened as a result of the increased levels of job insecurity and precariousness.

These findings are confirmed by two other characteristics: immigrant origin and level of education attained. The first columns of Table 5 show the results for European natives and for those of non-EU origin. In eight of the 10 indicators, the results show a negative relationship between job insecurity and fertility among immigrants (and also some of the highest marginal effects so far found in this study).[32] Instead, for European natives, the level of unemployment and the impossibility of finding a full-time job are the only two indicators that yield a negative relationship with fertility (and the first is not even confirmed at the country level). The rest of the columns in Table 5 show results by educational level attained, distinguishing between high-school dropouts, high-school graduates and university graduates. In this case, the number of indicators negatively related to fertility is not so different in the three groups, but one can observe higher marginal effects for most of the results relative to individuals who did not manage to complete secondary education. Thus the results point to increased difficulties of childbearing in the immigrant population and among those with low educational attainment, and highlight the fact that low socio-economic background may have become more important in understanding the possibilities of childbearing in Europe over the past decade.

5.3 Country clusters

Another important source of heterogeneity is that stemming from the large differences between countries because of institutional and labour market arrangements. For this reason, I have run specifications at the regional level by groups of countries, considering four clusters: a) the Mediterranean countries (Cyprus, Greece, Italy, Malta, Portugal and Spain); b) the Nordic countries (Denmark, Iceland, Finland,

[32] At the country level, the same relationship is found in five of the 10 indicators: unemployment, long-term unemployment, redundancy, the impossibility of finding a full-time job and the impossibility of finding a permanent one.

Table 5 Results of the logit models with fixed effects for the probability of having a newborn child by immigrant origin and educational level attained, using objective and subjective measures of job insecurity, Europe, 2004–2015

Indicator	Immigrant origin		Educational level		
	Native	Immigrant	High-school dropout	High-school graduate	University graduate
Objective measures of job insecurity					
Unemployment					
Coeff.	−0.0143***	−0.0392***	−0.0298***	−0.0132**	−0.0162***
	(0.0045)	(0.0096)	(0.0076)	(0.0057)	(0.0043)
Marg.	−0.0005***	−0.0020***	−0.0009***	−0.0004**	−0.0007***
	(0.0002)	(0.0005)	(0.0002)	(0.0002)	(0.0002)
Temporary					
Coeff.	0.0053	0.0267	0.0198**	−0.0029	0.0083
	(0.0080)	(0.0169)	(0.0100)	(0.0114)	(0.0072)
Marg.	0.0002	0.0013	0.0006**	−0.0001	0.0004
	(0.0003)	(0.0008)	(0.0003)	(0.0004)	(0.0003)
Part-time					
Coeff.	−0.0199	−0.0714***	−0.0852***	−0.0086	−0.0256**
	(0.0123)	(0.0250)	(0.0229)	(0.0141)	(0.0119)
Marg.	−0.0007	−0.0036***	−0.0027***	−0.0003	−0.0012**
	(0.0004)	(0.0013)	(0.0007)	(0.0005)	(0.0005)
Long-term unemployment					
Coeff.	−0.0039*	−0.0172***	−0.0075**	−0.0054**	−0.0049**
	(0.0020)	(0.0045)	(0.0038)	(0.0025)	(0.0021)
Marg.	−0.0001*	−0.0009***	−0.0002**	−0.0002**	−0.0002**
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)
Redundant					
Coeff.	−0.0044	−0.0230***	−0.0182***	−0.0040	−0.0071**
	(0.0034)	(0.0065)	(0.0059)	(0.0038)	(0.0033)
Marg.	−0.0002	−0.0012***	−0.0006***	−0.0001	−0.0003**
	(0.0001)	(0.0003)	(0.0002)	(0.0001)	(0.0001)
Subjective measures of job insecurity					
Not full-time					
Coeff.	−0.0097***	−0.0182***	−0.0161***	−0.0112***	−0.0098***
	(0.0020)	(0.0038)	(0.0042)	(0.0022)	(0.0021)
Marg.	−0.0003***	−0.0009***	−0.0005***	−0.0004***	−0.0004***
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)
Not permanent					
Coeff.	−0.0047	−0.0128*	−0.0097*	−0.0057*	−0.0046
	(0.0033)	(0.0068)	(0.0055)	(0.0033)	(0.0039)
Marg.	−0.0002	−0.0006*	−0.0003*	−0.0002*	−0.0002
	(0.0001)	(0.0003)	(0.0002)	(0.0001)	(0.0002)

Table 5 continued

Indicator	Immigrant origin		Educational level		
	Native	Immigrant	High-school dropout	High-school graduate	University graduate
Wish more hours					
Coeff.	−0.0009	−0.0268**	−0.0090	0.0014	−0.0027
	(0.0037)	(0.0124)	(0.0068)	(0.0038)	(0.0045)
Marg.	−0.0000	−0.0014**	−0.0003	0.0000	−0.0001
	(0.0001)	(0.0006)	(0.0002)	(0.0001)	(0.0002)
Risk job loss					
Coeff.	0.0040	−0.0124**	0.0005	0.0040	−0.0015
	(0.0037)	(0.0056)	(0.0046)	(0.0047)	(0.0040)
Marg.	0.0001	−0.0006**	0.0000	0.0001	−0.0001
	(0.0001)	(0.0003)	(0.0001)	(0.0002)	(0.0002)
No work					
Coeff.	−0.0179	−0.0401	−0.0272*	−0.0150	−0.0279**
	(0.0116)	(0.0255)	(0.0142)	(0.0163)	(0.0127)
Marg.	−0.0006	−0.0020	−0.0009*	−0.0005	−0.0012**
	(0.0004)	(0.0013)	(0.0004)	(0.0005)	(0.0006)

Note: Individual controls include gender, age, age squared, labour market status, educational level, immigrant origin, having a partner, and a series of dummies for household income quartile. Regressions include year and region fixed effects. Standard errors are in parentheses and have been clustered at the regional level

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Norway and Sweden); c) the Eastern European countries (Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia) and d) the Continental European countries (Austria, Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland). Ideally, I would have liked to derive results for the English-speaking countries (Ireland and the UK) and the Baltic States (Estonia, Latvia and Lithuania); but since they do not provide information at the regional level (except the UK), the analysis was rendered impossible.

Table 6 presents several interesting findings. First, it is in Southern Europe where the largest number of job insecurity indicators is significantly related with fertility at standard significance levels. A negative relationship is found between fertility and unemployment, part-time work, long-term unemployment, redundancy, the impossibility of finding a full-time job and the desire to work more hours.[33] Thus, the results indicate that it is in Southern Europe where the different dimensions of job insecurity brought about by the Great Recession hit fertility decisions hardest. The only exception is that of temporary work, which surprisingly is positively related to fertility in the Mediterranean countries analysed. A possible explanation is that, given the sky-high levels of joblessness in this context, an increase in the percentage of

[33] The analysis at country level confirms these findings, except for part-time work and the desire to work more hours.

Table 6 Results of the logit models with fixed effects for the probability of having a newborn child by country group, using objective and subjective measures of job insecurity, Europe, 2004–2015

Indicator	Mediterranean countries	Nordic countries	Eastern Europe	Continental Europe
Objective measures of job insecurity				
Unemployment				
Coeff.	−0.0539***	−0.0764	0.0227	−0.0600***
	(0.0079)	(0.1620)	(0.0207)	(0.0125)
Marg.	−0.0020***	−0.0036	0.0007	−0.0023***
	(0.0003)	(0.0075)	(0.0007)	(0.0005)
Temporary				
Coeff.	0.0376***	−0.0524	−0.1108***	−0.0362
	(0.0095)	(0.0823)	(0.0359)	(0.0281)
Marg.	0.0014***	−0.0024	−0.0035***	−0.0014
	(0.0003)	(0.0038)	(0.0011)	(0.0011)
Part-time				
Coeff.	−0.1673***	0.0130	0.0118	−0.0209
	(0.0481)	(0.0619)	(0.0276)	(0.0210)
Marg.	−0.0062***	0.0006	0.0004	−0.0008
	(0.0018)	(0.0029)	(0.0009)	(0.0008)
Long-term unemployment				
Coeff.	−0.0222***	−0.0911***	0.0108	−0.0210***
	(0.0035)	(0.0335)	(0.0073)	(0.0071)
Marg.	−0.0008***	−0.0042***	0.0003	−0.0008***
	(0.0001)	(0.0016)	(0.0002)	(0.0003)
Redundant				
Coeff.	−0.0586***	−0.0280	0.0203*	−0.0203*
	(0.0100)	(0.0393)	(0.0108)	(0.0109)
Marg.	−0.0021***	−0.0013	0.0006*	−0.0008*
	(0.0004)	(0.0018)	(0.0003)	(0.0004)
Subjective measures of job insecurity				
Not full-time				
Coeff.	−0.0394***	−0.1137*	−0.0048	−0.0301***
	(0.0068)	(0.0673)	(0.0066)	(0.0077)
Marg.	−0.0014***	−0.0053*	−0.0002	−0.0012***
	(0.0002)	(0.0032)	(0.0002)	(0.0003)
Not permanent				
Coeff.	−0.0036	−0.0408**	−0.0009	−0.0070
	(0.0064)	(0.0159)	(0.0045)	(0.0049)
Marg.	−0.0001	−0.0019**	−0.0000	−0.0003
	(0.0002)	(0.0007)	(0.0001)	(0.0002)
Wish more hours				
Coeff.	−0.0306**	0.0998**	0.0449***	−0.0477**
	(0.0153)	(0.0507)	(0.0171)	(0.0215)

Table 6 continued

Indicator	Mediterranean countries	Nordic countries	Eastern Europe	Continental Europe
Marg.	−0.0011**	0.0047*	0.0014***	−0.0019**
	(0.0006)	(0.0024)	(0.0005)	(0.0009)
Risk job loss				
Coeff.	−0.0041	−0.0146	−0.0075	0.0145
	(0.0049)	(0.0190)	(0.0100)	(0.0092)
Marg.	−0.0001	−0.0007	−0.0002	0.0006
	(0.0002)	(0.0009)	(0.0003)	(0.0004)
No work				
Coeff.	−0.0152	0.0251	−0.1235***	−0.0599
	(0.0208)	(0.2916)	(0.0252)	(0.0556)
Marg.	−0.0006	0.0012	−0.0039***	−0.0023
	(0.0008)	(0.0136)	(0.0008)	(0.0022)

Note: Individual controls include gender, age, age squared, labour market status, educational level, immigrant origin, having a partner, and a series of dummies for household income quartile. Regressions include year and region fixed effects. Standard errors are in parentheses and have been clustered at the regional level

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

individuals with a contract (even if temporary) may be seen by some households as positive, and may therefore promote the decision to form a family.[34] Separate regressions by gender (not shown) indicate that results are as much driven by males as by females.

Second, the results show that in Northern Europe, fertility decisions are negatively related to long-term unemployment and the percentage of individuals on a temporary contract because they cannot find a permanent job; these results are confirmed for regressions at the country level and using different clusters. While a relationship with long-term unemployment is found in other contexts, the same is not true of 'not permanent', which seems to be relevant only in the Nordic countries analysed. Given that temporary contracts are not as common there as in other parts of Europe, it could be that an increase in the ratio of temporary workers who say it is impossible to find a permanent job is regarded as an obstacle to childbearing. Both indicators affect men and women similarly. Moreover, a positive relationship between fertility and the indicator 'wish more hours' is also found in the case of females (but not males). This could indicate that an increase in the level of dissatisfaction with working conditions may induce women to have children, if maternity is as well protected as it is in the Nordic countries.

Third, in Eastern Europe, there is only one indicator that is found to be negatively related to fertility, regardless of the specification used: the percentage of unemployed

[34] It is important to take into account that temporary workers in Southern Europe were the first to be out of the labour market when the economy came to a sudden halt, and so the percentage of workers on a temporary contract increased only when the economy started to recover.

who decide not to keep looking for work because they believe none is available. A 1 percentage point increase in this ratio reduces the probability of having a newborn child by 0.39 percentage points. Considering that the probability of having a newborn child in the cluster is 3.53%, this implies a total reduction of 11%. Again, while this indicator is not related (or only weakly) to fertility in other contexts, its role seems to be important in the Eastern European countries (for both men and women). That is, being surrounded by discouraged unemployed does not help couples to move on with childbearing in this context. Finally, the results for the Continental European countries follow a pattern similar to that found for the whole sample, with robust negative relationships for unemployment, long-term unemployment and the impossibility of finding a full-time job (again with similar results for men and women).

6 Conclusions

This paper shows that not all indicators of job insecurity were related to fertility decisions across Europe during the period of the Great Recession. Of the 10 indicators analysed, only the unemployment rate, the long-term unemployment rate and the percentage of part-time workers who believe it is impossible to find a full-time job can be robustly associated with reduced fertility; the link is particularly strong for those over the age of 24. In specifications for the full sample that include the three indicators simultaneously, 'not full-time' offsets the effect of 'unemployment' and 'long-term unemployment', highlighting the importance of having a full-time job for fertility decisions (particularly the case in Mediterranean and Continental Europe). Other indicators are also related to reduced fertility, but the results depend on age, gender and especially country group. For example, in the Nordic countries, the impossibility of securing a permanent contract also matters; whereas in Eastern Europe, reduced fertility can also be linked to the percentage of workers who stop looking for a job because they believe none is available. Furthermore, the results also depend on the type of clustering used to compute standard errors. All in all, though, it seems that structural measures of job insecurity are better for understanding changes in fertility decisions than are aggregate measures of perceptions, which appear more context dependent.

Subgroup analysis has also shown the existence of a social gradient in the impact of the Great Recession on fertility in Europe: the differential in the possibilities of childbearing because of socio-economic background that existed prior to the economic crisis has widened as a result of the increased levels of job insecurity and precariousness. During the period analysed, individuals in the bottom half of the income distribution and immigrants of non-EU origin have been those most affected by job insecurity in their fertility decisions.

This paper has focused on the short-term effects on fertility of economic conditions. When more data are available, future analysis may provide fresh knowledge about the long-term effects of the Great Recession, in order to ascertain whether the results presented here acknowledge a permanent fall in fertility or a temporary decline that can be recovered. Such an analysis needs to take account for the different durations of the recession across the European countries.

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Compliance with ethical standards

Conflict of interest The author declares that she has no conflict of interest.

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