Transition to first birth during the Great Recession: the case of Greece

Abstract In this study, we examine the effects of the economic uncertainty of partners on the transition to first birth in Greece before and after the onset of the recent economic crisis. After selecting a sample of childless couples, we applied a random effects model to EU-SILC data for the period 2005-2013. Few studies have focused on the association between economic uncertainty and fertility in Greece considering characteristics of both partners. Even fewer studies have examined panel data in the context of the recent crisis. Our findings show that Greek couples in which both partners are employed, have a high income or are highly educated are in a more favourable position to have a first child. During the Greek Great Recession, corresponding in our study to the period 2010-2013, the odds of having a first child decreased to half the odds in the 2005-2009 period. The recession period also modified the effect of couples' characteristics on first childbearing. During the economic crisis, male breadwinner couples were particularly penalized in their transition to have a first child. Surprisingly, couples with at least one temporary worker, usually the woman, were encouraged to have their first child. Implications in terms of gender and social inequality are discussed in the concluding section, and selection processes at play are also discussed.

Keywords Fertility • Economic Uncertainty • Economic Recession • Greece

Introduction

Since the 1960s, developed countries have been characterized by a decline in fertility. This process has been associated with an ideational change, defined as the second demographic transition and characterized by a process of secularization and a greater emphasis on individual self-realization (Lesthaeghe, 2010). Starting in the 1960s, we have also observed a massive entrance of women in the labour market that is negatively correlated with fertility (Engelhardt, Kögel and Prskawetz 2004; Engelhardt, Prskawetz, 2004; Kögel, 2004). In addition, modern societies are characterized by a process of globalization that has contributed to the deterioration of the socio-economic situation of young adults and that has delayed family formation (Comolli, 2017; Aasve et al., 2013; Buchholz et al. 2009; McDonald 2006).

In the general framework of low fertility and societal changes, Southern European countries present specific features. First, Southern European countries exhibit the highest rates of youth unemployment. In Southern Europe, uncertainty might be particularly strong because the dominant form of the welfare state is a familistic one characterized by poor institutional support for vulnerable social groups (the unemployed, youth, etc.) that must rely on family support (Barbieri and Bozzon, 2016; Aasve et al. 2006). The consequences are a considerable increase in poverty risk for young adults, late departure from the parental home, late entry into the labour market, and low fertility (Barbieri and Bozzon, 2016; Balbo et al. 2013; Goldstein et al. 2009; Billari, 2008; Mills and Blossfeld, 2005; Dalla Zuanna and Micheli, 2004; Kohler et al. 2002; Dalla Zuanna, 2001). Second, since the 1980s, the negative link between female labour force participation and fertility has been weakened in non-Southern European countries. However, this negative association remains strong in Southern European countries (Kögel, 2004), pointing to limitations in family-friendly policies.

In the 2000s, fertility was slightly increasing in developed countries as an effect of the partial recovery of the fertility choices of generations that had previously postponed having a child (Sobotka, 2011; Goldstein, Sobotka & Jasilioniene 2009; Bongaarts & Feeney 1998). This effect was also observable in Southern European countries (Caltabiano, Castiglioni, Rosina, 2009). However, the 2008 Great Recession halted this trend.

In this study, we focus on Greece. Our first aim is to demonstrate the association between the economic uncertainty of partners and first birth. Since economic uncertainty concerns mostly young people in Southern Europe, we focus on the first stages of family formation and consider the transition to first birth. In line with previous findings, we consider how first birth is affected by occupational status, type of contract, income, and education (Fahlén and Olàh, 2018; Vignoli et al., 2012; Santarelli, 2011; Kreyenfeld, 2010). Our perspective on couples, jointly considering characteristics of both partners, has rarely been applied in the previous literature.
The second aim of this study is to ascertain the effect of the Great Recession on first birth. Previous studies have shown that economic recessions particularly affect younger cohorts and first birth (Golaz et al. 2018; Comolli, 2017; Goldstein et al. 2013; Neels et al. 2013; Adsera, 2011). However, few studies have focused on how the relationship between couples' economic uncertainty and first birth has changed as a result of the recent economic recession (Kotzamanis, 2018; Tragaki and Bagavos, 2014). To our knowledge, no studies on Greece have addressed this issue by conducting multivariate and longitudinal analyses or by considering multiple indicators of economic uncertainty for both partners.
Our analysis is based on longitudinal data from the EU-SILC survey (EU Statistics on Income and Living Conditions) for Greece. We select a sub-sample of childless couples and consider survey waves from 2005 to 2013, a period overlapping with the current economic crisis.
In the EU-SILC data, information about the level of income, education, occupational status, and type of contract (permanent or not) is available for both partners. In our sample, which includes only couples, most men (92%) are employed and have permanent contracts, which is already notable and indicates that for men, being employed and having a permanent contract might be preconditions for entering into a union.
Our study is structured as follows. After describing the Greek context in section 1, we present the theoretical and empirical background in section 2, together with our hypotheses. We consider the previous literature on how men's and women's economic uncertainty affects first birth. We also examine economic uncertainty as an aggregate phenomenon and focus on previous studies of economic recession and fertility. In section 3, we present our data, the operationalization of concepts and the methods that account for the panel structure of the data. In section 4, we present our

results. Finally, in the conclusion, we interpret the results and note the limitations of our study.

It may be useful here to anticipate the main limitations of our study. Since we studied couples, our study did not include people who were unable to leave their parental homes because of their economic uncertainty. Moreover, we compared transition to first birth before the crisis (2005-2009) and during the crisis (2010-2013), but because of the sample size, we were unable to consider each individual year.

The Greek context

In Greece, from the mid-1990s to 2003, the total fertility rate (TFR) was less than 1.3 children per woman (Eurostat database accessed in August 2018). As in other Southern European countries, the postponement of marriage and fertility has been observed, while new forms of unions and births out of wedlock remain exceptions (Gavalas et al. 2014). In 2013, Greece was the only European country in which the percentage of births out of wedlock was still less than 10% (Eurostat database accessed in July 2019). Beginning in 2004, the increase in fertility ushered in a new trend. Greece's TFR increased from 1.3 children per woman in 2004 to 1.5 in 2008 (Eurostat database accessed in March 2019). This trend was interrupted by the recent economic crisis: the number of births decreased by 15.2% (Vrachnis et al. 2014), and the TFR decreased to 1.3 in 2013 (Eurostat database accessed in July 2019). In a recent study, Salvati (2018) showed that during the recession, economic conditions worsened in all Greek districts and led to a decline in the growth rate of the population, except in certain coastal and tourist districts.

In addition to low fertility, another feature that Greece has in common with other Southern European countries is youth and female labour precariousness. In 2008, youth unemployment (15- to 24-year-olds) was already double the national average, reaching 28.3% (Kretsos, 2014; Eurostat database accessed in August 2018). In the same year, female unemployment was decreasing but still high compared to that in other European countries (11.5% in 2008, Eurostat database accessed in August 2018). The economic crisis exacerbated this situation. The youth (15- to 24-year-olds) unemployment rate reached 58.3% in 2013 (Eurostat database accessed in July 2019). Regarding female employment, Greek experienced a greater decline than other Southern countries, with an employment rate reaching 40% in 2013. A dramatic

decline was also observed for Greek men, with an employment rate of 49% in 2013 (Figures 1 and 2).

[FIGURES 1 AND 2 ABOUT HERE]

As an effect of the crisis, dual-earner households with children decreased by 9% between 2008q2 and 2012q2, from 55.1% to 46%. The percentage of households with children in which the man is the provider and the woman is inactive in the labour market decreased by 10% in the same period, from 34 to 24% (Karamessini, 2014). Meanwhile, the share of male breadwinner households with unemployed women increased by 6%, and the share of female breadwinner households increased by 5% (Karamessini, 2014).

Austerity measures have contributed further to worsening the economic conditions of young people (Kretsos, 2014). These policies have resulted in reductions in public expenditures and in the social security system. Moreover, firing costs were reduced, together with unemployment benefits for seasonal workers. A special employment regime for young people was also implemented in 2009, with a reduction in the minimum wage for workers younger than 25 years old (Kretsos, 2014). In addition, if the economic crisis deprived young Greek adults of their salaries, according to Matsaganis (2011), the crisis also deprived them of their parents' pensions. Already by 2008, the government had introduced a series of austerity measures with changes in the pension system that reinforced the links between contributions and pensions and increased the age of retirement (Papadopoulos Roumpakis, 2013). Moreover, a 6% pension reduction penalty for each year of early retirement was introduced into the pension calculation (Papadopoulos Roumbakis, 2013). Given the high percentage of young adults living with their parents in Greece (Albertini et al. 2007), such measures were not without influence and might have contributed, between 2009 and 2010, to the increase in poverty rates by 12.6% among the unemployed (Tzannatos and Monogios, 2013).

Public spending on families in Greece, among the lowest in Europe before the crisis, was also affected. In 2009, family benefits in cash stopped increasing, and in 2010, public spending on services for families, amounting to approximately 0.43% of the GDP, started decreasing (OCDE, Family database accessed in February 2019).

Researchers enquiring into the consequences of the economic crisis in Greece have typically identified 2008 as the beginning of the crisis (Tragaki and Bagavos, 2014; Vaughan- Whitehead, 2013; Papadopoulos and Roumbakis, 2008). In this year, unemployment started increasing (Goldstein et al. 2013), and the first austerity measures emerged. Studies taking 2009 as the starting point of the crisis have been less frequent (Tzannetos and Monogios, 2013). Fertility time series for Greece were increasing before 2008, stabilized in 2008 and 2009, and then started decreasing (Goldstein et al. 2013). To capture the negative trend, in our study, we refer to 2010 as a critical year.

Economic uncertainty and first birth

At the individual level, economic uncertainty is usually defined with reference to unemployment, job instability and low income (Oppenheimer 1988; Kreyenfeld et al. 2012). Over the last two decades, the process of globalization has caused economic deregulation that has primarily affected young adults and increased their economic uncertainty (Comolli, 2017; Aasve et al., 2013; Buchholz et al. 2009; McDonald, 2006). Economic uncertainty does not affect states or regions in the same way, but it is related to "institutional filters" (Mills and Blossfeld, 2005).

In this study of the effects of economic uncertainty on fertility, we focus on *first birth*. As stated in the introduction, economic uncertainty particularly affects young adults who might choose to postpone parenthood to obtain a more stable position in the labour market (Fahlén and Olàh, 2018; Vignoli et al., 2012; Santarelli, 2011; Kreyenfeld, 2010).

The relationship between economic uncertainty and fertility can differ between men and women. Using several indicators of economic uncertainty in developed countries, Blossfeld et al. (2005) found a negative relation between economic uncertainty among men and first birth, while more contradictory results were found for women. However, studies considering the joint effects of both partners' characteristics remain rare. Accounting for a joint effect of partners' economic uncertainty on first birth means acknowledging the process of negotiation, accumulation or compensation for partners' resources. In this process, traditional or egalitarian norms concerning gender-based economic roles can play a role.

In addition to the individual level, economic uncertainty "may also be conceptualized as an aggregate phenomenon, reflecting general uncertainties felt by all people during, for example, an economic recession" (Sobotka et al. 2011). It has been shown that economic recessions and adverse economic contexts affect younger cohorts and first birth (Golaz et al. 2018; Comolli, 2017; Goldstein et al. 2013; Neels et al. 2013; Adsera, 2011). In this study, our assumption is that the association between economic uncertainty and first birth changed with the Great Recession.

In the next section, we present theoretical insights and empirical results from previous studies on the relation between first birth and economic uncertainty. We place special emphasis on the joint effects of partners' characteristics on first birth and on studies referring to Southern Europe. We also present the theoretical reasoning and some previous empirical evidence concerning how the Great Recession changed the relation between economic uncertainty and first birth.

Theoretical background

Partner incomes and first birth

In its initial formulation, Becker's economic theory maintained a positive relation between men's income and number of children and posited that for women, factors other than income determine fertility (such as knowledge of contraception or living in rural/urban areas, Becker, 1960). Later, he emphasized the quantity-quality trade-off (Becker and Lewis 1973). In particular, a higher income is associated with greater investment in the "quality of children" and thus negatively correlated with the quantity of children. For the first child, however, we could assume the absence of the quality-quantity trade-off, and we could expect a positive relationship between men's income and fertility.

In accordance with Becker's view, Oppenheimer (1988) emphasized the importance of men's earnings and socio-economic characteristics in family formation. According to the work of Oppenheimer, age at marriage increases when men have more difficulty establishing their careers (1988). This phenomenon has been called the "uncertainty hypothesis." Although Oppenheimer's theoretical model was applied to marriage, it also reasonably applies to first birth. According to Oppenheimer (1988), even in periods when female labour force participation becomes increasingly

important, men's economic stability remains important (Oppenheimer, 1994; Oppenheimer, 1988). This trend is especially true in contexts with stronger specialization of roles in the family (Oppenheimer, 1988). In accordance with these theories and focusing on the Southern European area, Vignoli et al. (2012) found a strong, positive effect of men's income on first birth for Italy. Because of the persistence of the male breadwinner model in this area, it might be more important for men to become established professionally before having children.

In his successive works, Becker stated that high income for women is negatively associated with fertility because opportunity costs, or the indirect costs of raising children, are higher for women than for men (Becker, 1981). According to Joshi (1998), women's opportunity costs associated with higher income affect early childbearing in particular. An alternative view is presented by Oppenheimer (1994). Women's work, and thus income, protects households from risky life events, particularly the loss of the partner's job. However, for Italy, Rondinelli et al. (2010) found a negative relationship between women's income and first birth, showing that in Southern Europe, women with higher incomes might have high opportunity costs already with their first children.

Other studies have favoured the positive effect of high income of partners when jointly considered. In particular, a high household income can be positively associated with outsourcing strategies (Schneider and Hastings, 2017; De Ruijter et al. 2005). Thus, we might expect that both partners having high incomes has a positive effect on first birth because of outsourcing strategies, especially in a context such as Greece, where family policies are limited.

Our first hypothesis is the following: because of their higher financial resources and their outsourcing strategies, couples in which both partners have high incomes have a higher probability of having a first child than other couples. However, because of women's opportunity costs, couples in which the man has a high income are more likely to have a first child than couples in which the woman has a high income (and the man a low income). Note that, according to our assumptions, high income can have a positive or negative effect on fertility according to the combination of partners' income. We assume that the positive income effect on fertility prevails when both partners have a high income. This positive income effect should also exist when only the male partner has a high income. However, when only the female partner in the

couple has a high income, we assume a negative effect of opportunity costs on fertility.

Partners' work contracts and first birth

Transition to parenthood is an irreversible choice producing long-term effects; thus, the stability of work of both partners (defined here as having a permanent contract) offers the best framework for parenthood. However, it has been assumed that women's instability (having a temporary contract) can have a positive effect on first birth. According to Friedman et al.'s (1994) theory of reduction of uncertainty, in periods of life uncertainty, for example, with reference to the labour market, parenthood can be a strategy to reduce uncertainty (see also Vignoli et al. (2016) for an application of the theory to transition to marriage). While the individual cannot control labour market conditions, parenthood is an available strategy producing permanent effects, thus reducing life uncertainty. This strategy applies especially to women, for whom the consequences of parenthood are more compelling.
Previous empirical findings regarding job instability and first birth did not support Friedman et al.'s (1994) theory of reduction of uncertainty. Studies of Italy and Spain showed that both partners having permanent contracts has positive effects on the birth of the first child (Barbieri et al. 2015; Vignoli et al. 2012; Barbieri, 2011). Pailhé and Solaz (2013), for France, and Liefbroer (2005), for the Netherlands, showed that having a permanent contract is more important for women than for men in the decision to have a first child. One explanation is that women with fixed-term contracts might risk losing their jobs after having children, so they prefer to find stable jobs before having their first child (Barbieri et al.2015).
Thus*, our second hypothesis* is that in Greece, couples in which at least one partner has a temporary work contract are less likely to have a first birth than other couples.

Partners' activity status and first birth

Friedman et al.'s (1994) theory of reduction of uncertainty likely better applies to women who are inactive or unemployed. Unemployed women might seek to reduce their uncertainty in the labour market by becoming mothers. Inactive women might also have had difficulties in the labour market, or their devotion to the family might

have been in anticipation of their difficulties. In both cases, becoming a mother represents the full achievement of their identity as a housewife and might be a strategy to reduce their uncertainty. According to another theoretical framework, inactive women might simply have preferences for caring for the family instead of investing in careers (Hakim, 2016). Also according to this view, they should be more likely to have a first child.

Becker's economic models showed that the specialization of roles, with one partner devoted to paid labour and the other to unpaid labour, favours fertility (Becker, 1985). The partner specializing in unpaid labour is more often the female partner. This trend is observable especially in Greece, where women perform 92% of housework (Ruppanner, 2010).

These theories were confirmed by previous empirical studies showing that in Italy, an unemployed woman is more likely to have a first child than a working woman (Cazolla et al. 2016). The same result was obtained by Cooke (2009) for Italy and Spain. Paihlé's and Solaz (2012) showed that inactive women have considerably higher chances of having a first child than women with any other employment status (working, unemployed, student or in short-term employment). A requirement for the positive association between a woman's inactivity and fertility is, however, her partner's employment (Pailhé and Solaz, 2012; Vignoli et al. 2012; Santarelli, 2011). *In our third hypothesis,* we expect that couples in which women are inactive or unemployed and men are employed are more likely to have a first child than other couples.

Partners' education and first birth

The level of education is generally considered a proxy for income. Even when information about income is available, as in our study, education can still inform researchers about long-term economic prospects (Trimarchi and Van Bavel, 2017). Because of their investment in human capital and high expectations for the future, educated people might seek to establish themselves in their careers before having a first child. This mechanism could be observed especially for highly qualified women: since women still have the main responsibility for caring for the family (Ruppanner, 2010), more educated women's perceptions of opportunity costs (Joshi, 1998; Becker, 1981) might delay the birth of the first child. Moreover, according to Becker's

quality-quantity tradeoff, more educated couples may prefer to wait before entering parenthood to accumulate sufficient resources to improve the "quality" of the child (Becker and Lewis 1973).

While some studies did not find a significant effect of education on first birth (Vignoli et al. 2012; Skirbekk, 2008), Gutiérrez-Domènech (2008) found that a man's high education positively affects the likelihood of first birth. For highly educated women, a strong inverse relationship with the timing of first birth has generally been found (Balbo et al. 2013; Pailhé and Solaz, 2012; Gutiérrez-Domènech, 2008).

More generally, partners' education can inform us about partners' attitudes. According to the second demographic transition (SDT) theory, people delay entry into parenthood to promote self-realization (Vignoli, 2016; Lestaeghe 2010). In the typical path of diffusion underlined by the SDT, more educated people are the forerunners of the process, as well as those more concerned with the achievement of higher-order needs. Thus, according to this theory, a negative relationship between education and first birth can be assumed.

Fertility has been proposed to be more affected by gender relations than by adherence to higher-order needs (Goldscheider et al. 2015). From this perspective, we examine education as a proxy of partners' gender attitudes. More educated partners are found to be more likely to share household tasks more equally (Goldscheider et al. 2015; Davis and Greenstein, 2009; Coltrane, 2000). A highly educated male partner is more likely to be involved in family work, while a highly educated female partner might hold more power in the negotiation of this involvement (Lundberg and Pollak, 1996). The gender equity theory of fertility (McDonald, 2000) assumes a positive association between gender equity and fertility.

Thus, we should expect a positive relationship between fertility and the education levels of both partners.

Empirical studies of partners' education and first birth have not supported the gender theory of fertility. Some empirical studies that jointly considered the effect of the education of both partners on first birth did not find significant effects (Corijn et al. 1996; Jalovaara and Miettinen, 2013). An overall negative educational gradient of first birth was found by Trimarchi and Van Bavel (2017) and by Nitsche et al. 2018. For Greece, Bagavos (2017) showed that couples in which women are highly educated have later first births, especially if the men are less educated. These results support SDT, opportunity cost theory, the human capital argument, and preference of

the quality of the child. Thus, in the *fourth hypothesis* of this study, we expect that homogamous, highly educated couples and highly hypogamous couples are less likely to have a first child than other couples.

The Great Recession and fertility

Not only individual economic uncertainty but also economic uncertainty as an aggregated phenomenon can affect the arrival of the first child. We can identify at least three mechanisms of the influence of the economic recession on first birth. First, economic recessions increase unemployment and job instability among young people, causing the objective economic conditions of families to deteriorate and thus depressing fertility. For Greece, it has been shown that the decline in male fertility during economic recessions is primarily due to the decrease in the proportion of employed men (Tragaki and Bagavos, 2014). A strong effect of unemployment on first birth has been found for the periods of 2001-2011 (Goldstein et al., 2013) and 2000-2013 (Comolli 2017).

Second, a period of economic recession can worsen expectations about the future. This may result in an amplification of the effect of objective individual economic conditions on fertility (Sobotka et al. 2011). Thus, during economic recessions, couples in which partners have temporary contracts might be even less inclined to make irreversible choices, such as having a first child. Moreover, it is especially during economic recessions that women who are unemployed, inactive and minimally educated might find parenthood more attractive than facing uncertainty in the labour market (Sobotka et al. 2011). In this respect, with reference to Greece, Bagavos and Tragaki (2017) showed that the pre-crisis period was characterized by strong differences in fertility rates between employed and non-employed men, but these differences were unimportant among women. After the onset of the crisis, employed women with high education and non-employed women with low education had the highest fertility rates (Bagavos and Tragaki,
2017).

In a third mechanism of the influence of economic recessions on first birth, the reconciliation of work and family can become more difficult because of the shrinkage of the welfare state and, in particular, of family policies (see the section on the Greek context), thus reducing the likelihood of a first birth. In the context of shrinkage of the

welfare state, wealthier and more educated people are more likely to have alternative strategies to balance family and work. Wealthier couples might outsource family work and therefore be in a more favourable position to have a first child than other couples. Because of worsening expectations about the future, in our *fifth hypothesis*, we assume that during the economic recession the likelihood of having a first child decreases.

In our *sixth hypothesis*, we assume that the recent economic recession can amplify or diminish the effect of some couples' characteristics on first birth. In particular, we expect that the crisis magnifies the positive effect of the male breadwinner model (employed men and women inactive or unemployed) on first birth. In other words, in an economic recession, staying at home and having a child can become more attractive, also because of the Greek welfare shrinkage occurring during the crisis that affected family policies. Finally, the recession should also amplify the positive effect of being in a couple where both partners have a high income and of being in a couple where both partners have a permanent contract. This amplification should happen because of partners' greater ability to outsource care activities compared to the ability of lower-income couples, who are more affected by the Greek welfare shrinkage occurring during the recession. In addition, the worsening expectations about the future that come with a recession should be less severe for these high-income and economically stable couples.

Data and methods

For the purposes of this paper, we used longitudinal data from the EU-SILC survey (EU Statistics on Income and Living Conditions). The EU-SILC survey was launched in 2003 as the continuation of the European Community Household Panel survey (ECHP, 1994–2000). The survey is the instrument used by the European Union to monitor progress on its Europe 2020 strategy, the main objective of which is to reduce poverty. To these ends, the EU-SILC survey collects comparable and multidimensional micro-level data on income, poverty, social exclusion, housing, work, education and health. In Greece, the EU-SILC survey has been conducted since 2004, collecting longitudinal data on 3,500 households and 7,250 individuals per wave.

In this study, we focused on the period of 2005-2013, including 67,493 person-years of the Greek EU-SILC. We selected couples whose partners are childless and younger than 50 years old. We assumed that the possibility of having a first child in Greece exists almost exclusively for couples, since 93% of births in 2011 occurred within marriage (Eurostat, accessed in March 2019). For the sake of simplicity, we excluded individuals who live with children born from previous unions. As in Santarelli (2011), we excluded individuals living with adults other than their spouses because they might provide economic support to the household. Our final sample consists of 1,974 couple-years and 1,185 couples. For the period of analysis, we observed 136 first births. In the EU-SILC database, new births are identified under the variable "Membership status" in the category "Newly born into the household since the last wave." We created the variable "First birth," which takes the value of 1 when there is a new-born (variable …) in a household included in the previous wave by two members (variable "hx040") being in partnership (variable "pb200").

To study the effect of individual income, we first grouped men's and women's income into two categories based on their median yearly incomes: €6,403 in the case of women and €13,871 in the case of men. Subsequently, we created the new variable "couples' income," which includes four categories: (1) "High-Low" couples, in which the male partner's income is high (>€13,871) and the female partner's income is low (≤ €6,403); (2) "Low-High" couples, in which the male partner's income is low (≤ €13,871) and the female partner's income is high (≤ €6,403); (3) "Low–Low" couples, in which both partners have a low income; and (4) "High–High" couples, in which both partners have a high income. For problems related to the size of the sample, models 1-3 of Table 2 are estimated for all men and women. Thus, the income information includes zero income.

The variable "Couple's contract duration" contains two categories: (1) At least one partner temporary and (2) Woman's permanent-Man's permanent. Moreover, by combining the variables of women's activity status with those of their partners, we created the variable "Couple's activity status," which is recoded into four categories: (1) Inactive or Unemployed woman - Employed man; (2) Employed woman - Employed man; (3) Employed woman - Inactive or Unemployed man; and (4) Inactive or Unemployed man - Inactive or Unemployed man.

For couples' education, we referred to the variable "Highest ISCED level attained" (International Standard Classification of Education). We first grouped individuals into

three categories: (1) low educational level, including pre-primary, primary (Demotiko) or lower secondary school (Gymnasio) education; (2) intermediate educational level, including upper secondary (Lykeio) or non-tertiary education; and (3) high educational level, including tertiary education (bachelor's, master's or doctorate degrees). We then created a new variable to represent a couple's education, with five categories: (1) couples in which the male partner's educational level is higher ("Man's higher"); (2) couples in which the woman's educational level is higher ("Woman's higher"); (3) homogamous couples with a low education level ("Low–Low"); (4) homogamous couples with a medium education level ("Medium–Medium"); and (5) homogamous couples with a high education level ("High–High"). To study how the economic crisis affected fertility, we created the variable "Calendar time." In this study, we chose to define 2008 as the year in which the crisis began. For this reason, this variable contains two categories: (1) 2005-2009 and (2) 2010-2013.

Our control variables are the woman's age, marital status, region of residence and degree of urbanization. Age is recoded into five categories: (1) up to 24 years; (2) 25 to 29 years; (3) 30 to 34 years; (4) 35 to 39 years; and (5) 40 to 49 years. The variable "union" is coded as follows: (1) union with a legal basis and (2) union without a legal basis (de facto partners living in the same household). Regarding the place of residence of the respondents, we used two variables: "Region" and "Degree of urbanization." Concerning the region of residence, in the SILC database, a NUTS 1 classification of territorial units is available. NUTS 1 corresponds to four "development areas" that aggregate Greece's thirteen regions (without necessarily constituting official administrative units): (1) Northern Greece (Anatoliki Makedonia, Thraki, Kentriki Makedonia, Dytiki Makedonia, and Thessalia); (2) Central Greece (Ipeiros, Sterea Ellada, Dytiki Ellada, and Pelopponisos); (3) Attiki; and (4) the Aegean Islands and Crete (Voreio Aigaio, Notio Aigaio, and Kriti). Regarding the degree of urbanization, we used three categories corresponding to those proposed by the EU-SILC: (1) sparsely populated area; (2) intermediate area; and (3) densely populated area.

Regarding the estimation method, it is not advisable to use ordinary logistic regression with panel data because of the correlation between observations for the same person, which can cause biased standard errors. The use of logistic random effects regression models in this study allows us to consider this correlation (Li et al.

2011; Mood, 2010; Rabe-Hesketh and Skrondal, 2008). Other models (not used here) that account for this correlation, such as the fixed effects model with conditional likelihood, have the inconvenience of estimating coefficients only for the time-varying explanatory variables.

Finally, childbearing is the result of a decisional process in which economic factors influence first birth with a delay of at least nine months. According to Pailhé (2010), demographic trends follow economic trends with a one- or two-year lag. In this study, we assumed that the decision to have a first birth is made one year earlier, and the relevant explanatory factors are lagged by one year.

Results

Descriptive analysis of our sample

In our sample composed of childless couples, 87% are in legal unions (Table 1). Hypogamy is more frequent than hypergamy: the female partner has a higher education level than the male partner in 21% of couples, while the male partner has a higher education level than the female partner in 15% of couples (Table 1), confirming recent empirical evidence of a "reversal of gender inequality in education" in developed countries in recent years (Van Bavel, 2012).

In 29% of couples, the man is employed, and the woman is inactive or unemployed. In 52.5% of couples, both partners are employed. In addition, among employed partners, in 70.7% of cases, both have permanent contracts (Table 1). This relatively high percentage shows that young adults without a stable employment status are more likely to avoid entering into a union (Aasve et al. 2006).

When comparing the period of 2005-2009 with the period of 2010-2013, we observed that some notable changes occurred with the economic crisis. While the share of dual-earner couples decreased from 58% to 46%, the share of male breadwinner households (employed man – unemployed/inactive woman) increased from 27% to 31%, together with the share of female breadwinner couples (employed woman – unemployed/inactive man), from 7% to 14% (Table A1 in the Appendix). Couples where both partners have a high income decreased from 34% to 28%, while we

observed an increase in couples where women have a higher income than the median and men a lower income than the median, from 20% to 24% (Table 1).

[TABLE 1 ABOUT HERE]

The effect of economic uncertainty on first birth

The estimated random effects models (Table 2, models 1-5) showed strong and statistically significant effects on first birth due to the economic crisis, partners' education levels, partners' incomes, and partners' activity status.

As expected, the economic crisis affected couples' choice to have a first child. Couples had a 2.1 times higher probability (equal to 1/0.47) of having a first child during the pre-crisis period of 2005-2009 than during the crisis period of 2010-2013 (Table 2, model 1 without interactions).

Contrary to our expectations, we observed that the higher the parents' education level was, the greater the likelihood of their having their first child (Table 2, model 1). Couples in which the woman is more educated than the man are also more likely to have a first child than couples in which the man is more educated (Table 2, model 1).

Moreover, couples' income significantly affects first birth. In particular, couples where both partners have a high income are 2.1 times more likely to have a first child than couples where both partners have a low income (Table 2, model 1).

Our results also showed the impact of couples' activity status on the occurrence of a first birth. Dual-earner couples have a greater likelihood of having a first birth than couples in which the male partner is unemployed or inactive (OR=5.5=1/0.18, Table 2, model 4). Regarding the interaction between the couple's activity status and the dummy "2010-2013," male breadwinner couples are less likely to have a first child during the economic crisis than couples where both partners are employed in the period 2005-2009 (Table 2, model 3). The interaction indicates an OR lower than zero (or negative coefficient). Summing the coefficients (lnOR) of the main effect of this variable with the coefficients of the interaction with the period, we observe that the total effect of the male breadwinner model during the economic crisis is negative, corresponding to an OR=exp(-1.15)=0.32.

Finally, regarding the type of contract, couples where both partners have a permanent contract seem more likely to have a first birth, although the result is not statistically

significant (Appendix A2, model 9). However, the effect becomes statistically significant in interaction with the variable "period" (Table 2, model 5). In this case, summing for this variable the coefficients (lnOR) of the main effect and of the interaction effect, we obtain -0.37, giving an OR=exp(-0.37)=0.69. The OR equal to 1/0.69= 1.44 indicates a surprising result: during the economic crisis, couples with at least one partner with a temporary work, usually the woman, have an odds to have a first child 44% higher than couples where both partners have a permanent work in the period 2005-2009.

Overall, when looking at nested models in the appendix, we observe that the main effects of the explanatory variables only slightly change when the control variables are added to the model, indicating robustness in the value and direction of the effect on first birth (Appendix A2).

[TABLE 2 ABOUT HERE]

Discussion and conclusions

Our study showed that individual economic uncertainty strongly affects the arrival of the first child in Greece. However, the effect depends on the indicators that we consider. Having both partners with a high income favours the arrival of the first birth, partially confirming our *first hypothesis* and emphasizing that the decision to have a first child can be made in consideration of their ability to outsource care work and household tasks (Schneider and Hastings, 2017; De Ruijter et al. 2005; Coltrane, 2000). Couples where both partners have a permanent contract are also more likely to have a first child, supporting our *second hypothesis* and previous studies *(*Barbieri, 2015; Vignoli, 2012; Barbier, 2011). However, contrary to our *third hypothesis*, we do not find statistically significant evidence of a higher likelihood of having a first child for male breadwinner couples than for dual-earner couples.

When considering the level of education, we found that highly homogamous couples are more likely to have a first child than hypergamous couples (where the man's education is higher). This finding was in opposition to our *fourth hypothesis* and to previous empirical studies. Nische et al. (2018) found a negative effect of education on first birth in Nordic and Western European countries but not in Southern Europe. This result by European regions may be explained by studies showing the tendency of

young people to delay exiting the parental home in Southern European countries (Hank 2007; Aasve et al. 2006). Thus, in these countries, the accumulation of resources could be a prerequisite for entry into unions (or marriages), especially for the more educated. Thus, once they marry, more educated couples might already be prepared to have a first child and more quickly become parents. Our observation of a positive effect on first birth in the case of hypogamous couples (where women are more educated) might mean that preconditions for marriage, such as satisfactory resources and returns on human capital, can be especially important for women. Other plausible explanations for the positive effects of high homogamy and high hypogamy on first birth are the greater involvement in the family by highly educated men (Goldscheider et al. 2015; Coltrane, 2000), the greater power of highly educated women in negotiating this involvement, and the higher propensity to purchase domestic and care services (Coltrane, 2000).

Regarding economic uncertainty as an aggregate phenomenon, we found that the Great Recession had a strong, negative effect on first birth: during the years 2010-2013, the likelihood of having a child decreased to half the value in the period of 2005-2009, supporting our *fifth hypothesis*. Moreover, the economic recession interacts with some couples' characteristics, although our *sixth hypothesis* is not supported. In fact, during the economic recession, male breadwinner couples became even less likely to have a first child than couples where both partners are employed. These results contradict our previous assumptions based on the shortage of work and shrinkage of the welfare state. Moreover, surprisingly, couples in which both partners had a permanent contract were less likely to have a first birth during the Great Recession. One interpretation is that lower prospects during the crisis may have convinced temporary workers, more often women, to have a first child.

In summary, our study showed the negative role of individual economic uncertainty on first birth in Greece. Greek couples where both partners are employed, have a high income or are highly educated are in a more favourable position to have a first child. We also demonstrated the overall negative effect of the Great Recession on transition to first birth, indicating the worsening of partners' expectations about the future. Moreover, male breadwinner couples were less likely to have a first child during the Great Recession (2010-2013) than dual-earner couples in the previous period (2005-2009). This may be explained by the vulnerability of single-earner couples in the

recession period, when the consequences of losing one's job may be more critical for the sole earner.

To conclude, we must remember the main limitations of our study. First, since we consider couples living independently of their parents, our sample could include individuals who were able to leave the parental home. Second, because of the small size of our sample, we are unable to disentangle the effect of a single year of the crisis. Despite these limitations, this study is one of the rare studies investigating fertility in Greece and shows the effects of the recent economic recession.

Since 2014, the negative trend in fertility seems to have stopped (Eurostat database accessed in May 2019). However, the demographic situation in Greece remains dire, with its fertility rate among the lowest in Europe. It is an appropriate time to remember that "the kingdom belongs to a child" (Heraclitus).

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Figures and Tables

Figure 1 - Male employment rate, 2005-2013

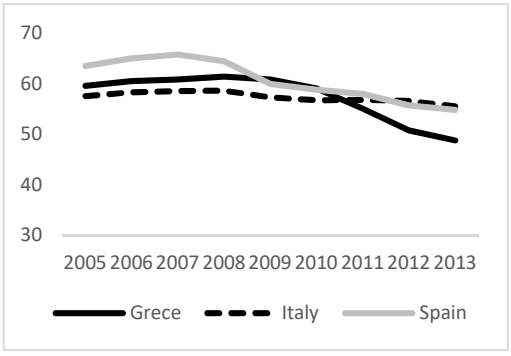
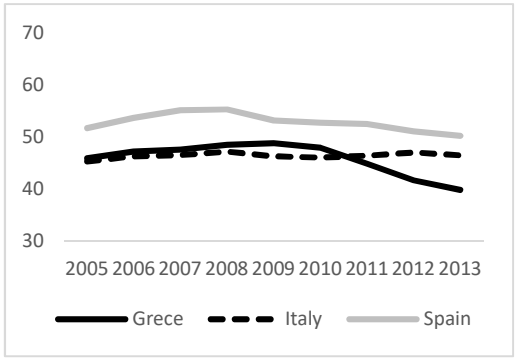


Figure 2 - Female employment rate, 2005-2013



Source: OECD (2019), Employment rate (indicator). doi: 10.1787/1de68a9b-en (Accessed 26 February 2019)

Table 1 Descriptive statistics for the variables used in the study

	%	Obs.	1st child
Couple's Education			
Man's Higher	14.58%	254	6
Woman's Higher	20.72%	361	32
Low-Low	17.34%	302	11
Medium-Medium	25.32%	441	38
High-High	22.04%	384	46
Couple's Activity Status			
Unemployed/Inactive Woman-Employed Man	28.59%	500	36
Employed Woman-Employed Man	52.48%	918	92
Employed Woman-Unemployed/Inactive Man	10.18%	176	2
Unemployed/Inactive Woman-Unemployed/ Inactive Man	8.75%	153	3
Couple's Income			
Woman's High-Man's Low	21.82%	378	32
Man's High-Woman's Low	20.79%	360	20
Low-Low	26.15%	453	24
High-High	31.24%	541	56
Calendar Time			
2005-2009	54.46%	1075	98
2010-2013	45.54%	899	38
Woman's Age			
Up to 24	5.92%	101	13
25-29	17.42%	297	33
30-34	21.29%	363	64
35-39	14.84%	253	19
40-49	40.53%	691	7
Marital Status			
Legal Union	87.11%	1601	125
Other Union	12.89%	237	11
Area of Residence			

Voreia Ellada (Northern Greece)	36.34%	668	52
Kentriki Ellada (Central Greece)	21.16%	389	20
Attiki	32.54%	598	46
Aigaio and Kriti (Aegean Islands and Crete)	9.96%	183	18
Degree of Urbanization			
Densely Populated Area	42.6%	783	60
Intermediate Area	12.84%	236	25
Sparsely Populated Area	44.56%	819	51
Couple's Type of Contract			
At Least One Partner Temporary	29.26%	158	10
Woman’s Permanent-Man’s Permanent	70.74%	382	41

Source: Authors’ own calculations based on the European Union Statistics on Income and Living Conditions 2013

Table 2 Transition to first child in Greece; random effects models

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR
MAIN VARIABLES					
Couple's Activity Status					
(Ref= Employed Woman-Employed Man)					
Unemployed/Inactive Woman-Employed Man	1.11	1.08	1.09	1.66	
Empl Woman-Unempl/Inactive Man	0.18**	0.17**	0.21*	0.56	
Unempl./Inactive Woman-Unempl./Inactive Man	0.38	0.38	0.31	0.16*	
Couple's Income (Ref= Low-Low)					
Woman's High-Man's Low	1.89	1.42	1.89	1.96	2.73
Man's High-Woman's Low	1.76	2.31*	1.72	1.77	2.91
High-High	2.12*	1.57	2.11*	2.26*	3.69
Couple's Type of Contract					
(Ref=At Least One Partner Temporary)					
Woman's Permanent- Man's Permanent					3.65**
Couple's Education (Ref=Man's higher)					
Woman's higher	2.97**	2.95*	5.47**	3.01*	4.2
Low-Low	2.41	2.27	5.72**	2.56	
Medium-Medium	2.62*	2.73*	3.64*	2.57*	6.99*
High-High	3.56**	3.66**	5.28**	3.57**	10.14**
Calendar Time (Ref= 2005-2009)					
2010-2013	0.47***	0.43**	1.57	0.67	2.82
INTERACTION TERMS					
Couple's Education * Time					
Woman's Higher* Time		0.18			
Low-Low* Time		/			
Medium-Medium* Time		0.43			
High-High* Time		0.36			
Couple's Activity Status * Time					
Unempl./Inactive Woman-Empl. Man* Time			0.29**		
Empl Woman-Unempl/Inactive Man* Time			/		
Unempl./Inactive Woman-Unempl./Inactive Man			4.47		
Partners' Income * Time					
Woman's Income High-Man's Low * Time				1.94	
Man's Income High-Woman's Low * Time				0.14	
Woman's and Man's Income High * Time				2.06	
Couple's Type of Contract * Time					
Woman's Permanent-Man's Permanent* Time					0.19*
No. of couples	1592	1592	1492	1497	482
Log Pseudolikelihood	-362.8	-357.4	-357.9	-357.3	-137.3

Notes: *** p<0.01 **p<0.05 *p<0.1. Control variables are woman's age, marital status, area of residence, and degree of urbanization. Model 5 refers to working women.

Appendix

Table A1 Descriptive statistics for the variables used in the study according to time period (2005-2009; 2010-2013)

	2005 - 2009		2010 - 2013	
Couple's Education	**%**	**Obs.**	**%**	**Obs.**
Man's Higher	13.68%	128	15.63%	126
Woman's Higher	20.19%	189	21.34%	172
Low-Low	19.02%	178	15.38%	124
Medium-Medium	23.93%	224	26.92%	217
High-High	23.18%	217	20.72%	167
Couple's Activity Status				
Unemployed/Inactive Woman-Employed Man	26.54%	250	30.98%	250
Employed Woman-Employed Man	57.96%	546	46.1%	372
Employed Woman-Unemployed/Inactive Man	7.11%	67	13.75%	111
Unemployed/Inactive Woman-Unemployed/Inactive Man	8.39%	79	9.17%	74
Couple's Income				
Woman's High-Man's Low	19.83%	185	24.16%	193
Man's High-Woman's Low	21.01%	196	20.53%	164
Low-Low	24.97%	233	27.53%	220
High-High	34.19%	319	27.78%	222
Calendar Time				
2005	8.56%	92		
2006	15.81%	170		
2007	21.58%	232		
2008	32.74%	352		
2009	21.3%	229		
2010			33.04%	297
2011			31.15%	280
2012			18.91%	170
2013			16.91%	152
Woman's Age				
Up to 24	6.11%	57	5.7%	44
25-29	18.65%	174	15.93%	123

30-34	23.37%	218	18.78%	145
35-39	14.15%	132	15.67%	121
40-49	37.73%	352	43.91%	339
Marital Status				
Legal Union	86.1%	855	88.28%	746
Other Union	13.9%	138	11.72%	99
Area of Residence				
Voreia Ellada (Northern Greece)	37.87%	376	34.56%	292
Kentriki Ellada (Central Greece)	17.22%	171	25.8%	218
Attiki	34.94%	347	29.7%	251
Aigaio and Kriti (Aegean Islands and Crete)	9.97%	99	9.94%	84
Degree of Urbanization				
Densely Populated Area	45.82%	455	38.82%	328
Intermediate Area	13.49%	134	12.07%	102
Sparsely Populated Area	40.68%	404	49.11%	415
Couple's Type of Contract				
At Least One Partner Temporary	29.19%	101	29.38%	57
Both Partners Permanent	70.81%	245	70.62%	137

Source: Authors' own calculations based on the European Union Statistics on Income and Living Conditions 2013

Table A2 Transition to first child in Greece; nested random effects models (without interactions)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	OR	OR	OR	OR	OR	OR	OR	OR	OR
Couple's Activity Status (Ref=Empl. Woman-Empl. Man)									
Unemployed/Inactive Woman-Employed Man	0.61*	0.98	1.03	1.15	1.09	1.09	1.09	1.11	/
Employed Woman-Unemployed/Inactive Man	0.05***	0.06***	0.07***	0.1***	0.18**	0.18**	0.17**	0.18**	/
Unempl/Inact Woman-Unempl/Inact Man	0.1***	0.17***	0.21**	0.27*	0.39	0.4	0.36	0.38	/
Couple's Income (Ref=Low-Low)									
Woman's High-Man's Low		1.94	1.31	1.41	1.59	1.83	1.89	1.89	1.88
Man's High-Woman's Low		0.93	0.86	0.83	1.69	1.61	1.76	1.76	1.94
High-High		2.01*	1.29	1.26	1.73	1.78	2.1*	2.12*	2.31
Couple's Education (Ref=Man's higher)									
Woman's Higher			5.94***	4.66***	3.27**	3.36**	3.09**	2.97**	3.92
Low-Low			1.93	1.67	3.08**	2.63*	2.41	2.41	/
Medium-Medium			5.42***	4.42***	2.81***	2.76*	2.69*	2.62*	6.48*
High-High			8.01***	5.95***	3.42**	3.62**	3.49**	3.56**	9.59*
Calendar Time (Ref=2005-2009)									
2010-2013				0.41***	0.49***	0.48***	0.47***	0.47***	0.81
Woman's Age (Ref=30-34)									
Up to 24					1.2	1.94	1.89	1.79	1.23
25-29					0.6*	0.72	0.67	0.66	0.54
35-39					0.39***	0.37***	0.36***	0.36***	0.83

	Model 1 OR	Model 2 OR	Model 3 OR	Model 4 OR	Model 5 OR	Model 6 OR	Model 7 OR	Model 8 OR	Model 9 OR
40-49					0.04***	0.04***	0.04***	0.04***	0.05***
Marital Status (Ref=Other union)									
Legal Union						4.62***	5.03***	4.58***	1.9
Area of Residence (Ref=Attiki)									
Voreia Ellada (Northern Greece)							2.28***	2.13**	2.15*
Kentriki Ellada (Central Greece)							1.65	1.59	1.69
Aigaio and Kriti (Aegean Islands and Crete)							2.27**	2.13*	2.36
Degree of Urbanization (Densely populated area)									
Intermediate Area								1.56	1.13
Sparsely Populated Area								1.26	2.36*
Couple's Type of Contract (Ref=At Least One Partner Temporary)									
Woman's Permanent-Man's Permanent									1.92
No. of Couples	1749	1729	1719	1719	1592	1592	1592	1592	461
Log Pseudolikelihood	-449.5	-443.6	-432.7	-425.9	-378.1	-369.1	-363.9	-362.8	-137.5

*Notes: *** p<0.01 **p<0.05 *p<0.1*