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The effect of the Great Recession on permanent childlessness in Italy

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Abstract (300 words)

The severe recession that has hit advanced economies since summer 2007 had a very strong effect not only on the economic system but also on family dynamics. Many studies address the issue of how the business cycles impact on fertility behavior both in the US and in Europe but the literature and the empirical evidence have not come to conclusive results yet on the causal link between economic shocks and childbearing.

Most studies also argue that fertility responds to recessions only with a temporary postponement of births, concentrated on the first child and among the younger strata of the population. A recent paper by Comolli and Bernardi (2015) though, finds a permanent negative effect of the Great Recession in the US on childless women in their late thirties. In light of these results, in this paper we test weather a similar effect can be found in a different context, i.e. Italy.

The aim of this study is to apply the difference-in-difference method to synthetic cohorts of Italian childless women (as done by Comolli and Bernardi 2015) in their thirties to assess whether the crisis had an impact on cohorts' childlessness rates, and to evaluate the magnitude of this impact. We also test the effect on women around 40 years old to assess weather there is a permanent effect of the Great Recession on childbearing (lost births). Presumably, in fact, these women who are close to end of their reproductive lives will not have another chance to become mothers after 40. We use the Italian Labor Force Survey (LFS) 2004-2013 to compare cohorts' childlessness rates across phases of the Great Recession.

1. Introduction

The severe recession that has hit advanced economies since the summer 2007 – the strongest since the Great Depression of the late 1920s – had a significant effect not only on the economic system but also on family dynamics.

In particular, the preexisting long-term declining trend in marriage rates has dramatically accelerated since 2008 and the increase in fertility registered during the years 2000s has abruptly halted. These trends are common to most countries in Europe and the US.

Compared to other western countries Italy, during the first phase of the Great Recession, has been in an economic dip for a longer period and the negative growth registered in the GDP has also been stronger. Compared to the US, for instance, Italy entered into the recession a quarter before in 2008 and exited negative growth a quarter later in 2010; moreover, the GDP contraction peaked in mid-2009 at -5.5% compared to the -3% of the US (OECD).

In a second phase, when the financial crisis turned into a European sovereign debt crisis, Italy entered again into recession in the third quarter of 2011 and kept having significantly negative growth (around -2%) for the whole 2013. In addition, also in 2014 Italy registered basically zero (or slightly negative) economic growth (OECD).

The financial and sovereign debt crises generated tremendous consequences especially for the Italian labor market. Between 2008 and 2013, 4.2% of the labor force lost the job (almost a million jobs were lost). The unemployment rate went from 6.8% in 2008 to 12.2% in 2013 (23% for young adults below 34 years old; 40% among the 15-24 years old) (Eurostat; Istat).

Many studies address the issue of how the business cycles impact on fertility behavior (among others Meron and Widmer 2002; Adsera 2004; Dehejia and Lleras-Muney 2004; Fokkema et al. 2008; Adsera 2011; Morgan et al. 2011; Sobotka et al. 2010, 2011; Currie and Schwandt 2014; Del Bono et al. 2014; Kreyenfeld and Andersson 2014; Inanc 2015) and the majority of the findings indicate that fertility slows down during recession and accelerate during economic booms.

Many of these studies obtain similar findings and document the postponement of childbearing during periods of economic recessions, especially for couples at low parities (first births) and among women of younger ages (Goldstein 2013). However, the existing empirical evidence is still weak concerning many aspects. First, few of those studies address the permanent effects of the crisis and, second, few of them consider the consequences of economic crises

specifically for childlessness rates (Comolli and Bernardi 2015). Finally, a third drawback of this literature is that the large majority of the studies are descriptive in nature[1] and they do not allow excluding the possibility that there is just a spurious link between recessions and fertility behavior, due to unobserved characteristics.

The effect of the crisis on the extensive margin (having a baby or not) of fertility is important in many ways, first, because a further acceleration in postponement tends to reduce also completed fertility and, second, because childlessness can lead to social isolation (Bachrach 1980; Connidis 2010) and institutionalization (Rowland 1998). Advanced economies, and Italy among them, also face the challenge of a rapidly aging population and an increasing dependency ratio in the society that is dramatically driven by this long-term decline in births.

Permanent childlessness is on the rise in Europe. Not only in Northern and Continental European countries but also in Southern – and more traditional – countries like Italy, an increasing number of women are forgoing motherhood (Gonzáles and Jurado-Guerrero 2006). As it will be illustrated in more details later in the paper, childlessness among Italian women at the age of 45 increased from around 12% for the birth cohort of the 1950 to almost 25% of the birth cohort of 1980 (Human Fertility Database, Eurostat and Istat[2]). Notwithstanding this rapid diffusion of permanent childlessness, research on this topic is relatively rare in Italy where, until recently, childlessness appeared to be due only to celibacy or biological sterility (Tanturri and Menrcarini 2008).

The diversification of living arrangements, the weakening of the social norm of parenthood and the change in the traditional life course where marriage and parenthood has become only one of the many avenues of individual fulfillment, might be responsible both for the decline in family size and for the diffusion of childlessness (Van de Kaa 1987). In addition to these cultural-normative change, there are other structural conditions incentivizing childbearing postponement and childlessness: the increase in both the direct and indirect costs of childbearing – especially for women – (De Santis and Livi Bacci 2001), the lack of adequate family policies and childcare facilities, and the gender unequal division of domestic tasks within the couple (McDonald 2000; Rosina and Caltabiano 2012).

The literature showed that during negative economic circumstances individuals delay family commitments: marriage and childbearing. However, postponement is usually only

[1] With the exceptions of Del Bono, Weber, and Winter-Ebmer 2014; Dehejia and Lleras-Muney 2004; McKenzie 2003; Comolli and Bernardi 2015.
[2] Estimates of the authors for cohorts 1965-80.

temporary and as soon as the economy recovers, couples recuperate marriages and births. Scholars therefore tend to focus on this temporary postponement of family formation among young adults and on the mechanisms transmitting economic and employment insecurity to the family domain.

Nevertheless, despite the literature showing that there is no impact of the recession on childbearing at older ages (Goldstein 2013; Schneider 2015), other results for the US show instead that there is an increase in permanent childlessness due to the Great Recession (Comolli e Bernardi 2015).

The present paper aims at filling these gaps in the literature (a) by testing the existence of a link between the recent economic dip and childlessness rates in Italy and (b) by, first, investigating whether the Great Recession had a permanent effect on fertility in terms of forgone (first) births and, second, trying to get close to a causal estimate of this relation.

To do so, we focus on a specific group of Italian women, namely childless women in their late thirties who spend their last years of reproductive lives during the Great Recession and during this extremely uncertain period have to decide on whether to have their first child or postpone it (McDonald et al. 2011). For this peculiar group of women, clearly, the chances of successfully postponing childbearing are lower since they are approaching the limit of their biological ability to conceive. We argue therefore that, should these women postpone motherhood due to the crisis, few of them would be actually able to recuperate births after the recession and thus the large majority of these postponed births would be lost.

On the one hand, we might think that there are no reasons for the feeling of uncertainty generated by the Great Recession impacting on childbearing decisions by women of older ages differently, or less, compared to women in their early thirties. While we might argue that economic insecurity impact on the reproductive decisions of childless women differently than those made by mothers, or that it might affect childbearing choices by women with different educational levels or belonging to different social classes, we might hypothesize that there is no difference in the impact of the crisis on women in their early compared to women in their late thirties.

However, women who are close to the age of 40 know that their chances to conceive a baby get smaller and smaller every year that passes and they might not be willing to take the risk of postponing further motherhood due to financial and labor market uncertainty.

The results on the US (Comolli and Bernardi 2015) confirm that some*, but few*, American women took that risk during the crisis.

As it will be shown later in the paper, Italy has one of the smallest number of children per women among western countries[3], one of the highest age at first child and a quite large share of childless women (Istat 2016; Adsera 2004; Del Boca 2002; Balbo, Billari, and Mills 2013; Caltabiano 2016) compared to other Southern European countries, however, the social norm of motherhood is still quite strong in Italy and economic circumstances may not be as powerful as the cultural and social norm of childbearing (Micheli 2000).

Another reason why me might expect not to find a similar effect of the crisis on childlessness in Italy as it was shown for the US is a sort of *floor effect*: in Italy fertility is already so low that it cannot get much lower, especially so for the first child and for older women who cannot postpone motherhood further.

In terms of the Italian institutional context, it is clearly different from the US in terms of redistributive and broad welfare policies but not in terms of family policies, services supply to families and financial support to parents: in Italy it is - similarly to the US - difficult and costly to have babies. While young parents might be able to rely on extended family, the older the parents the lower might the support from grandparents (who also get older).

These are some of the reasons why our hypothesis is that while there might be a postponement effect of the crisis on first births to Italian women in their early thirties, it is much harder that women close to the age of 40 further postpone childbearing, even in the presence of the massive economic and labor market uncertainty generated by the Great Recession.

After this introduction the paper is organized as follows: section 2 illustrates the existing empirical evidence on the effects of economic crisis on the extensive margin of fertility. In particular, Section 2 focuses on the specificities of the Italian context and it presents the research questions of the paper. Section 3 describes the data and the method we use in the analyses. The results of the latter are illustrated in section 4 that, first, reports the descriptive results on a few selected European countries and, second, presents the multivariate results for Italy. Finally, section 5 concludes.

[3] In countries where unemployment is high and welfare and labor market policies are weak and rigid – as in Southern European countries – fertility rates tend to be lower (Adsera 2004; Del Boca 2002; Balbo, Billari, and Mills 2013).

2. Childlessness and Economic Crisis in Italy: the empirical evidence and the research questions

This paper speaks to the literature concerning the socio-economic determinants of childbearing and, in particular, the literature on how the extensive margin of fertility – having babies or not – responds to macroeconomic fluctuations.

The rationale for remaining childless may be similar to the determinants of low fertility and of the postponement of childbearing (Kohler et al. 2002; Ongaro 2004). The socio-cultural explanation of the decline in family size and for the diffusion of childlessness points to the individualization and de-structuring of the life-course (Ehrhardt and Kohli 2011), the diversification of family living arrangements, the weakening of the social norm of parenthood and the change in the traditional life-course where marriage and parenthood has become only one of the many avenues of individual fulfillment (Worts et al. 2013).

In addition to these cultural-normative long-term changes, there are structural conditions incentivizing childbearing postponement and childlessness.

First, the increase in the direct cost of childbearing: the 'quality for quantity' trade off and the increasing investment of parents on children (Esping-Andersen 2002; Bonke and Esping-Andersen 2011; Eibach and Mock 2011). Second, the increase in the indirect costs of childbearing represented by the increasing opportunity cost of reducing job market work commitment to devote more time to domestic work and childrearing, especially for women (De Santis and Livi Bacci 2001). The third structural condition negatively affecting fertility rates in many countries is the still persistent lack of adequate family policies and the gender unequal division of the domestic tasks within the couple (McDonald 2000)[4].

Finally, growing economic and labor market uncertainties (Mills and Blossfeld 2003; Vignoli et al. 2012; Sironi and Rosina 2016) exacerbated by the negative macroeconomic circumstances discourage long-term family commitments.

A growing number of studies address the issue of how business cycles impact on fertility behavior (among others Meron and Widmer 2002; Adsera 2004; Dehejia and Lleras-Muney 2004; Fokkema et al. 2008; Adsera 2011; Morgan et al. 2011; Sobotka et al. 2010, 2011; Currie and Schwandt 2014; Del Bono et al. 2014; Kreyenfeld and Andersson 2014;

[4] However, with respect to the process of childbearing postponement, voluntary childlessness breaks even further with the notion of a strong biological predisposition to nurturing behavior that is arguably instinctive in the human race (Foster 2000).

Inanc 2015). Many of these studies document the negative effect of economic downturns on births, namely they show postponement of childbearing during economic recessions, especially among women at younger ages (Goldstein 2013) and at low parities (first births) but none of them address the permanent effect of a crisis on fertility. The latter is difficult to identify since researchers need to wait to observe complete fertility of women who spend part of their reproductive years during the recession, to investigate whether the total number of children these women had is higher or lower.

One of the main theoretical arguments driving the postponement of childbearing during economic dips links labor market constraints, such as rising unemployment and declining wages to the increase in the cost of childbearing and thus to the growing incentives for childlessness. In an increasingly uncertain social and economic context, a long-term commitment to parenthood might be considered unsustainable by some couples.

Already in absence of a recession, several of the widespread societal changes that have taken place in the last decades in western societies, such as higher female education and labor market participation, have increased the relative rewards of childlessness (Poston and Trent 1982; Rowland 1998). Childless women do not need to withdraw (at least temporarily) from the labor market, and they avoid the struggle of combining family and work (Huinink 2001). Both sources of costs are becoming increasingly burdensome in Italy, where the job market is highly inflexible (Del Boca 1997), public childcare services are inadequate (Saraceno 1998), and the "gender contract" is still largely modeled on traditional patterns (McDonald 2000; Mencarini and Tanturri 2004).

Some studies addressed the issue of the relationship between uncertainty in the labor market and childbearing behavior in Italy. Cazzola, Pasquini and Angeli (2016) investigate the relationship between unemployment and fertility in Italy in the time interval 1995-2012 so that they include the Great Recession period. They focus in particular on the geographical differences in this correlation. The authors find that the recent increase in male and female unemployment rates seems to be negatively linked to fertility in the Northern and Central areas of Italy, but the results for the Southern region are ambiguous. The weak and positive relationship emerging between unemployment and fertility rates could mean that couples take advantage of periods out of the labor market to have children. However, the author suggest that results could have been affected by the uncertainty in the local labor market participation data, which do not take into account the undeclared work occurring in the black economy[5].

[5] In 2012 the incidence of black economy activity in the Southern regions reached 20.9% of total employment compared with 12.1% in Italy as a whole (European Parliament 2014).

Santarelli (2011) and Vignoli, Drefahl, and De Santis (2012) analyzed the labor force status of both members of married couples in Italy and their effect on childbearing. They consider the interaction of male and female labor market conditions to investigate how economic uncertainty influences fertility behavior. They find higher first birth rates for couples with non-working women, confirming the importance of the man's economic position on the decision of having a first child. These results are partially confirmed by González and Jurado-Guerrero (2006), analyzing the transition to motherhood in Italy and Spain, and Baizán (2005), who analyzed second or higher order birth rates for Italy, Spain, and Denmark.
In traditional countries like Italy, there seems to be two distinct avenues to childbearing: for couples where the traditional breadwinner model is at place, women are full time mothers (the so called 'stay-at-home-moms'), do not participate in the labor market and have children earlier. The second way in which couples have children is when both partners are highly educated (often implicating a higher gender equity in the couple), have higher income and can afford to have children even though the mother is working (Testa, Cavalli and Rosina 2014).

In a study of the paths to childlessness in Italy (and Poland) Mynarska et al. (2013) also identified the largest majority of Italian childless women (more than 40%) as working single women. However, the second largest category of childless women comprises disadvantaged women, who are very low educated, come from economically poor conditions and have been unemployed and single for most of their adult life (more than 20%).
There is no clear distinction in the literature between voluntary (childfree) and involuntary childlessness because the boundaries between the two are blurry. Many women change their opinion over time or move back and forth from one position and the other. Many women delay pregnancy to the point that it becomes unlikely or impossible, in which case voluntary postponement is transformed into involuntary childlessness (Rowland 1998; Mynarska et al. 2013). This highlights the importance of the temporal dimension in this type of study and the useful distinction between temporary and permanent childlessness (Bloom and Pebley 1982).
Tanturri and Mencarini (2008) give an interesting portrait of voluntary childfree women in Italy that might by useful for the interpretation of our results. The lack of a stable partnership seems to be an important cause but so is voluntary childlessness among couples (around one third of couples). Voluntary childlessness is more common in urban environments, among women with less traditional value orientations (less religious and choosing non-marital living arrangements) and with higher educational attainment. Interestingly, among childfree women, public benefits are perceived as insufficient to compensate for the high costs involved in parenthood, which are mostly described as obstacles to the personal achievement and

fulfillment through a relationship and career. Contrary to what has been found in other countries, childfree Italian women do not come from a specific (high) social class[6] (González and Jurado-Guerrero 2006) and they do not consider financial constraints as the main reason to remain childless.

Nevertheless, Tanturri and Mencarini highlight also the fact that voluntarily and involuntarily childless women share a common obstacle to motherhood, namely the experience of a difficult entry into the labor market. This might be a structural constraint to early childbearing that influences the decision later in life to remain childless.

Even though in this paper we do not focus on the rationale of childlessness and its motivations an implicit contribution of our study is that we move forward the debate on whether childlessness has structural socio-economic roots beyond the cultural, physical or circumstantial reasons to have no kids.

A detailed evaluation of the rationale behind voluntary childlessness in Italy goes beyond the scope of this article but it is nevertheless paramount to understand that the decision to have children or not (the so called 'extensive' margin of fertility) is radically different from the decision of parents to have or not another child (the 'intensive' margin of fertility). This is especially important in Italy, a context where the consensus in the literature is that almost all women want to have at least one child (De Sandre et al. 1997, 1999; Goldstein et al. 2003).

With this respect, several concepts have been used to measure fertility preferences: ideal number of children, desired number of children, expected (additional) number of children, and intended number of children. The ideal family size is an abstract concept (Toulemon 2001) measuring reproductive goals usually interpreted as reflecting the normative context of childbearing and parenthood (Testa and Grilli 2006).

The Eurobarometer 2011 data (Testa 2014) reveal that in Italy 23% of women aged 25-39 have as ideal family size one child only (the proportion in Europe is larger only in Germany and Austria). Moreover, the mean personal ideal family size has sensibly declined over time especially for women over 40: being higher than 2.2 in 2001, it is smaller than 2 in 2011[7]. However, even if the ideal family size in Italy is declining over time and childlessness rates are growing, most Italian women still end up having at least on child (Istat 2014).

In fact, notwithstanding the transformation of motherhood into a question of personal

[6] Confirming in this the findings by M. Livi Bacci (1977) for Italy in eighteen century that showed a larger number of children among higher social strata.

[7] Another crucial issue is that the cross-country correlation between the percentage of childless individuals and the proportion of men and women having fewer children that they want is positive. In countries, like Italy, where most parents are unsatisfied with the number of children they have, the childlessness rate is also higher that the European average.

preference rather than a natural transition in adulthood - or a social obligation - and of childlessness as one acceptable option that does not entail any loss of status, recent estimates show that 80% of Italian women born in the seventies will have at least one child[8].

Together with other Southern European countries, Italy is still a strong familistic society "where the family and its well-being are considered to be central" and "[…] loyalty, trust, and cooperation within the family are key building blocks for societal cohesion" (Dalla Zuanna and Micheli 2004; Testa and Grilli 2006). Familism might not equate to high fertility rates (Testa and Grilli 2006) but might still buffer the weakening of the social norm of motherhood[9].

Despite the strong family attachments and the prevalence of traditional family forms within the country, persistently low fertility levels have long characterized Italy. After the baby boom in the mid-1960s – mostly ascribed to a variation in the tempo of the childbearing of Italian women – the TFR steadily declined to very low levels in the mid-1980s, reaching the lowest fertility rates (less than 1.3 children per woman) in the period 1993–2003 (Cazzola, Pasquini and Angeli 2016; Caltabiano 2016)[10].

At the end of the nineties, in Italy as much as in other European countries, fertility started to increase again and total fertility rate peaked in 2010 at 1.46. This increase was due to the recuperation of postponed births during the nineties but also to the larger share of births coming from immigrant women (15% of total births in 2012).

The geographical variation in Italy is extremely large and it should be taken into consideration in fertility studies regarding this country. The recovery in the TFR, in fact, primarily occurred in Northern regions, where a relevant part of the rise can be attributed to the contributions of foreign women (Caltabiano, Castiglioni, and Rosina 2009)[11].

However, the positive trend in fertility halted after 2010: in 2012 the TFR registered in Italy was 1.42 and it reduced further in 2015 getting to 1.35 (Istat). With the advent of the recession, births to Italian women declined but *also* migration declined in 2013 *and* births from non-Italian citizens declined (-2.7% with respect to the previous year).

At the onset of the financial crisis, between 2008 and 2009 Italian births already decreased by 1.4%, more intensely in the Central (−3.3%) and Southern regions (−1.3%) than in the

[8] On the contrary the proportion of women having a second or a higher parity birth are expected to decline.
[9] Sobotka and Testa (2008) also show that even though the negative connotation of the choice to remain childless is weakening, parenthood is still highly-valued and normatively considered as paramount in a couple life-course.
[10] The long-term decline in fertility in Italy during the last three decades touched its minimum in 1995 with a fertility rate of 1.19 children per women.
[11] In Italy, the TFR of immigrant women reached 2.37 in 2012, whereas that of Italian women reached 1.29. Children of immigrant women represent 15% of total births. Due to the different proportions of immigrant women of reproductive age in various Italian regions the percentage reaches nearly 22% in the Northern regions, whereas these values are 17% and 5% in the central and Southern regions, respectively (Istat 2014) (Cazzola, Pasquini and Angeli 2016).

Northern area (−0.6%). Since then the decrease has further accelerated and between 2009 and 2012 the number of births fell by 6.2%. Differently from before, this time the reduction was greater in the Northern and Southern regions (larger than 6%), whereas in the Central regions it was approximately 4% (Cazzola, Pasquini and Angeli 2016).

If we look at age-specific births rates in Italy during the years of the crisis, as in other countries, we witness that the largest fertility drop is concentrated among young women (-9% for women below 25 years old between 2008 and 2012) while we do witness an increase in the fertility rate of older women, +1.9% in 2008-2012 among 35-39 years old women (+20.6% among 40+).

In the present paper we are interested precisely in estimating more precisely this effect of the Great Recession on childbearing behavior at later ages but, in particular, we focus on the behavior of childless women. So, what happened to first births in Italy during the crisis?

In the period 2008-2012, for first births the difference between the decline of births among young women and the increase among older women is even larger: first births declined 13.4% for young women below 25, -5.9% for the 25-29, -1.1% for the 30-34, while they registered a +7.4% for the 35-39 and an astonishing +26.9% for the 40+.

It seems thus that the negative fertility response to the recession in Italy is concentrated on women who can afford to postpone births because they are far from the biological limit of fertility[12] (De Rose and Strozza 2015; Indagine Campionarie sulle nascite e le madri Istat 2012).

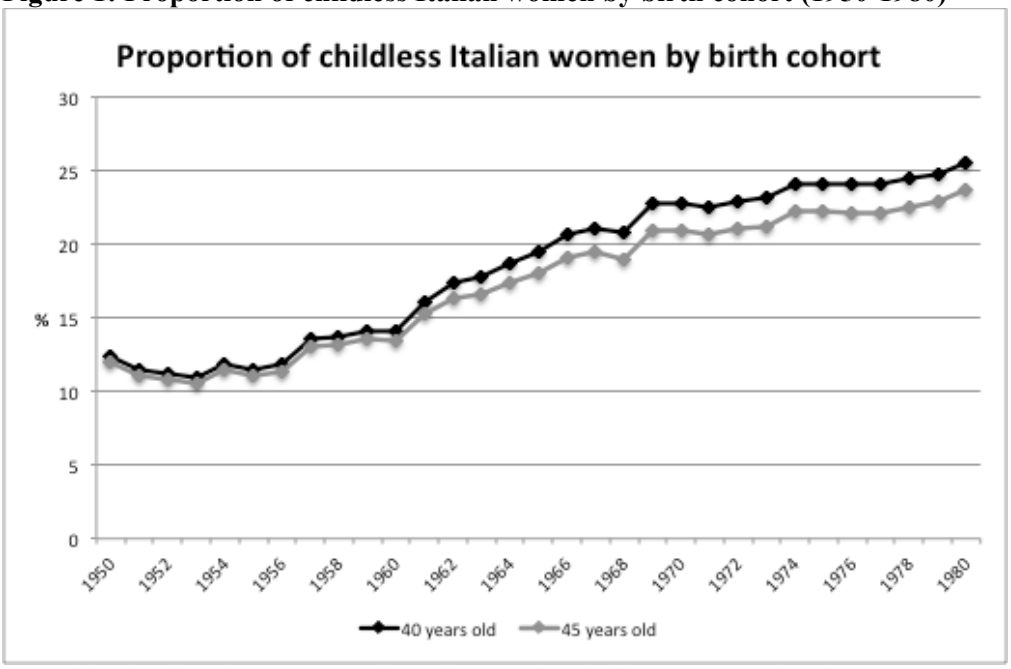
The latter figures would suggest that older women do not change their reproductive behavior based on the economic outlook of the country, if the biological limits of fertility are approaching, in contrast to younger women who can afford to postpone their first child or two or three years. However, the same results were found and the same conclusions were drawn for the US and yet, the empirical evidence has shown that there has been a negative effect of the crisis on older women close to the end of their reproductive life (Comolli and Bernardi 2015). In this paper we test whether the same happened in Italy, namely if women close to the end of their reproductive lives changed their fertility behavior and postponed their first child due to the crisis as women in their early thirties seems to be doing.

[12] The same is evident for the second parity: among mothers who declared to having been affected by the recession a smaller percentage of 40+ women declared they have postponed the second child.

Figure 1 shows the trend in cohort childlessness among Italian women born between 1950 and 1980 (Human fertility database; Istat and Eurostat data) at the ages of 40 and 45 (estimates of the authors for the birth cohorts 1965-80). The proportion of women remaining without children by the age of 45 should give us an idea of the diffusion of permanent childlessness in Italy since, after that age, it is extremely hard to conceive.

The figure shows the positive trend in childlessness at both ages and a slight divergence between childlessness at 40 and 45 for women born after the mid-sixties (around a 2% of first births take place between 40 and 45 years old). This indicates the strong postponement of childbearing that has taken place in Italy, namely that nowadays more women have their first child between the age of 40 and 45. For the birth cohorts of Italian women born in the fifties up to the mid-sixties, permanent childlessness can be measured at 40 since almost no first births took place after that age. For women born during the fifties the proportion of women remaining permanently without children was around 12% while the same proportion for women born at the end of the seventies it is more than the double, namely around 23-24%. The fastest increase in childlessness took place in the cohorts between 1960 and 1970 while for the birth cohorts of the seventies and the eighties the increase was slower.

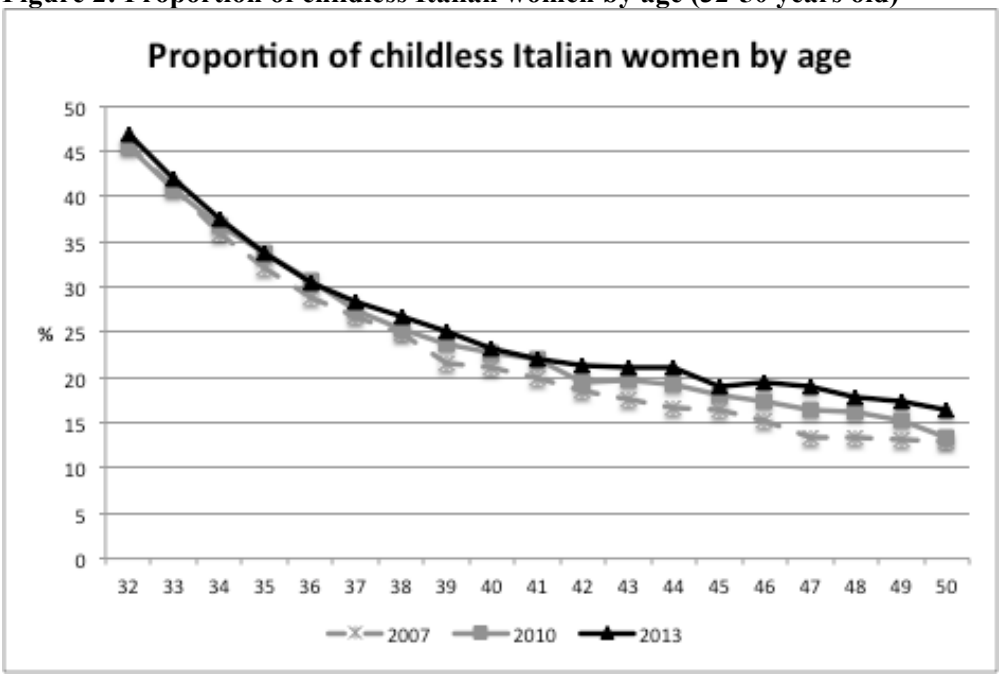
Figure 1: Proportion of childless Italian women by birth cohort (1950-1980)



Source: Elaboration of the authors on Human Fertility Database (www.humanfertility.org), Eurostat and Istat data.
Note: data for cohorts 1965-1980 are partly estimated by the authors.

Figure 2 illustrates instead the change over time (in 2007, 2010 and 2013) in the proportion of childless women by age. In their early thirties, around 45% of Italian women were childless before the Great Recession and this percentage did not change between 2007 and 2013. By the age of 39, instead, while in 2007 slightly more that 21% of women remained without children, this percentage in 2013 is close to 25%. The increase in childlessness by age after the crisis compared to before reaches the maximum - with a difference of more than 6% - by the age of 47. Importantly, by the age of 50 the proportion of childless women in 2007 and 2010 converged, meaning that first births were postponed in 2010 compared to 2007 but ultimately births were recuperated in 2010 and permanent childlessness did not differ. As shown in Figure 2, this is not the case in 2013: permanent childlessness by the age of 50 remains higher compared to the pre-crisis years.

Figure 2: Proportion of childless Italian women by age (32-50 years old)



Source: Elaboration of the authors on Human Fertility Database (www.humanfertility.org), Eurostat and Istat data.

An important issue to take into consideration is that the effects of the Great Recession were different across Italian geographical regions: the largest negative consequences were registered in the South, compared to the Center and North of the country. Second, as already mentioned, also fertility rates are very different across the country and their trend in the last decades has been peculiar. While traditionally childbearing rates have been larger in the South of Italy compared to the North, between the nineties and the pre-crisis period, fertility rates were slightly declining in the South *and* strongly increasing in the Center and North of Italy. Once very different, fertility rates in the North, Center and South of Italy converged in 2006/07, and since then we witnessed a reversal of the geographical trends in fertility. Since 2007 they have, in fact, started to diverge again but in the opposite way: fertility has remained stable until 2010 in the South and then it registered a strong decline after 2010 (from 1.38 to 1.31 in only three years between 2010-2013); in contrast the increase in TFR in the North and Center continued until 2010 (arriving over 1.5 births per woman) and the decline after 2010 has been smaller compared to the Southern regions. In 2013 the TFR were respectively 1.45 (North) and 1.39 (Center) (De Rose and Strozza 2015).
Considering first births the same geographical reversal appears: in 1995, 570 first births per 1000 women were registered in the Center-North and 627 in the South, while in 2012 750 births were recorded in the Center-North *versus* 645 in the South. However, during the recession, the largest decline in first births has been concentrated in the North while second order births declined more in the South.

Finally, while the Southern regions show a positive relationship between female unemployment and fertility, in the Central and Northern regions the relationship is negative. This evidence confirms that Italy can be divided into the more advanced regions of the North (for instance, in terms of stages of the Second Demographic Transition, women labor force participation and gender equality) and the less developed, more welfare-dependent South. These results could also be due to the different characteristics of family networks (Micheli 2012), to the system of local welfare benefits or the availability of public child care (Del Boca 2002), and to different labor market arrangements (Cazzola, Pasquini and Angeli 2016).
The overall level of childlessness in Italy is also made up of heterogeneous regional trends (Caltabiano 2008). Until recently overall fertility was higher in the South, but remaining unmarried and childless were more also common in the Southern regions. In the North, overall fertility was lower, but childlessness was less common (Santini 1995; Tanturri and Mencarini 2008). However, the situation has recently reversed: while the trend in childlessness in the South is more or less flat, they are increasing rapidly in the North and in

Central Italy.

These trends are confirmed by recent data from the 2003 Multipurpose Survey. These patterns indicate that the causes of childlessness have probably changed over time (Tanturri and Mencarini 2008). Given the illustrated peculiar geographical variation in the Italian context, we complement our investigation of the effect of the recession on cohorts' childlessness analyzing the differential impact across geographical divisions, namely North-East, North-West, Center, South and the Islands (Sicily and Sardinia).

3. Data and Methods

As mentioned, the present paper aims, first, at testing the existence of a link between the recent economic dip and childlessness in Italy and, second, at investigating whether the Great Recession had a permanent effect on fertility in terms of forgone births. Finally, we also try to go into the direction of a more causal estimation of this effect.

To do so, we follow - as close as possible - the approach by Comolli e Bernardi (2015) who apply the method of Difference-in-Difference (DID) to pseudo-cohorts of American women close to the end of their reproductive life, to test the existence of a similar effect of the Great Recession in the Italian context on persistent cohort's childlessness rates[13].

Pseudo (or synthetic) panel data are pooled cross-sectional data collected over time. Individuals are pooled together according to some time invariant characteristics (year of birth, race, gender) and then these similar individuals are followed of time. Information is collected longitudinally, not from the same individuals, but from random samples of individuals that share those particular time-invariant characteristics. In the present case we focus on Italian women born in particular cohorts.

In addition, since we are interested in estimating the permanent effect of the recession, we focus the analyses especially on childless women close to the end of their reproductive life (around 40 years old) for whom a postponement of the first child very likely means forgone births. However, for the sake of comparison we also analyze the effect of the crisis on the postponement of first birth among early thirties Italian women.

What we do in practice in this paper is to select two pseudo-cohorts of women based initially on their year of birth as illustrated in Figure 3.

First of all, based on the trend in the Total Fertility Rate (TFR) in Italy, the recession periods characterizing the recent crisis (in terms of quarters with negative GDP growth) and the availability of data, we choose the recession/non-recession years.

The financial crisis started in the summer of 2007 in the US but the first quarter of negative growth in Italy was registered one year later, in the summer of 2008, and the negative GDP

[13] The identification of the causal effect of the recession on childbearing is complicated because of the endogeneity of the parenthood decision to many other life choices pertaining to other life-course dimensions such as education, partnering and employment. Attitudes and preferences also play a crucial role in all these decisions and are notoriously difficult to measure and account for.
Moreover, in the specific case of the Great Recession, the contagion has been rapid and widespread in all western economies and it is difficult to identify a good counterfactual of similar individuals not hit by the crisis between 2007 and 2012.
We plan to overcome these issues of identification by combining a diff-in-diff approach to synthetic panels of Italian women (Deaton 1985) as done by Comolli and Bernardi (2015) for white American women.

growth persisted until mid 2009 (as indicated by the red bars in Figure 3). In Italy, as mentioned before, after a period of illusionary positive growth in 2010, we entered into a new recession period in 2011 that lasted until mid 2013. We argue that these two dips are part of the same crisis that never really interrupted and thus we considered the entire period 2009-2013 as a recession period.

Given the lag between macroeconomic phenomena, individual level internalization of these economic downturns and fertility realizations we selected as last year of *non-recession births* 2010 (also because it was the last year of peak of TFR, which declined ever after since then). The babies born in 2010, we argue, are the last that were planned in 2008 and conceived in 2009, at the onset of the Great Recession.

A final crucial reason to select 2009 as the last non-recession year (and 2010 as last year of *non-recession births*) is that we only dispose of the data starting from 2004[14]. Since for this paper we need cohorts of women of at least three years (large enough to have a sensible comparison between them but small enough to include in each pseudo-cohort only the very similar women) and we wanted to include three groups (Treatment, Control and Placebo) we could not select any year earlier than 2010 as last year of *non-recession births* to be able to include all the three groups[15].

In a second step, we select the groups (the pseudo-panels) of women to compare, also shown in Figure 3 below. As *treated*, we select childless women who turned 34-36 years old exactly in 2010 (thus being 37-39 years old in 2013). These childless women born in 1974-76 spent the last years of reproductive lives (late thirties) during the hardest period of the Great Recession and they had to decide whether to have their first child or not during these years.

We compare this Treatment group to another pseudo-cohort of women (*control* group) who were born three years before (1971-73) and turned the same age - 34-36 in 2007 and 37-39 in 2010 - just before the onset of the crisis. We argue that the only difference between these two random groups of women is that women in the first group, the treatment, spend their last years of reproductive life during the economic turmoil (2010-2013) while the control groups spend the years up to 39 years old in a non-crisis period (2007-2010).

We initially select the maximum age at which we measure permanent childlessness at 39 years old because in the data we do not have the variable indicating how many children each women in sample has, but we build ourselves this variable based on the resident children in

[14] We could not use the data before 2004 because the collection and the sampling method of the Italian Labor Force Survey were too different.

[15] As robustness check we replicated the analyses using as last non recession births year 2009 and 2011 and we did not find any significant difference in the results.

the household and the parental relations reported between the members of the family. This means that we might be underestimating the number of children each woman has, had these children left the parental house. Restricting the age at which we measure completed fertility allows us to limit the impact of this measurement error in our dependent variable[16].

However, even if the probability of conceiving is greatly reduced after the age of 39, it is still possible that women have children after that age and also completed fertility is usually measured in the literature at 44 years old, therefore, to ensure the robustness of our estimates, as illustrated in Figure 3, we replicated the analysis changing the age range at which we measure permanent childlessness. Beyond looking at women 37-39 we also investigate the probability of remaining childless for women who at the end of the analyzed period turn 38-40 and 42-44. The results obtained looking at these different groups of women are reported in the results section (4.2)[17].

Finally, in the attempt to check whether our estimates truly identify the causal effect of the crisis we also pick a placebo group of women who - as for the control group - did *not* leave their last years of reproductive life during the recession (34-39 years old in the period 2004-2007), and we will check if the difference-in-difference estimate between them and the control group is zero as predicted by the model. The idea at the basis of the difference-in-difference model is that there should be no effect of the treatment in absence of the treatment, in other words no effect of the crisis on childlessness between the cohorts who did not go through the crisis.

The analyses are based on the Italian Labor Force Survey (LFS)[18] data using the waves 2004-2013. The number of biological resident children is retrievable from the indication of the type of relationship with the reference person of the survey. In more details, we generated a code for the family and - based on the parental relations within the family - we identified those women who are mothers and those who are not. Our dependent variable is binary: being childless or not. We further use women's age to divide them into birth cohorts.

The LFS is useful because first, it has the necessary large sample size needed for a pseudo-cohort study of childless women where we only select a specific group of them; second, the LFS covers many years up to the very recent and it is important for the diff-in-diff study to maximize the number of points in time to check the robustness of the estimates; and third the

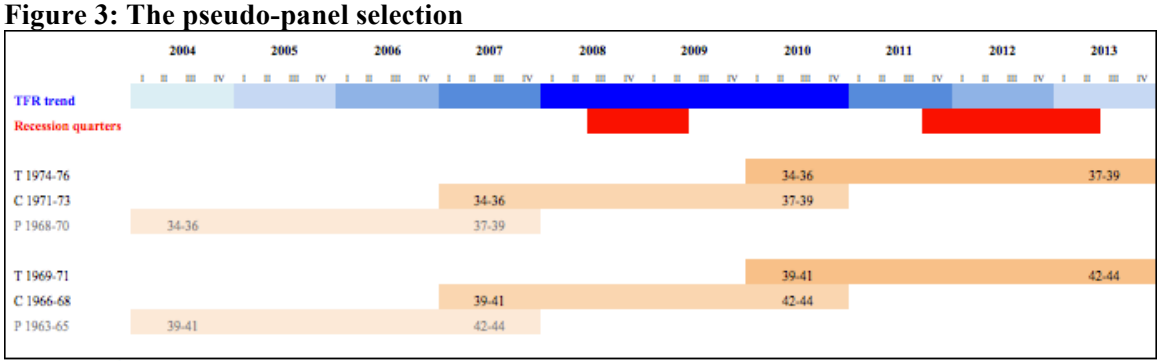
[16] We can easily suppose that in Italy, given the late age at leaving parental home, only a very small number of offspring have already left when mothers are aged 39 (De Rose and Strozza 2015).

[17] We further plan to investigate the effect of the crisis on all women in their thirties. We expect to find a larger effect among women in their early thirties compared to older women close to forty since the formers know that they have more time to postpone the birth of their first child while the latter might acknowledge that the probability of conceiving already lower in the late thirties. We started by looking at older women because we are interested in testing the existence of a permanent effect of the crisis on births.

[18] The data have been accessed and the analyses have been carried on at the Laboratorio Adele (Istat) in Firenze (FI).

LFS has detailed demographic information, that could be useful to refine the analysis and investigate whether there are heterogeneous effects of the recession on childlessness (for instance across geographical region, educational group or ethnicity[19]).

Figure 3: The pseudo-panel selection

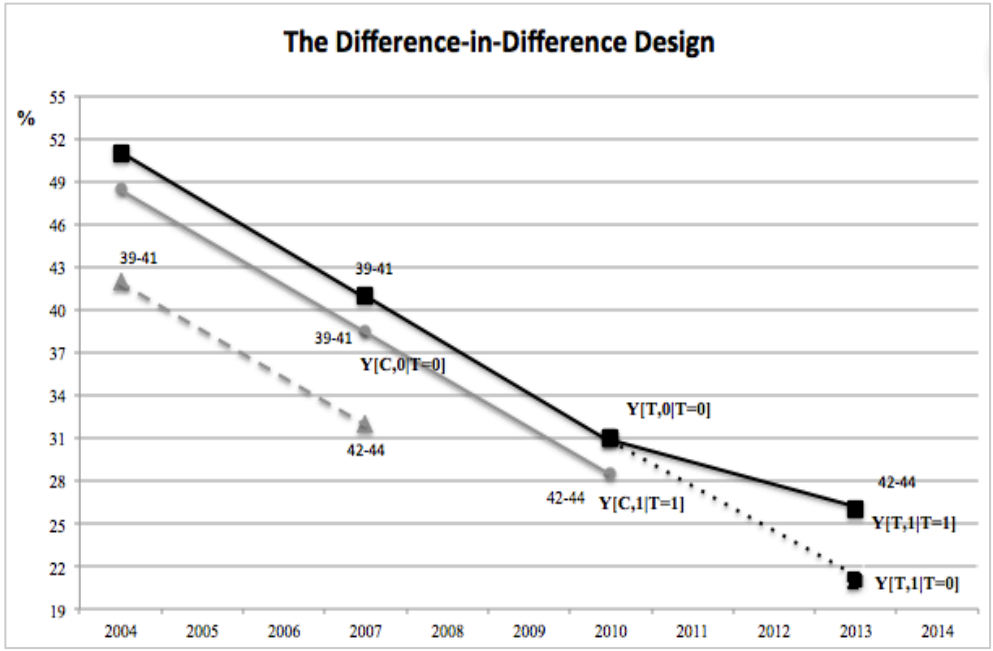


Source: Elaboration of the authors.

Figure 4 instead shows the rationale for a cohort difference-in-difference analysis (using simulated data). The graph illustrates the hypothetical trend over time in childlessness across three different cohorts. The black continuous line represents childlessness in the cohort of women born in 1969-71 while the grey continuous line represents childlessness in the cohort of women born in 1966-68[20]. The first group is the treatment while the second is the control group. As mentioned above, they differ because the treated women spend their last years of reproductive life – in this case from 39 to 44 years old – during the crisis, while the control women don't.

[19] Among all women in the sample within reproductive age (15-45) 88.3% are Italian citizens, 3.8% are EU citizens and 7.9% are non-EU citizens. In a future stage of the paper it would be useful to replicate the analysis by Italian versus non-Italian citizenship.
[20] The third dotted grey line represents the placebo group of women born in 1963-65 also spending their last years of reproductive lives in a non-recession period.

Figure 4: The hypothetical trend over time in the proportion of childless women across different birth cohorts (Treatment, Control, Placebo).



Source: elaboration of the authors from fictitious data. Model based on Comolli and Bernardi (2015).

The important features of this graphical representation represents the assumption of our theoretical model: first, within each birth cohort the proportion of childless women declines (obviously) over time, as part of these childless women over time will have had babies. Second, we assume that younger cohorts present a higher proportion of childless women: at 39-41 years old the proportion of childless women is higher in the treatment cohort than in the control cohort. Third and crucial, we assume that the cohort trends over time in childlessness are parallel: across cohorts the percentage of women remaining without children increases, but it increases with age at the same pace in adjacent cohorts. This assumption is fundamental in the model to use the trend in childlessness in the control group as a sort od counterfactual of what would have been the proportion of women remaining without kids at the end of their reproductive life in the treatment group, *had the crisis not happened*.

Finally, the model described in Figure 4 assumes that the effect of the crisis on cohort childlessness is positive meaning that after the recession the proportion of women without children in the treatment group is higher than it would have been without the crisis, as the trend in childlessness in the treatment and control group in the previous years would have suggested.

To put the argument in a more formal way, when we try to estimate the effect of the crisis on childlessness, the identification is complicated by the presence of two different effects in the change of the childlessness rate over time: the period and the cohort effects. If we only look at the difference between the proportion of childless women at 44 years old in 2013 and the same proportion of childless women at the age of 44 in 2010 we cannot detect the period from the cohort effect (Eq. 1).

$$\Delta = (Y_{T,1|T=1} - Y_{C,1|T=1}) \qquad (1)$$

However, we can use the trend over time in childlessness in the control group to de-trend the period change in childlessness in the treatment group thus obtaining (at least in close approximation) the period effect of the crisis on cohort childlessness (Eq. 2)[21].

$$\Delta\Delta = (Y_{T,1|T=1} - Y_{T,0=|T=0}) - (Y_{C,1|T=1} - Y_{C,0|T=0}) \qquad (2)$$

We use this simple difference of the differences in Section 4.1 to illustrate the change in the proportion of childless women in a few selected European countries, which is relevant to make a useful comparison with the subsequent estimates for the Italian case. For the latter, since we dispose of more detailed individual-level data and more points in time, we further conduct a multivariate analysis of the period effect of the crisis on women's probability of remaining childless, using model specification in Equation (3).

Woman *i*'s individual level probability of remaining childless depends on the her age (the variable *Post*, which is equal to 1 for women in the age interval that we considered for complete fertility, e.g. 42-44 in Fig. 2) and her birth cohort (the variable *Treat*, which is equal to 1 if she is born in the treatment birth cohort, e.g. 1969-71 in Fig.2) which jointly determine whether this woman spends the last years of her reproductive life during the Great Recession or not. This joint probability is captured by the coefficient β_3 of the interaction term in Eq. 3 (*DID=Post*Treat*), namely the difference-in-difference estimate of the period effect of the crisis on the treatment group with respect to the control group.

The analysis is replicated comparing the control and the placebo group of childless women and also using different age groups at which we measure complete fertility.

[21] It is like using the control group as a counterfactual for what would have been the trend in childlessness also in treatment group *had the recession not happened.*

$$\text{Prob(Childless)}_i = \alpha + \beta_1 * \text{Post}_i + \beta_2 * \text{Treat}_i + \beta_3 * \text{DID}_i + \varepsilon_i \qquad (3)$$

As suggested by the description of the Italian context in Section 2, neither the intensity of the crisis, nor the fertility behavior is homogenous in the country.

The analysis in this paper is thus further replicated adding the differentiation by geographical division of residence (North-East; North-West; Center; South; Islands) and women's educational level (Primary, Lower Secondary; Higher Secondary; University Diploma and University Degree).

We ran separate regression for each group for the ease of interpretation of the estimates and because conceptually it is as if we were comparing different pseudo-panels of women. We consider these two variables as being time-invariant characteristics (which might be a reasonable assumption by the age of 30 or more) and we assume that women residing in the North are more similar to each other compared to women living in the Center or in the South of Italy (and the same goes for Primarily educated women compared to Tertiary educated women).

The latter assumptions of time-invariance of the region of residence and the educational level on which we base the pseudo-cohort selection though have to be taken a bit more cautiously compared to the same assumption about gender and year of birth. In fact, while the latter are *clearly* time-invariant characteristics, women could move from one region to another to rejoin their partner, or for personal working reasons, and both these two unobservable variables (there is no question in the survey about any change in geographical residence) could be affected by the crisis and certainly affect women's likelihood of becoming mothers. Furthermore, even though it is not very common in Italy, adult education exists and we cannot rule out the possibility that women increase their educational level between the age of 30 and 40. However, on average we judge these two variables as sufficiently stable in the period considered and substantially time-invariant.

As mentioned, before presenting the results of the multivariate analysis (in Section 4.2) of the effect of the crisis on childlessness in Italy on the LFS data, in the next section we first present descriptive calculations of the difference-in-difference estimates of the period variation of the proportion of childless women in a few European countries (Section 4.1) during the Great Recession years. These preliminary results present a first idea of how to frame the findings from Italy within the European context.

4. Preliminary Results

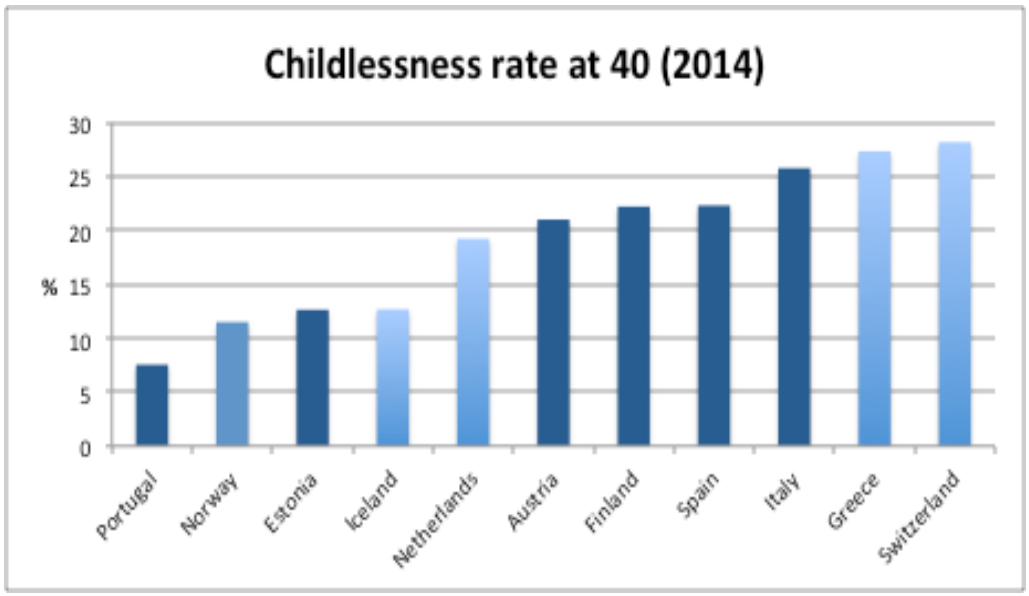
4.1. Descriptive evidence from selected European countries

Different institutional settings and cultural traditions, different stages in the process of transformation from the more to the less traditional path of family formation and dynamics, imply very different attitudes toward childbearing and a diverse diffusion of childlessness.
Sobotka and Testa (2008) analyze attitudes and intentions toward childlessness in different European countries and they show that while countries like Belgium and the Netherlands register the most positive attitudes toward childlessness while the strongest intention to remain childless is registered in Germany.
In terms of actual behavior, among the 1960 birth cohort of European women in 2002, the highest childless rate was registered in West Germany and the UK, respectively at 27.8% and 21.5% (Eurostat data from Tanturri and Mencarini 2008). The lowest rates were registered in Portugal, Iceland and East Germany (7.2%, 7.3% and 7.9% respectively). Differently from what we could expect, Italy lays half way in the spectrum, displaying a rate of childlessness (14.7%) more similar to Sweden, Denmark and Belgium than to Spain or Portugal (Tanturri and Mencarini 2008).

According to our more recent estimates reported in Figure 5, based on Eurostat data 2014 (and LFS data for Italy) childlessness rates among women of age 40, have recently increased in Greece and Spain coming closer to the Italian rate. Portugal still has a very low proportion of women who remain without children, together with Northern-Eastern European countries. Unfortunately, using the available data for many countries[22] it is possible to estimate cohort childlessness only for women who are only 38 years old (light blue bars in Figure 5) therefore permanent childlessness is probably lower in such countries (e.g. Greece). Our estimates are nevertheless very similar to those obtained using different sources of data by Miettinen and colleagues in their Families and Societies working paper of 2015.

[22] Whereas on Eurostat database data for all countries are available up to 2014, for most of them the series of first order fertility rates by age starts in early 1990s. Only for Austria (1984) and Spain (1985) longer series are published.

Figure 5: Proportion of childless women at the age of 40 in 2014 in selected European countries



Source: Elaboration of the authors based on Eurostat Data (LSF for Italy).
Note: Bars in dark blue report childlessness rates at 40 years old in 2014; light blue bars report childlessness at 38 years old.

Table 1 reports our estimates of the proportion of childless women by age (and mean age groups: late, mid and early thirties) between 32 and 40 years old in the year across the Great Recession (2007-2010-2013) in selected European countries (specifically, those countries that have sufficiently extended time series of first order fertility rates in Eurostat database). The table further reports the estimated variation over time across the three years in the proportion of childless women within age groups (and mean age groups). The three middle columns (Δ) indicate the total cohort plus period variation in childlessness from which we detect a first trend but from which we cannot separate between the cohort trend and the period effect on childlessness.

The last column in Table 1 (ΔΔ) instead reports the difference-in-difference calculus of the variation within cohort. The estimates are obtained in the following way:

$$\Delta\Delta = (Y_{40,\,2013} - Y_{37,\,2010}) - (Y_{40,\,2010} - Y_{37,\,2007})$$

The cohort of women born in 1973 turned 37 in 2010 and were 40 in 2013 while the cohort of women born in 1970 turner 37 in 2007 and 40 in 2010, three years before (and in the years just before the onset of the crisis). We first calculate how much childlessness has declined within each birth cohort of women between the age of 37 and 40, and then we calculate how different are these differences. In this second difference lays the de-trending of

the cohort effect, namely we control away the different cohort trends over time in childlessness. This is clearly a descriptive attempt to disentangle the two confounding effects since we are only using aggregate estimates, only four points in time/cohort and we do not use any model or additional control variable to describe the change over time. However, we argue that this is a first and more accurate description of the variation in childlessness over the period of the Great Recession.

In Continental Europe (Austria in our data) the 'cohort+period effect' (Δ) is mostly negative: the proportion of childless women in their thirties are in 2013 less compared to the proportion of women *at the same age* in 2010 and in 2010 with respect to 2007.
In Austria it is negative above 37 but positive among younger women: the proportion of childless women in their early thirties in 2013 is higher compared to the proportion of women *at the same age* in 2010.
However, the difference in difference effect (ΔΔ), or in other words the period effect (2013-2010) controlling for cohort trends (same age in 2010-2007) is positive among older women if we look at the mean 38-40 years old versus the 35-37 years old women. In other words, in the crisis period childlessness increased in Austria for women in their late thirties despite the negative cohort trend. Instead, among women in their early thirties it happens exactly the opposite: while the cohort trend would suggest an increase in childlessness among these women, in the crisis period, net of this positive cohort trend, the proportion of childless women actually declined.
In Scandinavian countries (Finland in our case), 'cohort+period' (Δ) childlessness has declined among women around 37-35 but not among the lower thirties. Controlling for cohort trend, the period effect (ΔΔ) in Finland (where we have better data but still we could not check the effect for women close to 40) among women in early 30 is instead negative, namely the proportion of childless women decreased (slightly) between 2010 and 2013 for women in their mid thirties of 0,1%.
In Southern European countries the 'cohort+period' effect (Δ) is positive: between 2010 and 2013 younger cohorts of women present a higher proportion of childless women both considering women in their late and early thirties. However, controlling for cohort trends, the period effect (ΔΔ) on childlessness is negative between 2010 and 2013 meaning that the proportion of childless women in that period declined, especially for women in their late thirties.
A similar negative variation, but with a lower decline, is observed among childless women in their mid-thirties in Easter European countries (Estonia).

Table 1: Proportion of childless women in selected European countries

Continental Europe: Austria							
Age	2007	2010	2013	Δ 10-07	Δ 13-10	Δ 13-07	ΔΔ
40	-	21.58	21.01	-	-0.57	-	-0.53%
39	-	22.09	21.69	-	-0.40	-	
38	-	22.64	22.03	-	-0.61	-	
Mean 38-40		*21.16*	*21.58*		0.42		*0.31%*
37	23.45	23.41	24.55	-0.04	1.14	1.10	-0.95%
36	24.77	24.86	26.62	0.09	1.76	1.86	
35	26.19	26.46	29.01	0.27	2.55	2.82	
Mean 35-37	*24.80*	*24.91*	*26.73*	0.11	1.82	*1.93*	*-1.14%*
34	28.10	30.19	30.91	2.09	0.72	2.81	
33	30.72	33.61	35.07	2.89	1.46	4.35	
32	33.62	37.50	38.00	3.88	0.50	4.38	
Mean 32-34	*30.81*	*33.77*	*34.66*	2.96	0.89	*3.85*	
Northern Europe: Finland							
Age	2007	2010	2013	Δ 10-07	Δ 13-10	Δ 13-07	ΔΔ
40	-	-	22.22	-	-	-	
39	-	-	21.30	-	-	-	
38	-	-	22.61	-	-	-	
37	-	24.57	22.89	-	-1.68	-	-0,22%
36	-	24.24	25.26	-	1.02	-	
35	-	26.75	27.27	-	0.52	-	
Mean 35-37		*25.19*	*25.14*		*-0.05*		*-0.10%*
34	29.64	28.18	29.72	-1.46	1.54	0.08	
33	30.79	31.65	32.52	0.86	0.88	1.73	
32	34.57	35.34	36.54	0.78	1.19	1.97	
Mean 32-34	*31.67*	*31.72*	*32.93*	*0.05*	*1.21*	*1.26*	
Southern Europe: Spain							
Age	2007	2010	2013	Δ 10-07	Δ 13-10	Δ 13-07	ΔΔ
40	-	18.96	22.32	-	3.36	-	-1.02%
39	-	21.00	24.48	-	3.48	-	
38	-	23.51	26.63	-	3.12	-	
Mean 38-40		*21.16*	*24.48*				*-1.09%*
37	22.45	26.83	29.31	4.37	2.48	6.86	-1.29%
36	25.93	30.43	32.40	4.50	1.97	6.47	
35	30.01	34.35	35.62	4.34	1.26	5.60	
Mean 35-37	*26.13*	*30.54*	*32.44*	*4.41*	*1.90*	*6.31*	*-1.16%*
34	35.20	38.97	40.27	3.77	1.30	5.06	-0.28%
33	40.86	44.12	44.33	3.26	0.21	3.47	
32	46.90	49.06	49.28	2.17	0.22	2.39	
Mean 32-34	*40.99*	*44.05*	*44.63*	*3.06*	*0.58*	*3.64*	
Eastern Europe: Estonia							
Age	2007	2010	2013	Δ 10-07	Δ 13-10	Δ 13-07	ΔΔ
40	-	-	12.65	-	-	-	
39	-	-	13.07	-	-	-	
38	-	11.39	14.14	-	2.75	-	
37	-	13.87	15.77	-	1.90	-	-0.34%
36	-	14.50	16.09	-	1.60	-	
35	13.08	16.21	17.24	3.13	1.03	4.16	
Mean 35-37	*13.08*	*14.86*	*16.37*	*1.78*	*1.51*	*3.29*	*0.23%*
34	16.35	18.59	19.81	2.24	1.22	3.46	
33	18.06	19.35	21.22	1.29	1.87	3.16	
32	19.83	21.51	23.37	1.68	1.86	3.54	
Mean 32-34	*18.08*	*19.82*	*21.47*	*1.74*	*1.65*	*3.39*	

Source: Elaboration of the authors based on Eurostat data.

4.2. The effect of the crisis on childlessness in Italy

The results in this section are presented using figures and graphs reporting trends and coefficients of multivariate regression. Complete tables are reported in the Appendix.

Figure 6 shows the proportion of childless women in the different cohorts we tested and at different ages. The dark blue lines show the decline in childlessness between the ages of 34-36 and 37-39 in the three different cohorts: the treatment cohort of women born in 1974-76 (the think dark blue line in the right part of the graph); the control cohort born in 1971-73 (the thin dark blue line in the middle) and the placebo cohort of women born in 1968-70 (the dotted dark blue line in the left part of the graph). As illustrated above each birth cohort of women are assumed to differ from the others only because they turn a specific age in a specific year, thus before or after the onset of the crisis.

The light blue lines show the decline in the proportion of childless women between different age groups: in the Center of the graph from 35-37 to 38-40 (in the three cohorts: 1973-75 (T); 1970-72 (C); 1967-69 (P)) and in the lower part of the graph between 39-41 and 42-44 years old (in the three cohorts born in 1969-71 (T); 1966-68 (C); 1963-65 (P)).

The three age groups are chosen to test the robustness of our estimates and to measure the different effect of the crisis in various age groups but obviously the group of women being 42-44 in 2013 gives us the strongest proxy of the effect of the recession on permanent childlessness, since they are closer to the end of the reproductive life.

The first point to make looking at this figure is again that younger cohorts show a higher proportion of women remaining without children until their late thirties, and also permanently childless. Notice that this is a first divergent result with respect to the evidence from the US (Comolli and Bernardi 2015) where the incidence of childlessness was declining in younger cohorts. In fact, even if the proportion of permanently childless women in the two countries is rather similar (around 23-25% at completed fertility), in Italy, contrary to what happened in the US, this proportion has steadily increased since the birth cohorts of the mid 40s (when it was around 10%) to the birth cohorts of the late 60s today (getting close to 25%) (Tanturri and Mencarini 2008). Even during the first years 2000s, when fertility rates were increasing and childlessness was declining in the US and in other European countries, in Italy (despite the recuperation of births and the rising TFR) childlessness kept increasing.

This constant increase in Italy seems to still be going on among the more recent cohorts included in our analysis. In our LFS data, the increase – at least concerning the period

considered (2004 - 2013) – seems more pronounced between the cohort of women born in the late sixties (the placebo groups indicated by the dotted lines) and the cohorts born in the seventies (almost a +5% increase in childlessness both by the late thirties and the early forties) during the mid years 2000s, namely just before the onset of the crisis. The problem with these descriptive speculations is that we cannot really judge, as we did with the estimates shown in the last section for European countries, weather it is really a cohort of a period effect in the increase in childlessness.

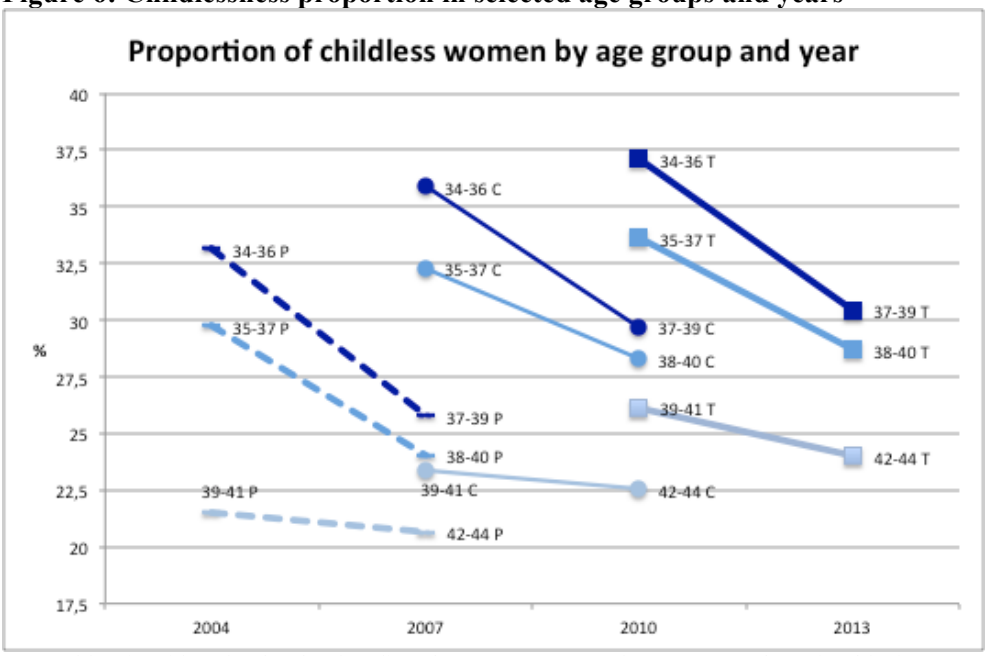
According to our estimates, in the youngest birth cohort for whom we could observe complete fertility until the age of 44 in 2013 (women born in 1969-71) included in the analysis, the proportion of permanent childlessness is around 24%. Five years later, in the birth cohort of the mid-seventies at the latest age at which we can observe complete fertility, namely at 40 years old, the proportion of women without children is at 28-30%.

The second point to be made about the results illustrated in Figure 6 is that decline is obviously also steeper in the late thirties with respect to the early forties where the biological limits of fecundity reduce the probability that women conceive (McDonald et al. 2011).

Finally, in terms of the effect of the Great Recession for childlessness between 2010 and 2013, although we cannot really come to definite conclusions just from this graphical descriptive representation, there seems to be a steeper decline in the proportion of women without children between 2010 and 2013 compared to the decline between 2007 and 2010 (and 2004 and 2007), and this seems to be especially evident at older ages, namely for permanent childlessness measured at 42-44 years old.

This first descriptive result seems to indicate that Italian childless women, who happened to be in their late thirties during the crisis, actually accelerated their first birth compared to women of the same age just before the recession. This is again in contrast to the results obtained regarding American women, but it is closer to the descriptive estimates we obtained using aggregate data from Eurostat regarding other European countries (except for Austria).

Figure 6: Childlessness proportion in selected age groups and years



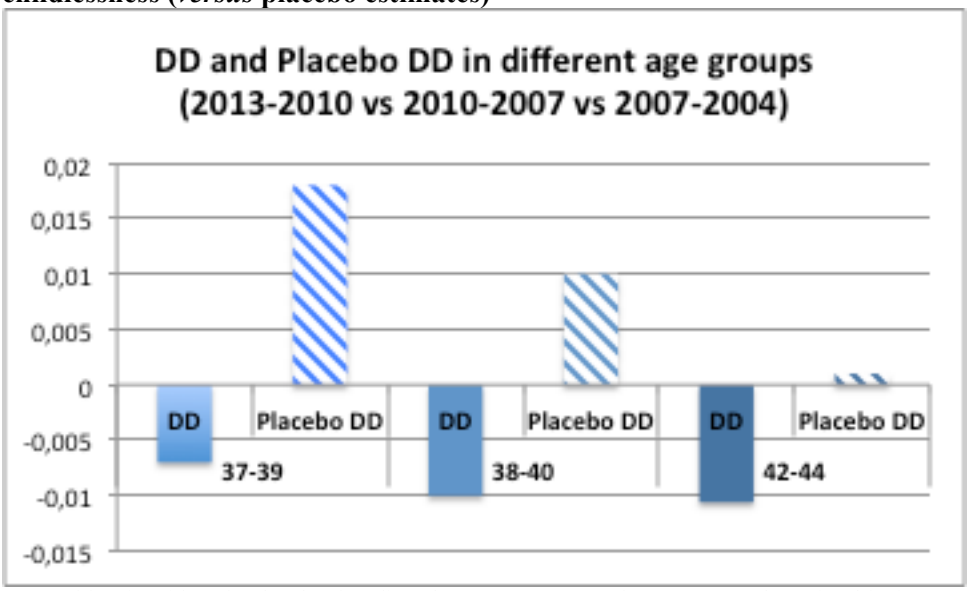
Source: Elaboration of the authors based on the Italian Labor Force Survey (LFS) data 2004-2013 (Laboratorio Adele Firenze).

Figure 7 shows instead the difference-in-difference estimates of a linear probability model of the total period effect of the Great Recession net of cohort effects on the probability that women in the Italian sample remain childless. Table A.1 in the Appendix reports the complete regression table. The figure presents the results in the different age groups considered also in Fig.6 above and, finally, it also reports the placebo difference-in-difference estimates of the difference in childlessness between cohorts who did *not* go through the crisis. The results of the multivariate regression are in line with the descriptive results illustrated above. They show that, at all three ages considered, while there was a positive period effect in childlessness – net of cohort effects – in the years before the crisis, after 2010 the proportion of Italian women remaining without children until their late thirties and early forties actually declined. Both this decline and the previous increase are quite small reaching a +2% in the placebo group of women 37-39 in 2010 versus women of the same age in 2007 and a -1% for women in the early 40s in 2013 versus women of the same age in 2010.

Notice, however, that these estimates cannot be considered as pure causal estimates of the effect of the recession on childlessness between the control and treatment group, because we did not find a zero placebo effect. For the causal effect to be correctly identified there should be no effect of the treatment in absence of the treatment, namely no period effect beyond the cohort effect between the control and the placebo group. This is not what we find

in using this data, which we judge as quite reliable, therefore we attribute these findings to very strong and persistent cohort effects on childlessness that overcomes any period fluctuations, even those due to the Great Recession.

Figure 7: Difference-in-Difference estimates of the effect of the crisis on childlessness (*versus* placebo estimates)



Source: Elaboration of the authors based on the Italian Labor Force Survey (LFS) data 2004-2013 (Laboratorio Adele Firenze).

These general results do not consider the heterogeneous effect of the crisis on childlessness across different groups of Italian women.

Figure 8 reports the estimates of the period effect of the crisis on childlessness by geographic division (North-West; North-East; Center; South; Islands)[23]. Table A.2 in the Appendix reports the complete regression coefficients.

The only increase in the probability of women being childless is registered in the Center regions for women around 40 (+6% among women 38-40 years old and +2% among women in the age range 42-44) and in the Islands (Sicily and Sardinia) for women 42-44 years old (+2%). We also register an increase in the probability of childlessness among women in the age range 37-39 living in the North-West of Italy.

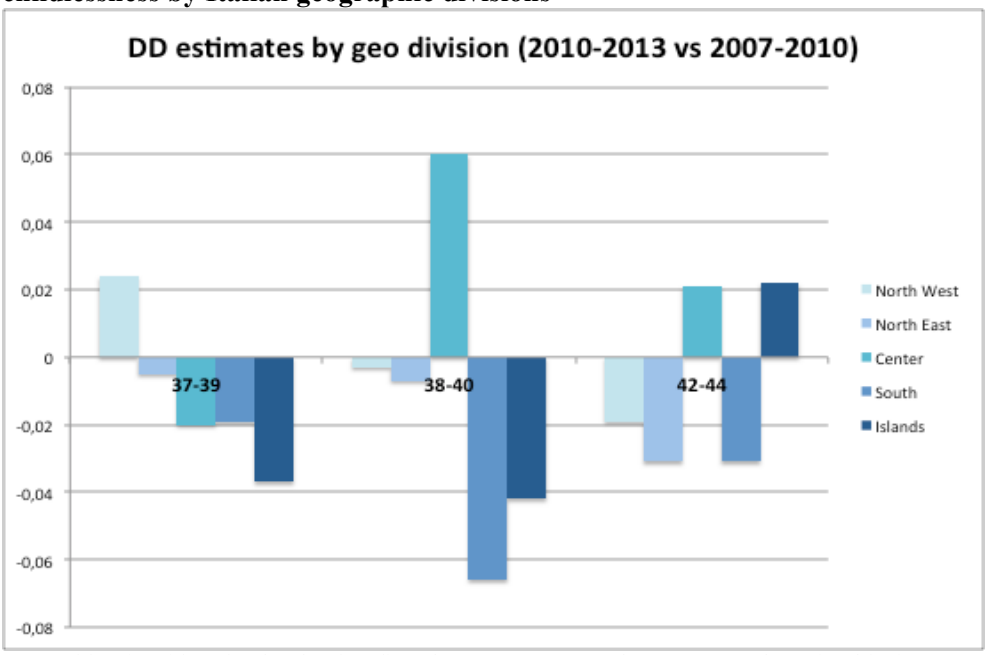
Figure 9 instead reports the estimates across women's educational levels (Primary; Lower Secondary; Upper Secondary; University Diploma and University Degree).

Here the trend is clearer: on average in all age ranges considered, among women with either very low (primary) or very high (University Degree) education the probability of remaining

[23] For simplicity the placebo difference-in-difference estimates are not reported.

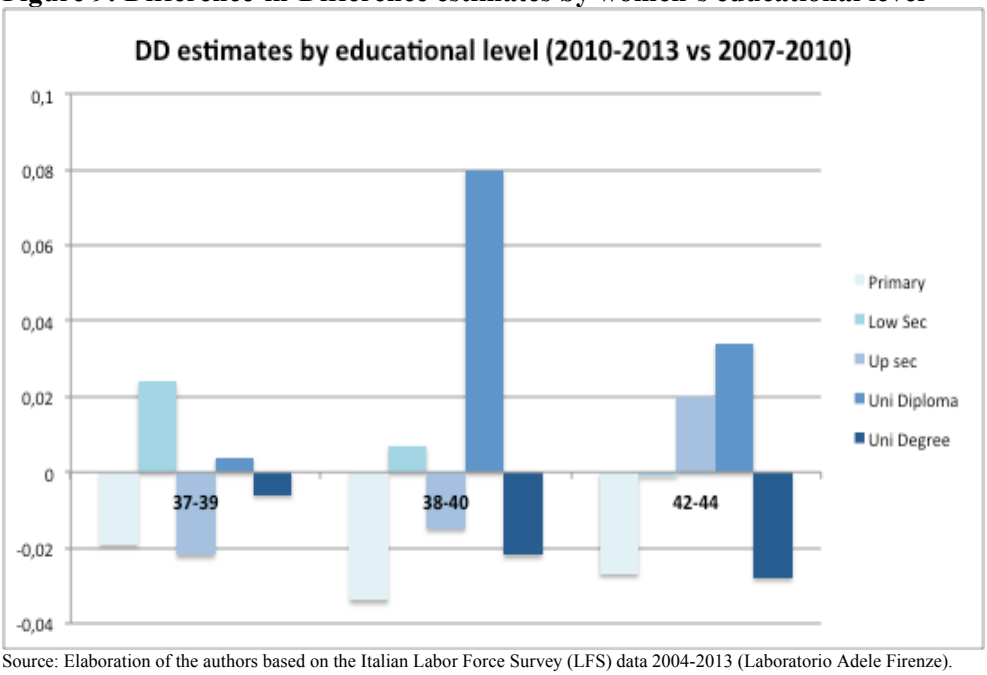
childless during the years of the crisis declined, while this probability increased among women with mid education. The latter increase in childlessness is at the maximum among women with a university diploma in the age range of 38-40 years old (+8%) and 42-44 years old (more than +3%).

Figure 8: Difference-in-Difference estimates of the effect of the crisis on childlessness by Italian geographic divisions



Source: Elaboration of the authors based on the Italian Labor Force Survey (LFS) data 2004-2013 (Laboratorio Adele Firenze).

Figure 9: Difference-in-Difference estimates by women's educational level



Source: Elaboration of the authors based on the Italian Labor Force Survey (LFS) data 2004-2013 (Laboratorio Adele Firenze).

5. Discussion

Many studies address the issue of how business cycles impact on fertility behavior, but the literature and the empirical evidence have not come to conclusive results yet on the causal link between economic shocks and childbearing.

Most of these studies argue that fertility responds to recessions only with a temporary postponement of births, concentrated on the first child and among the younger strata of the population. A recent paper by Comolli and Bernardi (2015) though, finds a permanent negative effect of the Great Recession in the US on childless women in their late thirties. In light of these results, in this paper we test weather a similar effect can be found in a different context, i.e. Italy.

With respect to the literature on Italy, the first innovation of this study is thus that, following Comolli and Bernardi (2015), we focus on childlessness and in particular we try to estimate whether there is an effect of the crisis on permanent childlessness.

In fact, we apply the difference-in-difference method to synthetic cohorts of Italian childless women in their thirties to assess whether the crisis had an impact on cohorts' childlessness rates, and to evaluate the magnitude of this impact. In addition, we also test the effect on women at complete fertility (age 42-44) years old to assess weather there is a permanent effect of the Great Recession on childbearing (lost births). Presumably, in fact, these women who are close to end of their reproductive lives will not have another chance to become mothers after 44 years old. We use the Italian Labor Force Survey (LFS) 2004-2013 to compare cohorts' childlessness rates across phases of the Great Recession.

Another contribution of this paper is that we further disentangle the effect of the crisis on childlessness across macro-regions of residence of Italian women and across their educational level. This allows us to try to speculate on the mechanisms that could explain out results on the link between economic downturns and fertility behavior.

The final innovative feature of this study is that we try to go towards a more causal interpretation of the estimate of the fertility response to period business cycles fluctuations. As mentioned we apply a pseudo-cohort difference-in-difference approach in the attempt to separate the period effect from any cohort effect. While we cannot claim that our estimates truly identify the pure causal link between the crisis and childlessness, we can definitely argue that by using this approach already tested on American data, we manage to control for part of the cohort effect on childlessness that would have biased the final estimates.

Before showing the results of our analyses we also report a description of the trends in childlessness among a few selected European countries across the years of the Great Recession using Eurostat data. Among the European countries for which we retrieve sufficient data to estimate fertility by cohort, we find that while there seems to be in some cases an increase in childlessness among women in their thirties in the period of the crisis, when we separate the period effect from the cohort effect we find that during the crisis childlessness actually declined in all regions of Europe (except for Austria) and in almost all age groups, namely both among women in their early and late thirties.

This seems to confirm the previous empirical evidence that shows that the decline in fertility during the Great Recession is mostly due to the postponement of first births among very young women in their twenties.

Coming to the results regarding Italy, the preliminary descriptive results also show a steeper decline in the proportion of women without children between 2010 and 2013 compared to the decline between 2007 and 2010 (and 2004 and 2007), and this seems to be especially evident at older ages, namely for permanent childlessness measured at 42-44 years old. This result indicates that Italian childless women, who happened to be in their late thirties during the crisis, actually accelerated their first birth compared to women of the same age just before the recession. This is in contrast with the results obtained regarding American women, but it is close to the descriptive estimates we obtained using aggregate data from Eurostat regarding other European countries.

The results of the multivariate regression are in line with the descriptive results illustrated above. They show that, at all three ages considered, while there was a positive period effect in childlessness – net of cohort effects – in the years before the crisis, after 2010 the proportion of Italian women remaining without children until their late thirties and early forties actually declined. Both this decline and the previous increase are quite small reaching a +2% in the placebo group of women 37-39 in 2010 versus women of the same age in 2007 and a -1% for women in the early 40s in 2013 versus women of the same age in 2010[24].

If we look at the heterogeneous effect of the crisis on childlessness across different groups of Italian women, namely geographical residence and level of education, we find that the only increase in the probability of women being childless is registered in the Center regions for women around 40 and in the Islands for women 42-44 years old. We also register

[24] Notice, however, that these estimates cannot be considered as pure causal estimates of the effect of the recession on childlessness between the control and treatment group, because we did not find a zero placebo effect. For the causal effect to be correctly identified there should be no effect of the treatment in absence of the treatment, namely no period effect beyond the cohort effect between the control and the placebo group.

an increase in the probability of childlessness among women in the age range 37-39 living in the North-West of Italy. Again, in the majority of regions and age ranges considered, during the crisis we find a decline in childlessness.

As mentioned in Section 2, childlessness has traditionally been higher in the South compared to the Center and the North of Italy but in the latter regions it has recently started to increase (Santini 1995; Tanturri and Mencarini 2008). Previous empirical evidence also shows that the largest decline in first births has been registered in the Northern Italian regions. Our results indicate that due to the crisis, permanent childlessness (among women over 40 years old) might rise in the Center and the South (Islands)[25], while in the North the postponement of first births might still be recuperated after the crisis (the slight increase in childlessness is only among women aged 37-39).

In the last part of the analysis we also show the estimates across women's educational levels (Primary; Lower Secondary; Upper Secondary; University Diploma and University Degree).

Here the trend is clearer: on average in all age ranges considered, among women with either very low (primary) or very high (University Degree) education the probability of remaining childless during the years of the crisis declined, while this probability increased among women with mid education. The uncertainty generated by the crisis reduced thus first births among women with average (secondary or initial tertiary) education while very highly educated women and very low educated women had their first child, if they wanted, notwithstanding the crisis.

The explanation might be that women with a University degree have been touched less by the economic insecurity generated by the recession *and* they might also be more capable to anticipate their declining probability of conceiving at older ages, therefore they both have the financial and human capital resources to have their first child even during the crisis, if they want. To very low educated women, instead, might apply the argument cited at the beginning of this paper about the socio-cultural norm of the first child. The argument is that low-educated women are more likely to be subject to the normative pressure by their family network to become mothers and, therefore, their decision to have children – especially at older ages – might be less influenced by financial constraints. Moreover, they are more often out of the job market, being either permanently unemployed or housewives, and thus more disposed to dedicate themselves in childrearing.

[25] This result is consistent with what has been hypothesized among the consequence of the crisis for southern Italy (Istat 2016 and Svimez 2015).

These to arguments also explain why the only positive effect of the crisis is found among women with middle education. Those women might be more likely to be influenced in their family decisions by financial constraints compared to very highly educated women and they also might be less influenced by traditional norms of motherhood compared to low educated women.

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Appendix

Table A.1: Weighted Linear probability model of the period effect of the Great Recession on the probability of childlessness. Last non-recession year 2010.

	37-39		38-40		42-44	
	ΔΔ	Placebo ΔΔ	ΔΔ	Placebo ΔΔ	ΔΔ	Placebo ΔΔ
Post (e.g. 37-39)	-0.058*** (-0.0582 - - 0.579)	-0.076*** (-0.076 - - 0.0761)	-0.042*** (-0.0420 - - 0.0416)	-0.052*** (-0.0522 - - 0.0519)	-0.011*** (-0.011 - - 0.0108)	-0.012*** (-0.0118 - - 0.0116)
Treat (e.g. 1974-76)	0.013*** (0.0127 – 0.0130)	0.026*** (0.0257 – 0.0260)	0.013*** (0.0128 - 0.013)	0.030*** (0.0297 – 0.0300)	0.026*** (0.0255 – 0.0258)	0.019*** (0.0185 – 0.0187)
ΔΔ (Post*Treat)	**-0.007*** (-0.0075 - - 0.0070)**	**0.018*** (0.0180 – 0.0184)**	**-0.010*** (-0.010 - - 0.0099)**	**0.010*** (0.0101 – 0.0105)**	**-0.0106*** (-0.0108 - - 0.0104)**	**0.0008*** (0.0005 – 0.001)**
Constant	0.353*** (0.352 – 0.353)	0.327*** (0.03265 – 0.0327)	0.321*** (0.3203 – 0.3206)	0.291*** (0.2905 – 0.2907)	0.234*** (0.2341 – 0.2343)	0.216*** (0.216 – 0.0216)

Source: Elaboration of the authors based on the Italian Labor Force Survey (LFS) data 2004-2014 accessed through the Laboratorio Adele in Firenze. Note: * p≤0.05, ** p≤0.01, *** p≤0.001.Robust 95% confidence intervals in parentheses.

Table A.2: Weighted Linear probability model of the period effect of the Great Recession on the probability of childlessness across Italian geographic divisions. Last non-recession year 2010.

	North-West					
	37-39		**38-40**		**42-44**	
	ΔΔ	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**
Post (e.g. 37-39)	-0.076*** (-0.0759 - -0.0752)	-0.087*** (-0.0875 - -0.0868)	-0.048*** (-0.0481 - -0.0474)	-0.063*** (-0.063 - -0.063)	0.006*** (0.006 – 0.007)	-0.025*** (-0.025 - -0.0246)
Treat (e.g. 1974-76)	-0.029*** (-0.0294 - -0.0288)	0.023*** (0.0231 – 0.0237)	0.0014*** (0.0011 – 0.0017)	0.016*** (0.015 – 0.016)	0.014*** (0.0141 – 0.0146)	0.012*** (0.011 – 0.0118)
ΔΔ (Post*Treat)	0.024*** (0.0235 – 0.0245)	*0.012*** (0.0111 – 0.0120)*	-0.003*** (-0.0035 - -0.0026)	0.015*** (0.0148 – 0.0158)	-0.019*** (-0.019 - -0.018)	0.031*** (0.0309 – 0.0317)
Constant	0.40*** (0.4006 – 0.0401)	0.377*** (0.377 - 0.376)	0.355*** (0.354 – 0.355)	0.339*** (0.338 – 0.339)	0.266*** (0.266 – 0.267)	0.255*** (0.255 – 0.255)
	North-East					
	37-39		**38-40**		**42-44**	
	ΔΔ	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**
Post (e.g. 37-39)	-0.063*** (-0.064 - -0.0629)	-0.117*** (-0.117 - -0.116)	-0.039*** (-0.039 - -0.038)	-0.076*** (-0.077 - -0.076)	-0.005*** (-0.006 - -0.005)	-0.013*** (-0.014 - -0.013)
Treat (e.g. 1974-76)	0.027*** (0.0268 – 0.0276)	0.0031*** (0.003 – 0.004)	0.014*** (0.0132 – 0.0140)	0.028*** (0.027 – 0.028)	0.035*** (0.035 – 0.036)	0.012*** (0.012 – 0.013)
ΔΔ (Post*Treat)	**-0.005*** (-0.005 - -0.004)**	**0.053*** (0.053 – 0.054)**	**-0.007*** (-0.007 - -0.006)**	**0.038*** (0.037 – 0.038)**	**-0.031*** (-0.032 - -0.031)**	**0.008*** (0.008 – 0.0085)**
Constant	0.372*** (0.3718 – 0.372)	0.370*** (0.369 – 0.369)	0.346*** (0.345 – 0.346)	0.318*** (0.318 – 0.318)	0.260*** (0.259 – 0.260)	0.247*** (0.247 – 0.248)
	Center					
	37-39		**38-40**		**42-44**	
	ΔΔ	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**
Post (e.g. 37-39)	-0.071*** (-0.072 - -0.071)	-0.080*** (-0.081 – 0.080)	-0.095*** (-0.096 - -0.095)	-0.054*** (-0.054 - -0.053)	-0.035*** (-0.035 - -0.034)	-0.012*** (-0.012 - -0.0115)
Treat (e.g. 1974-76)	0.014*** (0.014 – 0.015)	0.047*** (0.046 – 0.047)	-0.038*** (-0.038 - -0.038)	0.072*** (0.0716 – 0.0723)	0.017*** (0.016 – 0.017)	0.029*** (0.0290 – 0.0297)
ΔΔ (Post*Treat)	**-0.019*** (-0.0198 - -0.0187)**	**0.009*** (0.008 – 0.009)**	**0.060*** (0.060 – 0.061)**	**-0.042*** (-0.042 - -0.041)**	**0.021*** (0.020 – 0.021)**	**-0.023*** (-0.023 - -0.022)**
Constant	0.387*** (0.387 – 0.388)	0.341*** (0.340 – 0.341)	0.378*** (0.377 – 0.378)	0.306*** (0.305 – 0.306)	0.257*** (0.257 – 0.257)	0.228*** (0.227 – 0.228)
	South					
	37-39		**38-40**		**42-44**	
	ΔΔ	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**
Post (e.g. 37-39)	-0.049*** (-0.049 - -0.0485)	-0.049*** (-0.049 – -0.049)	0.003*** (0.003 – 0.004)	-0.047*** (-0.047 - -0.047)	-0.004*** (-0.004 - -0.0036)	0.009*** (0.008 – 0.009)
Treat (e.g. 1974-76)	0.043*** (0.043 – 0.043)	0.0309*** (0.0306 – 0.031)	0.066*** (0.0658 – 0.0665)	0.009*** (0.009 – 0.010)	0.059*** (0.0592 – 0.060)	0.007*** (0.006 – 0.007)
ΔΔ (Post*Treat)	**-0.019*** (-0.019 - -0.018)**	**0.0003 (-0.0002 – 0.0008)**	**-0.0655*** (-0.066 - -0.065)**	**0.050*** (0.0498 – 0.0507)**	**-0.031*** (-0.0311 - -0.0303)**	**-0.012** (-0.013 - -0.012)**
Constant	0.278***	0.247***	0.231***	0.221***	0.157***	0.150***

	(0.277 – 0.278)	(0.246 – 0.247)	(0.2305 – 0.231)	(0.221 – 0.222)	(0.157 – 0.157)	(0.150 – 0.151)
	Islands					
	37-39		**38-40**		**42-44**	
	ΔΔ	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**
Post (e.g. 37-39)	-0.009*** (-0.009 – 0.008)	-0.040*** (-0.040 - - 0.039)	-0.039*** (-0.040 - - 0.039)	-0.007*** (-0.008 - - 0.007)	-0.028*** (-0.028 - - 0.027)	-0.008*** (-0.009 - - 0.008)
Treat (e.g. 1974-76)	0.0244*** (0.024 – 0.025)	0.010*** (0.010 – 0.011)	0.021*** (0.021 – 0.022)	0.023*** (0.022 – 0.023)	-0.016*** (-0.017 - - 0.016)	0.048*** (0.048 – 0.049)
ΔΔ (Post*Treat)	**-0.037*** (-0.038 - - 0.036)**	**0.031*** (0.030 – 0.032)**	**-0.042*** (-0.043 - - 0.042)**	**-0.032*** (-0.033 - - 0.031)**	**0.022*** (0.022 – 0.023)**	**-0.019*** (-0.020 - - 0.019)**
Constant	0.291*** (0.291 – 0.291)	0.281*** (0.280 – 0.281)	0.277*** (0.276 – 0.277)	0.254*** (0.253 – 0.254)	0.223*** (0.222 – 0.223)	0.174*** (0.174 – 0.175)

Source: Elaboration of the authors based on the Italian Labor Force Survey (LFS) data 2004-2014 accessed through the Laboratorio Adele in Firenze. Note: * p≤0.05, ** p≤0.01, *** p≤0.001.Robust 95% confidence intervals in parentheses.

Table A.3: Weighted Linear probability model of the period effect of the Great Recession on the probability of childlessness across women's educational level. Last non-recession year 2010.

	Primary					
	37-39		**38-40**		**42-44**	
	ΔΔ	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**
Post (e.g. 37-39)	-0.039*** (-0.040 - - 0.038)	0.051*** (0.050 - 0.052)	0.017*** (0.016 – 0.018)	-0.037*** (-0.038 - - 0.037)	0.017*** (0.017 – 0.018)	-0.003*** (-0.003 - - 0.002)
Treat (e.g. 1974-76)	0.040*** (0.039 – 0.040)	0.087*** (0.086 – 0.087)	0.061*** (0.06 – 0.061)	-0.014*** (-0.015 - - 0.013)	0.042*** (0.041 – 0.043)	0.0007** (0.0001 – 0.001)
ΔΔ (Post*Treat)	**-0.019*** (-0.021 - - 0.018)**	**-0.090*** (-0.091 - - 0.089)**	**-0.034*** (-0.036 – 0.033)**	**0.054*** (0.053 – 0.055)**	**-0.027*** (-0.028 - - 0.026)**	**0.020*** (0.019 – 0.021)**
Constant	0.282*** (0.282 0.283)	0.196*** (0.195 – 0.196)	0.22*** (0.219 – 0.220)	0.234*** (0.233 – 0.234)	0.171*** (0.0171 – 0.172)	0.171** (0.170 – 0.171)
	Lower Secondary					
	37-39		**38-40**		**42-44**	
	ΔΔ	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**
Post (e.g. 37-39)	-0.029*** (-0.029 - - 0.028)	-0.047*** (-0.047 - - 0.047)	-0.012*** (-0.012 - - 0.011)	-0.038*** (-0.038 - - 0.037)	-0.005*** (-0.006 - - 0.005)	-0.004*** (-0.004 - - 0.004)
Treat (e.g. 1974-76)	-0.0001 (-0.0004 – 0.0001)	0.016*** (0.016 – 0.017)	0.004*** (0.0035 – 0.0041)	0.018*** (0.017 – 0.018)	0.034*** (0.034 – 0.035)	0.019*** (0.019 – 0.019)
ΔΔ (Post*Treat)	**0.024*** (0.023 – 0.024)**	**0.019*** (0.018 – 0.019)**	**0.007*** (0.007 – 0.008)**	**0.026*** (0.0257 – 0.0263)**	**-0.025*** (-0.025 – 0.025)**	**-0.0013*** (-0.0016 - - 0.0096)**
Constant	0.274*** (0.274 – 0.275)	0.258*** (0.258 – 0.258)	0.257*** (0.257 – 0.257)	0.240*** (0.239 – 0.240)	0.198*** (0.198 – 0.198)	0.179*** (0.179 – 0.179)
	Upper Secondary					
	37-39		**38-40**		**42-44**	
	ΔΔ	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**
Post (e.g. 37-39)	-0.062*** (-0.062 - - 0.061)	-0.098*** (-0.098 - - 0.097)	-0.058*** (-0.058 - - 0.057)	-0.055*** (-0.055 - - 0.054)	-0.015*** (-0.015 - - 0.015)	-0.019*** (-0.019 - - 0.0187)
Treat (e.g. 1974-76)	0.001*** (0.001 – 0.002)	0.012*** (0.012 – 0.012)	-0.003*** (-0.004 - - 0.003)	0.034*** (0.034 – 0.034)	0.007*** (0.006 – 0.007)	0.020*** (0.0198 – 0.020)
ΔΔ (Post*Treat)	**-0.022*** (-0.022 - - 0.022)**	**0.036*** (0.036 – 0.037)**	**-0.015*** (-0.016 - - 0.015)**	**-0.003*** (-0.003 - - 0.0025)**	**0.020*** (0.020 – 0.021)**	**0.004*** (0.0038 – 0.0046)**
Constant	0.367*** (0.367 – 0.367)	0.355*** (0.355 – 0.355)	0.338*** (0.338 – 0.338)	0.304*** (0.304 – 0.3045)	0.253*** (0.253 – 0.253)	0.233*** (0.233 – 0.233)
	University Diploma					
	37-39		**38-40**		**42-44**	
	ΔΔ	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**
Post (e.g. 37-39)	-0.001** (-0.002 - - 0.0003)	-0.173*** (-0.174 - - 0.172)	-0.077*** (-0.078 - - 0.076)	-0.121*** (-0.122 - - 0.119)	-0.05*** (-0.052 - - 0.050)	0.023*** (0.022 – 0.024)
Treat (e.g. 1974-	0.033*** (0.032 –	-0.105*** (-0.106 - -	0.008*** (0.007 –	-0.021*** (-0.022 - -	-0.009*** (-0.10 - -	-0.005*** (-0.006 - -

76)	0.034)	0.104)	0.009)	0.020)	0.008)	0.05)
ΔΔ (Post*Treat)	**0.004*** (0.002 – 0.005)**	**0.172*** (0.171 – 0.173)**	**0.080*** (0.078 – 0.082)**	**0.044*** (0.0425 – 0.0455)**	**0.034*** (0.032 – 0.035)**	**-0.075*** (-0.076 - - 0.073)**
Constant	0.361*** (0.361 – 0.362)	0.466*** (0.465 – 0.467)	0.367*** (0.366 – 0.367)	0.388*** (0.388 – 0.389)	0.283*** (0.282 – 0.284)	0.287*** (0.287 – 0.288)
	University Degree					
	37-39		**38-40**		**42-44**	
	ΔΔ	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**	**ΔΔ**	**Placebo ΔΔ**
Post (e.g. 37-39)	-0.126*** (-0.0129 - - 0.125)	-0.142*** (-0.143 - - 0.142)	-0.090*** (-0.090 – - 0.089)	-0.092*** (-0.09 - - 0.091)	-0.024*** (-0.024 - - 0.023)	-0.048*** (-0.049 - - 0.048)
Treat (e.g. 1974-76)	0.014*** (0.014 – 0.015)	0.022*** (0.011 – 0.012)	0.033*** (0.033 – 0.034)	0.003*** (0.003 – 0.004)	0.005*** (0.005 – 0.006)	-0.006*** (-0.007 - - 0.006)
ΔΔ (Post*Treat)	**-0.005*** (-0.006 - - 0.005)**	**0.017*** (0.016 – 0.017)**	**-0.022*** (-0.022 – - 0.021)**	**0.002*** (0.0015 – 0.003)**	**-0.028*** (-0.029 - - 0.028)**	**0.024*** (0.023 – 0.025)**
Constant	0.492*** (0.491 – 0.492)	0.480*** (0.480 – 0.481)	0.433*** (0.433 – 0.433)	0.430*** (0.430 – 0.430)	0.332*** (0.331 – 0.332)	0.338*** (0.337 – 0.338)

Source: Elaboration of the authors based on the Italian Labor Force Survey (LFS) data 2004-2014 accessed through the Laboratorio Adele in Firenze. Note: * p≤0.05, ** p≤0.01, *** p≤0.001.Robust 95% confidence intervals in parentheses.