Working Women and Fertility: The Role of Grandmothers' Labor Force Participation

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Abstract

Grandmothers' availability for child care has been shown to increase the labor force participation (LFP) and fertility of daughters. However, grandmothers' child care availability depends highly on their LFP. When grandmothers work, intergenerational income transfers to their daughters may increase at the expense of time transfers (through child care). Using a Two-stage Two-steps Least Squares estimation, we exploit changes in legal retirement ages in Italy to explore the relationship between mothers' LFP and daughters' LFP and fertility choices. We show that even though grandmothers who participate in the labor force provide less child care, their daughters are more likely to have children and less likely to participate in the labor force. This can be explained by the increase in family income as a result of mothers' LFP offsetting the influence of the reduction in child care.

JEL codes: J41, J24, M51, C41, C33, C35, J6, L1

Keywords: child care, mothers' retirement, daughter's labor force participation, fertility.

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1 Introduction

Young working mothers around the world are increasingly relying on their parents (and particularly mothers) as a child care option, largely due to the rise in both young mothers' labor force participation (LFP) rates and child care costs (Milligan, 2014, Compton and Pollak, 2014 and Posadas and Vidal-Fernandez, 2013). For instance, in Italy and Greece, more than 40 percent of grandparents provide daily care for grandchildren under ten years of age.

In the United States, these figures are also quite significant; according to the Survey of Income Participation Program (2010) grandparents are the largest source of informal child care and account for 20 percent of all primary child care arrangements of employed women with preschool-aged children.

Besides child care, mothers can provide monetary transfers to their daughters. While in theory, child care increases daughters' LFP and fertility rates, monetary transfers increase fertility at the expense of a negative income effect on daughters' LFP.[1]

An increasing body of literature shows a positive link between grandmothers' child care provision and their daughters' LFP[2] and fertility (Aassve et al., 2012b, Garcia-Moran and Kuehn, 2013). However, there is less evidence on the effects of the joint provision of monetary and time transfers to daughters by their mothers.[3]

We explore how mothers' LFP affects daughters' LFP and fertility through both monetary and time transfers. We argue that mothers' LFP increases monetary transfers, at the expense of time transfers, which should decrease daughters' LFP, but has an ambiguous effect on fertility.

Studying the impact of mothers' LFP on daughter's fertility is challenging because mothers may quit the labor force when becoming grandmothers (Rupert and Zanella,

[1]There is large evidence that women increase their fertility (Milligan, 2005; Cohen et al., 2007 and González, 2013) and decrease LFP (Imbens et al., 2001) in response to increases in income.

[2]Examples of studies with compelling identification strategies are Compton and Pollak (2014), Maurer-Fazio et al. (2011) and Posadas and Vidal-Fernandez (2013).

[3]Dimova and Wolff (2011) separately analyze the effect of monetary and time transfers on daughters' LFP.

2014). Similarly, simple correlations of mothers' LFP and their daughter's LFP may be misleading if mothers and daughters take joint labor force participation decisions. Additionally, mothers and daughters may share the same believes about female roles (or have the same "gender culture" as defined in Campa et al., 2010).

In this paper, we use the Multiscopo - Famiglie e Soggetti Sociali (Families and Social Subjects) survey issued by the Italian Statistics Institute to exploit time variation in minimum retirement age laws in Italy as an instrument for mothers' LFP to analyze the effects on daughters' fertility and LFP.

We shed more light on the channels by which mothers' LFP affects daughters' choices by (i) analyzing the impact on fertility separately for labor and non-labor active daughters; and (ii) exploring the impact on daughters' LFP separately for those with and without children.

First, we find a negative relationship between mothers' and daughters' LFP; this relationship is weaker for daughters with children under three years of age.[4] We argue that our results are consistent with a model in which an increase in altruistic mothers' LFP increases monetary transfers, at the expense of child care (or time) transfers, and that both mechanisms have a negative impact on daughters' LFP. We also show that indeed, mother's LFP is negatively related to child care provision.

Second, we find a positive relationship between mothers' LFP and their daughters' fertility, and that this relationship is weaker for working daughters. Our second set of results may seem counterintuitive because previous literature finds that a decrease in time transfers from mothers to daughters decreases fertility (Aassve et al., 2012b). Nonetheless, an increase in mothers' LFP can also increase income transfers, which have a positive income effect on daughters' fertility choices. Overall, we conclude that the positive impact of mothers' LFP on daughters' fertility can be explained by the income effect dominating the time (or child care provision) effect because the former is stronger

[4]We focus on children under three years of age because formal child care is less common and has potential negative implications for that age group, see Kottelenberg and Lehrer (2014)

when mothers' availability is determined by LFP.

This potential intergenerational trade-off between mothers' and daughters' LFP and fertility choices should be taken into account when designing retirement policies. For example, increasing the retirement age could have implications for young mother's LFP and fertility rates.

The remainder of the paper proceeds as follows. In Section 2, we review the existing literature. In Section 3, we discuss the relationship between mothers' LFP and daughters' LFP and fertility choices. In Section 4, we describe the database, and in Section 5, we discuss the empirical strategy. We present the empirical results in Section 6, and conclude in Section 7.

2 Literature Review

A large body of literature shows a strong and positive link between grandparents' child care availability and daughters' LFP and fertility. The two main challenges faced in many of these studies are identifying a causal relationship and arguing that variables proxying grandparental child care availability, such as geographical distance between mothers and daughters, are a good proxy for child care provision.

Leibowitz et al. (1992) were among the first to establish a marginally significant and positive correlation between the probability of working among mothers with children under the age of two and having a grandmother living in the household in the US.

Similarly, further studies for Europe confirm the strong relationship between grandparents' child care and mothers' LFP in Europe. For instance, Del Boca (2002) and Del Boca et al. (2005) find that in Italy, having a grandmother living near the household and in good health increases the probability of being in the labor market for mothers of children under five years of age.

However, the data used in these studies do not include child care information, and therefore the authors cannot directly test whether the potential channel of the effect

of family distance on daughters' LFP is, in fact, child care. Moreover, Ordinary Least Squares (OLS) estimates are likely to be biased due to omitted variables and reverse causality. An example of a problematic omitted variable that can yield an unclear bias in the estimates' sign is mothers' health: daughters who have to care for their elderly mothers at home (or nearby) might engage in the labor force to pay for their mothers' health expenses, or they may stop working to provide their mothers with care (Pezzin et al., 2007 and Pagani and Marenzi, 2008).

Endogeneity might also arise because mothers and daughters might make simultaneous child care decisions. For instance, if mothers become available for child care once daughters have already decided to engage in the labor force, OLS estimates of the effect of grandparents' child care on mothers' LFP will be biased upwards.

While some recent studies that use precise measures of child care and thus do not suffer from measurement error have confirmed a positive relationship between mothers' child care and daughters' LFP (Aassve et al., 2012a; Albuquerque and Passos, 2010 and Arpino et al., 2010) and fertility (Aassve et al., 2012b), it is possible that their estimates were biased due to endogeneity or omitted variables.

Two other recent papers have attempted to establish a causal relationship between mothers' (or in-laws') geographical proximity and daughters' LFP. While they argue that the effect of co-residence or distance to grandparents on mothers' LFP is through child care provision, they both use census data, which do not contain information on grandparental child care to directly test this hypothesis. The first, by Maurer-Fazio et al. (2011), finds that in China, daughters living with their parents or in-laws are 12 percent more likely to participate in the labor market. The set of instruments used to predict grandparental cohabitation are: the percentage of households in the county who have co-resident parents, in-laws or co-residents aged more than 70 years, daughter's age, husband's age, a set of interactions between the daughter's and husband's age with higher order terms, and a full set of provincial dummies. Nonetheless, there is little discussion about whether these instruments satisfy the exclusion restriction. The average proportion of old individuals

in the county will not fulfill the exclusion restriction if investment in counties with a high proportion of old individuals is devoted to retirement homes rather than children's daycare centers. Moreover, the age of parents is also a problematic instrument because they are highly correlated with grandparents' age, and older grandparents are more likely to have health problems that prevent them from taking care of their grandchildren.

The second paper by Compton and Pollak (2014) finds that the probability of employment increases 4 to 10 percentage points for young married women with young children if they live in the same state as their mothers or mothers in-law. The main concern of this approach is that geographic location is not random. In a more compelling set of estimates, they use the subsample of military wives for whom distance to family is likely to be exogenous, and find similar magnitudes but noisier estimates. However, individuals enrolled in the military may still influence their location; they actually declare their preferred bases when enlisting. Additionally, women who choose to marry military men may be very different from the average woman. Finally, some grandmothers may move with their daughters to take care of their grandchildren.

The first paper that uses data that includes child care information and also tackles identification is by Zamarro (2011). She uses the Survey of Health, Ageing and Retirement in Europe (SHARE) to estimate a joint mother-grandmother LFP model and finds that grandparental child care positively affects mothers' LFP but only in the Netherlands and Greece. This author's identification strategy relies on the assumption that unobserved characteristics related to LFP decisions of mothers and grandmothers are uncorrelated. However, it seems very likely that the degree of labor force attachment can be transmitted from grandmothers to mothers (Farre and Vella, 2013).

More recently, Posadas and Vidal-Fernandez (2013) rely on child care information available in the National Longitudinal Survey of Youth 1979, employ fixed effects and exploit maternal mother's death as an instrument of grandparents' child care to measure the effect of mothers' child care on daughters' LFP in the US. They find that on average, grandparents' child care significantly increases daughters' LFP by nine percentage

points in their fixed effect models. While their fixed effect estimates can only account for individual heterogeneity, unfortunately, their IV estimates, which account for both heterogeneity and endogeneity, are imprecise. Also in this case the exclusion restriction for the validity of the instrument might fail because maternal mother's death is a shock to income and psychological well-being of the mother.

In this paper, we exploit time variation in minimum retirement age laws in Italy as an instrument for mothers' employment status to analyze the effects on daughters' fertility and LFP. Because mothers' LFP choices do not only affect child care (time transfers) but also income transfers to their daughters, our paper is also closely related to another strand of literature showing that fertility and LFP respond to changes in income. Milligan (2005); Cohen et al. (2007) and González (2013) use difference-in-differences and regression discontinuity designs and find that fertility significantly increases with child care subsidies, while Imbens et al. (2001) show that labor supply negatively responds to income shocks.

While our empirical strategy does not directly allow us to measure the direct effect of mothers' child care or income transfers on daughters' LFP, we analyze the impact of mothers' labor supply on both their daughters' fertility and labor supply. We show that even though mothers' LFP negatively affects child care, it increases their daughters' fertility and decreases daughters' LFP. This stands in contrast with the existing literature on child care availability. We argue that this difference can be attributed to the fact that income effects are stronger when mothers' availability is determined by LFP.

Our work is closely related to the work of Dimova and Wolff (2011). Using data from the Survey of Health, Ageing and Retirement in Europe (SHARE), the authors employ fixed effects to analyze the effect of monetary and child care transfers on daughters' LFP. They find a strong positive effect of child care by grandparents on the LFP of daughters, but no impact of monetary transfers.

We believe that our paper complements Dimova and Wolff (2011) in three ways. First, we extend the analysis to include the effect of mothers' LFP on fertility and find a negative

relationship between daughters' fertility and mothers' LFP. Second, our empirical strategy complements Dimova and Wolff's fixed effects estimates because our estimation strategy accounts for omitted variable bias as well as reverse causality. Finally, we believe that unlike Dimova and Wolff (2011) who define a monetary transfer as one gift of at least 250 Euro to a daughter, we find a negative income effect of mothers' LFP on fertility because mothers' LFP is more likely to imply frequent and larger quantities income transfers.

3 Intergenerational Transfers, Labor Force Participation and Fertility

In this section we analyze the theoretical implications of mothers' LFP for daughters' fertility and LFP. We build on existing literature and focus on two types of mechanisms: income and time transfers.[5]

Mothers' LFP and fertility

Theoretically, mothers might affect their daughters' fertility through the provision of either time or income, or both. On the one hand, if a mother provides her daughter (or in-law) with free or low-cost time for child care, fertility should increase in response to the reduction in child care costs. On the other hand, if mothers transfer income, fertility should increase because the extra income can be used to pay for child-related expenditures. Because a rise in mothers' LFP increases the likelihood of monetary transfers at the expense of time transfers, the net effect of mothers' LFP on daughters' fertility is ambiguous. Thus, two situations can emerge:

Case A.1 Mothers' LFP increases daughters' fertility. This indicates that effects associated with the provision of income prevail over the reduction in free or low-cost child care.

[5] Although we focus on income and time transfers as the main mechanisms through which mothers' LFP has an impact on daughters' fertility and LFP, we acknowledge that other (possibly related) mechanisms may operate in practice.

Case A.2 Mothers' LFP decreases daughters' fertility. This could be the case if grandmothers' availability for child care has a stronger impact on daughters' fertility decisions than the transfer from the extra income earned by the grandmother.

The empirical analysis of the impact of mothers' LFP on daughters' fertility will determine whether we are in case A.1 (positive impact) or A.2 (negative impact).

We expect the impact of mothers' LFP on daughters' fertility to differ for working and non-working daughters. Working daughters' fertility decisions should depend less on maternal income than those of non-working daughters because the additional income earned by mothers becomes less relevant for daughters with alternative income sources (either because daughters have decreasing marginal utility of income or because mothers transfer less to daughters with less needs, see Halvorsen and Thoresen, 2011). Moreover, working daughters may be more likely to rely on mothers' availability for child care to make childbearing and working compatible. Given these premises, the following conjecture should hold:

Conjecture 1 Under case A.1, the positive effect of mothers' LFP on daughters' fertility is weaker for working daughters. Under case A.2, the negative effect of mothers' LFP on daughters' fertility is stronger for working daughters.

Hence, if the estimated coefficient of mothers' LFP on daughter fertility is positive, it should be lower when restricting the sample to working daughters only. Moreover, if the estimated coefficient is negative for the whole sample, it should be higher in absolute value than the one for working daughters only.

The effect of mothers' LFP on daughters' fertility may also be different in regions with scarce and expensive child care services because daughters may rely more on both extra income to afford formal child care and grandmothers' child care. In this regard, we expect that:

Conjecture 2 Under case A.1, the positive effect of mothers' LFP on daughters' fertility is stronger in low-childcare-availability regions because maternal income might be pivotal to affording child care. Alternatively, under case A.2, the negative effect of

mothers' LFP on daughters' fertility may be stronger in low-childcare-availability regions because grandmothers' availability for child care becomes crucial when formal child care is not available.

As a result, we expect that the estimated coefficient for the impact of mothers' LFP on daughters' fertility is higher in absolute value in low-childcare-availability regions.

Mothers' and daughters' LFP

Similarly to the case of daughters' fertility decisions, mothers' LFP can influence their daughters' LFP through income transfers and/or child care. On the one hand, the additional income earned by mothers deters daughters with decreasing marginal utility of income from participating in the workforce. On the other hand, the reduction in grandmothers' availability for child care increases the opportunity cost of working for daughters. As a result, differently from the case of daughters' fertility, we make an unambiguous prediction:

Conjecture 3 Mothers' LFP has a negative effect on daughters' LFP.

So far, we have implicitly assumed that young women with children do not work if their potential wage is lower than the cost of childcare. The reason is that the marginal cost of working for mothers is likely to exceed the child care cost since working mothers are forgoing also the time spent with her child, incur in monitoring costs, etc. Instead, if daughters obtain positive utility from working (or they prefer to work to be entitled to retirement benefits or avoid human capital depreciation), it may be the case that the additional income transfers provided by mothers allow daughters to afford formal child care and work if their hourly wage is not high enough to even cover child care costs. In that particular case, income transfers can be such that older women's LFP increases their daughters' LFP even if mothers transfer part of their earned income to daughters.

Despite the unambiguous prediction in Conjecture 3, we can still shed light on the mechanisms behind the interaction of mothers' and daughters' LFP by analyzing daughters with and without young children. We focus on this distinction because previous literature highlights the role of child care needs in the relationship between mothers' and

daughters' LFP. Two different situations can emerge:

Case B.1 The LFP of daughters with children under 3 may be more affected by mothers' LFP because of the reduction in grandmothers' child care availability and/or if mothers make more transfers to daughters with small children.

Case B.2 The LFP of daughters with children under 3 may be less affected by mothers' LFP if mothers' income becomes less relevant for women with small children because fathers contribute significantly to family expenditures.

Again, empirical analysis is required to disentangle which case applies in practice. If the negative impact of mothers' LFP on daughters' LFP is stronger for daughters with children under 3, we interpret it as evidence that we are in Case B.1. In contrast, if the impact is weaker for daughters with children under 3, we conclude that we are in Case B.2.

Finally, the impact of mothers' LFP on daughters' LFP also depends on the provision of formal child care in the region of residence. If formal child care is scarce and expensive, maternal monetary transfers may be more decisive to afford formal child care. Two cases can arise:

Case C.1 The negative effect of mothers' LFP on daughters' LFP is weaker in low-childcare-availability regions because mothers may help to afford formal child care and participate in the labor force more often in those regions.

Case C.2 The negative effect of mothers' LFP on daughters' LFP is stronger in low-childcare-availability regions because grandmothers' lack of availability for child care might become more relevant or they make more income transfers to daughters in poor regions.

If the estimated coefficient of mothers' LFP on daughter's LFP is negative and lower in absolute value in low-childcare-availability regions, we conclude that we are in case C.1. In contrast, if the estimated coefficient is negative but higher in absolute value in low-childcare-availability regions, we are likely to be under Case C.2.

In the remainder of the paper we test our conjectures empirically.

4 Institutional Setting and Data

4.1 The Italian context

The Italian legislation establishes the conditions under which individuals can first draw full retirement benefits, i.e., without actuarial reduction for early retirement. During the last two decades, subsequent reforms have increasingly restricted access to pension benefits. The requisites to access pension benefits are a combination of the minimum retirement age and a minimum number of years the worker has contributed to the Social Security system and are typically different for men and women. The minimum retirement age that applied to the vast majority of women in the labor market increased progressively after the Amato reform in 1992 from 55 years to 60 years in 2000 (see Table A.1 in the Appendix). We exploit that this reform implied an increase from 58 years in the first wave (year 1998) to 60 years in the second wave of our data (year 2003). The minimum retirement age remained constant from 2003 to the 2009 wave. These reforms translated into marked increases in the average effective retirement age for women (see Figure 1).

Among the child care options in Italy, informal child care is predominant among families with children under three years of age because formal child care is scarce and the service is rationed (Brilli et al., 2011). Hence, mothers often rely on other family members to take care of their children. According to the OECD (2009), the average age at which women have their first child in Italy is among the highest of the OECD (29.9 years), only slightly below Germany and the United Kingdom (30 years). Moreover, female LFP in Italy was slightly over 50% in 2010 and is the lowest among all OECD countries.

4.2 The Family and Social Subjects Survey

The Family and Social Subjects Survey (Multiscopo - Famiglia e Soggetti Sociali) is elaborated by the Italian Statistics Institute. It comprises three waves collected in 1998, 2003 and 2009. Each wave surveys around 50,000 individuals in approximately 20,000 households. The survey contains information about individual demographic characteristics,

family interactions (type and frequency), and labor market history. The design has varied slightly across waves. Our study is affected by the omission of the variable indicating mothers' LFP in the 2003 and 2009 waves which forces us to use a TS2SLS estimation in order to include all three waves into our analysis.[6]

4.3 Descriptive statistics

For our estimation we use two samples of women. In the first stage we use a sample composed of mothers of women aged 20-40. The sample of the second stage contains women aged 20-40. Table 1 shows the descriptive statistics for the variables included in the second stage estimation. We observe that more than 63% of women are in the labor force and approximately 51% are employed. Almost 17% of the sample has at least one child under three years of age. Regarding the women's mothers, more than 33% are in the labor force and approximately 23% would not be entitled to benefits if they were to retire. Finally, slightly less than 4% of mothers graduated from university, and almost 17% have an upper-secondary education.

5 Methodology

We estimate the impact of mothers' LFP on fertility and LFP of their daughters by using "mother not entitled to retirement benefits" as an instrument for her LFP.[7] The validity of "mother not entitled to retire" as an instrument for mother's LFP requires two conditions. First, the increase in retirement age of a mother should have an impact on her daughters' LFP and fertility only through mother's LFP. For this first condition to hold, it is crucial to include daughter's age dummies into the model. The reason for

[6] In the 1998 wave, adult children were asked to report their mother's employment status. For unknown reasons, the Italian Statistics Institute did not include the question about mothers' employment status in the 2003 and 2009 questionnaires.

[7] We focus on maternal grandmothers for two reasons: (i) mothers are more likely to take care of their daughters' children than fathers or in-laws (Hank and Buber, 2009 and Posadas and Vidal-Fernandez, 2013) and (ii) information about paternal grandparents is not available in our survey.

this is that two young women of the same age will be equally affected in their future retirement expectations by the change in the retirement law. However, if one of them has a mother who retires as a consequence of the new law while the other does not, the young women will be affected differently by the change in their mothers' LFP as a consequence of the regulatory change. Second, the validity of the instrument depends on the absence of any contemporaneous institutional change correlated both with mothers' statutory retirement age and daughters' LFP. Such a problematic institutional change would had occurred between 1998 and 2003, and would had affected women of the same age differently depending on whether their mothers were 59 or 60 years old. We could not find any evidence that such a peculiar institutional change took place in Italy.[8]

Given our data restrictions, we use a TS2SLS estimation. In the first stage, we use a sample of mothers with information on their LFP and their entitlement to retire (which are the explanatory variable of interest and the instrument, respectively). In the second stage, we use a sample of daughters with information on their fertility, their LFP and their mothers' eligibility for retirement (which are the outcomes of study and the instrument, respectively). TS2SLS estimation is a computationally convenient variant of Angrist and Krueger (1992)'s estimator. According to Inoue and Solon (2010), the TS2SLS estimator is more asymptotically efficient than the Two Samples Instrument Variables estimator. In practice, we estimate a first stage using the sample of mothers and a second stage using the sample of daughters. In the second stage, we impute the predicted probability of mothers' LFP obtained using the first stage estimates. In computing standard errors we follow Murphy and Topel (1985). Unfortunately, this methodology restricts the set of potential controls to variables that are simultaneously present in both samples. For instance, we are able to include mothers' age as control because mothers state their age and daughters declare the age of their mothers.

We first estimate the probability of being in the labor force for mothers with daughters

[8]We can rule out that the Dini reform of the pension system (1995), the Commissione Onofri (1997) on pensions, welfare and health care, and the Treu reform of the labor market (1997) fulfill the criteria that would invalidate the instrument.

between 20 and 40 years of age controlling for age and education level of the daughter.

$$P(MLFP_{it} = 1) = \alpha_0 + \alpha_1 Mretire_t + \alpha_2 Mage_{it} + \alpha_3 Dage_{it} + \alpha_4 Meducation_i + u_{it} \quad (1)$$

where *MLFP* is equal to one if mother i is in the labor force and zero otherwise; *Mretire* is a dummy equal to one if the mother is not entitled to retirement benefits according to her age and the legislation in place at the time of the survey t. *Mage* and *Dage* are dummies for the mother's and the daughter's age, respectively. *Meducation* are indicators for mother's high-school and university education.

The second stage employs the estimated coefficients from the first stage to predict the LFP of mothers and impute it to their daughters. The resulting estimated equations are:

$$P(Dchildren_{jt} = 1) = \beta_0 + \beta_1 \widehat{MLFP}_{jt} + \beta_2 Dage_{jt} + \beta_3 Mage_{jt} + \beta_4 Meducation_{jt} + v_{jt} \quad (2)$$

$$P(DLFP_{jt} = 1) = \beta_0 + \beta_1 \widehat{MLFP}_{jt} + \beta_2 Dage_{jt} + \beta_3 Mage_{jt} + \beta_4 Meducation_{jt} + v_{jt} \quad (3)$$

where the dependent variable is equal to one if the daughter j has children under three years of age (Equation 2), or if she participates in the labor force (Equation 3). $\widehat{MLFP}$ is the predicted value of a mother's participation in the labor market from the first stage; *Dage* is the daughter's age, *Mage* is the mother's age and *Meducation* are dummies for mother's high-school and university education. Standard errors are clustered at the household level to account for the presence of sisters in our sample.

6 Results

To get a sense of the potential relationship between mother's LFP and daughter's fertility and LFP, we show the results of the reduced-form estimations of daughter's fertility and

LFP on "mother not entitled to retire" in Table 2.[9] The first column shows the results for fertility using the entire sample of young women. The second column displays the results for fertility using only employed young women. The third column shows the results for LFP using the entire sample of young women. Finally, the results for LFP using only young women with children under three years of age are displayed in the fourth column. We use this specification as a first approximation to distinguish between cases A.1 and A.2., to test Conjecture 3, and to distinguish between cases B.1 and B.2 as previously stated in our theoretical discussion. The first and second columns of Table 2 show that the effect of "mother not entitled to retire" on daughters' fertility is positive and weaker for working daughters. Hence, our results are consistent with case A.1. The effect of "mother not entitled to retire" on daughters' LFP is negative and weaker for daughters with children under three. This suggests that Conjecture 3 holds and that case B.2 is most likely to apply in practice. Thus, our results are consistent with the presence of income effects that offset the reduction-in-childcare effects. These income effects on fertility would be weaker for working daughters because additional income from their mothers is likely to have weaker effects on them. Income effects on LFP would be weaker for daughters with children under three, possibly because the fathers of their children contribute to family income.[10] Nonetheless, it could also be that working mothers co-finance formal child care for their grandchildren, allowing daughters to participate in the labor force, which results in a weaker negative correlation between mothers' non-elegibility for retirement and daughters' LFP.

Table 3 shows the results of the TS2SLS estimation of the impact of mothers' LFP on fertility (Equation 2) and LFP (Equation 3). These results are consistent with those in Table 2. The impact of having a mother in the labor force on fertility is positive and is

[9]We use "mother not entitled to retire" rather than simply "mother entitled to retire" to ease interpretation in terms of mothers' LFP. This estimation does not require the use of two samples because the necessary information is available from the sample of daughters.

[10]We run regressions where we further subdivide the sample of daughters with children under three between married and unmarried daughters. The point estimates in those regressions corroborate our hypothesis. However, the sample size is too small to provide significant estimates.

weaker for working daughters. The effect of mothers' LFP on daughters' LFP is negative and smaller for daughters with children under three. Hence, this constitutes additional evidence that for fertility, the effect of income (possibly through monetary transfers) prevails over effects arising from provision of time by grandmothers.

In the first stage (Equation 1), the variable "mother not entitled to retire" has a coefficient of 0.065 and a standard deviation of 0.014. This corresponds to an F-statistic of the excluded instrument of 20.94 which is well above the threshold determined by the Stock and Yogo (2005) test. The results displayed in Table 3 are robust to the use of a Probit model instead of the linear model to predict the probability that the mother is in the labor force (see Table 4).[11]

The TS2SLS strategy provides information only on the effect of mothers' LFP for compliers, i.e., for daughters of women whose decisions to participate in the labor market depend on retirement laws. Under the assumption that the impact has the same sign for compliers and non-compliers, we can determine intervals for the average impact of mothers' LFP on their daughters' fertility and LFP in the whole population. The impact of mothers' LFP on their daughters' fertility is between -0.158 and -0.169 for all daughters and between -0.029 and -0.154 for working daughters. The impact of mothers' LFP on their daughters' LFP is between 0.051 and 0.366 for all young women and between 0.008 and 0.422 for those with children under three. The details regarding the computation of these numbers can be found in the Appendix.

Do the aforementioned results imply that mothers' LFP does not affect daughters' LFP through the channel of child care? We check this hypothesis by regressing child care provision on mother entiled to retire, controlling for mothers' and daughters' age and education as well as for regional dummies.[12] Table 5 shows that "mother not entitled to retire" is associated with a lower probability of child care provision. Hence, mothers' LFP

[11]This estimation is only valid under the assumption that the conditional expectation function of the first stage is a probit. Unfortunately, such an assumption is not testable and hence, the estimates should be interpreted with caution (Angrist and Pischke, 2009).

[12]We do not use IV estimation because while our instrument is strong for addressing endogeneity in older women's LFP, it is not so strong for predicting child care provision.

implies less provision of time for child care. However, this does not show up in Tables 2 and 3 because forces that operate in the opposite direction prevail (income effects, time complementarities between mothers and daughters, role models, etc.).

Finally, in order to understand if the effect of mothers' LFP depends on the availability of formal child care, we run separate regressions for regions with high and low child care provision. To classify these regions, we use the number of child care slots over the population aged 0-2 used by Brilli et al. (2011). According to their classification, in the regions of Piemonte, Valle d'Aosta, Lombardia, Trento, Liguria, Emilia Romagna, Toscana, Umbria, Marche, and Lazio, there is higher child care availability than in the rest of Italy. In this classification, high child care availability areas coincide with richer Northern areas (with the two notable exceptions of Veneto and Friulli). The results in Table 6 show that the impact of mothers' LFP is weaker in high child care availability areas and hence corroborate that case A.1 is most likely to apply in practice. It also provides evidence consistent with case C.2. Additionally, we find that the smaller effect of mothers' LFP choices on the LFP of their daughters with small children is driven by low-childcare-availability regions. This may indicate that mothers are more helpful in co-financing child care in regions where formal child care is scarce and expensive.

7 Discussion

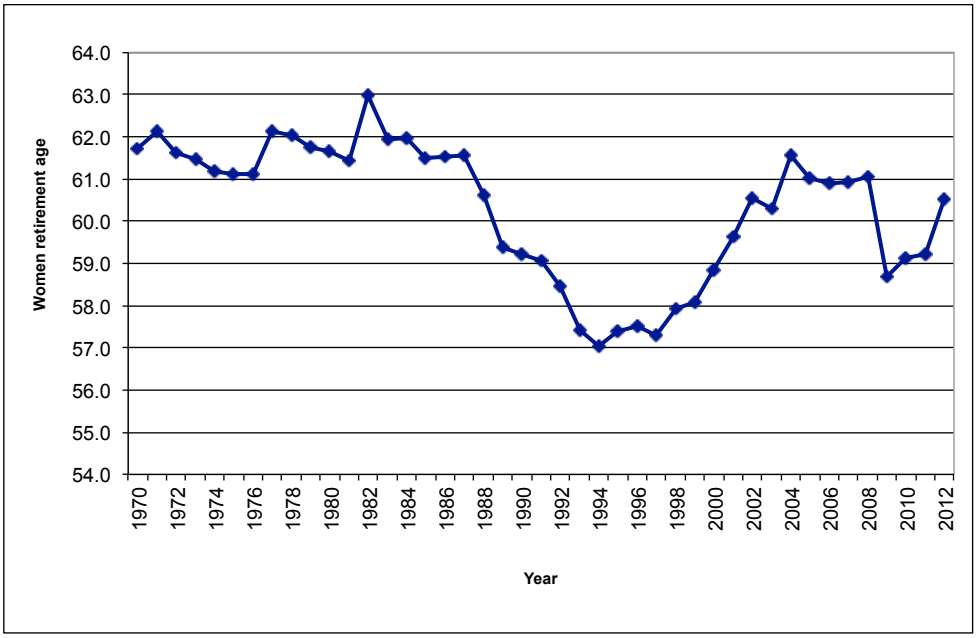
The increase in women's LFP in the last decades together with increases in legal retirement ages in many OECD countries has reduced grandmothers' availability for child care. Previous literature has found that grandmothers' availability for child care increases fertility and LFP of their daughters. However, previous findings are not fully applicable to the case in which grandmothers' availability is determined by their LFP, which affects intergenerational transfers of both time and money. We explore the impact of mothers' (grandmothers') labor supply on fertility and labor market participation decisions of their daughters and find that mothers' labor supply increases daughters' fertility (but less for

working daughters) and decreases LFP (but not as much for daughters with children under three). We interpret this as evidence that income effects prevail over effects arising from time provision by the grandmother.

Our results have relevant policy implications. Increases in the legal retirement age are often implemented as a way to attenuate the effects of demographic ageing and compensate for financial imbalances in the pension system. Moreover, increasing legal retirement age has been used as a tool to mitigate the impact of the financial global economic crises that started in 2008. When designing retirement policies, authorities should be aware that increases in the legal retirement age of women with grandchildren have implications for the fertility and labor supply of their daughters. In particular, increases in legal retirement age imply increases in fertility but reductions in young women's LFP. Therefore, policies that imply rises in actual retirement age may need to be complemented by measures to promote the LFP of young women with young children.

Figures

Figure 1: Evolution of women's retirement age over time



Tables

Table 1: Descriptive statistics

Variable	Mean	Std. Dev.
Daughter in labor force	0.634	D
Daughter Working	0.508	D
Daughter has children under three	0.169	D
Mother not entitled to retire	0.229	D
Predicted mother's LFP	0.336	0.151
Daughter's age	30.54	D
Mother's age 58-60	0.059	D
Mother's age under 58	0.804	D
Mother's age over 60	0.137	D
Mother high-school graduate	0.168	D
Mother university graduate	0.037	D

Standard deviations displayed only for continous variables. D stands for dummy variable. The sample, drawn from the Multiscopo Survey, consists of women aged 20 to 40 years whose mother is alive. The number of individuals is 21,320.

Table 2: The effect of mothers' non-entitlement to retire

	Fertility	Fertility if working	LFP	LFP if children
	(1)	(2)	(3)	(4)
Mother not entitled to retire	0.158***	0.120***	-0.051***	-0.034*
	(0.008)	(0.009)	(0.008)	(0.019)
Mother high-school grad	-0.014**	0.016*	0.009	0.187***
	(0.007)	(0.009)	(0.009)	(0.021)
Mother university grad	-0.037***	-0.023	-0.1***	0.1*
	(0.011)	(0.016)	(0.018)	(0.051)
Year 2003	-0.019***	-0.021***	0.031***	0.021
	(0.006)	(0.007)	(0.008)	(0.019)
Year 2009	-0.009	-0.013*	0.064***	0.043**
	(0.006)	(0.008)	(0.008)	(0.02)
Obs.	21,320	13,521	21,320	3,612
F statistic	68.235	33.889	27.238	10.157

In columns 1 and 2 the dependent variable is equal to one if the woman has a child under three and zero otherwise. In columns 3 and 4, the dependent variable equals one if the daughter is in the labor force and zero otherwise. The coefficients shown are those of the indicator for the mother not being entitled to retire. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All regressions control for daughter's and mother's ages, mother's level of education and year dummies.

Table 3: The effect of mothers' LFP: TS2SLS

	Fertility	Fertility if working	LFP	LFP if children
	(1)	(2)	(3)	(4)
Mother's LFP	0.659***	0.497***	-0.214***	-0.140*
	(0.032)	(0.038)	(0.035)	(0.08)
Mother high-school grad	-0.152***	-0.088***	0.054***	0.216***
	(0.009)	(0.012)	(0.012)	(0.027)
Mother university grad	-0.258***	-0.190***	-0.028	0.147**
	(0.015)	(0.02)	(0.021)	(0.058)
Year 2003	0.037***	0.021***	0.012	0.009
	(0.006)	(0.008)	(0.008)	(0.02)
Year 2009	0.048***	0.03***	0.045***	0.031
	(0.007)	(0.008)	(0.009)	(0.02)
Obs.	21,320	13,521	21,320	3,612
R^2	0.077	0.061	0.032	0.069
F statistic	68.235	33.889	27.238	10.157

In columns 1 and 2 the dependent variable is equal to one if the daughter has a child under three and zero otherwise. In columns 3 and 4, the dependent variable equals one if the mother is in the labor force and zero otherwise. The coefficients shown are those of predicted mother's LFP. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All regressions control for daughter's and mother's ages, mother's level of education and year dummies.

Table 4: The impact of mothers' LFP. First stage probit

	Fertility	Fertility if working	LFP	LFP if children
	(1)	(2)	(3)	(4)
Mother's LFP	0.45***	0.348****	-0.120***	-0.085
	(0.022)	(0.027)	(0.025)	(0.056)
Mother high-school grad	-0.109***	-0.059***	0.034***	0.206***
	(0.008)	(0.01)	(0.01)	(0.025)
Mother university grad	-0.194***	-0.150***	-0.058***	0.131**
	(0.013)	(0.018)	(0.019)	(0.056)
Year 2003	0.049***	0.032***	0.012	0.006
	(0.007)	(0.008)	(0.009)	(0.02)
Year 2009	0.06***	0.04***	0.045***	0.028
	(0.007)	(0.008)	(0.009)	(0.021)
Obs.	21,320	13,521	21,320	3,612
R^2	0.076	0.061	0.032	0.068
F statistic	67.129	33.891	26.693	10.123

In columns 1 and 2 the dependent variable is equal to one if the daughter has a child under three and zero otherwise. In columns 3 and 4, the dependent variable equals one if the daughter is in the labor force and zero otherwise. The coefficients shown are those of predicted mother's LFP using a Probit model. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All regressions control for daughter's and mother's ages, mother's level of education and year dummies.

Table 5: Retirement and child care

Dep var: child care	(1)	(2)	(3)
Grandmother not entitled to retire	-0.031*	-0.041**	-0.042**
	(0.016)	(0.018)	(0.018)
Year2003	-0.115***	-0.109***	-0.113***
	(0.019)	(0.019)	(0.019)
Year2009	-0.079***	-0.075***	-0.085***
	(0.019)	(0.02)	(0.02)
Mother high-school grad		0.023	-0.022
		(0.023)	(0.024)
Mother university grad		-0.130**	-0.173***
		(0.056)	(0.057)
Daughter high-school grad			0.119***
			(0.018)
Daughter university grad			0.125***
			(0.026)
Mother's age	No	Yes	Yes
Daughter's age	No	No	Yes
Obs.	3,612	3,612	3,612
F statistic	12.56	3.48	3.803

The dependent variable is equal to one if the grandmother is the primary care giver for at least one of her grandchildren and zero otherwise. The coefficients shown are those of the indicator for grandmother not entitled to retire. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All regressions control for daughter's and mother's ages, mother's level of education and year dummies.

Table 6: The effect of mothers' LFP: High and low child care regions

High child care availability regions

	Fertility	Fertility if working	LFP	LFP if children
	(1)	(2)	(3)	(4)
Mother's LFP	0.544***	0.374***	-0.120***	-0.238**
	(0.038)	(0.043)	(0.046)	(0.109)
Mother high-school grad	-0.104***	-0.042***	0.0009	0.184***
	(0.013)	(0.015)	(0.015)	(0.035)
Mother university grad	-0.205***	-0.148***	-0.121***	0.055
	(0.021)	(0.027)	(0.028)	(0.078)
Year 2003	0.031***	0.017*	0.025**	0.026
	(0.009)	(0.01)	(0.011)	(0.027)
Year 2009	0.045	0.021	0.057	0.014
	(0.01)	(0.011)	(0.011)	(0.028)
Obs.	10,357	7,480	10,357	1,729
R^2	0.068	0.056	0.055	0.076
F statistic	28.764	16.915	23.011	5.395

Low child care availability regions

	Fertility	Fertility if working	LFP	LFP if children
	(1)	(2)	(3)	(4)
Mother's LFP	0.773***	0.666***	-0.333***	-0.050
	(0.037)	(0.049)	(0.05)	(0.11)
Mother high-school grad	-0.202***	-0.151***	0.075***	0.205***
	(0.013)	(0.018)	(0.017)	(0.043)
Mother university grad	-0.307***	-0.240***	0.042	0.246***
	(0.02)	(0.03)	(0.03)	(0.088)
Year 2003	0.043***	0.027**	0.003	-0.003
	(0.009)	(0.012)	(0.012)	(0.027)
Year 2009	0.051***	0.042***	0.043***	0.053*
	(0.009)	(0.012)	(0.013)	(0.029)
Obs.	10,963	6,041	10,963	1,883
R^2	0.092	0.076	0.023	0.066
F statistic	42.449	19.07	9.992	5.08

In columns 1 and 2 the dependent variable is equal to one if the daughter has a child under three and zero otherwise. In columns 3 and 4, the dependent variable equals one if the mother is in the labor force and zero otherwise. The coefficients shown are those of predicted mother's LFP. The coefficients are marked with * if the level of significance is between 5% and 10%, ** if the level of significance is between 1% and 5% and *** if the level of significance is less than 1%. All regressions control for daughter's and mother's ages, mother's level of education and year dummies.

Appendix A

Table A.1: Women's retirement age after 1992 Amato's Reform

Year	Private Employees	Public Employees	Self-employed
1992	55	55	55
1993	55	55	55
1994	56	56	56
1995	56	56	56
1996	57	57	57
1997	57	58	58
1998	58	58	60
1999	59	59	60
2000	60	60	60
2001	60	60	60
2002	60	60	60
2003	60	60	60
2004	60	60	60
2005	60	60	60
2006	60	60	60
2007	60	60	60
2008	60	60	60
2009	60	60	60
2010	60	61	60
2011	60	61	60
2012	62	62	63

Source: Own elaboration.

Appendix B

In this section, we compute intervals for the average effects in the population using the coefficients obtained from the IV estimations and under the assumption that the impact follows the same direction for compliers and non-compliers. The proportion of compliers is obtained from the first stage estimation and equals 0.24. IV estimations indicate that the impact of mothers' LFP on their daughters' fertility is positive. Hence, the effect for non-compliers must be contained between 0 and 1. If the effect was 0, the average effect would equal the proportion of compliers (0.24) times the estimated IV coefficient (0.659), which gives 0.158. Moreover, descriptive statistics show that the average proportion of young women with children under three years is 0.169, and therefore the average effect cannot exceed 0.169. If the effect was 1, the average effect would equal the upper bound of 0.169. Hence, we conclude that the average effect is between 0.158 and 0.169. Similar computations lead to the intervals for the subsample of working women and for the impact of mothers' LFP on their daughters LFP.

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