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Immigrants, Domestic Labor and Women's Retirement decisions

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Abstract

This paper estimates the effect of immigrants on the women-men gap in retirement and working decisions. We focus on the effect that operates through immigrants' supply of domestic labor, which substitutes women's household services especially in the care of elderly parents. We use a dataset of Italian households that contains information on planned retirement age, labor supply and family structure for a representative sample in the years 2000-2008. A "double difference" identification approach exploits the women-men differences between families with and without old parents, interacted with the supply of immigrants in the local labor market. We find that an increase of immigrants by one percentage point of the local population is associated with an increase in the planned retirement age gap between women and men by 0.45 years if they had a living parent over 80. Such differential was instead only 0.17 if the household had no living old parent. The effect found is stronger for poor or less educated women and particularly correlated with the inflow of Eastern European female immigrants, the group supplying the largest share of labor for domestic care.

1. Introduction

In this paper we analyze how changes in the local supply of immigrants affected the labor supply and retirement decisions of women over 55 years, relative to men in Italy. The main hypothesis of this paper originates from two observations. First, most of the household work in many countries (e.g. Burda et al., 2008), is performed by women and a growing share of that work has involved in European countries the care of an elderly parent. Second, in several countries of Europe the recent inflow of immigrants produced a significant increase in the supply of workers performing domestic services and specifically those associated to elderly care. In this paper we devise an empirical strategy to isolate the effect that immigration has on women labor supply and retirement decisions through the supply of care services for elderly people. Available and affordable elderly care services provided by immigrants, have affected the decision of retirement for women with elderly parents, relative to men. We isolate this impact by using a "double-difference" approach. Differences in immigrant supply

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can produce differential effects on labor supply and retirement choices of men and women through two channels. One is the labor market competition/complementarity and the other is the substitution for domestic labor. To control for the first effect and identify the domestic labor substitution effect only, we consider the impact on women-men differentials across families with and without elderly parents. Our interpretation is that differences in the impact between these two types of families represent the additional effect of immigration on women-men gap, deriving from domestic help with elderly parents. While the labor market competition effect of immigrants can be different for men and women, it is unlikely to vary between families with and without older relatives. The substitution effect on domestic labor, instead, should be stronger for women and stronger in families with older relatives. As the relative intensity of the domestic labor substitution and wage competition effect for women (and men) may also depend on their potential wage, we analyze these effects also separating between more and less educated women (which have different potential wages). The outcome variables that we will analyze are labor supply and planned retirement age.

In the existing literature the analysis of the effects of immigration on female labor supply has focused mainly on women during child-rearing years and on the availability of immigrants as baby-sitters (e.g. Barone and Mocetti, 2011; Cortès and Tessada, 2011; Farrè et al., 2011;[1] Cortès and Pan, 2013). We focus on the role of women and immigrants in caring for older relatives, instead, which is much more likely to be relevant in Italy for several reasons. First, in countries where fertility rates declined and population aged rapidly (as it is the case in Southern Europe) a large share of the household responsibilities of adult women has shifted from child-care to the care of elderly parents. Arrangements such as assisted living in institutions for the elderly were much less preferred than assisted living in one's own home so women were left to care for their older relatives. In our sample of women in the 55-70 age range we have information for one year (2000) on the time devoted to care activities weekly. Only 12 percent of these women performed any child care activity while 62 percent performed care activities for older relatives.

Second, the contribution of immigrant labor to the child care sector in Italy was negligible. According to the Italian Labor Force Survey, only 0.6 percent of employed immigrants worked in the child care sector, as opposed to the 11 percent in elderly care (LFS, 2004-2009). Therefore in this study we focus on the role of increased availability of immigrants as domestic workers providing an important substitute for women in the role of caretakers of elderly people. The affected age-group is that of women 55 and older. However not all of them were affected by the availability of care. Those with relatively young or deceased parents were not affected by the local availability of elderly care. Hence we analyze the differential effect of immigrants on the relative women-men retirement age or work participation (first difference) between families with and without elderly

[1] Farrè et al. (2011) is the only study looking also at the contribution of immigrants on the labor supply of 25-65 women with elderly relatives.

parents (second difference). This method isolates only the margin we are interested in.

Italy represents an interesting case to test such hypothesis. First, women participation in the labor market was still low in the 2000's (female employment/population ratio was 46% in 2010, one of the lowest in Europe) hence arrangements or policies increasing their labor market participation can have large impact. Second, Italian women, even when participating in the labor market, still performed the lion share of household services. The time spent by Italian women, 55 years and older, caring for family members was on average almost twice the time spent by men (14 vs. 8 hours per week).[2] The gap does not disappear once we control for the employment status (10 vs. 7 hours) and it increases when an older parent (defined as 80 years of age or older in the rest of the paper) was present in the household: (17 vs. 9 hours).[3] Finally, in Italy, during the last two decades the sector of domestic care-taker services has expanded massively due to foreign workers. In contrast, institutions devoted to assisted living for the elderly have not grown much.[4]

Although we use a double difference approach that differences away several unobserved characteristics of families across Italian regions, the selection of some unobservable individual characteristics into regions with fast immigrant growth may bias the results. At the same time unobserved labor demand shocks that are correlated with inflow of immigrants and with the specific women-men differentials in retirement and labor supply may still linger in the OLS regression. For this reason, on top of the double difference approach we also include individual fixed effects in the estimation (as the dataset, a panel of individuals, allows us to do so) which accounts for unobserved heterogeneity of individuals. And we use a shift-share instrument for the share of immigrants in the regional market, based on the distribution of immigrants across Italian regions, by nationality in 1991 and on their aggregate inflow in the 2000-2008 period. Only pre-determined variation in nationalities across regions affects the variation of such instrument. This 2SLS approach should isolate the part of immigration to a region, driven by network/preferences and exogenous to local labor demand and productivity shocks which may affect retirement decisions.

The main findings of our analysis are as follows. First we find that an increase in the share of immigrants in the population of a region has a significant and positive effect on the women-men differential in planned retirement age and on the women-men differences in probability of work over age 60. This effect is especially strong for families with elderly parents. In fact an increase in immigrants by 1 percentage point of the regional population increases the planned retirement age of women over 55, relative to men by 0.17 years and this

[2] These aggregate statistics are calculated from our dataset (SHIW) which provides information on self-reported time use in household chores and caring for family members for the year 2000.

[3] In a cross-country perspective, this evidence is also confirmed by Burda et al. (2008) who look at time-allocation data for European households.

[4] In Italy strong and persistent familial ties between children and their parents, accompanied by the low mobility of young people, have encouraged families to look after their elderly. Publicly provided residential care covers only 3% of those aged 65 and over (Presidi residenziali socio-assistenziali e sanitari, 2009, ISTAT). Institutions for the elderly (such as assisted living) care for only three out of 1,000 people aged 65 and over. They are perceived by families as being less desirable than caring for the elderly in their own home.

differential is 0.45 years if the family has elderly parents. The average planned retirement age of men is 62.75 years and of women is 61.45, so in regions with large immigration increases (up to 4 percentage points over the 2000-2008 period) the estimated effect could easily produce later retirement age for women than for men in families with older relatives. Similarly, the women-men differential in probability of working over 60 increases by 7 percentage points relative to the same differential for families without old relatives. As the average women-men differential in probability of employment over 60 was about 9 percentage points, regions experiencing increases in immigrants by more than one percentage point of the population could see that differential reversed, in favor of women, in families with old parents. These effects are reasonable if compared with estimates of the effect of parent disability on probability of employment of daughters. For instance, Crespo and Mira (2014) estimate that occurrence of parent disability would decrease the probability of working for Southern European daughters in their 50's by 9 to 12 percentage points. This is comparable (with opposite sign) to the effect of an increase of immigrants by 1 percentage point of the population. Also Farrè et al. (2011) find an 8% increase in probability of working for women, after their husband retires, in regions where the foreign-born share of population increased by 1%. Again this is similar to our estimated differential effect on women.[5]

The rest of the paper is organized as follows. Section 2 provides a review of the relevant literature on the impact of immigration on female labor market outcomes and on determinants of retirement. Section 3 presents the empirical specification and discusses the identification strategy. Section 4 describes the data used and Section 5.1 discusses the main results obtained. Section 5.2 considers the differences in the labor and retirement response of women depending on their education and wealth. Section 6 provides robustness checks for our findings and two falsification exercises. Finally, the paper is concluded by Section 7.

2. Basic Facts and Literature Review

Immigration has been a steadily increasing phenomenon in Italy, as in several other European countries. In 1991 immigrants represented only 0.6% of the total resident Italian population. In 2011, they reached 8% of the total population (4 million individuals). Eastern European immigrants, responsible for 92% of new immigrants as of 2010, was the fastest growing group.[6] At the same time the domestic labor sector attracted foreign workers. Considering only workers registered to the Italian National Social Security Institute (INPS), the percentage of immigrants in the domestic labor sector increased from 51% in 2000 to 80% in 2008. Between 2002 and 2010 the employment of foreign-born domestic labor increased by 78% vis-à-vis an increase of natives by 14% (333,513 units vis-à-vis 38,183 units).[7]

[5] Our estimated absolute effect on the probability of working for women with old parents is a bit lower: an increase by 5 percentage points as the share of immigrants rises by 1 percentage point.

[6] Eastern European immigrants, especially women, is the group of immigrants most heavily employed in domestic labor, followed by Asian immigrants (INPS).

[7] These percentages are likely to under-estimate the actual contribution of immigrants, as a large part of them is not registered with the INPS, or lacks a regular contract.

This paper is related to the literature about the impact of immigration on different outcomes of natives. The literature has focused mainly on the competition/complementarity effects of immigrants on the labor market opportunities of native workers.[8] However a series of recent papers, has investigated the relationship between immigration and labor supply of women (Barone and Mocetti, 2011; Cortès and Tessada, 2011; Farrè et al., 2011; Cortès and Pan, 2013). Cortès and Tessada (2011) show that low-skilled immigration, by reducing the cost of household services, increases the labor supply of young educated women, reducing the time spent in household production and increasing their expenditure in housekeeping services. For Italy, Barone and Mocetti (2011) find similar results, showing that female immigrants who specialized in domestic labor increase the labor supply of young highly-educated Italian women by increasing their working hours. Also Cortès and Pan (2013) find that temporary migrant workers in the domestic sector have increased female labor force participation rates for women in Hong Kong and the effect has been particularly large for highly educated women with young children. No previous study, however, has looked at the effect of immigration on retirement decision. The closest study to ours is Farrè et al. (2011), who analyze the impact of female immigration to Spain on the labor supply of highly educated native women. Among others, one of their findings shows that female immigration rises the probability that highly skilled women with elderly relatives participate in the labor market. Our paper differs from theirs in three main aspects. First we use a different (double difference) identification strategy that explicitly uses the presence of elderly parents interacted with immigrants share to capture the domestic-labor substitution effect of immigrants. Second we focus on 55 and older[9] in order to isolate the more likely users of immigrants for elderly care. Third we analyze the impact of immigrants on planned retirement age, an outcome previously ignored, as our survey data include such information.

Our paper is also related to the literature on the determinants of retirement. Stock and Wise (1990) is the seminal work explaining the choice of retirement according to an Option Value (OV) model. That model considers the different utilities associated with immediate retirement versus the utility associated with its postponement. A rational agent would choose the option with the highest corresponding utility and retire at the optimal age. Several papers have drawn on the seminal contribution of Stock and Wise (1990) and evaluated, using this model, the effectiveness of policies and financial incentives in affecting retirement age. Brugiavini and Peracchi (2004) and Belloni and Alessie (2009, 2013) are such examples. Thus we can think of the individual decisions as depending on factors affecting the value of retirement, such as the OV of retirement in addition to the presence of foreign domestic labor in the region. We therefore introduce both factors in our empirical analysis. If the OV of retirement captures the direct financial incentive to retire, the local presence of immigrants

[8] See Card, 1990, 2001, 2009a,b; Gavosto et al., 1999; Borjas, 2003; Dustmann et al., 2005; Venturini and Villosio, 2006; Peri, 2007; Borjas et al., 2008; D'Amuri et al., 2010; Staffolani and Valentini, 2010; Peri and Sparber, 2011; Manacorda et al., 2012; Ottaviano and Peri, 2012, among others.

[9] The authors consider women of 25-65 years as opposed to our analysis looking at 55-70 years.

might affect retirement decisions by changing the market structure of the local labor market for long term care. This can occur by increasing the availability of these services (thus reducing search costs) or reducing their market costs. Both channels would produce a decrease in benefits from early retirement for those in need of the service provided by immigrants. The literature has recognized that the needs to assist elderly parents may act as a disincentive to continue working. The evidence agree on the negative effect of elderly care on labor supply, typically higher on women than on men (Carmichael and Charles, 2003; Van Houtven et al., 2013). Existing studies analyze the US, Canada (Wolf and Soldo, 1994; Ettner, 1996; Kolodinsky and Shirey, 2000; Lilly et al., 2010), the UK (Carmichael and Charles, 1998, 2003) and some consider cross-country studies of European countries. Bolin et al. (2008) and Crespo and Mira (2014) find that providing care to elderly relatives has a negative effect on individual labor force participation of 50 and older in southern Europe. In addition, a recent study shows that female caregivers of older relatives in the US are more likely to be retired (Van Houtven et al., 2013). Retiring earlier allows workers to care for parents and avoids buying long-term care on the formal market which can be very expensive. In this spirit our paper analyzes a market-based mechanism to achieve an increase in retirement age: increase the supply of domestic labor by immigrants reducing the cost of the care of elderly parents and enabling women to continue participating into the labor market.

3. Empirical Framework: Double difference

3.1. Basic Specification

Our empirical strategy is based on a specification relating outcome y_{irt} that captures, alternatively, measures of retirement or labor supply for individual i in region r at time t, to the share of immigrants in the regional labor market and its interactions with gender and family characteristics. We include in the basic specification the share of immigrants in the region-year (f_{rt}), the interaction of that share with a female dummy ($female_i * f_{rt}$), one with a dummy for the presence of old parents ($old\ parents_{irt} * f_{rt}$), and the double interaction between the presence of elderly parents, the female dummy and the share of immigrants ($female_i * old\ parents_{irt} * f_{rt}$). The interaction terms allow immigrants to have a differential effect on women and men labor supply as well as differential effects across families with or without older relatives. The first type of differences are potentially related to the different degree of competition between immigrants and males or females in the labor market. The double interaction, however, isolates the extra-effect on women-men differential due to the presence of elderly parents in the family. We interpret this additional effect as a clean estimate of the impact of immigration on relative women-men decisions due to the immigrant role as substitutes for domestic care-taker of the elderly. The basic estimated specification is as follows:

$$y_{irt} = \phi_i + \phi_t + \alpha_0 X_{irt} + \alpha_1(old\ parents_{irt}) + \alpha_2(female_i * old\ parents_{irt}) + \tag{1}$$
$$+ \beta f_{rt} + \gamma_1(old\ parents_{irt} * f_{rt}) + \gamma_2(female_i * f_{rt}) + \gamma_3(female_i * old\ parents_{irt} * f_{rt}) + \varepsilon_{irt}$$

As mentioned above, the dependent variable y_{irt} is an outcome which will be, alternatively, the planned retirement age, a dummy for being employed, or for working full time or the number of hours worked for those who are employed. The term ϕ_i represents a set of individual fixed effects capturing time invariant individual characteristics (including gender) that may affect labor supply and planned retirement. The term ϕ_t captures a set of year fixed effects, proxying for year specific conditions. The vector X_{irt} includes individual time-varying characteristics that may influence retirement and labor market decisions. They include 5-year age dummies, a marital status dummy, the logarithm of net household wealth, the number of living sisters and the number of living brothers (their presence may reduce the burden of parent's care). In the specification with planned retirement age as outcome we include individual controls for financial incentives to retire that we compute by using an Option Value framework[10] and controls for the eligibility for seniority pension (that changed over time according to requirements based on age, seniority, private/public sector, and occupation[11]). In calculating these financial incentives we took into account the change in eligibility requirement over time. In addition, we control for Law n. 243 (23/08/2004)[12] that introduced fiscal incentives to delay retirement, and the possibility for women to retire earlier by accepting the pension benefit to be entirely computed according to the contributive system.[13] Among the individual controls we also include the dummy $old\ parents_{irt}$ equal to one if the individual has at least a living parent (or parent in law) over the age of 80, and the interaction $(female_i * old\ parents_{irt})$.[14] Finally the term ε_{irt} captures all the zero-mean idiosyncratic random shocks to the outcome variable for individual i, in region r at time t.

The focus of our analysis is the estimate of the coefficient γ_3 which captures the additional effect of immigrants on the women-men differential in families with old parents relative to those without. This term is the cleanest estimate of the effect of immigrants on relative women-men labor supply, through their role as substitutes for domestic labor. Using the coefficients β, γ_1, γ_2, and γ_3 we can describe also the impact of immigration individually on men, and on women with and without elderly parents. More importantly we focus on the

[10] For the computation of the predicted measure of the OV see the Appendix.

[11] Until 1995, workers could opt for an early retirement and claim the seniority pension at any age, provided that they had 35 years of contributions. The 1995 Reform (*Law* 335/1995) restricted substantially the access to the seniority pension, both increasing the minimum years of contributions and introducing a new eligibility rule, as a combination of minimum age and minimum seniority. These requirements varied also by public/private sector, white/blue collar occupation, and by year. See Table A.1 in the Appendix for details.

[12] For a detailed description of the 2004 pension reform, see Fornero and Sestito (2005).

[13] We include two indicators, one set equal to one for those eligible over the period 2004-2007 when the fiscal exception was in place, and a second indicator set equal to one for women eligible since 2004.

[14] Notice that the variable $old\ parents_{irt}$ is not fixed at the individual level. For 22% of the sample it changes value within the time-period considered either because parents turn 80 years (value goes from 0 to 1) or because they die (value goes from 1 to 0).

women-men differentials. In families with no elderly parents such differential is γ_2 and in families with elderly parents it is $\gamma_2 + \gamma_3$. While part of the γ_2 difference could still be due to the effect of immigrants substituting for women's domestic labor in all families, part of it can be due to differential competition on the labor market, leading men to supply less labor and retire earlier. Assuming that the labor-market differential competition effects are unaffected by the presence of elderly parents, we obtain that the additional effect γ_3 on families with elderly parents is only due to the role of immigrants in substituting women as care-takers of those parents. While in our main table we will show the effect of immigrants on males and females individual outcomes separately, our focus is on the differential outcomes and subsequent tables include only the differential effects.

3.2. Identification and IV strategy

Our data set includes individual observations spanning the period 2000-2008. We exploit the longitudinal dimensions of the data and as noted in (1) we include a fixed individual effect to control for unobserved individual characteristics. The fixed effects control for individual heterogeneity that can be correlated with immigrants presence and retirement behavior and hence reduce problems of selection on unobservable characteristics. This approach can still produce inconsistent estimates of the causal impact of immigration if unobservable variables changing over time at the regional level affect both immigration and women's incentives to retire and to work relative to men. For instance an unobserved current or past shock in labor demand at local level could affect the current local share of immigrants as well as the women-men relative propensity to retire. This would violate the assumption of strong exogeneity of the explanatory variables. The fact that our variable of interest is a double difference, however, implies that a large number of unobserved factors that affect women-men labor market outcomes and may be correlated with immigration at the regional level, are differenced out, as long as they are common to families with and without elderly parents. Only economic factors that affect the women-men gap differentially across those two types of families would generate a bias in the OLS estimates. Still, to eliminate any bias from omitted unobservable factors, that could survive the double differencing we use an instrumental variable estimator. The most insidious omitted variables are region-year specific demand shocks that attract immigrants and affect the retirement and labor supply differential between men and women and across types of households (with/without elderly parents). While it is not easy to think about such type of shocks, they may exist and they would biased upwards our estimates. We adopt two separate strategies to deal with these shocks and to assess their potential relevance. First we rely on an instrumental variable approach (described below). Second we perform a falsification exercise to see if immigration has an effect on women-men wage gaps between households with and without older parents, which would be a sign of the potential presence of spurious labor market correlations.[15]

[15] In addition, we control for both current and past local unemployment rate of men and women (see Table 8).

The immigrant share of the population across Italian regions varied differentially over time[16] due to differential demand and supply factors. To isolate the *supply-push component* of immigration and use it as instrument in constructing the share of immigrants, we follow Card (2001) and the literature after that paper, relying on the pattern of settlement of immigrants from each country of origin in 1991 across Italian regions, which corresponds to a decade before we start our analysis. We then consider the total country-specific stock of immigrants in Italy every other year from 2000 to 2008 and we distribute it according to the 1991 regional shares for each country of origin. The region-specific demand shocks that may affect the inflow of immigrants in a region after 1991, do not contribute to the correlation between the instrument and the dependent variable. To the contrary the country of origin push factors, combined with the uneven distribution of nationalities in 1991, generate supply shocks captured by the instrument.

Specifically the instrument for the immigrants as share of the population in region r in year $t(= 2000, ...2008)$, is the "imputed immigrant share", denoted as $\widehat{f}_{rt}$ and computed according to the following formula:

$$\widehat{f}_{rt} = \frac{\Sigma_c \left(\frac{I_{cr,1991}}{I_{c,1991}} \right) I_{ct}}{Pop_{r,2000}} \tag{2}$$

In the formula (2) the term $\frac{I_{cr,1991}}{I_{ct,1991}}$ represents the number of immigrants born in country c and residing in region r in year 1991 relative to total immigrants from country c residing in Italy in the same year. We rely on Census data for year 1991 to construct these shares that are measured quite precisely.[17] I_{ct} is the total of immigrants from country c present in Italy as of year t, and $Pop_{r,2000}$ is the total resident population in region r in year 2000. We keep the native population constant at the 2000 level in the standardization, so that changes in native population will not contribute to the changes in the share. Native population can move endogenously and this will affect the share. Both of those values are taken from population registry data.

As we use the variation of this imputed share over time to identify the impact of immigration the validity and effectiveness of this strategy relies upon two main requirements. First, to satisfy the exclusion restriction, the distribution of immigrants by nationality across region in 1991 should be uncorrelated to local labor demand changes during the period 2000-2008, especially those affecting the women-men labor market gap. The ten year gap between the initial distribution of immigrants and the beginning of the analysis makes the assumption of low correlation of demand shocks plausible. Second, to guarantee power of the instrument, the distributions of immigrants across regions in 1991 should be correlated to the allocation of immigrants in the 2000-2008, because of network effects. This is strongly supported by existing empirical evidence on the tendency of newly-arrived immigrants to cluster in areas with large density of immigrants from the same country (Aslund (2005) and

[16] See for instance table A.2 of the Appendix.

[17] In the Data section we describe in greater detail both the data used for the implementation of the instrument and the sample of selected immigrants.

Damm (2009) provide two examples for Sweden, Cutler et al. (2008) for the US).

Table A.3 in the Appendix shows the predictive power of the instrument in the first stage regression using the aggregate region-time regression of the dependent variable on the imputed share defined in (2). In specifications (1) and (5) we show the simple unconditional correlation, in specifications (2) and (6) we include region and year effects, relying therefore on the within region change over time; in specifications (3) and (7) we add controls for the average regional-year level of the variables included in the individual specification. Finally, in specifications (4) and (8) we include also the regional female and male unemployment rate. Notice that the instrument has strong predictive power in each regression, the coefficient has the expected sign and the F-statistic is above 10 in each case, avoiding, therefore, worries of weak instruments. In the individual level regressions we will instrument not only the share of immigrants but also its interaction with gender, with the presence of old parents and the double interaction using the same imputed IV interacted with those household characteristics. We will report the joint first stage F-statistics of the instrumented main effects and interaction effects in the Tables. Those statistics do not raise concern of weak instruments when considering all endogenous regressor and instrument jointly. In addition to the joint First stage F-statistics reported in each Table, also the individual first stage F statistics are largely above any standard critical values.

4. Data: Description and Summary Statistics

Our empirical analysis relies on three different sources of data. The Survey of Household Income and Wealth (SHIW for brevity) provides all the individual variables, in the panel for the 2000-2008 period; the Administrative Registry of Population includes data on the total resident and immigrant population for the period 2000-2008. The 1991 Census data has the information needed to compute the regional distribution of immigrants in 1991 used to construct the instrument (2). The availability of Census data in 1991 drives our choice of the base year in constructing the instrument.[18] Ten year lag between the initial distribution and the beginning of the analysis implies that temporary shocks affecting 1991 distributions will be faded by 2000 (see, among others, Card, 2001 and Ottaviano and Peri, 2012). In particular the slow growth in Italy, during the 1990's might have affected immigration and labor markets, and choosing the distribution of immigrants before that period ensures against potential endogeneity from that period of negative performance. In addition Census data offers the largest available sample, hence reducing measurement error concerns on the share of immigrants (Aydemir and Borjas, 2011).

The SHIW survey collects since 1965 a large and representative random sample of the Italian population. The

[18] Census 1981 would be an alternative choice. However, the number of immigrants was smaller than a fraction of a percentage point in the population at that time, and the very long lag relative to the beginning of the period would make this a much weaker instrument.

latest available wave is for year 2012.[19] Since 1989 the survey has introduced a panel of households,[20] following them over time. Every two years, the survey gathers information on about 8,000 households corresponding to about 24,000 individuals and provides data about the income, wealth, work-related and socio-demographic characteristics of family members. Since 1993, a special section has been devoted to collecting information about the family background of the head of the household and his/her spouse. Detailed information is provided about living parents, their age, their highest attained educational level and their occupation at the time when they were the same age as the respondent.

When analyzing retirement decisions as dependent variable, we use the information provided by the survey on the planned retirement age. Individuals are asked the following question: *"At what age do you expect to retire?"* The survey also elicits information about the expected replacement rate currently and at the time of retirement. These variables allow us to calculate the option value of delaying retirement,[21] which we use as an explanatory variable in regression (1). The planned retirement age turns out to be a good proxy for the actual retirement age; for our sample aged 55-70 the correlation coefficient between the two variables is equal to 0.75, and the average value of their difference is 0.29 years. In addition to the planned retirement the survey includes information on labor supply: from them we compute a binary indicator for working or not, the logarithm of hours worked per week, and a binary indicator for working full-time versus working part-time. We use all of them as alternative outcomes.

The Residential Registry Data, includes information on the resident native and immigrant population at the regional level, by country of origin. This source of data allows us to compute the immigration share by region and year[22] and aggregating it nationally it is used to build the total number of resident immigrants by year and country of origin used in (2) to compute the term I_{ct}.

As we do not have information about the skill level of the immigrants, in order to focus on immigration that increased the supply of potential domestic labor in Italy, we limit our measures to immigrants who were born outside Western Europe and North America. Immigrants from EU15 and from North America are, in fact, the most educated. As many as 35% of EU15 immigrants and 57% of immigrants from North America have college education relative to only 14% of Italians.[23] Conversely, immigrants from other destinations have much lower rates of college education. For the construction of the instrument, we disaggregate the immigrant population according to groups of countries of origin. Similarity in cultures and traditions drives the tendency

[19] We cannot use the last two years 2010-2012 because, despite the information on the year of birth of parents being available for heads of household, the former cannot be matched to parental living status, only available at couple-level.

[20] Between 45 and 54 percent of total households depending on the year.

[21] For the details of its computation see the Appendix.

[22] This number may underestimate the total presence of immigrants as it is not compulsory to be registered for immigrants. It has been estimated that Registry data account for about 88% of immigrants regularly present in Italy (ISTAT, 2005) and the correlation with total number across regions is very high.

[23] Source is Labor Force Survey, 2005-2008.

to locate in the same areas (Aslund, 2005; Cutler et al., 2008; Damm, 2009). We categorize immigrants into five macro-regions: Asia; Africa; Central and South America; Central and Eastern Europe (non-EU) and others. Table A.2 in the Appendix reports the immigrant population share by region and over time; the table reveals that there is substantial variation of the immigrant share of the population both by region and time, and there are no clear outliers.

The sample used in the analysis includes native heads of household and their spouses 55 to 70 years old for the analysis on retirement,[24] and 60 to 70 for the work/not work regressions. For the regressions explaining retirement age we include all employed workers. To estimate the effects on the labor supply we also include unemployed, stay-at-home individuals and retired individuals (only the first retirement spell). The "planned retirement" sample consists of a panel of 1,669 individuals, 32 percent of whom are women.[25] The average planned retirement age is 62, immigrants represent on average 4% of the population, and 28 percent of the sample is eligible for a seniority pension. 55 percent of the sample is employed in white collar types of jobs (including teachers, office workers, and junior managers), whereas 7 percent of them work as managers or in other similarly high skilled jobs. 46 percent of individuals have at least one old living parent. Table 1 shows the summary statistics for the dependent and explanatory variables both in the sample used to estimate retirement age (left part of the table) and the sample used to estimate labor supply (right part of the sample).

Then Table 2 shows the evolution of the four dependent variables for men and women with and without old parents over the years. Focusing first on planned retirement age (top left panel), we see that women have increased their planned retirement age by 0.7 years between 2000 and 2008 as opposed to an increase for men by only 0.2 years. The rise is substantially higher for women, regardless of having or not elderly parents. It could be due, in part, to institutional changes introduced over the period. For the labor supply outcomes, however, the group of women with elderly parents is the group experiencing the largest increase over the 2000-2008 period. For instance the probability of working increased by ten percentage points for women with older parents in this period, while only by four points for men with older parents and by six for women without older parents. Similarly hours worked and percentage working full time increased the most for women with elderly parents.

[24] And for the analysis on labor supply for those working.

[25] 57 percent of the sample are people present only in one wave. This is due to the survey design, rather than to attrition. By design only a sub-sample of sampled households (between 45 and 54 percent, depending on the year) is re-interviewed multiple times. In addition there are no significant differences between the estimation sample and the sample including also the singleton observations. The final sample, after dropping the singleton observations due to the individual fixed effects estimation, is 933, for the retirement sample, corresponding to 397 persons. These people have the following distribution over the 5 waves: 70 percent is present for two waves, 22 percent for 3 waves, and 6 percent for 4 or 5 waves.

5. Empirical Results

5.1. Basic Specifications

Table 3 shows the estimates of the relevant coefficients for the basic specification (1) when the dependent variable is planned retirement age. The first two columns report the estimates obtained using ordinary least squares (OLS). The estimated specifications include individual fixed effects and the individual controls mentioned in section (3) above. Specifications (3) and (4) show the preferred two stage least squares (2SLS) estimates using the "imputed" immigrant share defined in expression (2) as instrument. The standard errors are clustered at the region-year level and account for individual correlation of unobservables within regions.[26] The F-statistics reported at the bottom are those for the joint significance of the first stage instruments, and for the significance of each endogenous regressor.

Specification (1) of Table 3 estimates only the main effect of immigration on planned retirement age and its differential effect (interaction) for women. The estimates of this regression (and the corresponding 2SLS ones, reported in column (3) show a significantly positive women-men differential effect of immigrants (the coefficient estimate of the immigrant-female interaction) equal to 0.26. In regions experiencing a one point increase in immigrants as percentage of the population women increased their planned retirement age by 0.26 years relative to similar men. The difference was significant at 5% significance level. Estimates in specification (2), and the corresponding and preferred 2SLS estimates of column (4) show the decomposition of the differential effect on women, interacting the impact of immigrants with the presence of old parents. For ease of interpretation we have reported in the lower part of the table, under specification (3) and (4) the absolute effects of a one point increase in the immigrant percentage of the population on each type of individual (men or women with or without older parents), obtained from the estimates. Then, more relevant to our analysis, we have shown the women-men differential effects for families without and families with old parents, and the difference between the two (double differences).[27]

Two results emerge clearly. First, the impact of immigrants on planned retirement is negative for men and positive for women in both types of families (with and without old parents). This is likely due to the combination of two effects. First, differential labor market competition of immigrants may be affecting men's opportunities more than women's', pushing them to retire early. Second, differential substitution for domestic labor enabling women to stay in the labor market longer. This second effect is much larger for families with old parents. We interpret the additional effect on families with old parents as caused by the role of immigrants as

[26] The cluster by region-year rather than by region alleviates the problem arising when the number of clusters is too low. In that case the standard errors suffer from downward bias (Arellano, 1987 and Wooldridge, 2002), since the asymptotics fails. However the maintained assumption in this case is that there is no time-series correlation of the error within region. In Table A.5 of the appendix we also report the results using region level cluster. The change in standard error estimates is very small and the significance of the estimates remains unchanged.

[27] In Table A.4 of the Appendix we also report the estimates without using individual fixed effects.

their care takers. The last three rows of column (4) show that immigration increases the women-men planned retirement differential in families without old parents by 0.17 years per percentage point. That effect is 0.45 years in families with old parents, and the difference between the two is a significant 0.28 years. An increase in immigration by four percentage points of the population (as observed over this period) will imply that women retire one year later than men in families with older parents relative to families without. This effect is likely due to the contribution of immigrant labor in caring for older relatives and it has a larger impact on women. The negative impact on men's retirement age is, instead, likely driven by the competition of immigrants on the labor market, which may induce earlier retirement by men (see, for instance Foged and Peri (2013) for a similar effect). The incentive effect of immigrants on women, by substituting domestic labor, more than compensates the competition effect so that women with older parents actually retire later in regions with more immigrants. Specifically (see the absolute effects listed in column 4) each increase of immigrants by one percentage of the population pushes women with older parents to retire 0.1 years later.

Turning to the effect of immigration on the labor supply of men and women, Table 4, whose structure is very similar to Table 3, shows the estimates of specification (1) when the dependent variable is a dummy equal to one if the individual is working and to 0 if he/she is not. We first show in column (1) and (2) the estimates using OLS, as comparison, and then in specifications (3) and (4) we show the 2SLS estimates using imputed immigration shares as instrument. Even in this case we observe a clear positive effect of immigrants on the women-men differential in employment probability. The differential is large enough that the absolute impact is negative for men and positive for women. While the women-men differential is positive for all types of families it is significantly larger for families with older relatives. The significant 0.07 difference in the women-men differential between families with and without old parents (last row of table 4) is what we consider the impact of immigrants through supply of care-services for older individuals. The estimates of column (4) show also that the presence of old parents while pushing males to work (positive coefficient on *Old Parent* dummy) likely due to higher need for income in the family, it also reduces the relative probability of women to work (negative coefficient on interaction *Old ParentxFem*), confirming the idea that increased house responsibility connected to the care of elderly parents may weight on women decisions reducing their labor supply. The effect of an increase of immigrants by one percent of the population increases the probability of working for women with old parents, by 5 percentage points whereas men in the same family would decrease their probability of working by 18 percentage points (see the absolute effects in the lower part of column (4) in Table 4). Confirming the results on planned retirement age, the working-non working decisions in families with old parents are influenced by the inflow of immigrants with a strong positive relative employment effect for women.

In Table 5 we move to analyze the effects of immigrants on other margins of the labor supply. The upper part of Table 5, which maintains the structure of Table 3 and 4, shows the estimated coefficients and the absolute and

differential effects, when the dependent variable is the (log) average hours worked per week. The lower part of Table 5 shows the corresponding coefficients when the dependent variable is a dummy equal to one if the worker is employed full time and 0 if he/she is working part-time. Columns (1) and (2) report the OLS estimates, while (3) and (4) report the 2SLS estimates. In these regressions we do not find any significant effect of immigrants on hours worked and on their gender differential. These estimates show insignificant effect of immigrants on the women-men differentials in hours worked, both in families without and in those with old relatives. There is however a small but significant effect of immigration on the double difference in women-men probability of full time employment between families with and without older parents. The absolute effects, however, both for hours and full time employment are quite small. In part this may be due to the rigidity of working hours and to the limited availability of part-time jobs in the Italian labor market, especially for older workers. The rigid contractual agreements in the Italian labor market, and the lack of flexible arrangements, limit substantially the response of this "intensive margin" of labor supply. The extensive margin of retirement and working or not, becomes therefore the main margin of response. The significantly positive effect of the double difference, on the probability of working full time that captures the differential effect on women-men gap between families with and without older relatives, is however a further confirmation that the "domestic labor" role of immigrants, substituting for female labors when older relatives are present is an important factor. Also the size of these effects is reasonable if compared with estimates of the effect of parent disability on probability of employment of daughters. For instance, Crespo and Mira (2014) estimate that occurrence of parent disability would decrease the probability of working for Southern European daughters in their 50's by 9 to 12 percentage points. This would be offset by an increase of immigrants by 1-2 percentage points of the population, using our estimates.

5.2. Heterogeneous effects by household characteristics

The effect of immigrants on the retirement age and labor supply gap between men and women may be different depending on the characteristics of the household. In particular the potential wage that women-men can earn if they work, relative to the opportunity cost of staying at home can be an important determinant of how hiring an immigrant will affect their labor supply and retirement decisions. Hence individuals with different skills (earning potential) and wealth (ability to pay) can be affected differentially by the local availability of immigrant labor. We explore the heterogeneity of the impact of immigration by separating individuals with different levels of education and wealth. We begin by replicating the previous empirical analysis separately for high and low educated individuals (where highly educated are people with at least some tertiary education) and then separately for individuals with high and low household wealth. Wealth is defined as net asset worth of the family, namely assets minus liability, and households with high wealth have net worth wealth above the median level. We organize the estimates in Table 6 and Table 7 which report the absolute and differential effects of immigrants for four different outcomes (retirement age, working/non working, hours worked and full-time

dummy) and split those effects between individuals with low and high levels of schooling (Table 6), or between low and high wealth households (Table 7). Table 6 shows the estimates separated by education group for planned age of retirement (upper left), probability of working (upper right), log weekly hours (lower left), and full-time dummy (lower right) as dependent variables. All coefficients are estimated using 2SLS and we report the individual effects as well as the differential women-men and the double difference between families with and without an older relative. Focusing on the double difference as a measure of the immigrant effect through care of the elderly we notice a significantly positive effect in each of the outcomes for families with low levels of education. Women-men differential in retirement age increases by a significant 0.47 years for each increase in immigrants as percentage of the region population for less educated family. No effect is observed on highly educated families. The differential effect of immigrants on women-men gaps in probability of working is 0.07, in weekly hours it is 0.04 and in full time frequency it is 0.03, when we consider less educated women. The effect on gaps in highly educated families is much less precisely estimated and non significant. All margins of labor supply for less educated individuals over 55 years seem tilted in favor of women, when more immigrants are present, and this effect is especially strong in families with older parents. The affordability of care benefits particularly less educated women who would be much more likely to retire early when an older relative is present. The magnitude of the effect on less educated women-men differential in families with one older relative corresponds to an increase of 0.5 years in retirement age and 0.25 higher probability of working in response to an increase of immigrants by 1 percentage point of the population. The differences in women-men differentials of hours worked and full time frequency are much smaller.

Table 7 shows the effect when splitting the sample according to household wealth. Mirroring the results of Table 6, and in this case showing an even stronger pattern, the household with low wealth are those driving the results. We see from the top-left panel that the impact of immigrants on women-men retirement gap is entirely driven by women in household whose wealth is below the median. For those families an increase of immigrants by 1 percentage point of population increases the women-men retirement age gap by 0.9 years if the family has an old relative. There is no significant effect for families with wealth above the median. To confirm that this stronger effect on less wealthy families is likely to be driven by the domestic labor substitution operated by immigrants we find that the dummy *old parents* has a strong and negative effect (not reported) on the planned retirement age of women, only in "low wealth" households. Hence, it seems likely that low wealth households rely more heavily than richer households on women to assist older parents and this may impact their labor supply more significantly. The presence of immigrants may relieve women in the role of caretakers more in lower wealth families, therefore the larger effect. Confirming a widespread perception among Italian families, the availability of immigrants has allowed non wealthy families the possibility of buying care for the elderly, thus relieving women.

6. Robustness Checks and Falsifications

In this section we perform several robustness checks and two falsification exercises to increase the reader's confidence in our main results. The first series of robustness checks addresses the fact that there may still be some lingering correlation between unobserved region-specific errors and the (imputed) share of immigrants in a region. A second issue is related to the fact that the share of immigrants is a noisy measure of the presence of immigrants in a region. Undocumented immigrants are unaccounted for in our measure and different groups of immigrants contribute very differently to house service labor. These issues are addressed in Table 8.

To control for local labor market conditions that affect women and men differentially and could be correlated with their retirement decisions and inflow of foreign-born, inducing a spurious correlation, we include two variables. First, we control for a dummy indicating the presence of a daughter between 18 and 35 years old in the household. This may signal weak labor market conditions for women, and also an attitude of the family favoring their staying at home. This can be correlated with the local labor market conditions for immigrants and with the family fixed effects. Additionally we account for local demand conditions by including both the female and male regional unemployment rate. Column (2) in Table 8 shows the estimated differential effects when we include current unemployment rate, column (3) shows results when we include lagged unemployment rate. Column (4) reports the estimates when we include a dummy for a coresident daughter. The reported coefficients measure the impact of immigrants on planned retirement age, and column (1) shows the baseline specification. Column (6)-(10) show the same specifications, when the dependent variable is a dummy for working or not.

By comparing the results with and without the additional controls we can see that the main effects on planned retirement age and on the probability of working are very stable and robust. The robustness checks in column (5) and (10) introduce a correction to account for undocumented immigrants using the information provided by the regularization law of 2002.[28] As of January 2004, 647,000 immigrants were regularized by receiving a residence permit (ISTAT, 2005) thanks to this law. We exploit this information and we estimate the approximate share of irregular immigrants by region, and we use this information to correct the stock of immigrants that we are using to calculate the shares in our empirical analysis.[29] The corrected measure of immigration rate has a mean value of 5% and it is 1 percentage point higher than our original measure, but highly correlated with it. The results are shown in column (5) for retirement age and in column (10) for probability of working. The estimates of the differential effects (in rows 5, 6 and 7) confirm the basic results in

[28] The law was enacted in October 2002 and introduced the possibility of regularization for undocumented immigrants, setting the period for requesting a permit up to November 2003. For this reason we compare the stock of regularized immigrants with total resident immigrants as of January 1st, 2004 to obtain an idea of how many undocumented were in the region.

[29] The factor is computed as follows: we first take the stock of regularization permits released in each region with the amnesty and we divide this measure by the stock of resident immigrants using the Registry data. This calculation provides us with a measure of the irregular immigrants (regularized by the new law) relative to the stock of regular ones by region. This measure has a mean value of 0.31. We correct our regional stock of resident immigrants using this share.

terms of significance and sign. The only difference is that the coefficients become somewhat lower in magnitude after the correction is applied. As the variation across regions increases when including the undocumented in the measure of immigrants, the lower coefficients produce essentially the same effect on the dependent variable when multiplied by one standard deviation of the explanatory variable.[30]

In Table 9 we tackle the issue that not all immigrants supply domestic labor in significant amount. Using the share of immigrants in the region may measure imprecisely the increased availability of domestic workers. To check that the double-difference effect is actually related to the presence of immigrants that are more likely to supply domestic labor, in Table 9 we include as explanatory variable only immigrants from countries more heavily associated with working in domestic services. We derive this information by looking at the registers of domestic workers sector within the Social Security Archive. From these data we learn that 76 percent of foreign-born workers in this sectors are from Eastern Europe and Asia (56 percent from Eastern EU, and 20 percent from Asia), and 85 percent are women. We thus replicate in Table 9 the main regressions results by selecting only women (specification (2), for retirement age and specification (6) for probability of working) then only women from Eastern EU and Asia (in columns (3) and (7)). Finally, as a check, we consider only male immigrants (in columns (4) and (8)). In this latter case we expect to find smaller effects, given that men represent only 15 percent of all immigrant workers officially registered in the domestic sector. We estimate each regression using 2SLS constructing the corresponding IV with only the group of immigrants included in the explanatory variable. From Table 9, and focusing on the women-men differentials we see the effects are progressively stronger when considering only female immigrants and significantly stronger when only focusing on female immigrants from Eastern EU and Asia (column (3)). This is true particularly for the impact on retirement age and, only marginally, for the impact on the probability of working (column (7)) . In contrast, the results using only male immigrants show the lowest effects in magnitude which are only marginally significant, for planned retirement age (column (4)), and probability of working (column (8)). These results confirm that the differential women-men effects are particularly strong when focusing on those groups contributing the most to the supply of domestic labor. If our results were driven by spurious correlation due to demand-related omitted factors, there would be stronger effects from male immigration that constitutes the largest part of employment (men represent 57% of all employed immigrants; LFS, 2004-2009).[31]

Finally, in Table 10 we present two "falsification" exercises whose goal is to rule out that our results can be driven by other omitted variables correlated to immigration. In the first four columns of Table 10 we present the

[30] The immigration rate regressor could still be subject to potential failure of the strict exogeneity assumption (i.e. sequential correlation, in case the regressor is correlated with past error terms, and contemporaneous correlation, due to omitted variables or measurement errors), these series of robustness checks ultimately support the validity of choosing a fixed effects estimator, which is consistent only provided that the strict exogeneity assumption holds.

[31] From the first stage F-stats we can see a reduction in the instrument predictive power, due to the fact that the number of immigrants in 1991 decreases once we select specific countries. However, all reduced from regressions - not shown but available - confirm the 2SLS results.

estimates of the absolute and differential effects of immigrants on planned retirement age, when considering the sample of women younger than 54 (40-54). This sample's decisions should be much less affected by consideration of assisting older parents and by the cost of it, both because women are much younger and the incidence of older parents on their decisions much smaller. As clearly shown in the differential results, the presence of immigrants does not affect men and women's plans differentially for this group. A second test is to analyze the effect of immigration on wages as a check of the strength of a potential labor market effect. This test serves two purposes. First, if the effect driving our estimates is due to differential labor market competition, then the immigrant inflow should have effects on women-men wage differentials of the same sign and similar significance as it has on retirement age. From column (5) of Table 10 we see instead that there appear to be no significant differential effect on wages. On the other hand, as we found in several specifications of Table 3 a negative impact of immigrants on expected retirement age of males, it is reassuring to see that there are also mild negative effects of immigrants on wages (of males and females). So a mildly negative effect on wages could help explaining the negative effects found on labor supply for men. The differential effect for women, however (in general and in families with older parents in particular) seems driven by the role of immigrants in supplying domestic labor and not by their competition in the labor market.

7. Conclusion

Italy experienced demographic and immigration patterns during the last decades typical of many developed countries: the ratio of its old to young population has increased rapidly and the need for home-care of older people has grown. The retirement and labor supply decisions of women, especially those with relatively low wealth have been affected by this. At the same time immigration from non-EU countries has grown, increasing the supply for home-care services, and substituting women's work at home. In localities with many immigrants families could hire affordable and available care-takers and hence the women's option to continue participating in employment has increased.

Our results show that the inflow of immigrants in the local labor market caused women to delay retirement and to increase their labor supply, relative to men. This effect was particularly strong in families with older relatives. Since in Italy women are those found in the role of care-takers of older relatives, the differential impact of immigrants is a result of immigrants being substitutes for women rather than men, in domestic work taking care of the elderly. Admitting a larger inflow of immigrants in these jobs may help tilt the retirement decision in a family allowing women to work longer as they typically now retire before men. Our analysis also finds that these effects in favor of later retirement of women, relative to men, are particularly strong among low wealth households and hence immigration as provider of domestic services would empower women especially in those families in which they may have a lower relative power.

Manuel Arellano. Computing Robust Standard Errors for Within-Group Estimators. *Oxford Bulletin of Economics and Statistics*, (49):431–434, 1987.

Olof Aslund. Now and forever? Initial and subsequent location choices of immigrants. *Regional Science and Urban Economics*, 35(2):141–165, 2005.

Abdurrahman Aydemir and George J. Borjas. Attenuation Bias in Measuring the Wage Impact of Immigration. *Journal of Labor Economics*, 29:69–112, 2011. ISSN 0734306X. doi: 10.1086/656360.

Guglielmo Barone and Sauro Mocetti. With a little help from abroad: The effect of low-skilled immigration on the female labour supply. *Labour Economics*, 18(5):664–675, 2011.

Michele Belloni and Rob Alessie. The importance of financial incentives on retirement choices: New evidence for Italy. *Labour Economics*, 16(5):578–588, 2009.

Michele Belloni and Rob Alessie. Retirement Choices in Italy: What an Option Value Model Tells us. *Oxford Bulletin of Economics and Statistics*, 75(4):499–527, 2013.

K Bolin, B Lindgren, and P Lundborg. Your next of kin or your own career?: Caring and working among the 50+ of Europe. *Journal of Health Economics*, 27(3):718–738, 2008.

Margherita Borella and Flavia Coda Moscarola. Microsimulation of pension reforms: behavioural versus non-behavioural approach. *Journal of Pension Economics and Finance*, 9(04):583–607, 2010.

George J Borjas. The Labor Demand Curve Is Downward Sloping: Reexamining The Impact Of Immigration On The Labor Market. *The Quarterly Journal of Economics*, 118(4):1335–1374, 2003.

George J Borjas, Jeffrey Grogger, and Gordon H Hanson. Imperfect Substitution between Immigrants and Natives: A Reappraisal. *NBER Working Paper Series*, 13887, March 2008.

Agar Brugiavini and Franco Peracchi. Micro-Modeling of Retirement Behavior in Italy. In *Social Security Programs and Retirement around the World: Micro-Estimation*, NBER Chapters. National Bureau of Economic Research, Inc, 2004.

Michael Burda, Daniel Hamermesh, and Philippe Weil. The distribution of total work in the EU and in US. In *Working Hours and Job Sharing in the EU and USA: Are Europeans Lazy? Or Americans Crazy?, Boeri, T., Burda, M. and, Kramarz F.* Oxford University Press, 2008.

David Card. The impact of the Mariel boatlift on the Miami labor market. *Industrial and Labor Relations Review*, 43(2):245–257, 1990.

David Card. Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration. *Journal of Labor Economics*, 19(1):22–64, 2001.

David Card. *How Immigration Affects U.S. Cities*, pages 158–200. Princeton University press, 2009a.

David Card. Immigration and Inequality. *American Economic Review*, 99(2):1–21, 2009b.

Fiona Carmichael and Susan Charles. The labour market costs of community care. *Journal of Health Economics*, 17(6):747–765, 1998.

Fiona Carmichael and Susan Charles. The opportunity costs of informal care: does gender matter? *Journal of Health Economics*, 22(5):781–803, 2003.

Sewin Chan and Ann Huff Stevens. Do changes in pension incentives affect retirement? A longitudinal study of subjective retirement expectations. *Journal of Public Economics*, 88(7-8):1307–1333, 2004.

Patricia Cortès and Jessica Pan. Outsourcing Household Production: Foreign Domestic Workers and Native Labor Supply in Hong Kong. *Journal of Labor Economics*, 31(2):327–371, 2013.

Patricia Cortès and Jose Tessada. Low-Skilled Immigration and the Labor Supply of Highly Skilled Women. *American Economic Journal: Applied Economics*, 3(3):88–123, 2011.

Laura Crespo and Pedro Mira. Caregiving to Elderly Parents and Employment Status of European Mature Women. *Review of Economics and Statistics*, 96(4):693–709, October 2014. ISSN 0034-6535. doi: 10.1162/REST_a_00426.

David M Cutler, Edward L Glaeser, and Jacob L Vigdor. When are ghettos bad? Lessons from immigrant segregation in the United States. *Journal of Urban Economics*, 63(3):759–774, 2008.

Anna Damm. Determinants of recent immigrants' location choices: quasi-experimental evidence. *Journal of Population Economics*, 22(1):145–174, 2009.

Francesco D'Amuri, Gianmarco I P Ottaviano, and Giovanni Peri. The labor market impact of immigration in Western Germany in the 1990. *European Economic Review*, 54(4):550–570, 2010.

Christian Dustmann, Francesca Fabbri, and Ian Preston. The Impact of Immigration on the British Labour Market. *Economic Journal*, 115(507):F324–F341, 2005.

Susan L Ettner. The Opportunity Costs of Elder Care. *The Journal of Human Resources*, 31(1):189, 1996.

Lidia Farrè, Libertad Gonzalez, and Francesc Ortega. Immigration, Family Responsibilities and the Labor Supply of Skilled Native Women. *B.E. Journal of Economic Analysis and Policy: Contributions to Economic Analysis and Policy*, 11(1):1–48, 2011.

Mette Foged and Giovanni Peri. Immigrants and Native Workers: New Analysis Using Longitudinal Employer-Employee Data. *NBER Working Paper Series*, wp19315, August 2013.

Elsa Fornero and Paolo Sestito, editors. *Pension Systems: Beyond Mandatory Retirement.* Edward Elgar Publishing, 2005.

Andrea Gavosto, Alessandra Venturini, and Claudia Villosio. Do Immigrants Compete with Natives? *LABOUR*, 13(3):603–621, 1999.

ISTAT. Gli stranieri in Italia: gli effetti dell'ultima regolarizzazione. 2005.

Jane Kolodinsky and Lee Shirey. The Impact of Living with an Elder Parent on Adult Daughter's Labor Supply and Hours of Work. *Journal of Family and Economic Issues*, 21(2):149–175, 2000.

Meredith B. Lilly, Audrey Laporte, and Peter C. Coyte. Do they care too much to work? The influence of caregiving intensity on the labour force participation of unpaid caregivers in Canada. *Journal of Health Economics*, 29(6):895–903, 2010.

Marco Manacorda, Alan Manning, and Jonathan Wadsworth. The impact of immgration on the structure of wages: theory and evidence from Britain. *Journal of the European Economic Association*, 10(1):120–151, 2012.

Gianmarco I P Ottaviano and Giovanni Peri. Rethinking the effect of immigration on wages. *Journal of the European Economic Association*, 10(1):152–197, 2012.

Giovanni Peri. Immigrants' Complementarities and Native Wages: Evidence from California. NBER Working Papers 12956, National Bureau of Economic Research, Inc, 2007.

Giovanni Peri and Chad Sparber. Highly Educated Immigrants and Native Occupational Choice. *Industrial Relations: A Journal of Economy and Society*, 50(3):385–411, 2011.

Stefano Staffolani and Enzo Valentini. Does Immigration Raise Blue and White Collar Wages of Natives? The Case of Italy. *Labour*, 24(3):295–310, 2010.

James H Stock and David A Wise. Pensions, the Option Value of Work, and Retirement. *Econometrica*, 58(5): 1151–1180, 1990. ISSN 00129682.

Courtney Harold Van Houtven, Norma B. Coe, and Meghan M. Skira. The effect of informal care on work and wages. *Journal of Health Economics*, 32(1):240–252, 2013.

Alessandra Venturini and Claudia Villosio. Labour market effects of immigration into Italy: An empirical analysis. *International Labour Review*, 145(1-2):91–118, 2006.

Douglas A Wolf and Beth J Soldo. Married Women's Allocation of Time to Employment and Care of Elderly Parents. *The Journal of Human Resources*, 29(4):pp. 1259–1276, 1994.

Jeffrey M Wooldridge. *Econometric analysis of cross section and panel data*. MIT Press, Cambridge and London, 2002.

Table 1: Summary Statistics

Sample: Retirement				**Sample: Labor Supply**			
	Mean	**S.d.**	**N**		**Mean**	**S.d.**	**N**
Planned Retirement Age	62.33	3.31	2,205	Work/Not Work	0.28	0.45	8,683
OV	0.1	0.11	2,205	Weekly Hours	36.91	9.05	2,390
Eligible (seniority p)	0.28	0.44	2,205	Full Time	0.94	0.23	2,390
Law	0.15	0.34	2,205				
Law Women	0.05	0.21	2,205				
Wealth (log)	11.58	1.97	2,205	Wealth (log)	11.56	1.99	8,683
Share Immigrants	0.04	0.03	2,205	Share Immigrants	0.04	0.02	8,683
Age	57.94	2.81	2,205	Age	61.44	4.55	8,683
Women	0.32	0.13	2,205	Women	0.44	0.50	8,683
Old parents	0.46	0.5	2,205	Old Parents	0.36	0.48	8,683
Couple	0.8	0.4	2,205	Couple	0.80	0.40	8,683
Numb Brothers	1.03	1.04	2,205	Numb Brothers	1.04	1.04	8,683
Numb Sisters	1.09	1.06	2,205	Numb Brothers	1.10	1.06	8,683
Office workers	0.34	0.14	2,205	Office workers	0.32	0.47	2,390
Teacher	0.14	0.01	2,205	Teacher	0.15	0.36	2,390
Junior manager	0.07	0.01	2,205	Junior manager	0.07	0.26	2,390
Senior manager	0.07	0.01	2,205	Senior manager	0.07	0.26	2,390
Blue collar	0.39	0.01	2,205	Blue collar	0.38	0.49	2,390

Source: SHIW, 2000-2008

Table 2: Planned Retirement Age and Labor Supply

	Planned Retirement Age				Work/not work			
	Men		Women		Men		Women	
	No old parents	Old parents	No old parents	Old parents	No old parents	Old parents	No parents	Old parents
2000	62.99	62.71	60.97	61.45	0.13	0.16	0.05	0.10
2002	63.62	61.78	61.36	60.78	0.13	0.15	0.04	0.10
2004	62.99	62.14	61.44	61.33	0.15	0.19	0.06	0.11
2006	63.07	62.04	62.50	60.58	0.14	0.20	0.06	0.09
2008	63.56	62.71	62.03	61.67	0.29	0.20	0.11	0.20
	Weekly hours (conditional on working)				Full time (conditional on working)			
2000	39.18	39.16	34.15	31.64	0.97	0.98	0.92	0.84
2002	38.56	38.99	33.22	34.03	0.95	0.97	0.89	0.83
2004	38.59	39.81	34.55	33.49	0.96	1.00	0.92	0.93
2006	38.24	39.51	32.47	32.14	0.98	0.98	0.90	0.82
2008	38.71	39.74	31.33	33.56	0.97	1.00	0.83	0.93

Source: SHIW: 2000-2008
Old parents refers to individuals having at least one parent or parent-in-law of age 80 or older.

Table 3: The Effect of Immigration on Planned Retirement Age

	OLS		**2SLS**	
	Base	**Old parents**	**Base**	**Old parents**
	(1)	**(2)**	**(3)**	**(4)**
(Share immigrants)	-0.157	-0.116	-0.217	-0.153
	(0.122)	(0.119)	(0.175)	(0.184)
(Share immigrants)x(Fem)	0.263**	0.190	0.281**	0.170
	(0.126)	(0.133)	(0.133)	(0.142)
(Share immigrants)x(Old Parent)		-0.138*		-0.193**
		(0.081)		(0.097)
(Share immigrants)x(Old Parent)x(Fem)		0.185*		0.279**
		(0.101)		(0.131)
(Old Parent)		0.448		0.611
		(0.348)		(0.390)
(Old Parent)x(Fem)		-0.355		-0.656
		(0.590)		(0.658)
		Absolute Effects		
Men			-0.22	
Women			+0.06	
Wom-Men			+0.28**	
Men w/o Old Par				-0.15
Men with old parents				-0.35*
Women w/o Old Par				+0.02
Women with old parents				+0.10
		Differential Effects		
Wom-Men w/o Old Par				+0.17
Wom-Men with Old Par				+0.45***
Double Differences				+0.28**
F-stats				
Joint instruments			29.51	15.26
(Share immigrants)			41.43	21.93
(Share immigrants)x(Fem)			185.81	97.74
(Share immigrants)x(Old Parent)				66.92
(Share immigrants)x(Old Parent)x(Fem)				49.95
N	933	933	933	933

Source: SHIW and Population Registry data: 2000-2008; 1991 Census data (for the past distribution of immigrants used for the instrument).
Note: Each column shows estimates from separate regressions estimated using individual level data. The method of estimation is OLS or 2SLS according to the heading. The dependent variable is planned retirement age. Each regression includes individual fixed effects and the following controls: (predicted) OV, (log) net worth, eligibility for seniority pension, two dummies for the Law 243/2004, number of sisters, number of brothers, occupation, marital status, 5 year-bracket age dummies, and time fixed effects. Additional regressors for the "Old parents" specification: dummy for old parents and its interaction with female. The variable "Share immigrants" as reported in descriptive tables has been multiplied by 100.
Standard errors in parenthesis clustered by region*year, significance: (*) if p<.1, (**) if p<.05, (***) if p<.01.

Table 4: The Effect of Immigration on Labor Supply: Work/not Work

	OLS		2SLS	
	Base	**Old parents**	**Base**	**Old parents**
	(1)	**(2)**	**(3)**	**(4)**
(Share immigrants)	-0.157***	-0.146***	-0.138***	-0.126***
	(0.029)	(0.028)	(0.036)	(0.035)
(Share immigrants)x(Fem)	0.176***	0.161***	0.181***	0.163***
	(0.025)	(0.025)	(0.028)	(0.027)
(Share immigrants)x(Old Parent)		-0.050**		-0.052*
		(0.024)		(0.027)
(Share immigrants)x(Old Parent)x(Fem)		0.054*		0.067**
		(0.030)		(0.033)
(Old Parent)		0.244***		0.245***
		(0.074)		(0.081)
(Old Parent)x(Fem)		-0.194*		-0.238**
		(0.100)		(0.111)
		Absolute Effects		
Men			-0.14***	
Women			+0.04*	
Wom-Men			+0.18***	
Men w/o Old Par				-0.12***
Men with old parents				-0.18***
Women w/o Old Par				+0.04
Women with old parents				+0.05*
		Differential Effects		
Wom-Men w/o Old Par				+0.16***
Wom-Men with Old Par				+0.23***
Double Differences				+0.07**
F-stats				
Joint instruments			18.35	9.50
(Share immigrants)			41.08	21.67
(Share immigrants)x(Fem)			138.74	79.65
(Share immigrants)x(Old Parent)				122.37
(Share immigrants)x(Old Parent)x(Fem)				34.74
N	817	817	817	817

Source: SHIW and Population Registry data: 2000-2008; 1991 Census data (for the past distribution of immigrants used for the instrument).
Note: Each column shows estimates from separate regressions estimated using individual level data. The method of estimation is OLS or 2SLS according to the heading. The dependent variable is an indicator for working/not working. Each regression includes individual fixed effects and the following controls: (log) net worth, marital status, 5 year-bracket age dummies, number of living sisters, number of living brothers, and time fixed effects. Additional regressors for the "Old parents" specification: dummy for old parents and its interaction with female. The variable "Share immigrants" as reported in descriptive tables has been multiplied by 100.
Standard errors in parenthesis clustered by region*year, significance: (*) if p<.1, (**) if p<.05, (***) if p<.01.

Table 5: The Effect of Immigration on Labor Supply: Weekly Hours and Full Time

	OLS		2SLS	
	Base	**Old parents**	**Base**	**Old parents**
	(1)	**(2)**	**(3)**	**(4)**
			Weekly Hours (log)	
(Share immigrants)	-0.002	0.004	-0.008	0.002
	(0.014)	(0.013)	(0.016)	(0.016)
(Share immigrants)x(Fem)	0.003	-0.008	0.002	-0.004
	(0.012)	(0.012)	(0.013)	(0.012)
(Share immigrants)x(Old Parent)		-0.007		-0.012
		(0.010)		(0.010)
(Share immigrants)x(Old Parent)x(Fem)		0.028		0.019
		(0.018)		(0.018)
			Absolute Effects	
Men			-0.01	
Women			-0.01	
Wom-Men			+0.00	
Men w/o Old Par				+0.00
Men with old parents				-0.01
Women w/o Old Par				-0.00
Women with old parents				+0.00
			Differential Effects	
Wom-Men w/o Old Par				-0.00
Wom-Men with Old Par				+0.01
Double Differences				+0.02
F-stats			28.75	14.29
N	1,048	1,048	1,048	1,048
			Full Time	
(Share immigrants)	-0.002	0.001	0.019**	0.022**
	(0.006)	(0.006)	(0.009)	(0.009)
(Share immigrants)x(Fem)	-0.013	-0.022**	-0.012	-0.022***
	(0.009)	(0.009)	(0.010)	(0.008)
(Share immigrants)x(Old Parent)		-0.011**		-0.007*
		(0.005)		(0.004)
(Share immigrants)x(Old Parent)x(Fem)		0.025**		0.027**
		(0.011)		(0.014)
			Absolute Effects	
Men			+0.02**	
Women			+0.01	
Wom-Men			-0.01	
Men w/o Old Par				+0.02**
Men with old parents				+0.01
Women w/o Old Par				-0.00
Women with old parents				+0.02
			Differential Effects	
Wom-Men w/o Old Par				-0.02***
Wom-Men with Old Par				+0.00
Double Differences				+0.03**
F-stats			28.75	14.29
N	1,048	1,048	1,048	1,048

Source: SHIW and Population Registry data: 2000-2008; 1991 Census data (for the past distribution of immigrants used for the instrument).
Note: Each column shows estimates from separate regressions estimated using individual level data. The method of estimation is OLS or 2SLS according to the heading. The dependent variables are, respectively: (log) weekly work hours, and a full time indicator, as reported in the headings. Each regression includes individual fixed effects and the following controls: (log) net worth, marital status, 5 year-bracket age dummies, occupation, number of living sisters, number of living brothers, and time fixed effects. Additional regressors for the "Old parents" specification: dummy for old parents and its interaction with female. The variable "Share immigrants" as reported in descriptive tables has been multiplied by 100.
Standard errors in parenthesis clustered by region*year, significance: (*) if p<.1, (**) if p<.05, (***) if p<.01.

Table 6: Effects by Education Level

	High Education	Low Education	High Education	Low Education
	Planned Retirement Age		Work/not Work	
	Absolute Effects			
Men w/o Old Par	-0.42	-0.14	+0.17	-0.16***
Men with old parents	-0.15	-0.40*	+0.13	-0.21***
Women w/o Old Par	-0.19	-0.10	+0.28***	+0.02
Women with old parents	-0.47	+0.10	+0.28***	+0.04
	Differential Effects			
Wom-Men w/o Old Par	+0.24	+0.04	+0.11	+0.18***
Wom-Men with Old Par	-0.32	+0.50***	+0.15	+0.25***
Double Differences	-0.56	+0.47***	+0.04	+0.07*
	Weekly Hours		Full Time	
	Absolute Effect			
Men w/o Old Par	-0.01	+0.01	+0.01	+0.03**
Men with old parents	+0.01	-0.01	+0.01	+0.02
Women w/o Old Par	+0.07	-0.02	-0.00	+0.00
Women with old parents	+0.02	-0.00	+0.03	+0.02
	Differential Effects			
Wom-Men w/o Old Par	+0.08**	-0.03**	-0.01	-0.02**
Wom-Men with Old Par	+0.01	+0.01	+0.02	+0.01
Double Differences	-0.07	+0.04**	+0.03	+0.03*

Source: SHIW and Population Registry data: 2000-2008; 1991 Census data (for the past distribution of immigrants used for the instrument).
Note: Each column is relative to estimates from separate regressions on two different samples broken down by education level and estimated using individual level data. The method of estimation is 2SLS. The dependent variables are reported in the headings. Each regression includes individual fixed effects and the following controls: (log) net worth, marital status, 5 year-bracket age dummies, number of living sisters, number of living brothers, a dummy for old parents and its interaction with female, and time fixed effects. Additional regressors included only for the planned retirement age specification: (predicted) OV, eligibility for seniority pension, two dummies for the Law 243/2004, and occupation. Occupation is also included in the specifications for week hours and full time. The variable "Share immigrants" as reported in descriptive tables has been multiplied by 100.
Standard errors in parenthesis clustered by region*year, significance: (*) if p<.1, (**) if p<.05, (***) if p<.01.

Table 7: Effects by Wealth

	Above Median Wealth	Below Median Wealth	Above Median Wealth	Above Median Wealth
	Planned Retirement Age		**Work/not Work**	
	Absolute Effects			
Men w/o Old Par	-0.23	-0.31	-0.16***	-0.15***
Men with old parents	-0.37	-0.62**	+0.17***	-0.30***
Women w/o Old Par	-0.07	+0.01	+0.01	+0.05*
Women with old parents	-0.15	+0.28	-0.03	+0.12**
	Differential Effects			
Wom-Men w/o Old Par	+0.17	+0.32	+0.17	+0.20***
Wom-Men with Old Par	+0.22	+0.90***	+0.14	+0.42***
Double Differences	+0.06	+0.58***	-0.03	+0.22***
	Week Hours		**Full Time**	
	Absolute Effect			
Men w/o Old Par	+0.03	-0.04	+0.02*	+0.03**
Men with old parents	+0.04	-0.10***	+0.02**	+0.02
Women w/o Old Par	+0.05*	-0.06**	+0.01	+0.00
Women with old parents	+0.05	-0.03	+0.01	+0.07
	Differential Effects			
Wom-Men w/o Old Par	+0.01	-0.02	-0.01	-0.03*
Wom-Men with Old Par	+0.01	+0.07**	-0.01	+0.05
Double Differences	-0.00	+0.09***	-0.00	+0.08**

Source: SHIW and Population Registry data: 2000-2008; 1991 Census data (for the past distribution of immigrants used for the instrument).
Note: Each column is relative to estimates from separate regressions on two different samples broken down by household wealth and estimated using individual level data. The method of estimation is 2SLS. The dependent variables are reported in the headings. Each regression includes individual fixed effects and the following controls: (log) net worth, marital status, 5 year-bracket age dummies, number of living sisters, number of living brothers, a dummy for old parents and its interaction with female, and time fixed effects. Additional regressors included only for the planned retirement age specification: (predicted) OV, eligibility for seniority pension, two dummies for the Law 243/2004, and occupation. Occupation is also included in the specifications for week hours and full time. The variable "Share immigrants" as reported in descriptive tables has been multiplied by 100.
Standard errors in parenthesis clustered by region*year, significance: (*) if p<.1, (**) if p<.05, (***) if p<.01.

Table 8: Robustness. Retirement and Working/not Working

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Plan. Retir. Age					**Work/not Work**				
	Absolute Effects									
Men w/o Old Par	-0.15	-0.12	-0.23	-0.15	-0.13	-0.13***	-0.10**	-0.14***	-0.13***	-0.12***
Men with old parents	-0.35*	-0.32	-0.42*	-0.38**	-0.29*	-0.18***	-0.15***	-0.19***	-0.18***	-0.14***
Women w/o Old Par	+0.02	+0.04	-0.06	+0.06	-0.00	+0.04	+0.06**	+0.03	+0.05*	+0.04*
Women with old parents	+0.10	+0.13	+0.10	+0.16	+0.06	+0.05*	+0.08**	+0.04	+0.04*	+0.05*
	Differential Effects									
Wom-Men w/o Old Par	+0.17	+0.16	+0.17	+0.21	+0.13	+0.16***	+0.16***	+0.16***	+0.17***	+0.12***
Wom-Men with Old Par	+0.45***	+0.45***	+0.44***	+0.54***	+0.35***	+0.23***	+0.22***	+0.23***	+0.23***	+0.18***
Double Differences	+0.28**	+0.28**	+0.27**	+0.34**	+0.22**	+0.07**	+0.07**	+0.07**	+0.06*	+0.05**
Controls										
Unempl rate$_t$	**No**	**Yes**	**No**	**No**	**No**	**No**	**Yes**	**No**	**No**	**No**
Unempl rate$_{t-1}$	**No**	**No**	**Yes**	**No**	**No**	**No**	**No**	**Yes**	**No**	**No**
Coresident daughters	**No**	**No**	**No**	**Yes**	**No**	**No**	**No**	**No**	**Yes**	**No**
Correction for Undoc	**No**	**No**	**No**	**No**	**Yes**	**No**	**No**	**No**	**No**	**Yes**

Source: SHIW and Population Registry data: 2000-2008; 1991 Census data (for the past distribution of immigrants used for the instrument). Note: Each column shows estimates from separate regressions and estimated using individual level data. The method of estimation is 2SLS. The dependent variables are: planned retirement age (1-4 columns) and an indicator for working/not working (5-8 columns). In each column we add a different control: contextual local labor market factors (male and female regional unemployment rate), potential contribution to family care from co-resident daughters (by including its indicator and its interaction with female), correction for illegals (as described in section 6). Each regression includes individual fixed effects and the following controls: (log) net worth, marital status, 5 year-bracket age dummies, number of living sisters, number of living brothers, a dummy for old parents and its interaction with female, and time fixed effects. Additional regressors included only for the planned retirement age specification: (predicted) OV, eligibility for seniority pension, two dummies for the Law 243/2004, and occupation. The variable "Share immigrants" as reported in descriptive tables has been multiplied by 100.
Standard errors in parenthesis clustered by region*year, significance: (*) if p<.1, (**) if p<.05, (***) if p<.01.

Table 9: Robustness: selected groups of immigrants specialized in Household Services

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Plan. Retir. Age					**Work/not Work**		
					Absolute Effects			
Men w/o Old Par	-0.15	-0.16	-0.27	-0.13	-0.13***	-0.12***	-0.14***	-0.13***
Men with old parents	-0.35*	-0.37*	-0.55**	-0.31*	-0.18***	-0.17***	-0.22***	-0.18***
Women w/o Old Par	+0.02	-0.00	-0.12	+0.05	+0.04	+0.04	+0.05	+0.04*
Women with old parents	+0.11	+0.06	+0.11	+0.10	+0.05*	+0.06**	+0.08*	+0.05*
					Differential Effects			
Wom-Men w/o Old Par	+0.17	+0.16	+0.15	+0.18	+0.16***	+0.16***	+0.19***	+0.16***
Wom-Men with Old Par	+0.45***	+0.48***	+0.61***	+0.42***	+0.23***	+0.23***	+0.30**	+0.23***
Double Differences	+0.28**	+0.31**	+0.45**	+0.24*	+0.07**	+0.07**	+0.10**	+0.06**
All	**Yes**				**Yes**			
East Eu and Asia			**Yes**				**Yes**	
Fem		**Yes**	**Yes**			**Yes**	**Yes**	
Male				**Yes**				**Yes**

Source: SHIW and Population Registry data: 2000-2008; 1991 Census data (for the past distribution of immigrants used for the instrument). Note: Each column shows estimates from separate regressions and estimated using individual level data. The method of estimation is 2SLS. The dependent variables are: planned retirement age (1-4 columns) and an indicator for working/not working (5-8 columns). In each column we use a different definition of immigrants. Columns (1) and (4) refer to the baseline definition. Columns (2) and (5) include only female immigrants, columns (3) and (6) include only female immigrants from Easter EU and Asia, and columns (4) and (8) consider only male immigrants. Each regression includes individual fixed effects and the following controls: (log) net worth, marital status, 5 year-bracket age dummies, number of living sisters, number of living brothers, a dummy for old parents and its interaction with female, and time fixed effects. Additional regressors included only for the planned retirement age specification: (predicted) OV, eligibility for seniority pension, two dummies for the Law 243/2004, and occupation. The variable "Share immigrants" as reported in descriptive tables has been multiplied by 100.
Standard errors in parenthesis clustered by region*year, significance: (*) if p<.1, (**) if p<.05, (***) if p<.01.

Table 10: Falsification exercise: Age and Wages

	(1)	(2)	(3)	(4)	(5)	(6)
	Age 40-54				**Retir. Sample**	**Lab. Supply Sample**
	Retir. Age		**Work/not Work**		**Wage**	
			Absolute Effects			
Men	+0.00		-0.02***			
Wom	+0.07		+0.01			
Wom-Men	+0.07		+0.01***			
Men w/o Old Par		-0.03		-0.01**	-0.05	-0.10*
Men with old parents		+0.05		-0.02***	-0.03	-0.13**
Women w/o Old Par		+0.09		-0.00	-0.07*	-0.05
Women with old parents		+0.04		-0.00	-0.06*	+0.02
			Differential Effects			
Wom-Men w/o Old Par		+0.12*		+0.01*	-0.01	+0.05
Wom-Men with Old Par		-0.01		+0.01***	-0.02	+0.16*
Double Differences		-0.13		+0.00	-0.01	+0.11
F-stats	15.93	7.99	18.88	9.54	13.38	24.01
N	4,681	4,681	6,249	6,249	1,081	208

Source: SHIW and Population Registry data: 2000-2008; 1991 Census data (for the past distribution of immigrants used for the instrument).
Note: Each column shows estimates from separate regressions using individual level data. The method of estimation is 2SLS with individual fixed effects. The dependent variables are: planned retirement age (column 1-2), an indicator for working/not working (column 3-4), and hourly wages (log) (column 5-6). Additional regressors for column (1)-(4) are described in Table 3, and 4, respectively. Additional regressors for column (5)-(6): occupation, sector, age (and its squared value), old parents and its interaction with female, and year fixed effects. The variable "Share immigrants" as reported in descriptive tables has been multiplied by 100.
Standard errors in parenthesis clustered by region*year, significance: (*) if p<.1, (**) if p<.05, (***) if p<.01.

Appendix

A1. Data Appendix

Table A.1: Eligibility Requirements for Seniority Pension

		White Collar			Blue Collar		
Year	**Sector**	**Age**	**Seniority**	**Only Sen**	**Age**	**Seniority**	**Only Sen**
2000	Public	54	35	37	54	35	37
	Private	55	35	37	54	35	37
2002	Public	55	35	37	55	35	37
	Private	57	35	37	55	35	37
2004	Public	57	35	38	56	35	38
	Private	57	35	38	56	35	38
2006	Public	57	35	39	57	35	39
	Private	57	35	39	57	35	39
2008	Public	60	35	40	60	35	40
	Private	60	35	40	60	35	40

Table A.2: Distribution of Immigrants by Regions and Year

	2000	**2008**	**Total**
Piemonte	0.023	0.080	0.054
Valle D'Aosta	0.017	0.059	0.027
Lombardia	0.034	0.097	0.069
Trentino	0.025	0.077	0.049
Veneto	0.029	0.098	0.070
Friuli Venezia Giulia	0.025	0.078	0.055
Liguria	0.020	0.062	0.038
Emilia Romagna	0.031	0.104	0.074
Toscana	0.028	0.083	0.057
Umbria	0.031	0.098	0.065
Marche	0.026	0.086	0.062
Lazio	0.039	0.082	0.053
Abruzzo	0.017	0.053	0.034
Molise	0.006	0.022	0.015
Campania	0.009	0.022	0.013
Puglia	0.008	0.017	0.011
Basilicata	0.005	0.019	0.010
Calabria	0.009	0.028	0.019
Sicilia	0.013	0.022	0.017
Sardegna	0.006	0.016	0.010
Total	0.020	0.066	0.042

Source: Registry data, 2000-2008.

Table A.3: Instrument Predictive Power. Aggregate Regressions

	Retirement sample				Work/not work sample			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
(Imputed Share)	0.933***	0.727***	0.587***	0.585***	0.933***	0.727***	0.603***	0.608***
	(0.096)	(0.155)	(0.160)	(0.160)	(0.095)	(0.155)	(0.159)	(0.161)
Clust-rob F stats	95.01	21.95	13.44	13.38	95.61	22.01	14.44	14.35
N	99	99	99	99	100	100	100	100
Controls								
FE	**No**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**Yes**
Full specification	**No**	**No**	**Yes**	**Yes**	**No**	**No**	**Yes**	**Yes**
Unemployment rate	**No**	**No**	**No**	**Yes**	**No**	**No**	**No**	**Yes**

Source: SHIW and Population Registry data: 2000-2008; 1991 Census data (for the past distribution of immigrants used for the instrument).
Note: Each column represents estimates from separate 2SLS regressions where the unit of analysis is given by region-year. The dependent variable is the immigrant share of the population at regional level, and the "Imputed Share" represents the instrument explained in (2). The heading "Retirement sample" refers to the regional-time values for the (55 and older) retirement sample, whereas the heading "Work/not work sample" refers to the (60 and older) labor supply sample. Columns (1) and (5) include only the predicted value, whereas the heading "Full specification" includes the region-year average of the following regressors: (predicted) OV (only for the Retirement sample), eligibility for seniority pension (only for the Retirement sample), two dummies for the Law 243/2004 (only for the Retirement sample), number of living sisters, number of living brothers, (log) net worth, occupation (only for the Retirement sample), marital status, 5 year-bracket age dummies, time fixed effects, regional fixed effects, dummy for old parents and its interaction with female.
Standard errors in parenthesis clustered by region*year, significance: (*) if p<.1, (**) if p<.05, (***) if p<.01.

Table A.4: The Effect of Immigration on Planned Retirement Age and Work/not Work. OLS and Fixed Effects

	Retir. Age				**Work/not Work**			
	OLS		**2SLS**		**OLS**		**2SLS**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
(Share immigrants)	-0.116	0.005	-0.153	-0.104	-0.146***	-0.034*	-0.126***	0.002
	(0.119)	(0.093)	(0.184)	(0.124)	(0.028)	(0.019)	(0.035)	(0.024)
(Share immigrants)x(Fem)	0.190	0.161*	0.170	0.153	0.161***	-0.004	0.163***	-0.013
	(0.133)	(0.087)	(0.142)	(0.101)	(0.025)	(0.014)	(0.027)	(0.016)
(Share immigrants)x(Old Parent)	-0.138*	-0.087	-0.193**	-0.100	-0.050**	-0.047**	-0.052*	-0.050**
	(0.081)	(0.062)	(0.097)	(0.074)	(0.024)	(0.022)	(0.027)	(0.024)
(Share immigrants)x(Old Parent)x(Fem)	0.185*	0.111	0.279**	0.178	0.054*	0.057**	0.067**	0.068**
	(0.101)	(0.110)	(0.131)	(0.136)	(0.030)	(0.028)	(0.033)	(0.032)
(Old Parent)	0.448	-0.097	0.611	-0.076	0.244***	0.244***	0.245***	0.252***
	(0.348)	(0.311)	(0.390)	(0.323)	(0.074)	(0.094)	(0.081)	(0.092)
(Old Parent)x(Fem)	-0.355	0.058	-0.656	-0.193	-0.194*	-0.275**	-0.238**	-0.310**
	(0.590)	(0.501)	(0.658)	(0.594)	(0.100)	(0.120)	(0.111)	(0.128)
F-stats			15.26	8.90			9.50	7.81
Individual FE	Yes		Yes		Yes		Yes	
N	933	933	933	933	817	817	817	817

Source: SHIW and Population Registry data: 2000-2008; 1991 Census data (for the past distribution of immigrants used for the instrument). Note: Each column shows estimates from separate regressions estimated using individual level data. The method of estimation is OLS or 2SLS according to the heading. The final sample consists of 397 persons distributed over 5 waves: 70 percent is present for two waves, 22 percent for 3 waves, and 6 percent for 4 or 5 waves. The dependent variables are reported in the heading. Each regression includes the following controls: (predicted) OV, (log) net worth, eligibility for seniority pension, two dummies for the Law 243/2004, number of living sisters, number of living brothers, occupation, marital status, 5 year-bracket age dummies, and time fixed effects. Additional regressors for the "Old parents" specification: dummy for old parents and its interaction with female. The variable "Share immigrants" as reported in descriptive tables has been multiplied by 100.
Standard errors in parenthesis clustered by region*year, significance: (*) if p<.1, (**) if p<.05, (***) if p<.01.

Table A.5: The Effect of Immigration on Planned Retirement Age and Labor Supply. Cluster by Region

	Planned Retirement Age		Work/not Work	
	Base	**Old parents**	**Base**	**Old parents**
	(1)	**(2)**	**(3)**	**(4)**
		Absolute Effects		
Men	-0.22		-0.14***	
Women	+0.06		+0.04	
Wom-Men	+0.28*		+0.18***	
Men w/o Old Par		-0.15		-0.13***
Men with old parents		-0.35*		-0.18***
Women w/o Old Par		+0.02		+0.04
Women with old parents		+0.10		+0.05
		Differential Effects		
Wom-Men w/o Old Par		+0.17		+0.16***
Wom-Men with Old Par		+0.45**		+0.23***
Double Differences		+0.28**		+0.07**
F-stats	7.54	3.87	6.30	3.20
N	933	933	817	817

Source: SHIW and Population Registry data: 2000-2008; 1991 Census data (for the past distribution of immigrants used for the instrument).
Note: Each column shows estimates from separate regressions estimated using individual level data. The dependent variables are reported in the heading. The method of estimation is 2SLS. Each regression includes individual fixed effects and the following controls: (log) net worth, marital status, 5 year-bracket age dummies, dummy for old parents and its interaction with female, number of living sisters, number of living brothers, and time fixed effects. Additional regressors for the Planned Retirement Age regressions include: (predicted) OV, eligibility for seniority pension, and two dummies for the Law 243/2004. The variable "Share immigrants" as reported in descriptive tables has been multiplied by 100.
Standard errors in parenthesis clustered by region, significance: (*) if p<.1, (**) if p<.05, (***) if p<.01.

A2. Theoretical appendix

We describe briefly here a model in the spirit of Chan and Stevens (2004) that we used to compute the financial incentives related to the planned retirement age, given by the Option Value of postponing retirement. The Option Value approach has been pioneered by Stock and Wise (1990). This model expands upon Chan and Stevens (2004) in two main respects: we introduce the non separability between leisure and consumption and the role of the long-term care costs for parental care.[32] Individuals are assumed to maximize the following inter-temporal and separable utility function, with a Constant Relative Risk Aversion (CRRA) form:

$$\max_{c_t} U(c_t, c_{t+1}, ..., c_T) = \max_{c_t, c_{t+1}..c_T} \sum_{s=t}^{R} \frac{(c_s)^{1-\gamma}}{(1+\rho)^{s-t}(1-\gamma)} + \sum_{s=R+1}^{T} \frac{(kc_s)^{1-\gamma}}{(1+\rho)^{s-t}(1-\gamma)} \tag{3}$$

where c is consumption level, $1/\gamma$ is the inter-temporal elasticity of substitution, ρ is the subjective discount rate, T the expected lifetime, and $k > 1$ is a factor enhancing utility when individuals enjoy free time. It captures, in other words, the leisure in the utility function which we suppose the individual can enjoy if she/he does neither work nor takes care of her/his parents. R corresponds to early retirement age, and T is the end of lifetime (known with certainty).

The inter-temporal budget constraint can be written as follows:

$$\sum_{s=t}^{T} \frac{c_s}{(1+r)^{s-t}} = A_t + \sum_{s=t}^{R} \frac{y_s}{(1+r)^{s-t}} + \sum_{s=R+1}^{T} \frac{B_s}{(1+r)^{s-t}} \tag{4}$$

where y and B are labor income and pension benefits, respectively, A_t is the sum of real and financial wealth, and r is the annual interest rate, supposed to be known and constant over time.[33] After solving the maximization problem,[34] the relevant value function is the sum of flows of future utility when consumption is chosen at its optimal level:

$$V_t(R, A_t) = \left(\sum_{s=t}^{R} y_s + \sum_{s=R+1}^{T} B_s + A_t \right)^{1-\gamma} \frac{(R - t + 1 + k^{\frac{1-\gamma}{\gamma}}(T-R))^{\gamma}}{(1-\gamma)}$$

Suppose that the parents are alive until age R_3, which is higher than the early possible retirement age (R) and the maximum retirement age allowed (R_2). If the care of parents is bought in the market and the agent continues working up to R_2, we have the following inter-temporal utility function:

$$\max_{c_t} U(c_t, c_{t+1}, ..., c_T) = \max_{c_s} \sum_{s=t}^{R_3} \frac{(c_s)^{1-\gamma}}{(1+\rho)^{s-t}(1-\gamma)} + \sum_{s=R_3+1}^{T} \frac{(kc_s)^{1-\gamma}}{(1+\rho)^{s-t}(1-\gamma)} \tag{5}$$

[32] As Stock and Wise (1990) and Chan and Stevens (2004) our model is a modified version of the standard life-cycle approach with a leisure enhancing factor entering the utility function only after retirement.

[33] Uncertainty is removed from the model by assuming that individuals know with certainty their expected end of life.

[34] We assume here for simplicity $r = \rho$ and equal to zero, though the general case with $r \neq 0$ provides the same testable implication and it is available upon request.

subject to the following inter-temporal budget constraint

$$\sum_{s=t}^{T} \frac{c_s}{(1+r)^{s-t}} = A_t + \sum_{s=t}^{R_2} \frac{y_s}{(1+r)^{s-t}} + \sum_{s=R_2+1}^{T} \frac{\bar{B}_s}{(1+r)^{s-t}} - \sum_{s=R+1}^{R_2} \frac{y_s^c}{(1+r)^{s-t}} \tag{6}$$

Individuals start enjoying leisure only after R_3, which corresponds to their parents' death and we assume that they optimally decide to postpone the possible early retirement age R to $R_2 < R_3$ by paying the market cost of long-term care $y^c = w^c h$, for the time interval $R_2 - R$, where w^c is the hourly salary for elderly care-givers with $y_s > y_s^c$. After some algebra it follows that the following inequality must hold:

$$\log(H_{\bar{R}}) - \log(H_R) > \frac{\gamma}{1-\gamma} \log \left[\frac{(R-t+1) + k^{\frac{1-\gamma}{\gamma}}(T-R)}{(R_3-t+1) + k^{\frac{1-\gamma}{\gamma}}(T-R_3)} \right] \tag{7}$$

where

$$H_{\bar{R}} = \textstyle\sum_{s=t}^{R_2} y_s + \sum_{s=R_2+1}^{T} \bar{B}_s + A_t - \sum_{s=R+1}^{R_2} y_s^c \quad \text{and} \quad H_R = \sum_{s=t}^{R} y_s + \sum_{s=R+1}^{T} B_s + A_t$$

A3. OV, earnings, and pension benefits projection

Our measure of the OV is computed as the left hand side of equation (7), where $H_{\bar{R}}$, and (H_R) are the sum of life-time resources including the sums of net worth wealth, labor earnings, and pension benefits.[35] In order to compute the sum of life-time resources we need to recover individual life-expectancy. First we assume that individuals know with certainty the expected end of their life, (T) which we take for each respondent from the life-tables, disaggregated by year, gender, age and geographic location (defined by five macro-regions and provided by ISTAT). Second, for each worker we need to compute the expected pension benefits, $\bar{B}$, thus we need to project forward their earnings to the year before their expected retirement and to apply the expected replacement rate. Therefore, individual earnings are projected forward up to the year prior to the expected retirement, applying the constant growth rate of real earnings per capita corresponding to the last year in which they featured in the sample. We compute the per capita (real) earning growth rate by using the growth rate of earning at national level.[36] In addition, in order to compute the pension benefit in cases of immediate retirement, B, we need to recover the expected replacement rate corresponding to the last year in which the

[35] Unfortunately we do not have information on wages in the domestic sector. The only available info would be provided by the Italian Labor Force Survey, but this does not cover our period of analysis. SHIW provides information on wages, but the sample size for people working in the domestic sector is extremely low (1,299) to be representative at (regional-year) level where our immigration variable varies. Not having appropriate information on wages of the domestic sector, we cannot include the market cost of elderly care in $H_{\bar{R}}$.

[36] For an alternative earnings projection strategy see Borella and Moscarola (2010) who model individual earnings profiles by using a regression model, which controls for age, cohort, regional and time dummies, plus and additional individual random effect, and with the error term following an AR(1) process.

individuals featured in the sample. However, the data provides only the expected replacement rate for the year when the respondent expects to retire. We therefore predict the expected replacement rate using the following regression:

$$y_{it} = \beta z_{it} + x'_{it}\gamma + D_t + \epsilon_{it} \tag{8}$$

where y_{it} is the expected replacement rate provided by the survey and z_{it} represents the years of contributions expected to be paid before retirement. In order to compute the latter variable, we use the information provided by the survey regarding the number of years of contributions paid by workers at the time of the interview, and we assume that each worker would pay contributions for the remaining years up to their expected retirement age. x_{it} is a vector of individual characteristics including gender, education, type of occupation and civil status, D_t is a time dummy and ϵ_{it} is the standard zero-mean error term. We then use the coefficients estimated in equation (8) to predict the expected replacement rate corresponding to immediate retirement. This predicted value is applied to the earnings corresponding to the penultimate year to recover the immediate benefits (B). In the computation of $H_{\bar{R}}$ and H_R, both $\bar{B}$ and B are assumed to be constant. All financial values are expressed in real terms, deflated using the CPI-based index with base= 2005.