Immigration, Family Responsibilities and the Labor Supply of Skilled Native Women*

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Abstract: This paper investigates the effects of Spain's large recent immigration wave on the labor supply of highly skilled native women. We hypothesize that female immigration led to an increase in the supply of affordable household services, such as housekeeping and child or elderly care. As a result, i) native females with high earnings potential were able to increase their labor supply, and ii) the effects were larger on skilled women whose labor supply was heavily constrained by family responsibilities. Our evidence indicates that over the last decade immigration led to an important expansion in the size of the household services sector and to an increase in the labor supply of women in high-earning occupations (of about 2 hours per week). We also find that immigration allowed skilled native women to return to work sooner after childbirth, to stay in the workforce longer when having elderly dependents in the household, and to postpone retirement. Methodologically, we show that the availability of even limited Registry data makes it feasible to conduct the analysis using quarterly household survey data, as opposed to having to rely on the decennial Census.

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1. Introduction

There is a large literature addressing the effects of immigration on the host country's labor market. Most studies focus on the direct effects of immigration on the wages and employment opportunities of natives with the *same* skill level.[1] However, immigration may also affect the labor market decisions of natives with *different* skills through general-equilibrium effects. In particular, immigration may lead to increases in the local supply of services that are close substitutes with household work (such as cleaning, cooking or child and elderly care). As a result, women that can afford to purchase these services may be able to shift time from housework toward market work.

As pointed out by Kremer and Watt (2006), this particular channel through which immigration can affect the labor market of the receiving economy may be quantitatively important. Through a calibration exercise, they estimate that taking this form of skill complementarity into account implies that the immigration surplus in the US may be more than 10 times larger than previously thought.[2] In turn, Cortes and Tessada (2009) provide empirical evidence that supports this mechanism. Their estimates indicate that low-skilled immigration has led to a significant increase in the amount of time worked by highly skilled women in the US.

In this paper, we analyze empirically the effect of immigration on the labor supply of skilled women in Spain, through increases in the availability of household services. The Spanish case is of particular interest for several reasons. First, over the last decade Spain has experienced a large wave of immigration. The foreign-born share in the working-age population increased from 3% in 1999 to 15% in 2008.[3] Compared to natives, recent immigrants are on average younger, less educated, and more are heavily concentrated in low-earnings occupations (even controlling for education). In 2008, foreign-born females accounted for half of total employment in house-cleaning and home-provided childcare and elderly care together (compared to 12% in 1999).

Second, despite large progress in recent decades, female labor force participation remains low in Spain, compared to other OECD countries. In 2005, Spain's female participation rate was

[1] See, among many others, Card (1990), Altonji and Card (1991), Borjas et al. (1996), Card (2001), Borjas (2003) and Ottaviano and Peri (2006).

[2] The immigration surplus associated to a given immigration flow is defined as the increase in income, net of payments to immigrants. That is, the aggregate increase in income accruing to natives. Borjas (1999) estimates that the immigration surplus associated to a 10 percentage-point increase in the foreign-born share is around 0.1% of GDP.

[3] Population Registry on January 1st of the corresponding years. The analogous figures from the Labor Force Survey are 4% and 17%.

only 58%, compared with 69% in the UK, 70% in the US and 76% in Sweden.[4] Low female participation is a common pattern in Southern Europe and it has been argued that it is related to the traditionally large role of the family in caring for children and the elderly, which results in a large burden on women's time. Table 1 illustrates this point. In 2008, 39% of Spanish women aged 25 to 64 were out of the labor force, and 61% of them reported "family responsibilities" as the main reason.[5]

This paper addresses three main questions. First, we analyze whether immigration has led to an increase in the size of the household services sector, measured in terms of employment. We define "household services" to include nannies (in-house childcare), housekeepers and in-house personal care workers. Second, we examine the effects of immigration on the labor supply of highly skilled native women, defined as individuals with high educational attainment or employed in high-earnings occupations. For comparison purposes, we also analyze the effects on highly skilled men and on low-skill natives. Finally, we examine whether the labor supply response to immigration is higher for skilled women whose labor supply is more heavily constrained by family responsibilities. In theory, these women should have a larger demand for market-provided household services. Specifically, we focus on college-educated women in households with young children, with elderly relatives, or whose husband is already in retirement. To our knowledge, we are the first to study systematically the effects of immigration on the labor market decisions of women with large family responsibilities.[6]

Methodologically, we follow a spatial correlations approach. We correlate changes in immigrant concentration at the regional level (measured using Registry data) with changes in the labor supply of skilled natives (from the Labor Force Survey). Crucial to this approach, there has been large variation in the inflows of low-skilled immigrants across Spanish regions, as shown in Table 2. Over the last decade, the increase in low-educated immigrants as a share of the regional labor force ranged from below 4% to almost 25%. In order to provide a causal interpretation for our estimates, we adopt an instrumental variables approach based on ethnic networks (a la Card (2001)).

[4] Source: OECD Factbook 2007.
[5] The non-participation rate of females with a college degree is lower (11%), but among these women "family responsibilities" is also the main self-reported reason (53%).
[6] The only exceptions we know are Cortes and Tessada (2008) and Furtado and Hock (2008), who analyze the impact of immigration on the labor supply of skilled women with young children in the US.

Our results show, first, that immigration had a positive effect on the size of the household services sector. Second, we find that immigration over the period 1999-2008 led to a substantial increase in the time worked by women in high-earnings occupations (of about 2 hours per week). We find no effects on men with the same skills. Third, we find that immigration led to a larger labor supply response for women with large family responsibilities. Specifically, our evidence indicates that immigration allowed women to return to work sooner after childbirth, to continue working while caring for (male) elderly relatives, and to postpone their own retirement at the time their husbands retire.

There are several important differences between our paper and the study by Cortes and Tessada (2009) for the US. First, we focus on the effects of female immigration, which, at least in the case of Spain, is more closely related to the size of the household services sector. Second, in addition to using education to define highly skilled natives, we also employ an occupation-based definition. In particular, we consider native workers employed in high-earning occupations, which better captures the set of individuals that can afford to hire household service workers. Third, we analyze systematically the interaction with family responsibilities of different types.

Our paper also makes a methodological contribution with important implications for policy makers, which can be useful in studying the effects of immigration in other countries.[7] We show that the availability of even limited Registry data (as is the case in Spain) makes it feasible to conduct the analysis using quarterly household survey data.[8] The main advantage of this approach is that it allows researchers to analyze the effects of an immigration episode promptly, as opposed to having to rely on Census data that become available only every ten years.

The remainder of the paper is organized as follows. Section 2 introduces the empirical methodology. Section 3 describes the datasets, presents some descriptive statistics, and explains the construction of the main variables. Sections 4 through 7 describe the results of the analysis, and section 8 concludes.

[7] Several Scandinavian countries have high-quality, individual-level, Registry data that are linked to several other surveys. While this is great for research purposes, these type of data are not available in most other countries. Other countries, such as Italy or Spain, also have Registry data but these data contain more limited information.

[8] Aydemir and Borjas (2006) argue that estimates of regional immigrant concentration based on 5% Census samples (let alone the much smaller Labor Force Survey) may be very noisy, inducing substantial attenuation bias.

2. Methodology

This section presents our empirical approach and identification strategy. Our analysis proceeds in three steps. First, we examine the connection between female immigration and the size of the household service sector (section 2.1). We focus on females because they make up for the overwhelming majority (over 95%) of workers in this sector. Second, we estimate the effects of immigration on the labor supply of natives, separately by gender and skill level (section 2.2). Finally, we investigate if the labor supply response has been larger for skilled native women whose labor supply is particularly constrained by family responsibilities (section 2.3). Section 2.4 describes the instrumental variables approach.

2.1 Immigration and household services

To establish the relationship between female immigration and the size of the household services sector we propose the following regression model:

$$HHS_{rt} = \phi_r + \lambda_t + \beta FF_{rt} + \varepsilon_{rt}. \quad (1)$$

The dependent variable (*HHS*) is region *r*'s total employment in household services in year *t*, normalized by the initial (1999) working-age female population in the region, to account for regional differences in population size. The main explanatory variable (*FF*) is a measure of the size of the female foreign-born population, also normalized by the initial female population in the region. The specification includes year (λ_t) and region (ϕ_r) fixed effects. Accordingly, identification is based on within-region changes over time. Our coefficient of interest (β) will indicate to what extent increases in the foreign-born, female population are associated with increases in employment in household services. Note that β will be zero if either no immigrant becomes employed in household services, or if immigrants fully displace natives working in that sector. A positive coefficient implies that female immigration is associated with a net increase in the size of the household services sector.

2.2. Immigration and the labor supply of skilled natives

Next, we estimate the effect of immigration on the labor supply of skilled natives. Our main explanatory variable is again the share of female immigrants in a region and year (*FF*), constructed from local Registry data (see section 3 for details). We prefer this variable to a more direct measure of employment in the household service sector at the regional level, because the

latter can only be measured using the relatively small Labor Force Survey, which can lead to severe measurement error problems. These problems are aggravated by the high degree of informal employment in this sector.

Our model of the labor supply of highly skilled natives is the following:

$$y_{irt} = \phi_r + \lambda_t + \beta FF_{rt} + X'_{irt}\Lambda + \varepsilon_{irt}\,, \tag{2}$$

where y_{irt} is a measure of the labor supply of individual *i* living in region *r* at time *t*. The regression includes region (ϕ_r) and year dummies (λ_t), as well as a vector of individual characteristics (X_{irt}), such as age, marital status, number of children in the household, and so on. We allow the disturbance term to be correlated across individuals in the same region-year cell. Identification is based on the correlation between within-region changes in the share of foreign females (*FF*) and changes in the average labor supply of highly skilled natives, after controlling for changes in average individual characteristics.

For comparability with the results in previous studies (such as Cortes and Tessada, 2009), we also report the results from specifications where the main explanatory variable is defined as the share of low-skilled female workers in the region (including both immigrants and natives) or the share of low-skilled female immigrants.

To further investigate the nature of the complementarity between high and low-skill workers, we estimate model (2) separately on the samples of highly skilled males and females. Cross-skill effects arising from the standard complementarity built into the commonly used aggregate production functions should lead to effects on the labor supply of both skilled men and women. In contrast, cross-skill effects that operate through increases in the regional supply of household services are likely to have much larger effects on the labor supply of women. The reason for the asymmetry is the well-documented unequal gender distribution of housework.

Furthermore, the theory suggests that only women with high earnings potential will benefit from the increased supply of household services in their region. Low-skill women will not find it profitable to purchase these services in order to expand their own labor supply. If anything, these women face larger competition in the labor market. To examine this additional hypothesis we also estimate our labor supply models on the sample of low-skill native females.

2.3. Women with Family Responsibilities

Next, we test the prediction that skilled women with high family responsibilities should display higher sensitivity to changes in the supply of household services in the region. We estimate an extended version of the model in (2):

$$y_{irt} = \phi_r + \lambda_t + \alpha D_{irt} + \beta FF_{rt} + \gamma D_{irt} FF_{rt} + X'_{irt}\Lambda + \varepsilon_{irt}, \quad (3)$$

where D_{irt} is an indicator variable that takes value one when a highly skilled woman has high "family responsibilities", which further constrain her labor supply. In particular, we consider three types of family responsibilities: young children, elderly relatives, and retired husbands. Coefficient γ thus indicates the additional effect of immigration on the labor supply of highly skilled women with high family responsibilities, relative to other women with the same skills in the same region.

2.4. Instrumental Variables

Clearly, OLS estimates of equation (1), (2) and (3) are likely to suffer from an endogeneity problem. If immigrants move to regions with increasing demand for household services, then the OLS coefficient in equation (1) will be biased upwards. In turn, if immigrants move to regions with a growing demand for *skilled* labor that is unobserved to the econometrician, OLS estimates of equations (2) and (3) will be upwardly biased. However, it could well be the case that immigrants and high-skill native workers are attracted to different regions, responding to skill-specific regional labor demand shocks. For instance, this would be the case if some regions specialize in unskilled - intensive sectors (e.g. agriculture) while others specialize in skilled-intensive sectors (e.g. IT).[9] In this case, OLS estimates of (2) and (3) may be biased downward.

Following Cortes and Tessada (2009), we account for the potential endogeneity of migrants' location choices using an instrumental variables approach. Specifically, we build a version of the widely used ethnic networks instrument a la Card (2001). This instrument exploits the fact that recent immigrants tend to locate in regions with large communities of previous immigrants from the same country of origin.

More formally, consider the following predictor for the size of the foreign-born population in a region *r* in a given year *t*:

[9] When we examine the effects of unskilled immigration on the labor supply of unskilled natives, the previous argument does not apply. In that case, we would expect OLS to be unequivocally biased upwards.

$$Z_{r,t} = \sum_{c} \left(\frac{FB_{r,c,t_0}}{FB_{c,t_0}} \right) FB_{c,t} \qquad \text{for } t_0 < t, \tag{4}$$

where the term in parenthesis denotes the share of the foreign-born population from country of origin *c* living in Spain's region *r* in some base year t_0. *FB* is the total size of the population from country *c* residing in Spain in year *t*. We include both men and women since our definition of networks is based purely on ethnicity, not gender.

Recall that our regression models include region and year fixed effects. Thus, effectively, the instrument predicts regional *changes* in the population from a particular country of origin by using past *time-invariant* regional data interacted with the current change in the size of the population from that country of origin living in Spain as a whole. Our exogeneity assumption regarding specifications (2) and (3) is that regional shocks to the current demand for *skilled* labor are uncorrelated with the regional shares of the stock of immigrants at some point in the past.[10]

3. Data

3.1. Sources and definitions

We exploit the regional variation in migration densities across the 52 Spanish provinces.[11] We combine data from three different sources: the Labor Force Survey (1999-2008), the Local Population Registry (1999-2008), and the 1991 Decennial Census.

Our main data source is the Labor Force Survey ("Encuesta de Poblacion Activa"). This survey interviews about 60,000 households on a quarterly basis and is completely standardized with the labor force surveys in other European countries.[12] We use the second quarter interviews for each year between 1999 and 2008.[13] We use the Labor Force Survey (LFS) to calculate the number of workers employed in household services by region and year, the dependent variable in equation (1). We also use these data to build our measures of individual labor supply. We define three extensive margin indicators: currently employed, currently employed full-time, or currently employed part-time (less than 35 hours a week). We also build three measures of labor supply at the intensive margin (conditional on working): weekly hours worked and indicators for working

[10] In the first-stage regression both the dependent variable (*FF*) and the main explanatory variable (*Z*) are normalized by the total working age population in 1999.
[11] We refer to regions and provinces interchangeably.
[12] Relative to the US and UK, the main difference is that the Spanish Labor Force Survey lacks income data.
[13] We focus on the second quarter of each year to minimize the effects of seasonality.

long hours (more than 40 or 50 hours weekly). Data on individual characteristics (age, gender, education, marital status, and number and age of children in the household) are also obtained from the Labor Force Survey. Finally, we also use these data to build two alternative measures of our main explanatory variable. Specifically, we compute the share of low-skill females (*LSF*) and the share of low-skill foreign-born females (*LSFF*) in each region and year.[14] Low-skill workers are defined as those having at most a high-school degree (no college). In both cases, we divide by the initial (year 1999) female working-age population in the region.

Our second source of data is the Local Population Registry ("Padron Continuo"). The Registry is collected by municipalities and published annually since 1996. It contains demographic information on all current residents, including gender, age, country of birth, nationality, and region of residence in Spain.[15] We use these data in the construction of our instrument and to compute our main explanatory variable: the share of women with foreign nationality in each region and year (*FF*).

Finally, we also use the 1991 Spanish Decennial Census in the construction of the instrument. We compute the proportion of immigrants that lived in each Spanish region in 1991, separately by country of origin.

3.2. Sample

We are mainly interested in the labor supply of highly skilled natives in the age group 25-64. We restrict our sample to household heads and their spouses. We consider two definitions of highly skilled, one based on education and the other based on current occupation. The occupation-based sample contains native workers currently employed in occupations with average earnings ranging from 150% to 300% of the average earnings in the whole population (i.e. lawyers, judges, physicians, university professors, etc.).[16] This definition fits the theory as "high-earnings" women are those that may find it profitable to hire household service workers and expand their own labor supply, regardless of their education level. The shortcoming of this definition is that we cannot analyze participation decisions, since occupation is only observed conditional on being currently employed. Accordingly we also construct a sample that includes

[14] In order to properly estimate immigrant concentration at the regional level, we use the appropriate weights provided in the survey.
[15] The Registry data made publicly available contain no information on educational attainment.
[16] Wage Structure Survey, 2006. See the appendix for more details.

all Spain-born individuals with a college degree (or higher education). Obviously, there is some overlap between the two definitions of highly skilled workers. However, note that only 32% of women in the high-education sample are employed in high-earnings occupations. Thus the education-based sample is a fairly heterogeneous group in terms of earnings.

3.3. Measurement error

As pointed out by Aydemir and Borjas (2006), the spatial correlations approach is likely to suffer, in practice, from substantial attenuation bias due to measurement error in the main explanatory variable (some measure of regional immigration concentration).[17] Their warning is highly relevant in our analysis, since our main data source is the relatively small (compared to the Census) quarterly Labor Force Survey.

Fortunately, we can get around this problem thanks to the Registry data. Using these data, we define our main explanatory variable as the share of *females with foreign nationality* (*FF*) by region. Since the whole population is contained in the Registry, we can argue that this variable is virtually free of measurement error. Our variable includes foreigners with all education levels (since no education data is available in the Registry) and is based on nationality rather than country of birth, which provides a better measure of recent immigration. As we show in the next section, a large fraction of recent female immigrants are employed in household services.

For comparison purposes, we also conduct our analysis using two alternative measures of immigrant concentration that are based on Labor Force Survey data (and thus allow us to focus on low-education immigrants). First, we calculate the share of *low-skilled, foreign-born women* (*LSFF*) in the region. As expected, for some regions in the early years in our sample period, the number of observations is quite low. Following Cortes and Tessada (2009), our second variation of the main explanatory variable is the *share of low-skill females* (LSF) in a given region, including both natives and immigrants. Naturally, this variable has a lower variance relative to its mean than the previous one (see table 3C), suggesting that measurement error should be less severe.

[17] Aydemir and Borjas (2006) focus on regression models where the dependent variable is the wage of a given group and the main explanatory variable is the immigrant share in the same group. In our case, the dependent variable of interest is the labor supply of highly skilled natives and we are examining a cross-skill effect.

3.4. Descriptive statistics

According to Table 3A, the share of foreign-born workers in total employment in Spain shifted from below 4% to more than 17% between 1999 and 2008. In 2008, immigrants were, on average, 5 years younger than natives, and had slightly lower levels of education (85% had at most a high-school degree, compared to 82% of natives). Despite the relatively small difference in educational attainment, immigrants were disproportionately employed in low-earnings occupations (83% compared with 33% of natives).

The size of immigration flows over the last decade has differed a great deal across regions. Table 2 reports the number of low-skill immigrants by region (as a proportion of the labor force) in 1999 and 2008, for the 13 largest provinces in terms of population. Over this period, the increase in the low-skill foreign-born population relative to the total initial population has ranged from less than 7 percentage points (Cadiz, Sevilla, Asturias) to more than 18 (Madrid, Barcelona, Valencia, Alicante, among others).

Female immigrants are heavily concentrated in household service jobs, with 49% of recent female immigrants employed in the sector in 2008 (table 3A).[18] Moreover, essentially half of all workers in household services were female immigrants in 2008. This was accompanied by an important expansion of the household service sector during the period. Between 1999 and 2008, employment in household services relative to total employment increased by almost 50%, reaching 4.44% of total employment in year 2008.[19] This is a remarkable increase given the large overall employment growth over the period.

Table 3B provides a brief description of the composition of the household service sector. In 2008 immigrants working in household services were (7 years) younger and substantially more educated than their native counterparts. In fact, 13% of the immigrant workers in the household service sector were college-graduates, compared to less than 5% among natives. However, the table also shows that the characteristics of natives and immigrants in the sector become more similar as years of residence increase, which suggests that over time immigrants find jobs that better match their qualifications.

Table 3C summarizes our main explanatory variables, that is, our measures of female immigrant concentration. Our preferred variable is the Registry-based share of foreign females

[18] We define recent immigrants as those that arrived in Spain less than 3 years ago.
[19] Given the high degree of informality in the sector, this is probably an underestimate.

(FF). Averaging across years and regions, we can see that in the typical region-year, 8.3% of women had foreign nationality. We note that the share of low-skill foreign-born women has very similar descriptive statistics.

Our three measures of female immigrant concentration are highly correlated. Figures 1A and 1B plot the 1999-2008 change in the share of females with foreign nationality (*FF*) in the region against, respectively, changes in the share of low-skill females (*LSF*) and the share of low-skill foreign-born females (*LSFF*). We also plot the 45 degree line in each figure. Clearly, there is a very strong association between the two measures of immigration and the supply of low-skill workers in the region. In fact, the slope is very close to one, although the values tend to lie below the 45 degree line, reflecting the general cohort skill upgrading in the native population that took place across all regions during this period.

Turning now to our dependent variables, Table 4 presents summary statistics for the labor supply indicators of native women across education groups (Table 4A) and occupations (Table 4B). The figures confirm the remarkable skill upgrading among the native population over the period. The share of high school dropouts fell almost 20 percentage points while the shares of high-school graduates and college graduates increased by 14 and 5 percentage points, respectively.

Second, employment rates have risen substantially during the period, roughly 10 percentage points, practically uniformly across all education groups. This reflects the economic expansion of the Spanish economy over the last decade. Regarding working hours, we note the significant drop for low-skill women (roughly 3 hours) and the slight increase for college-graduate women. We also note that the proportion working long hours (more than 40 hours per week) increased substantially (5 percentage points) for college-graduate women. Finally, the number of hours worked per week in low-earnings occupations decreased by almost 2, while remaining fairly constant in the other occupation groups. A similar pattern can be seen in the probabilities of working long hours (more than 40 or 50).

4. First-stage results

We employ an instrumental variables approach in order to provide a causal interpretation of the associations modeled by (1), (2) and (3). We first examine the relevance of our instrument in accounting for regional changes in the size of the female foreign population.

Table 5 (top panel) reports the results of the first-stage regressions. Column 1 shows the first-stage for our main specification, where the instrument is used to predict the Registry-based share of foreign-nationality women in a region (*FF*). The results show that the instrument is highly relevant in explaining variation across regions and time. The estimated coefficient is about 0.25, with an associated t-statistic of 6.6. This implies a value of 43 for the Cragg-Donald F-statistic, clearly rejecting the null of weak instruments (critical value 16.38).

Columns 2 and 3 report the performance of the instrument in explaining the variation in the share of low-skill females (*LSF*) and the share of low-skill foreign women (*LSFF*). In both cases, we are able to reject the null of weak instruments. However, the first-stage is borderline weak when attempting to predict the share of low-skilled foreign-born females (*LSFF*, column 3). We also note that the estimated coefficients are very similar in columns 1 (0.25) and 2 (0.26).

Let us now point out the benefits of having access to Registry data. In their absence, we would have had to build our instrument using the 1991 Census (as we do now) and the Labor Force Survey (instead of the Registry). Table 5 (panel B) reports the first-stage regression estimates that we obtain when using this version of the instrument that does not use Registry data. In all columns the Cragg-Donald F-statistics are substantially lower than in the top panel. In fact, we cannot reject the null of weak instruments in any of the three cases. In conclusion, identification of the causal effects of interest rests crucially on our use of Registry data in the construction of the instrument, as well as on the construction of the main explanatory variable (FF).

5. Immigration and household services

In this section we examine the relationship between immigration and the size of the household services sector, measured in terms of employment. Figures 2A and 2B plot the 1999-2008 change in employment in household services (*HHS*) against the change in the number of foreign females (*FF*) and the change in the number of foreign-born low-skill females (*LSFF*).[20] We also plot the linear fits. Clearly, there is a strong positive association between regional increases in female (low-skill) immigration and increases in the size of the household services sector.

Next, we provide a more formal analysis by estimating equation (1). Table 6 reports the OLS and IV estimates of the effect of female immigration into a region on total employment in

[20] The three variables have been normalized by the 1999 working-age female population.

household services (*HHS*) in that region. The OLS results for our preferred specification, which uses the Registry-based immigration measure (*FF*), suggest that the arrival of 100 female immigrants into a region is associated with an increase in the number of household service workers equal to 15. However, it could well be that immigrants are drawn to regions with increasing demand for service workers. If this is the case, then our OLS estimates will overestimate the impact of immigration.

The second panel of table 5 thus reports the IV results. As expected, the coefficient is now smaller, but it remains positive and strongly significant. An inflow of 100 female immigrants into a region *causes* an increase in the number of workers in household service occupations equal to 8.9. The estimates are similar in magnitude when we use the share of low-skilled females as the explanatory variable, but substantially higher when we use the share of low-skill female immigrants. Our interpretation is that low-educated immigrant women are much more likely to be employed in household services than foreign-born women with higher education.

Overall, the results in this section provide clear evidence that female immigration into a region leads to an increase in the size of the household services sector. Next, we study whether the increased supply of household service workers leads to an increase in the labor supply of high-skill native women.

6. Immigration and the labor supply of highly skilled natives

The goal of this section is to analyze whether immigration had an effect on the labor supply decisions of highly skilled natives. To gain better understanding on the nature of the effect, we also examine the labor supply response of men and low-skilled native women.

6.1. Ordinary Least Squares

We estimate a number of specifications of regression (2) where the dependent variables are several measures of individual labor supply. Our main explanatory variable is the Registry-based share of foreign females (*FF*) in the region. We also present results using the share of low-skill foreign-born females (*LSFF*) and share of low-skill females (*LSF*).

Table 7A presents the OLS estimates on the sample of *highly skilled native women*. Each column corresponds to a different dependent variable. The coefficients in each row are from different regressions. The top panel presents the estimates on the sample of *highly educated*

natives. For this sample we can estimate the effect on both the extensive and intensive margin of labor supply. As shown in column 1, we find no association between our measures of female immigrant concentration and the probability of employment (Work). Columns 2 and 3 suggest a positive (negative) correlation with the probability of being employed part-time (full-time) when the main explanatory variable is the share of low-skilled foreign-born women (*LSFF*). Columns 4-6 suggest that our main explanatory variable is uncorrelated with our measures of labor supply at the intensive margin.

The bottom panel of Table 7A reports the estimates on the sample of native females in *high-earnings occupations*. For this subgroup we find large and highly significant positive associations between the three measures of female immigration and our measures of labor supply along the intensive margin. The coefficients are roughly similar across the three specifications, ranging between 5.22 and 8.67 for hours, conditional on working. The standard errors are also very similar across the three specifications.

Table 7B reports the OLS estimates on the sample of *highly skilled native men*. The difference with the estimates for women is striking. There is no significant correlation between any of the labor supply measures and the explanatory variable in any specification (at the 5% significance level). In particular, we find no effect on hours for men in high-earnings occupations.

6.2. Instrumental variables results

We now turn to our IV estimates of the causal effects of immigration on the labor supply of skilled natives. The top panel in Table 8A presents the results on the sample of *highly educated females*. We find no significant effect of immigration on any of the six measures of labor supply. The bottom panel reports the results for *women in high-earnings occupations*. Confirming the OLS correlations, there is a positive and significant effect on hours worked (column 4) and on the probability of working long hours (column 5). Compared to OLS, these coefficients are substantially larger, suggesting that OLS was downward biased. Roughly, the coefficients are twice as large for the specifications using the share of females with foreign nationality (*FF*) and the share of low-skill females (*LSF*), and four times larger for the share of low-skill, foreign-born females (*LSFF*). Standard errors are also more than twice as large for the latter, reflecting the weaker first stage.

Table 8B presents the results for *native highly skilled men*. On the sample of *highly educated*, we cannot reject the null of zero effect at the usual confidence levels. For men in *high-earnings occupations*, all point estimates are positive, but not statistically different from zero (at 5% significance level).

To provide an idea of the magnitude of the effects, the IV estimates for women in high-earnings occupations imply that an increase in 10 percentage points in the share of female immigrants leads to an increase of 1.53 in weekly hours worked (92 minutes) and 9.6 percentage points in the probability of working long (more than 40) hours.

In conclusion, we find that (female) immigration had no effect on the labor supply decisions of highly skilled native males but a large, positive effect on the labor supply of native women in high-earnings occupations along the intensive margin. Taken together, these results suggest that cross-skill complementarities have been mostly due to a response to the changes in the supply of household services, rather than the standard cross-skill complementarities in production.

6.3. Immigration and the labor supply of low-skill natives

We expect different effects of (low-skill) immigration on the labor supply of high and low-skill natives. The latter are not likely to benefit from the greater availability of household services in their region, since they probably cannot afford them. Moreover, low-skill native women are likely to suffer from greater labor market competition as they are close substitutes with recently arrived female immigrants.

We consider two samples of low-skill natives: one including low-educated natives (high school dropouts and high school graduates), and the other with natives employed in low-earning occupations. Unlike in the case of highly skilled natives, there is a strong overlap between the two samples since few college graduates are employed in low-earnings occupations according to our definition.[21]

Tables 9 and 10 report, respectively, the OLS and IV estimates of the model in equation (2). The IV results (Table 10) reveal a significant negative effect of increases in the female immigrant population on the employment of low-skill native females (panel A, column 1), but no effects on that of low-skill men (panel B, column 1). Column 1 in Table 10A implies that a 10

[21] Average annual earnings in our group of low-earnings occupations are 82% of the average across all individuals. See the appendix for more details.

percentage-point increase in the share of foreign females (*FF*) leads to a reduction in the probability of employment for native low-skill women equal to 2.9 percentage points.[22] This is consistent with the high gender segregation in the occupations favored by female immigrants, such as household services.[23]

Let us now turn to the effects along the intensive margin. The IV estimates in columns 4 through 6 in Table 10A reveal a *positive* effect on weekly hours and on long hours (conditional on employment) for low educated native women. As before, the analogous coefficients for men (Table 11B) are not significantly different from zero. The coefficients are roughly half as large as in the case of highly skilled native women.

Taken together, these findings are consistent with the interpretation that female immigration into a region leads to increased competition for low-skill native females, reducing their probability of being (full-time) employed. It also leads to an increase in hours conditional on employment for these women, which is consistent with the response to a reduction in low-skill wages when the income effect dominates the substitution effect.[24]

7. Family Responsibilities

The results in the previous sections are consistent with the hypothesis that, by increasing the availability of affordable household services in a region, immigration has led to a rise in the labor supply of highly skilled native females. This section tests a further implication of the same mechanism. Among skilled women, those bearing a heavier burden in terms of housework should be more responsive to an increase in the local supply of household services. We examine this hypothesis by focusing on three groups of skilled women with large family responsibilities: women with young children, women caring for elderly relatives, and women whose husbands are in retirement.

In the context of the US, Furtado and Hock (2008) study the connection between immigration and fertility. They find that immigration by decreasing childcare costs led to an increase in the fertility of high skilled native women, resulting in temporary exits from the labor

[22] Note that the OLS estimates for the probability of work are positive. That is, as expected, there is an upward bias in the OLS estimate of the effects of unskilled immigration on unskilled natives.
[23] Amuedo-Dorantes and De la Rica (2009) document the high occupational segregation by gender in Spain.
[24] There are alternative interpretations for the increase in hours that do not rely on changes in wages. For instance, this could be due to peer effects as in Mas and Moretti (2009).

force. We provide a more systematic analysis of the relationship between immigration and the labor supply of mothers of young children.

Moreover, to our knowledge, we are the first to explore the effects of immigration on the labor supply of skilled women with elderly dependents. This issue is more relevant in the case of Spain and other southern European countries than for the US or Northern Europe (Jacobzone, 1999). In the former countries, daughters have traditionally been the main providers of care for their elderly parents. To deal with their care-giving responsibilities, it is well documented that women often exit the labor force early (Crespo, 2007; Ettner 1995). Partly, the differences between these two sets of countries may be cultural, but it is also plausible that differences in the availability of market-provided elderly care services and, more generally, household services may have played a role.[25]

We also examine the labor supply decisions of skilled women with husbands in retirement, which has not been studied previously either. It is well documented that women usually drop out of the labor force permanently when their husbands retire, despite typically being a few years younger (Blau 1998). Joint retirement decisions may be due to strong complementarities in leisure between married couples.[26] But, interestingly, the effect is gender asymmetric (Jiménez-Martín et al 1999). That is, in those instances where the wife reaches retirement age earlier than the husband, he usually does not stop working. This asymmetry suggests that there may be an increase in housework associated with the husband's retirement. Thus, at this point in time these women's demand for household services may increase sharply.

7.1. Young children

According to Table 1, college-educated mothers with young children are only slightly more likely to be out of the labor force than skilled females in general (12 versus 11%). But note that 75% of mothers report that the main reason to be out of the labor market is their family responsibilities, compared to only 53% of college-graduate women in general. Interestingly, the main difference between educated mothers of young children and educated women in general is

[25] Unlike in studies of female labor supply in the presence of dependent children, an important data limitation in studying the effects of elderly dependents is that often the elderly dependents do not co-reside with the woman that cares for them. As a result, they are invisible in household survey data. This is also the case here. Thus, our estimates should be taken as a lower bound.

[26] Laitner and Silverman (2008) study retirement decisions in an environment where consumption and leisure are non-separable.

the much larger rate of part-time employment (66% versus 45%). Again, most of these women report that the reason they work part-time is the burden derived from their family responsibilities.

We now test the hypothesis that the labor supply of skilled women with young children is more sensitive to increases in the local availability of household services than that of skilled women in general. Accordingly, we estimate equation (3) including an interaction between the indicator for having a child younger than 7 years old and the share of female immigrants in the region.

Table 11 reports the OLS and IV results for the six labor supply dependent variables. We provide estimates for the samples of highly educated women (top panel) and women in high-earnings occupations (bottom panel). The first row in each of the two panels simply confirms the earlier findings: increases in female immigration had no effect on the labor supply of highly educated women but led to an increase in the hours worked by women in high-earnings occupations.

The second row in each of the two panels presents the estimated coefficients for the interaction term with the children indicator. A positive coefficient should be interpreted as a larger effect of immigration on the labor supply of skilled mothers, relative to other skilled women in the same region. The IV estimates in Table 11 (column 7) imply that a 10 percentage point increase in the share of female immigrants (*FF*) in a region leads to an increase in the employment rate of highly educated mothers that is 1.6 percentage points higher than for other educated women in the region.

Interestingly, the effect is driven by the decision to work part-time. That is, the increase in employment rates, relative to other skilled women, is the net effect of an increase in the proportion of mothers in part-time work equal to 3.7 points (column 8) and a reduction in the proportion of mothers in full-time work equal to 2.1 points (column 9).[27] Our interpretation of these results is the following. Due to non-divisibilities in childcare, prior to the widespread availability of household services locally, mothers of young children had to make a tough choice: either go back to work full-time or not work at all, even though their latent optimal labor supply may have been in the middle. Immigration, by increasing the availability of affordable household services, may have introduced greater flexibility, making part-time employment feasible.

[27] As a result of the shift from full-time to part-time work, we find a negative effect on hours worked (column 10).

The bottom panel of Table 11 indicates that there is no differential effect of an increase in the share of foreign females on the intensive margin of the labor supply of mothers in high-earnings occupations.

Table 12 further decomposes the effect on participation for educated mothers by interacting the share of foreign females in the region with a set of dummies indicating the age of the youngest child (from 0 to 16). The omitted category is childless women. We report the IV results for the sample of highly educated women, for employment and part-time work. Significance levels are low, since we are now left with a small number of observations in each age category. However, both the employment and the part-time effects are significant at the 95% confidence level for age 0, and the magnitude of both coefficients is larger than for any other age.[28]

Taken together, our findings in this section suggest that immigration has allowed skilled women to return to work sooner after childbirth. This transition back to work seems to have operated mainly through an increase in part-time employment.

7.2. Elderly relatives

We now turn to the labor supply of highly skilled women living with an elderly relative. We define an indicator variable for the presence of an elderly person in the household (excluding the husband). Typically, this will be one of the woman's parents or in-laws. In the analysis, we distinguish between cases where the elderly person is a male or a female.

We first examine whether the labor supply of skilled women appears to be constrained by the presence of elderly co-residents. The sixth column in Table 1 reports information on their labor market participation. First, we note that skilled women co-residing with elderly relatives (65 or older) are far more likely (23%) to be out of the labor force than educated women in general (11%). The main self-reported reason for being out of the labor force is family responsibilities.[29]

Following the same strategy as in the previous section, we estimate the model in equation (3), where the indicator takes the value of one when an elderly person is present in the household. As in the previous sections, we focus our analysis on skilled native women (highly educated or in high-earnings occupations).

[28] We also find significant effects on part-time work for women with children up to age 6 (school entry age).
[29] Part-time employment rates for these women are low, as can be seen in the bottom panel of Table 1.

Table 13 presents the results. The top panel includes an indicator for male elderly co-residents (other than the husband), while the bottom panel focuses on female elderly co-residents. We first examine the estimates for the sample of *highly educated* native women (columns 1-6). The first row confirms previous findings: immigration has no effect on the labor supply of highly educated women. Turning to the interaction coefficient (second row), we find that increases in the female immigrant share in the region increase the probability of employment for women in households with an *elderly male* relative to other skilled women in the region. The effect is quite large (0.55 points larger than for highly educated women in general). This effect is not present for the case of elderly females in the household (bottom panel, columns 1-6). Regarding women in *high-earnings occupations*, the coefficients on the interaction term are not significantly different from zero regardless of the gender of the elderly co-resident.

Our results suggest that the presence of an elderly male increases the housework burden for the head female in the household, increasing the demand for household services. However, elderly women in the household do not increase the burden either because of better health than old men, or because they are able to help with the house work by taking care of children, cooking, cleaning, doing laundry, and so on.

Our results are likely to underestimate the constraints imposed by elderly care on the labor supply of native women due to data limitations. The reason is that our indicator is only an imperfect measure of a woman's care-giving responsibilities, as it is not informative about elderly co-residents' health status or about care giving to elderly relatives living out of the household.

7.3. Retired husbands

Finally, we examine the effects of immigration on the labor supply of skilled women whose husbands are retired. The labor supply of these women may be affected by the increased housework associated to the greater presence of the husband in the house, which in some cases may be compounded by poor health.

The last column in Table 1 provides evidence of the perceived larger family responsibilities of women with a retired husband. About 42% of educated women under 65 with a retired husband are out of the labor force. Interestingly, only about half of them report that the reason is

being in retirement herself (49%). The majority of the remaining women claim that the main reason is large family responsibilities.[30]

We create an indicator for having a retired husband and we estimate the augmented model (3). Table 14 (top panel) presents the results. Let us turn directly to the IV estimates of the coefficient associated to the interaction term (row 2). We find a large and highly significant effect on the work decisions of educated women with retired husbands. According to our IV estimates, the effect on the probability of work is 0.79 percentage points larger than for the rest of educated women in the region. The magnitude is quite large: a 10 percentage-point increase in the share of low-skill women in the region increases the employment probability of highly educated women with a retired husband by almost 8 percentage points. The effect is due to a larger probability of *full-time* employment.[31] As was the case in the previous two sections, we do not find any differential effect of immigration on women with large family responsibilities in the sample of high-earning women.

One concern with our interpretation is that the previous estimates may simply be capturing the behavior of women near retirement age, independently of the labor market status of the husband. To investigate this possibility we estimate the previous model restricting the sample to women older than 50 (bottom panel). The main coefficient on the share of female immigrants is again small and not significantly different from zero (0.129). In contrast, the coefficient of the interaction is highly significant, and very similar to the one for the whole sample (0.92 versus 0.79 for work). That is, immigration has only affected the retirement decisions of women in their fifties whose husband is in retirement.

In sum, the results in this section suggest that immigration has allowed educated women with a retired husband to postpone their retirement decisions. Women used to retire at the same time as their husbands, in part because of the increased household chores. With the increase in the local supply of household services, skilled women can now purchase household services and continue working for a few more years.

[30] Part-time employment rates are also very low for these women.

[31] We have re-estimated the same model but replacing the indicator for retired husband by an indicator of the husband being 65 or above. The results are practically identical.

8. Conclusions

Over the last decade, Spain experienced a very large immigration wave. A substantial fraction of the newly arrived female immigrants became employed in services that are close substitutes for household production. This paper analyzes the effects of female immigration into a region on the labor supply of highly skilled natives, operating through an increase in the region's supply of household services.

Our results strongly suggest that immigration inflows over the last decade have led to a substantial increase in the labor supply of skilled native women, with no effects on highly skilled native men. As predicted by the theory, we also find evidence of larger effects among skilled women whose labor supply is particularly constrained by family responsibilities.

Table 15 summarizes the magnitude of the effects. Between 1999 and 2008, the number of females with foreign nationality in Spain, normalized by the total female working-age population in 1999, increased by 14 percentage points, reaching 16 percent in 2008. Our estimates imply that, in response to immigration, women in high-earnings occupations increased their weekly hours of work by 2.1 (conditional on working).[32] Secondly, immigration allowed skilled (college-educated) native females to return to work sooner after childbirth. In particular, immigration increased the probability of (part-time) employment by 4 percentage points, which accounts for 80% of the overall increase observed during the period. Thirdly, immigration increased the employment rate of skilled women with male elderly co-residents by 5.9 percentage points. Finally, it allowed women in their fifties to continue working following their husbands' retirement. According to our estimates, the employment rate of these women increased by 14.6 percentage points as a result of immigration.

The magnitude of the effects is even larger for the main urban areas in Spain. For the aggregate of Madrid, Barcelona and Valencia (the three most populated metropolitan areas), the share of females with foreign nationality increased by 20 percentage points over the period, that is, 42% more than in Spain as a whole. As shown in Table 15, our estimates imply that in these regions immigration led to i) an increase of 3 work hours per week for women in high-earning occupations, ii) an increase of 5.7 percentage points in the (part-time) employment rate of college-educated women with young children, iii) an increase of 8.4 percentage points in the

[32] In the data, the weekly hours worked by these women have fallen by 1.2 hours over the period 1999-2008. Thus, in the absence of immigration, there would have been a large reduction in hours.

employment rate of skilled women with in-house, elderly males, and iv) an increase of 20.7 percentage points in the employment rate of women in their fifties with husbands in retirement.

It is interesting to compare our results to those found by Cortes and Tessada (2009) for the US. According to their estimates, immigration over the period 1980-2000 led to an increase in hours worked by highly skilled women (with a Ph.D. or a professional degree) ranging between 45 and 54 minutes. In Spain, the effect has been twice as large and has taken place over the course of only one decade. In addition, our analysis has uncovered important extensive margin effects on several groups of women with large family responsibilities.

Our results are both statistically and economically significant, and call for a re-evaluation of the overall economic effects of immigration. In particular, our findings suggest that the cross-skill complementarity effect operating through the labor supply of highly skilled women may, at the end of the day, be the single largest effect of immigration on the labor market outcomes of natives.

References

Amuedo-Dorantes, Catalina and Sara de la Rica (2009): "Complements or Substitutes? Immigrant and Native Task Specialization in Spain." Unpublished manuscript

Aydemir, Abdurrahman and George Borjas (2006): "Attenuation Bias in Estimating the Wage Impact of Immigration." Working Paper, Harvard University, October 2005

Blau, David (1998): "Labor Force Dynamics of Older Married Couples", Journal of Labor Economics, Vol. 16, No. 3, pp. 595-629.

Borjas, George J. (1999): "The Economic Analysis of Immigration" *Handbook of Labor Economics*. Edited by O. Ashenfelter and D. Card. Vol. 3A, pp. 1697 – 1760, North-Holland 1999.

Borjas, George J. (2003): "The Labor Demand Curve is Downward Sloping: Reexamining the Impact of Immigration on the Labor Market", Quarterly Journal of Economics, November 2003, (1335-1374).

Borjas, George J., Richard B. Freeman, and Lawrence Katz (1996): "Searching for the Effect of Immigration on the Labor Market." American Economic Review 86: May 1996, pp. 246-251.

Card, David (1990): "The Impact of the Mariel Boatlift on the Miami Labor Mareket." Industrial and Labor Elations Review 43: January, pp. 245-57

Card, David (2001): "Immigrant Inflows Native Outflows, and the Local Labor Market Impacts of Higher Immigration" Journal of Labor Economics 19: January, pp. 22-64.

Cortes, Patricia and Jose Tessada (2008): "Cheap Maids and Nannies: How Low-skilled Immigration is Changing the Labor Supply of High-skilled American Women" Unpublished manuscript.

Cortes, Patricia and Jose Tessada (2009): "Low-Skilled Immigration and the Labor Supply of Highly Educated Women" Unpublished manuscript.

Crespo, Laura (2007): "Caring for Parents and Employment Status of European Mid-Life Women", CEMFI Working Paper

Ettner, Susan L. (1995): "The Impact of "Parent Care" on Female Labor Supply Decisions", Demography, February, Vol. 32, No. 1, pp. 63-80.

Furtado, Delia and Heinrich Hock (2008): "Immigrant Labor, Child-Care Services, and the Work-Fertility Trade-Off in the United States", Discussion Paper N0. 3506, IZA, Germany

Jacobzone, Stéphane (1999) “Ageing and Care for Frail Elderly Persons: an Overview of International Perspectives”, Series OECD Labour Market and Social Policy-Occasional Papers, No. 38. Paris, OECD.

Jiménez-Martín, S., J.M. Labeaga and M. Martínez-Granado (1999): “Health Status and retirement decisions of older European Couples”, working paper.

Kremer, Michael and Stanley Watts (2006): “The Globalization of Household Production”, Harvard Working Paper

Laitner, John and Dan Silverman (2008): “Consumption, Retirement, and Social Security: Evaluating the Efficiency of Reform with a Life-Cycle Model”, Michigan Retirement Research Center, Research Paper WP 2006-142

Mas, Alexandre and Enrico Moretti (2009): ”Peers at Work” American Economic Review, 99:1, 112-145

Ottaviano, Gianmarco and Givoanni Peri (2006): “Rethinking the Effects of Immigration on Wages” NBER Working Paper No 12497

Table 1. Labor market behavior of highly skilled individuals with family responsibilities

					Skilled Women		
	All Women	All Men	Skilled Women	Skilled Men	with young children	with elderly co-residents	with retired husband
Out of the Labor Force	*39*	*13*	*11*	*4*	*12*	*23*	*42*
Reasons:							
Family Responsibilities	61	5	53	7	75	36	34
Discourage	4	4	2	5	2	2	2
Disable	16	43	10	24	2	19	9
Retired	3	31	8	34	0	16	49
Other reasons	15	18	26	30	21	27	6
Observations	74441	65966	7112	6813	2193	333	114
Working Part-Time	*22*	*2*	*13*	*3*	*21*	*10*	*6*
Reasons:							
Family Responsibilities	41	9	45	11	66	30	0
Disable	2	9	0	1	0	0	0
Full Time job not found	27	28	20	20	13	30	0
Full Time job not wanted	16	11	15	15	8	15	50
Other reasons	15	43	20	53	13	25	50
Observations	9153	1175	6156	6465	1846	269	66

Source: 1st and 2nd quarter EPA 2008.

Note: The table displays the percentage of individuals aged 25 to 64 years old out of the labor force or working part-time conditional on working. The table also shows the distribution of reasons for being out of the labor force or working part-time. Skilled individuals are defined as those with a college degree or higher education. Young children are age 6 or below. Elderly co-residents does not include husbands.

Table 2**.** Low-skilled immigrants as a proportion of the labor force (ages 16-64). Top provinces by population, in decreasing order.

	1999	2008	Change
Madrid	0.045	0.233	0.188
Barcelona	0.041	0.218	0.177
Valencia	0.039	0.230	0.191
Alicante	0.075	0.275	0.200
Sevilla	0.011	0.070	0.059
Malaga	0.079	0.196	0.118
Murcia	0.061	0.281	0.219
Cadiz	0.021	0.058	0.036
Vizcaya	0.013	0.118	0.105
Coruna	0.034	0.078	0.044
Asturias	0.027	0.093	0.066
Las Palmas	0.057	0.304	0.247
Baleares	0.098	0.306	0.208

Source: EPA 1999 and 2008 (2^{nd} quarter).
Note: Included are all 13 provinces with population of more than 1 million on January 1, 2008 (INE). The provinces are sorted in decreasing order of population in 2008.

Table 3. Descriptive Statistics (1)

A) Foreign-born and native population

	1999	2008
Immigrants as % of total employment	3.71	17.19
% of Low-skilled immigrants (i.e. with a high school degree or less)	79.93	84.68
% of Low-skilled natives (i.e. with a high school degree or less)	87.25	81.89
Average age of immigrants	36.94	36.48
Average age of natives	38.49	41
Immigrants employed in low-earnings occupations (as % of all immigrants)	67.36	82.57
Natives employed in low-earnings occupations (as % of all natives)	24.41	33.17
Female immigrants in household services (as % of all workers in household services)	12.33	48.96
Female immigrants in household services (as % of all female immigrants)	19.22	26.46
Recent female immigrants in household services (as % of all recent female immigrants)	54.53	48.84
Workers in household services (as % of total employment)	2.99	4.44
Number of household services workers per 100 households	4.88	7.26

Source: EPA 1999 and 2008 (2nd quarter). Working-age population.
Note: Recent immigrants are those who arrived to Spain less than 3 years ago

B) Workers in the household service sector, 2008

	Natives	Immigrants	Only female immigrants		
Average number of years in Spain	.	5.4	Less than 3	Between 3 and 10	More than 10
% of females	91.91	97.38	.	.	.
Average Age	44	37	33	38	47
% of High School Dropouts	69.92	48.08	47.37	47.08	55.3
% of High School Graduates	25.16	38.66	41.46	38.19	36.97
% with college or some college	4.92	13.25	11.17	14.73	7.73
% married	52.53	59.98	44.33	47.67	50.97

Source: EPA 2008 (2nd quarter). The percentages are obtained from individuals in the working age 25 to 64.

C) Main Explanatory Variable (immigrant concentration by region)

	Mean	S.D.	Min	Max
Share of foreign-born females	0.083	0.080	0.003	0.468
Share of LS females	0.875	0.085	0.671	1.3
Share of LS foreign-born females	0.079	0.073	0	0.511
Z: instrument	0.117	0.125	0.006	0.811

Note: "Share of LS females" is the proportion of low-skilled females in a region normalized by the 1999 female population in that region and "Share of LS foreign-born females" is the proportion of low-skilled foreign-born females in a region normalized by the 1999 female population in that region. These two variables are obtained from the information in the Labor Force Survey. "Share of foreign-born females" is the proportion of foreign-born females in a region normalized by the 1999 female population in that region. This variable is calculated from the Registry data. See Section 2.4 in the paper for a discussion on how to construct the instrument. The instrument is calculated form the Registry data.

Table 4. Descriptive Statistics (2): Labor supply of native females

A) By Education

	High School Dropouts		*High School Graduates*		*Some College*		*College Grad or Ph.D*	
	1999	2008	1999	2008	1999	2008	1999	2008
Sample Share	75.55	53.04	12.37	26.5	6.59	9.99	5.54	10.47
Work	30.1	41.62	57.01	66.97	76.22	82.91	78.93	87.27
Part-time	8.08	14.35	6.64	15.02	18.65	19.39	18.93	18.7
Full-time	22.01	26.44	50.36	51.46	57.57	63.25	60	68.28
Hours | Working	33.47	30.87	35.53	32.24	31.87	32.04	33.22	33.33
	(15.12)*	(16.07)	(11.65)	(13.95)	(12.13)	(12.47)	(12.20)	(13.09)
P40 | Working	18.68	14.59	12.1	11.91	5.07	8.02	9.87	14.78
P50 | Working	5.29	4.87	2.22	2.61	0.88	1.73	2.24	2.35
Married	88.53	80.73	86.61	76.07	83.65	73.2	80.77	70.88
Child younger than 6	14.08	11.2	28.31	23.55	25.13	25.11	34.11	30.33
Child younger than 16	42.44	32.88	59.79	49.93	53.38	47.82	55.52	52.35
Elderly co-residents	6.62	7.32	3.86	5.63	4.42	4.87	3.51	3.22
Retired husband	12.96	11.26	2.5	3.31	3.6	3.41	1.24	1.31
Number of observations	31,367	19,924	4,457	9,101	2,799	3,596	1,876	3,336

B) By Occupation

	Low-earnings		*Medium-earnings*		*High-earnings*	
	1999	2008	1999	2008	1999	2008
Sample Share	64.98	59.48	22.64	27.75	12.38	12.77
Hours | Working	32.6	30.31	32.14	31.73	40.93	39.54
	(14.30)	(14.77)	(11.67)	(12.33)	(13.97)	(15.61)
P40 | Working	13.19	10.07	4.36	7.49	42.11	38.12
P50 | Working	3.46	2.72	0.64	0.95	11.58	11.43
Married	82.95	73.61	81.83	71.25	84.34	73.11
Child younger than 6	17.44	16.98	24.7	23.48	19.07	23.57
Child younger than 16	49.62	43.55	53.71	46.95	44.39	47.14
Elderly co-residents	6.14	6.28	4.86	4.57	5.44	4.85
Retired husband	4.38	2.98	1.94	2.15	6.88	3.07
Number of Observations	9,885	11,928	3,537	5,474	1,959	2,449

Source: EPA 1999 and 2008 (2^{nd} quarter). The percentages are obtained from individuals in the working age 25 to 64. p40 and p50 represent the probability of working more than 40 and 50 hours, respectively. Note: Standard-deviations for hours are reported in parenthesis.

Table 5. First Stage Results

A) Instrument using the Registry Data (Z/WAF99):

DEPENDENT VARIABLE	Share of foreign women (*FF*)	Share of LS females (*LSF*)	Share of LS foreign-born females (*LSFF*)
	(1)	(2)	(3)
Z/WAF99	0.246	0.263	0.13
tstat	6.57	7.05	4.26
Cragg-Donald F stat	43.18	49.72	18.13
Partial R2	0.11	0.07	0.03

B) Instrument using the Labor Force Survey (ZEPA99):

DEPENDENT VARIABLE	Share of foreign women (*FF*)	Share of LS females (*LSF*)	Share of LS foreign-born females (*LSFF*)
	(1)	(2)	(3)
Z/WAF99	0.2	0.13	0.16
tstat	3.37	2.68	3.57
Cragg-Donald F stat	11.36	7.19	12.72
Partial R2	0.06	0.01	0.04

Note: OLS estimates. Each number comes from a different regression where the dependent variable is one of our measures of immigrant concentration. "Share of LS females" is the proportion of low-skilled females in a region normalized by the 1999 female population in that region and "Share of LS foreign-born females" is the proportion of low-skilled foreign-born females in a region normalized by the 1999 population in that region. These two variables are obtained from the Labor Force Survey. "Share of foreign females" is the proportion of foreign-nationality females in a region normalized by the 1999 female population in that region. This variable is calculated from the Registry data. All specifications include region and year fixed effects, age, age squared, marital status and the presence of children in several age brackets. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%. The cutoff for the test of weak instruments is 16.38 (Stock and Yogo 2001). The instrument is $Z=\sum_{c}\left(\frac{FB_{r,c,t_0}}{FB_{c,t_0}}\right)FB_{c,t}$, where the term in parenthesis denotes the share of the foreign-born population from country of origin c that were living in Spain's region r in year t. The term outside the parenthesis is the total size of the population from country c that is living in Spain in year t.

Table 6. Immigration and the size of the household services sector.

DEPENDENT VARIABLE	Employment in household services (divided by the 1999 female population)					
	OLS	OLS	OLS	IV	IV	IV
Share of foreign females (*FF)*	0.1542***			0.0886***		
	[0.012]			[0.027]		
Share of LS females (*LSF*)		0.0843***			0.0781***	
		[0.011]			[0.026]	
Share of LS foreign-born females (*LSFF*)			0.1684***			0.2028***
			[0.013]			[0.061]
Observations	520	520	520	520	520	520
R-squared	0.833	0.797	0.832	0.821	0.797	0.829

Note: Each coefficient comes from a different regression where the dependent variable is the number of workers employed in the Household Services Sector (HHS), normalized by the 1999 female population in the region. All specifications include region and year fixed effects and use the 1999 female population to weight different regions. "Share of LS females" is the proportion of low-skilled females in a region normalized by the 1999 female population, "Share of LS foreign-born females" is the proportion of low-skilled foreign-born females in a region normalized by the 1999 population. These two variables are obtained from the information in the Labor Force Survey. "Share of foreign females" is the proportion of foreign females in a region normalized by the 1999 female population. This variable is calculated from the Registry data. Standard errors are reported parentheses. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

Table 7. Immigration and the labor supply of highly skilled natives (1): OLS estimates

7A)Women

DEPENDENT VARIABLE SAMPLE	work (1)	part-time (2)	full-time (3)	hours| work (4)	p40| work (5)	p50| work (6)
HIGHLY EDUCATED						
Share of foreign-born females (*FF*)	-0.013	0.136	-0.141	-2.167	-0.009	-0.019
	[0.072]	[0.090]	[0.113]	[1.950]	[0.071]	[0.028]
Share of LS females (*LSF*)	0.046	0.037	0.011	-2.032	-0.095*	-0.040*
	[0.056]	[0.071]	[0.086]	[1.516]	[0.048]	[0.022]
Share of LS foreign-born females (*LSFF*)	-0.043	0.206**	-0.243**	-2.653	0.003	0.022
	[0.074]	[0.098]	[0.119]	[2.268]	[0.076]	[0.034]
Observations	25529	25272	25272	21275	21275	21275
HIGH EARNINGS OCCUPATIONS						
Share of foreign-born females (*FF*)	.	.	.	7.277***	0.383***	0.105
				[2.360]	[0.109]	[0.075]
Share of LS females (*LSF*)	.	.	.	5.217***	0.172*	0.066
				[2.013]	[0.090]	[0.060]
Share of LS foreign-born females (*LSFF*)	.	.	.	8.662***	0.357***	0.183**
				[2.738]	[0.120]	[0.089]
Observations				20415	20415	20415

Note: Each number comes from a different regression where the dependent variable is one of our labor supply measures. p40 and p50 represent the probability of working more than 40 and 50 hours, respectively. All estimates include region and year fixed effects, age, age squared, marital status and the presence of children in several age brackets. “Share of LS females” is the proportion of low-skilled females in a region normalized by the 1999 female population in that region and “Share of LS foreign-born females” is the proportion of low-skilled foreign-born females in a region normalized by the 1999 population in that region. These two variables are obtained from the information in the Labor Force Survey. “Share of foreign-born females” is the proportion of foreign-born females in a region normalized by the 1999 female population in that region. This variable is calculated from the Registry data. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

7B) Men

DEPENDENT VARIABLE SAMPLE	work (1)	part-time (2)	full-time (3)	hours| work (4)	p40| work (5)	p50| work (6)
HIGHLY EDUCATED						
Share of foreign-born females (*FF*)	-0.018	0.019	-0.037	2.026	0.143	0.071
	[0.040]	[0.066]	[0.078]	[1.898]	[0.124]	[0.062]
Share of LS females (*LSF*)	-0.054*	-0.023	-0.026	-0.834	-0.131*	-0.034
	[0.030]	[0.047]	[0.055]	[1.371]	[0.070]	[0.040]
Share of LS foreign-born females (*LSFF*)	-0.021	0.094	-0.106	2.042	0.181	0.058
	[0.046]	[0.069]	[0.085]	[2.133]	[0.126]	[0.067]
Observations	28686	28068	28068	26339	26339	26339
HIGH EARNINGS OCCUPATIONS						
Share of foreign-born females (*FF*)	.	.	.	-0.020	0.167	0
				[2.567]	[0.120]	[0.093]
Share of LS females (*LSF*)	.	.	.	0.121	-0.019	0.025
				[1.723]	[0.076]	[0.064]
Share of LS foreign-born females (*LSFF*)	.	.	.	3.211	0.185	0.124
				[2.496]	[0.114]	[0.095]
Observations				40306	40306	40306

Note: Each number comes from a different regression where the dependent variable is one of our labor supply measures. p40 and p50 represent the probability of working more than 40 and 50 hours, respectively. All estimates include region and year fixed effects, age, age squared, marital status and the presence of children in several age brackets. “Share of LS females” is the proportion of low-skilled females in a region normalized by the 1999 female population in that region and “Share of LS foreign-born females” is the proportion of low-skilled foreign-born females in a region normalized by the 1999 population in that region. These two variables are obtained from the information in the Labor Force Survey. “Share of foreign-born females” is the proportion of foreign-born females in a region normalized by the 1999 female population in that region. This variable is calculated from the Registry data. Standard errors clustered by region and year.

Table 8. Immigration and the labor supply of highly skilled natives (2): IV estimates.

8A) Women

DEPENDENT VARIABLE SAMPLE	work (1)	part-time (2)	full-time (3)	hours| work (4)	p40| work (5)	p50| work (6)
HIGHLY EDUCATED						
Share of foreign-born females (*FF*)	-0.114	-0.025	-0.088	3.393	0.160	-0.076
	[0.222]	[0.283]	[0.323]	[6.166]	[0.228]	[0.089]
Share of LS females (*LSF*)	-0.107	-0.023	-0.083	3.165	0.149	-0.071
	[0.213]	[0.265]	[0.308]	[5.730]	[0.218]	[0.081]
Share of LS foreign-born females (*LSFF*)	-0.217	-0.047	-0.167	6.411	0.301	-0.143
	[0.420]	[0.536]	[0.610]	[11.78]	[0.437]	[0.172]
Observations	25529	25272	25272	21275	21275	21275
HIGH EARNINGS OCCUPATIONS						
Share of foreign-born females (*FF*)	.	.	.	15.32**	0.965***	0.355*
				[6.680]	[0.311]	[0.198]
Share of LS females (*LSF*)	.	.	.	13.78**	0.868***	0.320*
				[6.196]	[0.296]	[0.177]
Share of LS foreign-born females (*LSFF*)	.	.	.	31.16**	1.962***	0.723
				[14.71]	[0.708]	[0.442]
Observations				20415	20415	20415

Note: Each number comes from a different regression where the dependent variable is one of our labor supply measures. p40 and p50 represent the probability of working more than 40 and 50 hours, respectively. All estimates include region and year fixed effects, age, age squared, marital status and the presence of children in several age brackets. "Share of LS females" is the proportion of low-skilled females in a region normalized by the 1999 female population in that region and "Share of LS foreign-born females" is the proportion of low-skilled foreign-born females in a region normalized by the 1999 population in that region. These two variables are obtained from the information in the Labor Force Survey. "Share of foreign-born females" is the proportion of foreign-born females in a region normalized by the 1999 female population in that region. This variable is calculated from the Registry data. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

8B) Men

DEPENDENT VARIABLE SAMPLE	work (1)	part-time (2)	full-time (3)	hours| work (4)	p40| work (5)	p50| work (6)
HIGHLY EDUCATED						
Share of foreign-born females (*FF*)	-0.0686	0.153	-0.212	1.968	0.116	0.0205
	[0.116]	[0.186]	[0.207]	[5.376]	[0.328]	[0.156]
Share of LS females (*LSF*)	-0.0618	0.137	-0.190	1.770	0.104	0.0185
	[0.102]	[0.170]	[0.186]	[4.872]	[0.298]	[0.141]
Share of LS foreign-born females (*LSFF*)	-0.126	0.280	-0.389	3.593	0.211	0.0375
	[0.216]	[0.338]	[0.382]	[9.751]	[0.592]	[0.284]
Observations	28686	28068	28068	26339	26339	26339
HIGH EARNINGS OCCUPATIONS						
Share of foreign-born females (*FF*)	.	.	.	17.03	1.017*	0.698
				[10.90]	[0.575]	[0.432]
Share of LS females (*LSF*)	.	.	.	8.227	0.491	0.337
				[5.587]	[0.311]	[0.209]
Share of LS foreign-born females (*LSFF*)	.	.	.	8.745	0.522*	0.358
				[5.740]	[0.311]	[0.220]
Observations				40306	40306	40306

Note: Each number comes from a different regression where the dependent variable is one of our labor supply measures. p40 and p50 represent the probability of working more than 40 and 50 hours, respectively. All estimates include region and year fixed effects, age, age squared, marital status and the presence of children in several age brackets. “Share of LS females” is the proportion of low-skilled females in a region normalized by the 1999 female population in that region and “Share of LS foreign-born females” is the proportion of low-skilled foreign-born females in a region normalized by the 1999 population in that region. These two variables are obtained from the information in the Labor Force Survey. “Share of foreign-born females” is the proportion of foreign-born females in a region normalized by the 1999 female population in that region. This variable is calculated from the Registry data. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

Table 9. Immigration and the labor supply of low-skill natives (1): OLS estimates.

9A) Women

DEPENDENT VARIABLE SAMPLE	Work (1)	part-time (2)	full-time (3)	hours| work (4)	p40| work (5)	p50| work (6)
LOW EDUCATED						
Share of foreign-born females (*FF*)	0.054	-0.002	0.080***	5.260***	0.141***	0.043
	[0.034]	[0.022]	[0.029]	[1.225]	[0.052]	[0.027]
Share of LS females (*LSF*)	-0.035	-0.060***	0.040*	3.825***	0.053	0.027
	[0.025]	[0.017]	[0.021]	[0.907]	[0.034]	[0.020]
Share of LS foreign-born females (*LSFF*)	0.035	-0.018	0.077***	4.992***	0.109**	0.059**
	[0.033]	[0.023]	[0.028]	[1.238]	[0.047]	[0.027]
Observations	306482	304597	304597	121081	121081	121081
LOW EARNINGS OCCUPATIONS						
Share of foreign-born females (*FF*)	.	.	.	4.360***	0.058	0.019
				[1.340]	[0.054]	[0.027]
Share of LS females (*LSF*)	.	.	.	3.731***	0.023	0.017
				[0.959]	[0.035]	[0.020]
Share of LS foreign-born females (*LSFF*)	.	.	.	3.595***	0.030	0.033
				[1.354]	[0.049]	[0.027]
Observations				102830	102830	102830

Note: Each number comes from a different regression where the dependent variable is one of our labor supply measures. p40 and p50 represent the probability of working more than 40 and 50 hours, respectively. All estimates include region and year fixed effects, age, age squared, marital status and the presence of children in several age brackets. "Share of LS females" is the proportion of low-skilled females in a region normalized by the 1999 female population in that region and "Share of LS foreign-born females" is the proportion of low-skilled foreign-born females in a region normalized by the 1999 population in that region. These two variables are obtained from the information in the Labor Force Survey. "Share of foreign-born females" is the proportion of foreign-born females in a region normalized by the 1999 female population in that region. This variable is calculated from the Registry data. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

9B) Men

DEPENDENT VARIABLE SAMPLE	work (1)	part-time (2)	full-time (3)	hours| work (4)	p40| work (5)	p50| work (6)
LOW EDUCATED						
Share of foreign-born females (*FF*)	-0.079*** [0.025]	-0.026*** [0.009]	-0.022 [0.028]	2.578*** [0.975]	0.160** [0.068]	0.060* [0.034]
Share of LS females (*LSF*)	-0.035* [0.019]	-0.017*** [0.006]	-0.004 [0.022]	0.271 [0.603]	-0.030 [0.044]	0.019 [0.022]
Share of LS foreign-born females (*LSFF*)	-0.073*** [0.026]	-0.018* [0.009]	-0.025 [0.029]	2.709*** [0.929]	0.142** [0.068]	0.073** [0.034]
Observations	272767	267979	267979	215902	215902	215902
LOW EARNINGS OCCUPATIONS						
Share of foreign-born females (*FF*)	.	.	.	2.857*** [0.850]	0.167** [0.066]	0.058* [0.030]
Share of LS females (*LSF*)	.	.	.	0.480 [0.551]	-0.018 [0.044]	0.010 [0.020]
Share of LS foreign-born females (*LSFF*)	.	.	.	2.445*** [0.881]	0.146** [0.068]	0.041 [0.032]
Observations				176459	176459	176459

Note: Each number comes from a different regression where the dependent variable is one of our labor supply measures. p40 and p50 represent the probability of working more than 40 and 50 hours, respectively. All estimates include region and year fixed effects, age, age squared, marital status and the presence of children in several age brackets. “Share of LS females” is the proportion of low-skilled females in a region normalized by the 1999 female population in that region and “Share of LS foreign-born females” is the proportion of low-skilled foreign-born females in a region normalized by the 1999 population in that region. These two variables are obtained from the information in the Labor Force Survey. “Share of foreign-born females” is the proportion of foreign-born females in a region normalized by the 1999 female population in that region. This variable is calculated from the Registry data. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

Table 10.Immigration and the labor supply of low-skill natives (2): IV estimates.

10A) Women

DEPENDENT VARIABLE SAMPLE	work (1)	part-time (2)	full-time (3)	hours| work (4)	p40| work (5)	p50| work (6)
LOW EDUCATED						
Share of foreign-born females (*FF*)	-0.291***	-0.093	-0.182***	6.792**	0.355***	0.170***
	[0.089]	[0.064]	[0.069]	[3.044]	[0.127]	[0.052]
Share of LS females (*LSF*)	-0.271***	-0.086	-0.170***	6.266**	0.327***	0.157***
	[0.074]	[0.058]	[0.059]	[2.848]	[0.122]	[0.045]
Share of LS foreign-born females (*LSFF*)	-0.587***	-0.187	-0.368**	14.40**	0.752***	0.360***
	[0.203]	[0.131]	[0.156]	[6.878]	[0.281]	[0.135]
Observations	306482	304597	304597	121081	121081	121081
LOW EARNINGS OCCUPATIONS						
Share of foreign-born females (*FF*)	.	.	.	3.258	0.179	0.102**
				[2.992]	[0.121]	[0.041]
Share of LS females (*LSF*)	.	.	.	2.981	0.164	0.093***
				[2.746]	[0.112]	[0.035]
Share of LS foreign-born females (*LSFF*)	.	.	.	6.953	0.382	0.217**
				[6.519]	[0.258]	[0.099]
Observations				102830	102830	102830

Note: Each number comes from a different regression where the dependent variable is one of our labor supply measures. p40 and p50 represent the probability of working more than 40 and 50 hours, respectively. All estimates include region and year fixed effects, age, age squared, marital status and the presence of children in several age brackets. "Share of LS females" is the proportion of low-skilled females in a region normalized by the 1999 female population in that region and "Share of LS foreign-born females" is the proportion of low-skilled foreign-born females in a region normalized by the 1999 population in that region. These two variables are obtained from the information in the Labor Force Survey. "Share of foreign-born females" is the proportion of foreign-born females in a region normalized by the 1999 female population in that region. This variable is calculated from the Registry data. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

10B) Men

DEPENDENT VARIABLE SAMPLE	work (1)	part-time (2)	full-time (3)	hours| work (4)	p40| work (5)	p50| work (6)
LOW EDUCATED						
Share of foreign-born females (*FF*)	-0.111	-0.021	-0.077	1.608	0.114	0.124
	[0.078]	[0.028]	[0.082]	[2.471]	[0.208]	[0.086]
Share of LS females (*LSF*)	-0.104	-0.020	-0.072	1.511	0.107	0.117
	[0.073]	[0.026]	[0.077]	[2.362]	[0.199]	[0.081]
Share of LS foreign-born females (*LSFF*)	-0.223	-0.042	-0.155	3.245	0.230	0.251
	[0.156]	[0.056]	[0.165]	[4.941]	[0.413]	[0.181]
Observations	272767	267979	267979	215902	215902	215902
LOW EARNINGS OCCUPATIONS						
Share of foreign-born females (*FF*)	.	.	.	2.390	0.174	0.115*
				[1.952]	[0.188]	[0.068]
Share of LS females (*LSF*)	.	.	.	2.249	0.164	0.108*
				[1.884]	[0.183]	[0.064]
Share of LS foreign-born females (*LSFF*)	.	.	.	4.891	0.356	0.235
				[4.064]	[0.383]	[0.152]
Observations				176459	176459	176459

Note: Each number comes from a different regression where the dependent variable is one of our labor supply measures. p40 and p50 represent the probability of working more than 40 and 50 hours, respectively. All estimates include region and year fixed effects, age, age squared, marital status and the presence of children in several age brackets. “Share of LS females” is the proportion of low-skilled females in a region normalized by the 1999 female population in that region and “Share of LS foreign-born females” is the proportion of low-skilled foreign-born females in a region normalized by the 1999 population in that region. These two variables are obtained from the information in the Labor Force Survey. “Share of foreign-born females” is the proportion of foreign-born females in a region normalized by the 1999 female population in that region. This variable is calculated from the Registry data. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

Table 11. The effect of Immigration on the labor supply of highly skilled women with children (OLS and IV estimates)

DEPENDENT VARIABLE	work	part-time	full-time	hours| work	p40| work	p50| work	work	part-time	full-time	hours| work	p40| work	p50| work
	1	2	3	4	5	6	7	8	9	10	11	12
SAMPLE	OLS	OLS	OLS	OLS	OLS	OLS	IV	IV	IV	IV	IV	IV
HIGHLY EDUCATED												
Share of foreign-born females (*FF*)	-0.053	0.012	-0.058	-0.289	0.008	-0.008	-0.140	-0.083	-0.056	4.511	0.163	-0.067
	[0.074]	[0.093]	[0.117]	[2.028]	[0.075]	[0.030]	[0.223]	[0.282]	[0.323]	[6.220]	[0.231]	[0.091]
Interaction with children<7	0.134**	0.411***	-0.269***	-6.444***	-0.064	-0.032*	0.160*	0.370***	-0.207*	-6.997***	-0.008	-0.039
	[0.057]	[0.076]	[0.085]	[1.512]	[0.052]	[0.019]	[0.085]	[0.102]	[0.109]	[2.146]	[0.088]	[0.028]
Observations	25529	25272	25272	21275	21275	21275	25529	25272	25272	21275	21275	21275
HIGH PAYING OCCUPATIONS												
Share of foreign-born females (*FF*)	.	.	.	6.893***	0.358***	0.102				15.767**	0.931***	0.394*
				[2.479]	[0.111]	[0.079]				[6.977]	[0.317]	[0.209]
Interaction with children<7	.	.	.	1.410	0.096	0.012				-3.052	0.086	-0.157*
				[2.144]	[0.090]	[0.059]				[3.093]	[0.125]	[0.087]
Observations				20415	20415	20415				20415	20415	20415

Note: The table displays the coefficient on the "Share of foreign-born females" and the coefficient on the interaction between this share and an indicator for the presence of young children. Each pair of coefficients comes from a different regression where the dependent variable is one of our labor supply measures. p40 and p50 represent the probability of working more than 40 and 50 hours, respectively. All estimates include region and year fixed effects, age, age squared, marital status and the presence of children in several age brackets. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

Table 12. The effect of LS immigration on the labor supply of highly skilled women by age of the youngest child. IV estimates.

DEPENDENT VARIABLE	Work			Part time work		
Share of foreign-born females (*FF*)	-0.111		[0.219]	-0.114		[0.281]
Interaction with child of:						
Age 0	0.479	**	[0.212]	0.920	***	[0.348]
Age 1	0.116		[0.185]	0.305	*	[0.172]
Age 2	0.095		[0.217]	0.228		[0.201]
Age 3	0.051		[0.169]	0.681	***	[0.243]
Age 4	0.133		[0.189]	0.301		[0.254]
Age 5	0.421	**	[0.201]	0.376		[0.277]
Age 6	0.233		[0.177]	0.452	**	[0.224]
Age 7	-0.052		[0.215]	0.269		[0.248]
Age 8	-0.061		[0.254]	0.607	*	[0.329]
Age 9	0.096		[0.267]	-0.292		[0.294]
Age 10	-0.038		[0.225]	0.331		[0.259]
Age 11	0.045		[0.222]	-0.233		[0.281]
Age 12	-0.057		[0.273]	0.351		[0.321]
Age 13	-0.144		[0.301]	-0.045		[0.267]
Age 14	-0.072		[0.282]	-0.144		[0.281]
Age 15	0.074		[0.260]	0.561		[0.407]
Age 16	-0.774		[0.525]	-0.132		[0.549]

Note: The table displays the coefficient on the "Share of foreign-born females" and the coefficients on the interactions between this share and indicators for the presence of children of different ages. Each column shows the results for a different dependent variable (work and part-time). All estimates include region and year fixed effects, age, age squared and marital status. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

Table 13. The effect of Immigration on the labor supply of women with elderly co-residents (other than the husband)

	Sample: Highly Educated						Sample: High-earning occupations		
	work	part-time	full-time	hours | work	p40 | work	p50| work	hours | work	p40 | work	p50| work
	1	2	3	4	5	6	7	8	9
Dummy for Male elderly									
OLS									
Share of foreign-born fem (*FF*)	-0.018	0.134	-0.142	-2.105	0.001	-0.019	7.591***	0.388***	0.112
	[0.073]	[0.090]	[0.114]	[1.960]	[0.071]	[0.029]	[2.367]	[0.110]	[0.074]
Interaction FF and Dummy	0.223	0.106	0.136	-1.658	-0.418***	-0.037	-16.31**	-0.212	-0.351
	[0.199]	[0.240]	[0.286]	[4.532]	[0.135]	[0.089]	[6.807]	[0.280]	[0.223]
IV									
Share of foreign-born fem (*FF*)	-0.13	-0.038	-0.091	3.729	0.181	-0.076	15.23**	0.959***	0.354*
	[0.224]	[0.284]	[0.326]	[6.207]	[0.229]	[0.089]	[6.642]	[0.307]	[0.197]
Interaction FF and Dummy	0.554**	0.442	0.103	-6.303	-0.510***	-0.022	-5.131	0.06	-0.394
	[0.233]	[0.392]	[0.433]	[6.601]	[0.165]	[0.079]	[13.18]	[0.507]	[0.295]
Dummy for Female elderly									
OLS									
Share of foreign-born fem (*FF*)	-0.012	0.156*	-0.158	-2.526	-0.012	-0.024	7.259***	0.394***	0.105
	[0.073]	[0.090]	[0.113]	[1.935]	[0.071]	[0.028]	[2.344]	[0.109]	[0.074]
Interaction FF and Dummy	-0.097	-0.563***	0.464**	9.309**	0.049	0.130*	0.478	-0.212	0.004
	[0.146]	[0.174]	[0.188]	[3.969]	[0.121]	[0.079]	[5.115]	[0.203]	[0.187]
IV									
Share of foreign-born fem (*FF*)	-0.11	-0.013	-0.096	3.002	0.153	-0.085	15.40**	0.966***	0.360*
	[0.224]	[0.282]	[0.324]	[6.114]	[0.227]	[0.088]	[6.629]	[0.308]	[0.198]
Interaction FF and Dummy	-0.115	-0.292	0.18	8.036	0.139	0.191**	3.765	0.316	-0.019
	[0.216]	[0.282]	[0.332]	[6.544]	[0.240]	[0.089]	[6.471]	[0.311]	[0.203]
Observations	25529	25272	25272	21275	21275	21275	20415	20415	20415

Note: The first panel of the table displays the coefficient on the "Share of foreign-born females" and the coefficient on the interaction between this share and an indicator for the presence of an elderly male co-resident other than the husband. The second panel displays the coefficient on the "Share of foreign-born females" and the coefficient on the interaction between this share and an indicator for the presence of an elderly female co-resident. Each pair of coefficients comes from a different regression where the dependent variable is one of our labor supply measures. All estimates include region and year fixed effects, age, age squared, marital status, the presence of children in several age brackets and an indicator for the presence of an elderly co-residents other than the husband or only male elderly co-resident other than the husband. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

Table 14. The effect of Immigration on the labor supply of women with a retired husband.

	Sample: Highly Educated						Sample: High-earning occupations		
	work	part-time	full-time	hours | work	p40 | work	p50| work	hours | work	p40 | work	p50| work
	1	2	3	4	5	6	7	8	9
Women all ages									
OLS									
Share of foreign-born fem (*FF*)	-0.019	0.139	-0.148	-2.318	-0.014	-0.021	7.282***	0.379***	0.105
	[0.072]	[0.090]	[0.114]	[1.944]	[0.070]	[0.029]	[2.354]	[0.109]	[0.075]
Interaction FF and Dummy Retired husband	0.356	-0.062	0.404	8.817	0.236	0.082	-6.012	-0.179	-0.041
	[0.264]	[0.199]	[0.275]	[6.656]	[0.230]	[0.109]	[5.131]	[0.198]	[0.138]
IV									
Share of foreign-born fem (*FF*)	-0.135	-0.007	-0.126	3.022	0.154	-0.078	15.19**	0.957***	0.353*
	[0.223]	[0.283]	[0.324]	[6.177]	[0.231]	[0.089]	[6.671]	[0.309]	[0.198]
Interaction FF and Dummy Retired husband	0.791**	-0.266	1.057***	9.33	0.139	0.05	2.42	-0.224	0.319
	[0.351]	[0.263]	[0.361]	[6.450]	[0.293]	[0.039]	[8.682]	[0.323]	[0.218]
Observations	25529	25272	25272	21275	21275	21275	20415	20415	20415
Women 50 or older									
OLS									
Share of foreign-born fem (*FF*)	0.021	-0.189	0.229	9.372**	0.17	0.08	9.489**	0.530***	0.059
	[0.184]	[0.190]	[0.251]	[3.764]	[0.168]	[0.062]	[4.499]	[0.194]	[0.137]
Interaction FF and Dummy Retired husband	0.566**	0.093	0.444	5.069	0.183	0.07	-1.95	-0.061	0.054
	[0.273]	[0.223]	[0.292]	[7.508]	[0.263]	[0.128]	[5.841]	[0.212]	[0.149]
IV									
Share of foreign-born fem (*FF*)	0.129	-0.113	0.245	7.973	-0.037	-0.108	29.08**	2.000***	0.372
	[0.422]	[0.578]	[0.707]	[11.33]	[0.616]	[0.154]	[12.13]	[0.516]	[0.399]
Interaction FF and Dummy Retired husband	0.916**	-0.193	1.099***	6.328	0.19	0.039	5.138	0.011	0.301
	[0.374]	[0.284]	[0.371]	[7.534]	[0.350]	[0.060]	[9.524]	[0.362]	[0.217]
Observations	4466	4407	4407	3462	3462	3462	6329	6329	6329

Note: The table displays the coefficient on the "Share of foreign-born females" and the coefficient on the interaction between this share and an indicator for the presence of retired husband. Each pair of coefficients comes from a different regression where the dependent variable is one of our labor supply measures. All estimates include region and year fixed effects, age, age squared, marital status, the presence of children in several age brackets and an indicator for the presence of a retired husband. Standard errors clustered by region and year are reported in brackets. One asterisk indicates significance at the 90% confidence level, two indicate 95% and three indicate 99%.

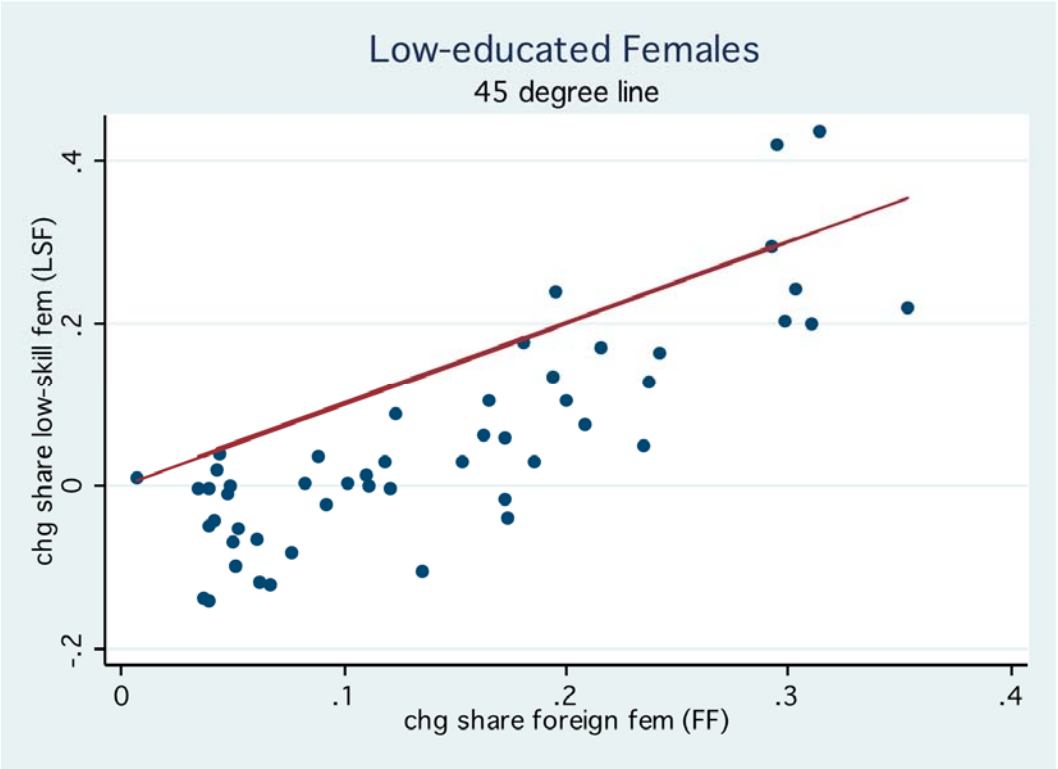
Table 15. Changes in the labor supply of highly skilled native women 1999-2008. Actual and predicted effect due to immigration.

Sample of women	Labor supply variable	Predicted change due to Immigration	Actual change
Spain			
Natives in high-earning occupations	hours|work	2.1	-1.2
Natives with college and young kids	prob. PT work	4	5.1
Natives with college & male elderly dependents	prob. work	5.9	-8.7
Natives age 50+ with college & retired husband	prob. work	14.6	-3.9
Madrid+Barcelona+Valencia			
Natives in high-earning occupations	hours|work	3	-1.5
Natives with college and young kids	prob. PT work	5.7	7.1
Natives with college & male elderly dependents	prob. work	8.4	0
Natives age 50+ with college & retired husband	prob. work	20.7	7.1

Note: All averages are weighted by population. We report the number of hours (conditional on work) and the change in percentage points (over 100). We use IV estimates from our preferred specifications (FF as explanatory variable). The predicted change is the estimated IV coefficient multiplied by the change in the female foreign population, normalized by working-age female population in 1999. The actual change is the change observed in the data between 1999 and 2008.

Figure 1: Increase in female low-skilled population (normalized) between 1999 and 2008

1A :



1B:

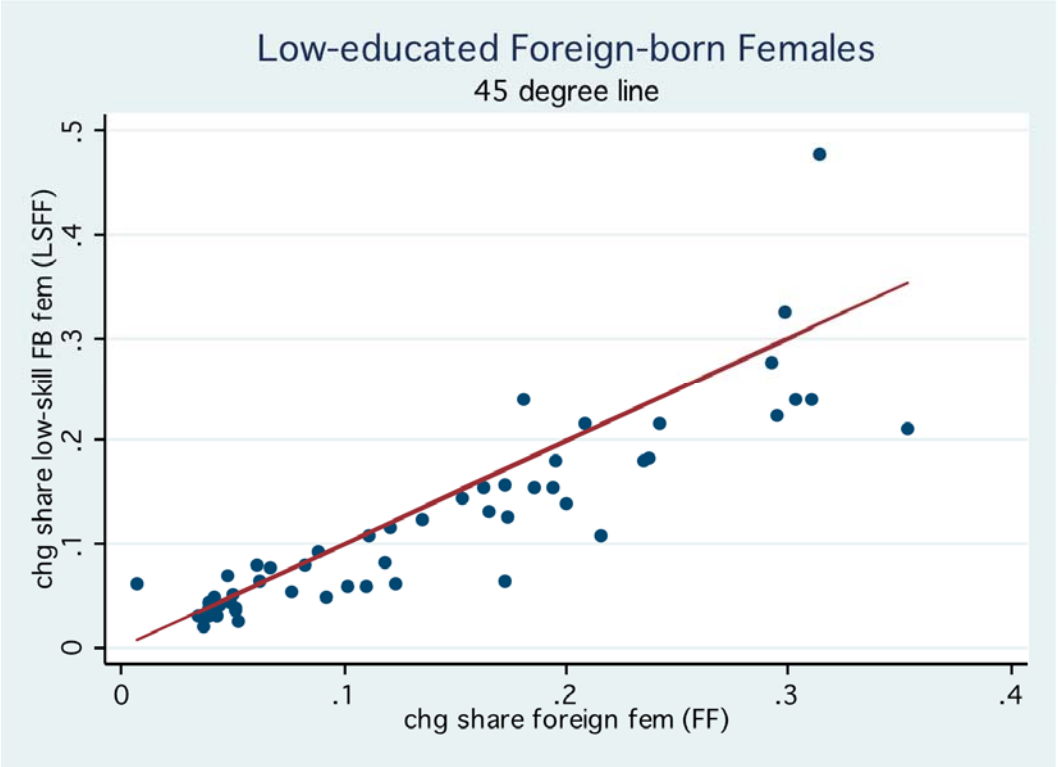
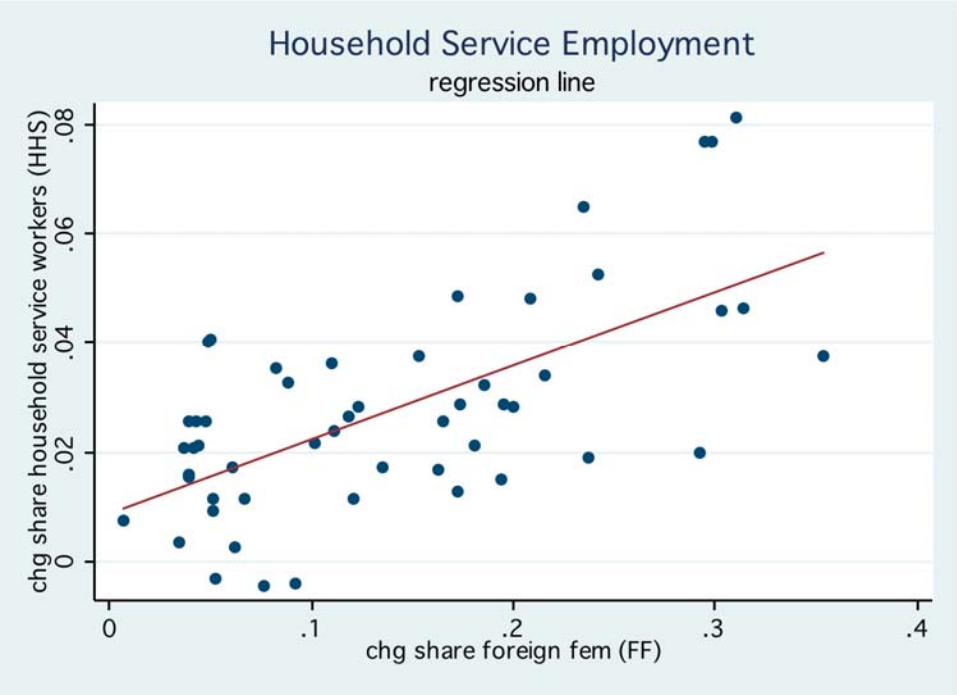
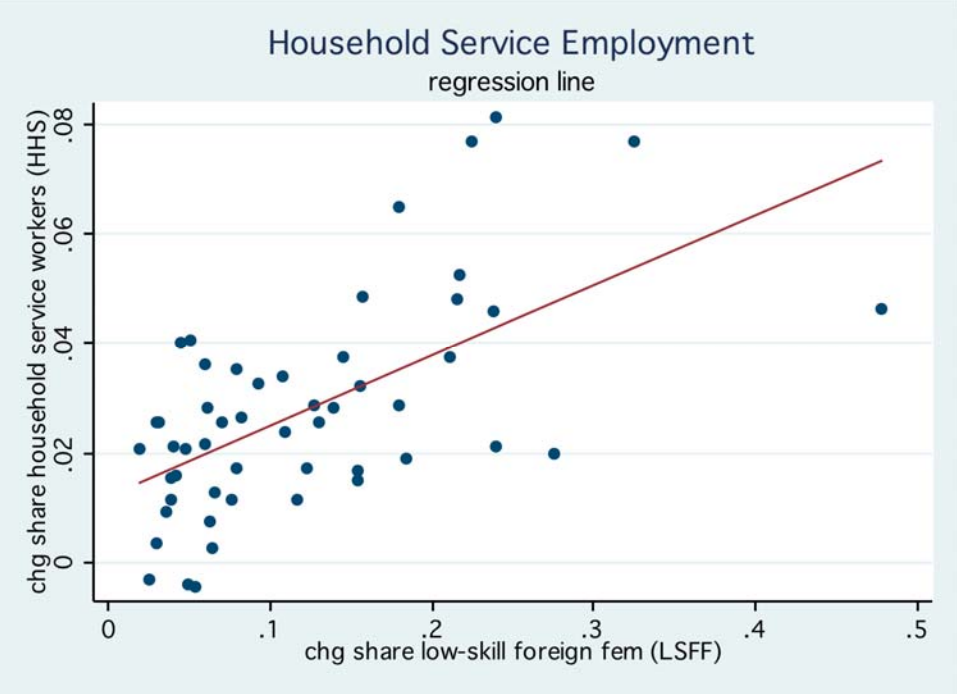


Figure 2:
Increase in employment in household services (normalized) between 1999 and 2008

2A:



2B:



Appendix

OCCUPATIONAL GROUPS

We define three groups of occupations based on average earnings in 2006. According to the most recent Wage Structure Survey (INE 2006), average earnings among employed individuals were 19,681 euros (22,051 for men and 16,245 for women). The average earnings in our high, medium, and low-earnings occupations are respectively, 45,045 euros, 25,700 euros, and 16,190 euros (both genders). That is, 229% of the average, 131%, and 82%.

The group of high-earnings occupations contains occupations 101-221 and 231-242 in the 3-digit classification (CNO 1994). Average earnings in the occupations included in this group ranged between 31,899 and 60,342 euros (both genders).

The medium-earnings occupations include high school teachers (code 222-223), jobs that require a short university degree (261-295) and assistant technical jobs (301-355). Average earnings in the occupations included in this group ranged between 25,423 and 25,978 euros (both genders).

Finally, low-earnings occupations include clerks, restaurant and domestic services employees, protection services, retail, manual qualified workers (agriculture, fishing, construction, manufacturing and transportation), operators of machinery and drivers, non-qualified service workers, and non-qualified workers (agriculture, fishing, and so on). That is codes 401-980. Average earnings in the occupations included in this group ranged between 11,435 and 20,653 euros (both genders).