Low-Skilled Immigration and the Labor Supply of Highly Educated Women*

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This draft: June, 2009

Abstract

Low-skilled immigrants represent a significant fraction of employment in services that are close substitutes of household production. This paper studies whether the increased supply of low-skilled immigrants has led high-skilled women, with the highest opportunity cost of time, to change their time-use decisions.

Exploiting cross-city variation in immigrant concentration, we find that low-skilled immigration increases average hours of market work and the probability of working long hours of women with a professional degree or Ph.D. Consistently, for women in this education group, we find a decrease in time spent in household work and an increase in expenditures on housekeeping services.

*We thank George-Marios Angeletos, Josh Angrist, David Autor, Marianne Bertrand, Olivier Blanchard, Esther Duflo, Alexander Gelber, Michael Kremer, Jeanne Lafortune, Alan Manning, and Stanley Watt for their excellent comments and suggestions. We also acknowledge seminar participants at MIT's Development and Labor lunches, NBER Labour Studies Meeting, CEA, PUC-Chile, Maryland, ZEW's Workshop on Gender and Labor Markets, the Seventh IZA/SOLE Transatlantic Meeting, and the 2008 IFN Stockholm Conference on Family, Children and Work for helpful comments. Tessada thanks financial support from the Chilean Scholarship Program (MIDEPLAN). An earlier version of this paper was previously circulated under the title "Cheap Maids and Nannies: How Low-skilled Immigration is Changing the Labor Supply of High-skilled American Women"

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1 Introduction

Low-skilled immigrants work disproportionately in service sectors that are close substitutes for household production. For example, whereas low-skilled immigrant women represent 1.9 percent of the labor force, they represent more than 25 percent of the workers in private household occupations and 12 percent of the workers in laundry and dry cleaning services. Low-skilled immigrant men account for 29 percent of all gardeners in America's largest cities although they represent only 3.3 percent of the labor force (see Table 1).

The importance of low-skilled immigrants in certain economic activities has been raised as part of the discussion on immigration policies. For example, in a recent article about immigration reform in the United States, *The Economist* argues that:

> " ... in the smarter neighborhoods of Los Angeles, white toddlers occasionally shout at each other in Spanish. They learn their first words from Mexican nannies who are often working illegally, just like the maids who scrub Angelenos' floors and the gardeners who cut their lawns. ...Californians... depend on immigrants for even such intimate tasks as bringing up their children." (*The Economist*, " Debate meets reality" , May 17th, 2007.)

If, as found by Cortés (2008), the recent waves of low-skilled immigration have led to lower prices of services that are substitutes for household production, we should expect natives to substitute their own time invested in the production of household goods with the purchase of the now cheaper services available in the market. The link between immigration and changes in the prices of household services indicates that even without direct effects on wages, low-skilled immigration has the potential to generate effects on natives' decisions related to time-use. Furthermore, these price changes should affect differently the various skill groups of the population; in particular, given that high-skilled women have the highest opportunity cost of working at home production, a decrease in the price of housekeeping services is likely to have the largest impact on the labor supply decisions of this group.

Overview. This paper studies whether low-skilled immigration, by reducing the prices of household services, has changed the labor supply of highly educated American women. It also explores closely related outcomes such as time devoted to household work and reported expenditures on housekeeping services.

Our empirical strategy exploits the cross-city variation in the concentration of low-skilled immigrants. To address the potential endogeneity of the location choices of immigrants, we instrument for low-skilled immigrant concentration using the historical (1970) distribution of immigrants of a country to project the location choices of recent immigrant flows.

Our instrumental variables estimates suggest that highly educated women (those with a professional degree or a Ph.D.) have significantly increased their supply of market work in response to low-skilled immigration lowering the prices of market provided household services.[1] The magnitudes of our coefficients suggest that as a result of the low-skilled immigration wave of the period 1980-2000, women from this group increased their time working in the market by approximately 40 minutes a week. This effect is the result of a significant increase at the intensive margin; labor force participation (which was already very high for this group in 1980) was not significantly affected.

Lawyers, physicians, and professors are the main categories represented in the group of women with professional degrees and Ph.Ds.[2] One common feature of this group is that in order to have a successful career in one of these fields, a person has to work long hours.[3] We find that the low-skilled immigration wave of 1980-2000 has helped professional women increase their probability of working more than 50 and 60 hours a week by 2.5 and 1.3 percentage points, respectively. Overall, using our baselines estimates we explain approximately 16 percent of the observed increase in several dimensions of the labor supply of highly educated women between 1980 and 2000.

There are two main concerns with the validity of our instrumental variables strategy. First, cities that attracted more immigrants in 1970 might be systematically different from other cities, therefore violating the identification assumption. We address this concern by allowing cities to experience decade shocks specific to their region, their level of progressiveness in 1970 (as proxied, for example, by the education composition of the female population and the labor force participation of college educated women), their initial industry composition, and the initial share of the male labor force represented by lawyers, doctors, and college professors.

The second concern is that low-skilled immigration might have an impact on the labor supply of highly educated women through other channels besides lowering prices of household services; in particular, through interactions in market production. We provide several pieces of evidence suggesting that complementarities do not play an important role. First, we show that low-skilled immigration has not increased the hourly wages of highly educated women. Second, we find significant smaller time-use effects found for all other groups of the population, even for women with a bachelor degree or a master's degree. It is hard to imagine low-skilled immigrant labor

[1] We exclude primary and secondary school teachers and nurses from the group of women with a professional degree or a Ph.D. We include them in the group of women with a college degree because their wages are more comparable to the later group. See Appendix A for a detailed description of the construction of the education groups.

[2] The occupational composition of our full sample of women with a professional degree or Ph.D. is the following: lawyers/judges 23.5%, physicians/medical scientists 11%, subject instructors (HS/college) 9%, unknown 6%, psychologists 4%, managers in education fields 3.5%, managers n.e.d 3.2%.

[3] For example, whereas the cross-occupation average of usual hours worked per week for males is 35.5, and the share working more than 50 hours is 7.4 percent and more than 60 hours is 2.6 percent, the same numbers for physicians are 47 hours, 44 percent, and 28 percent, and for lawyers 42 hours, 31 percent, and 10 percent.

being much more complementary to the labor of physicians, professors and lawyers than to college educated women in all other occupations. Finally, we show that labor supply effects for professional men go in the same direction as those for professional women, but are mostly smaller in magnitude and in many specifications not statistically significant.

More hours of market work resulting from lower prices of household services should be reflected in less time devoted to household production. Using data from the recently released 2003-05 American Time Use Survey conducted by the Bureau of Labor Statistics and from the 1992-1994 National Human Activity Pattern Survey (NHAPS), we find that the immigration wave of the 1980s and 1990s reduced between 40 and 107 minutes the time very skilled American women spent weekly on household chores.

Finally, we use data from the Consumer Expenditure Survey (CEX) to test if, consistent with our time-use results, highly educated women have changed their consumption levels of market-provided household services as a consequence of low-skilled immigration. Given that expenditures, not units of consumption, are reported in the CEX, the interpretation of the sign and magnitude of our estimates will depend on the price elasticity of these services. However, from Cortés (2008) we know that prices of household services have gone down because of low-skilled immigration; therefore, if we find a positive effect on expenditures (as we do), we can unambiguously conclude that consumption must have gone up. We also study in separate regressions if the immigration waves have made highly educated households more likely to report any positive expenditure on housekeeping services. We find supporting evidence in this respect.

Our findings with respect to highly skilled women have important implications. First, we provide evidence of a specific channel through which low-skilled immigration may be highly educated native workers; in particular, our results imply that highly educated women (and potentially their families) are benefitting from low-skilled immigration because of the reduction in the prices of services they consume more intensively than other groups. This effect does not rely on production complementarities, but on the substitution margin between household production and market provided services (e.g, household services).

Second, it also contributes with evidence on the joint labor supply/household production decision of highly-educated women. On one hand, the results suggest that the availability of flexible housekeeping and child care services at low prices might help female physicians and lawyers, and highly educated women in general, to advance in their careers. Conflicting demands of the profession and of the household have been linked to the relative lack of women in positions of leadership (such as partners in law firms) and in prestigious medical specializations, such as surgery.[4] On the other hand, it provides some evidence against recent theories that highly skilled

[4]For example, Harrington and Hsi (2007) say that " While many women with children negotiate a part-time schedule for family care... they are still less likely to be promoted to partner than women who stay in firms but

women are opting out of demanding careers because they value staying home with their children more.[5] Overall, it suggests that differences in preferences are not the only reason that highly educated women are not more actively involved in the labor market.

Related Literature. Our paper provides a new perspective on the literature of the labor market effects of low-skilled immigration. We move away from the past focus on the effects on the groups of natives competing directly with immigrants (Altonji and Card (1991), Borjas et al (1996), Borjas (2003), Card (1990), Card (2001), Ottaviano and Peri (2006)) and explore a potentially important dimension in which low-skilled immigrants affect the average level of native welfare and its distribution: the time-use effects of a decrease in prices of services that are close substitutes for household production.[6]

Ours is not the first paper to study the employment effects of low-skilled immigration; previous papers whose main focus is on wage levels also include regressions of employment levels. There is a great deal of dispersion in the findings reported by these various studies. As expected, studies that find no effect on wages also find no effect on employment or labor force participation. In his Mariel Boatlift paper, Card (1990) concludes that the 1980 influx of Cubans to Miami had no effects on the employment and unemployment rates of unskilled workers, even for earlier cohorts of Cubans. A similar result is obtained by Altonji and Card (1991), who find no significant effect of low-skilled immigrants on the labor force participation and hours worked of low-skilled native groups. On the other hand, Card (2001) calculates that " the inflow of new immigrants in the 1985-90 period reduced the relative employment rates of natives and earlier immigrants in laborer and low-skilled service occupations by up to 1 percentage point, and by up to 3 percentage points in very high-immigrant cities like Los Angeles or Miami." It is unclear from his results, however, if the displaced workers in these occupations moved out of the labor force, or simply shifted to another occupation. The estimates in Borjas (2003) suggest that a 10 percent supply shock (i.e. an immigrant flow that raises the number of workers in an education-experience skill group by 10 percent) reduces by approximately 3.5 percent the fraction of time worked by workers of that skill group.[7]

Our paper is also related to the literature on female labor supply and the provision and prices of child care. Gelbach (2002) estimates the effect of public school enrollment for five-year-old

do not use part time options" ... "The expectation that an attorney needs to be available practically 24/7 is a huge impediment to a balanced work/family life."

[5]The headline for the October 26, 2003 edition of the *New York Times Magazine* was " Why don't more women get to the top? They choose not to."

[6]Khananusapkul (2004) is, to the best of our knowledge, the only previous study that relates low-skilled immigration with the labor supply of high skilled women. The author finds that an increase in the proportion of low-skilled female immigrants in a metropolitan area raises the proportion of private household workers and lowers their wages. She does not, however, find a significant effect on the labor supply of college educated women.

[7]See Hanson (2008) for a recent survey of the literature on the effects of migration.

children on measures of maternal labor supply using as an instrument for enrollment the quarter of birth of the child. His main results suggest that public pre-school enrollment of a child has a strong effect on the labor supply of the mother, especially on single women whose youngest child is five years old, and on all married women with a five-year-old child. Strong effects of the availability/price of child care on labor supply are also found by Baker et al (2008), who study the introduction of universal, highly subsidized child care in Quebec in the late 1990s. The authors estimate difference-in-differences models comparing the outcomes in Quebec and the rest of Canada around the time of this reform. Using additional information on family and child outcomes, they also find that the provision of this subsidy has been associated with worse outcomes for the children. Our paper differs from these papers in the experimental set-up: the magnitude of the variation in prices generated by immigrants is of a different order of magnitude than the ones considered in the two studies mentioned above. We also consider the effect of changes in prices in services other than child care, which might also affect women with no children.[8]

Outline. The rest of the paper is organized as follows. The next section presents the theoretical framework. Section 3 describes the data and the descriptive statistics. Section 4 presents the empirical strategy and discusses the main results, and in Section 5 we conclude.

2 Theoretical Framework

In this section we present a simple time-use model, which follows closely the work of Kremer and Watts (2006), to frame our empirical analysis. Its purpose is to illustrate the interactions between wage levels, the decision to purchase household services, the price of the household services, and the labor force participation decision.

2.1 Set-up

An agent allocates her time between leisure, household production, and market work. She receives a wage w per unit of time devoted to market work.

The agent consumes two goods. First, there is a homogeneous consumption aggregate that can only be bought in the market; we normalize its price to 1. Second, the agent's household requires a certain number of units of a household service to function; this service can be produced

[8] Coen-Pirani et al (2008) exploits the same household production-female labor supply channel, but they focus on the effects of the introduction and availability of household appliances on female labor supply in the US during the 1960s. They conclude that a significant fraction of the variation in married women's labor force participation can be explained by the effect of household appliances.

at home or bought in the market at a price p. The household needs exactly R units of this service; the marginal benefit of units beyond R is 0.

Denote by y the amount of the consumption good, l the hours of leisure, h the hours of household work, n the hours of market work, x the units of the household service purchased on the market, and I non-wage income of the household. Assume that there is only one working agent per household and normalize total time available to the agent to 1.

Utility is given by

$$u(y) + \psi(l), \tag{1}$$

where $u(\cdot)$ and $\psi(\cdot)$ are concave and satisfy $u'(y) \to \infty$ as $y \to 0$ and $\psi'(l) \to \infty$ as $l \to 0$. Household production is described by the function $f(h)$, which we assume to have decreasing marginal returns to time spent at working at home and to satisfy $f'(h) \to \infty$ as $h \to 0$. This condition implies that a person will never outsource all of their household work.

Four important results arise from the solution of the model (see appendix B for more details). First, people with higher wages (for a given level of I and p) supply labor in the market. Second, for a given w and I, a decrease in p might induce a person to purchase market provided household services, or to purchase even more. Third, for a given p and I, people with higher wages are more likely to buy household services. Finally, only those who purchase services will change their decisions at the margin when p changes.

2.2 The effects of an inflow of low-skilled immigrants

Based on Cortés (2008) we model an inflow of low-skilled immigrants as a decrease in p. Furthermore, we assume the immigration inflow has no effect on wage levels, at least for the group that purchases household services in the market. It follows according to our simple model that women with higher wages will be more likely to respond to immigrant induced changes in p. The model also suggests that if we observe time-use effects of immigration in other groups, especially those characterized by low wages, they are likely to come through other channels besides changes in p.

2.2.1 Effect on household work (h)

For agents with high enough productivity outside the household such that it is optimal for them to outsource part of the household production, a decrease in p will reduce the number of hours worked at home. We should not see changes in hours spent in household production for households with lower wages (but not low enough that we expect them to compete with immigrants in the labor market).

Two additional points are worth mentioning. First, a decrease in p might induce some agents who were previously not buying household services –but who had high enough wages to be close to the threshold– to start doing so. Second, under a fairly simple household production function (for example $f(h) = \ln(h)$), within high salaried agents that already work and purchase household services, the ones with lower salaries will decrease their household work by more than those with higher salaries if p falls. This means that conditional on initially purchasing household services (i.e., the pure *intensive* margin), the effect of a fall in p might be decreasing in the wage. Therefore we expect the effect of a fall in p on household work to be stronger for the high salaried group as long as the intensive margin effect doesn't dominate for the top group, which is the focus of our study.[9]

2.2.2 Effect on labor supply (n)

As with the effect on h, only certain agents' labor supply decisions will be affected by a drop in p. Only agents that are both working in the market and purchasing household services will show any change on their labor supply in response to a drop of p; as we mentioned before these agents are characterized by high wages.

The effect on n will depend on how hours worked in household production and leisure change after a decrease in p. From the previous subsection it is clear that $\frac{\partial h^*}{\partial p} > 0$. Given that changes in p keep the relative price of leisure vs consumption good unchanged, the effect on leisure happens through a change in disposable income only. Its direction will depend on whether leisure is a normal or inferior good. If leisure is an inferior good or if it doesn't respond to income changes, then hours worked in the market is going to unambiguously increase when p goes down. If leisure is a normal good (as in our case because the utility function is separable in y and l) then the direction of the effect will depend on the relative magnitudes of $\frac{\partial h}{\partial p}$ vs. $x\frac{\partial Leisure}{\partial Income}$. Therefore, whether labor supply increases or decreases after a change in p can only be determined empirically.

In our particular case, we can show that the total effect can be decomposed as

$$\frac{\partial n^*}{\partial p} = -\frac{\partial h^*}{\partial p} + \frac{wxu''(\cdot)}{w^2u''(\cdot) + \psi''(\cdot)}. \tag{2}$$

Note that if the income effect is fairly small we have that

$$\frac{\partial \left| \frac{\partial n^*}{\partial p} \right|}{\partial w} < 0.$$

[9]Intuitively, agents with very high wages are already spending very little time working at home; therefore, compared to an agent with a high, but relatively lower wage, her marginal productivity in household production is relatively large. The shape of the production function, given by our assumptions about $f''(\cdot)$ and $f'(0)$, imply further decreases in h require larger reductions in p.

From equation (2) we can also conclude that all else equal, agents with higher unearned income (and therefore higher use of market provided household services, x) will react less to changes in p.

Summarizing, the model predicts that (only) women with high wages will be affected by the reduction in prices of household services resulting from a low-skilled immigration influx. This is true because for given household characteristics and preferences, women with higher wages buy market services and supply labor in the market.

In summary, a decrease in prices will likely reduce the hours spent in household production, and might increase the hours worked in the market if leisure is not very sensitive to income. Within the group of women affected by the change in p, which are those with the higher wages, the ones with lower wages will react more. Finally, higher unearned income is associated with a smaller labor supply response.[10]

3 Data and Descriptive Statistics

We now describe the basic details of the data we use to measure immigration, labor market outcomes and household production outcomes. A more detailed description is contained in Appendix A.

Immigration Data. This paper uses the 5% sample of the 1980, 1990, and 2000 Census Integrated Public Use Microdata Samples to measure the concentration of low-skilled immigrants among cities. Low-skilled workers are defined as those who have not completed high school and an immigrant is defined as someone who reports being a naturalized citizen or not being a citizen. We restrict the sample to people age 16-64 who report being in the labor force and not enrolled in school.

Table 2 shows the evolution of the share of low-skilled immigrants in the labor force for the 30 largest cities in the United States. As observed there is significant variation in immigrant concentration both across cities and through time. This variation will be used for our empirical strategy.

[10] As we mentioned in the introduction, some of the highly educated women work in careers that demand long hours of work. We can think of women in these fields as facing the choice between working long hours at a high wage or short (or more flexible) hours at a lower wage. With more time devoted to work, women who choose the " high-wage path" will likely face a situation where they need to purchase more services from the market; if so, a reduction in p could then reduce the burden of purchasing those services thereby making the option of working more hours more attractive. In this case, the labor supply decision is not binary, but there are different "career paths" and women might switch to a path with long hours, and potentially a higher wage or status, in response to immigration.

Market Work Data. We also use the Census to quantify hours worked and labor force participation of native women, and as before, restrict the sample to individuals who were between age 16 and 64 and not enrolled in school. As Table 3 shows, labor force participation and the number of hours worked a week increase systematically with the education level of the woman. Women with a graduate degree, a college degree, and some college present a significant increase in their labor force participation between 1980 and 1990.[11] During the past decade, participation of all education groups has stabilized, and if anything it has gone down. We also observe that the group of women with a graduate degree is the only one that experienced an increase in the probability of being married. The increase in marriage rates is particularly acute for women with professional degrees and Ph.D.'s.[12]

Table 3 also includes the share of women who reports working at least 50 or 60 hours a week. Close to a third of professional women reported working 50 hours or more a week in 2000, a double-fold increase from 1980 and at least two times as large as the share for women from any other group. Highly educated women are also at least three times as likely, compared to any other educational group, to work 60 hours or more a week.

Household Work Data. We combine information from the 2003-2005 ATUS with the Fall 92-Summer 94 National Human Activity Pattern Survey (NHAPS) to measure time devoted to household work.

Since 2003, the BLS has been running the ATUS, a monthly survey, whose sample is drawn from CPS two months after households complete their eight CPS interviews. An eligible person from each household is randomly selected to participate, and there are no substitutions. The week of the month and the day of the week on which the survey is conducted are randomly assigned; weekends are oversampled, they represent 50 percent of the sample. The overall response rate is 58 percent and the aggregated sample for 2003 to 2005 consists of approximately 38,000 observations.

The NHAP was conducted by the Survey Research Center at the University of Maryland and sponsored by the US Environmental Protection Agency.[13] The day of the week and person in the household are randomly chosen. The sample is limited to households with a telephone. Total sample size is 9,400. For both surveys, our sample consists of women ages 18-64 that have completed the time-use survey. We exclude low-skilled women of Hispanic origin. Our final

[11] See Appendix A for a detailed description of the construction of the education groups.

[12] Note that the characteristics of the education groups are likely to change significantly over time because of composition issues. For example, whereas in 1980 only 11 percent of women in the sample had a college degree, by 2000 this number has increased to 22 percent. The change in composition is likely to explain the unusual increase in marriage and fertility rates of women with a professional degree or Ph.D.

[13] For more information about the survey and to download the data go to http://www.timeuse.org/access/.

sample consists of 52 cities and 8,569 individual observations.[14]

The surveys have different activity classifications, which we match to the best of our ability. In particular we define household work as food preparation, food cleanup, cleaning house, clothes care, plant care, animal care and dry cleaning.

Table 4 presents the descriptive statistics of our time-use data. In both years, time spent on household chores decreases as the education of the woman increases, and labor force participation increases with education (note that we cannot distinguish between women with a master's degree and women with a professional degree or PhD). The time men spend doing household work is between a half and a third of the amount women of the same education spend. Despite the different sample sizes and survey questions, a comparison across the two decades shows similar levels of household and market work, especially for women. We do not see a systematic increase or decline in the time women spend doing household chores; as Ramey and Francis (2008) report most of decline observed in the past century happened before 1990. The share of women with children and small children is relatively similar across years and of the expected magnitude. The only exception is 1993's share of women with a graduate degree with children and small children, which is significantly lower than the observed in the Census data. Note that NHAPS's and ATUS's statistics on labor force participation of women and usual hours worked are not very different from the Census.

Consumption Data. We use the Consumer Expenditure Survey (CEX) to construct two measures of consumption of market supplied household services. First, in order to capture the extensive margin, we consider a dummy variable for positive reported expenditures in housekeeping services. Second, we also consider the amount spent on each of these services, a measure we identify as capturing mostly the intensive margin.[15] As observed in Table 5, the probability of consuming household services increases significantly with the education level of the wife/female head of the household. Whereas in 2000 only 3 percent of households where such a female has at most a high school degree reported positive expenditures on this category, that fraction rises to 6.5 percent, 15.4 percent and 26.5 percent when considering females with some college, a college degree, and a graduate degree, respectively.[16] Note that this pattern is consistent with the predictions of the model, where only women with high wages or high unearned income will purchase household services. With few exceptions, expenditures on household services tend to increase with the education of the main adult female in the household. The increasing pattern is

[14]We excluded cities with less than 10 observations per city-decade cell.

[15]We do not include child-care at home because the variable in the CEX was redefined between 1990 and 2000.

[16]The share of households with a wife/female head with a Ph.D. or professional degree that report positive expenditures in housekeeping services was close to 30 percent in 2000. Unfortunately, this statistic is only available after the BLS changed the education classification in 1996.

especially clear for 2000, when households with a wife or female household head with a graduate degree (conditional on reporting positive expenditures) spent between 40 percent and 60 percent more in housekeeping services than other households.

4 Empirical Analysis

4.1 Identification Strategy

We exploit the intercity variation in the (change of the) concentration of low-skilled immigrants to identify their effect on the time-use decisions of American women and purchases of household services in American households. There are two concerns with this strategy. First, immigrants are not randomly distributed across labor markets. If immigrants cluster in cities with thriving economies, there would be a spurious positive correlation between immigration and labor force participation of women, for example. To deal with this potential bias, we instrument for immigrant location using the historical city-distribution of immigrants of a given country. The instrument will be discussed thoroughly in section 4.2.

The second concern is that local labor markets are not closed and therefore natives may respond to the immigrant supply shock by moving their labor or capital to other cities, thereby re-equilibrating the national economy. Most of the papers that have empirically tested natives' migration response to immigration have not found evidence of large displacement effects. Card and Lewis (2005), Card and DiNardo (2000), and Card (2001), using different samples and specifications, have all found that native mobility has virtually no offsetting effect on the relative supply shocks created by immigration. Larger, but still not perfectly off-setting displacement effects are found by Borjas (2006). He estimates that 6.1 fewer native workers choose to reside in a city for every ten new immigrants that arrive in the city. In any case, if factor mobility dissipates the effects of immigration flows to cities, our estimates should provide a lower bound for the total effect of low-skilled immigration on the time-use of natives.

4.2 Instrument

The instrument exploits the tendency of immigrants to settle in a city with a large enclave of immigrants from the same country. Immigrant networks are an important consideration in the location choices of prospective immigrants because these networks facilitate the job search process and assimilation to the new culture, see Munshi (2003). The instrument uses the 1970 distribution of immigrants from a given country across U.S. cities to allocate the new waves of immigrants from that country. For example, if a third of Mexican immigrants in 1970 were living

in Los Angeles, the instrument allocates one third of all Mexicans in the 1990s to Los Angeles.

Formally, the instrument for the number of low-skilled immigrants in city i and decade t can be written as

$$\sum_j \frac{Immigrants_{ji1970}}{Immigrants_{j1970}} \times LSImmigrants_{jt}, \tag{3}$$

where j are all countries of origin included in the 1970 Census, $\frac{Immigrants_{ji1970}}{Immigrants_{j1970}}$ represents the percentage of all immigrants from country j included in the 1970 Census who were living in city i, and $LS\ Immigrants_{jt}$ stands for the *total* number low-skilled emigrants from country j to the United States in decade t.

Most of the econometric specifications in the paper include city and region-decade fixed effects (we use the 9 Census divisions). Therefore, the instrument will help in identifying the causal effect of immigration concentration on time-use of native women as long as the following conditions hold:

1. The unobserved factors determining that more immigrants decided to locate in city i vs. city $i\prime$ (both cities in the same region) in 1970 are not correlated with changes in the relative economic opportunities for skilled women offered by the two cities during the 1980s and 1990s. To ameliorate the concern that cities that attracted immigrants in or before 1970 are in a systematically different path from other cities, we test the robustness of our results to the inclusion of several sets of controls explained below.
2. The total (national) flow of low-skilled immigrants in a given decade (second term in the interaction) is exogenous to differential shocks to cities within a given region.[17]
   The sets of controls are the following:
   (a) **Additional Controls 1** tackles the possibility that cities where immigrants arrived in 1970 were more progressive and would have experienced a surge in the labor supply of highly educated women regardless of immigrant concentration. It includes the following variables, constructed using data for 1970, interacted with decade dummies: share of whites in the native labor force, share of working age women that are married, share of working age women with at least a college degree who participate in the labor force, share of working age women who participate in the labor force, share of working age women with less than high school degree, with a high school degree, with some college, and with at least a college degree.

[17] One might be concerned that this condition is violated if city specific pull factors are the driving force in the decision of low-skilled foreigners' migration decision. Boustan (2007) notes this problem and assesses its quantitative importance. She compares results from instruments that assign either the actual or the predicted migrant flows, where the predictions are based on push factors from source areas, and finds little difference between the two.

(b) **Additional Controls 2** addresses the concern that the instrument might be proxying for labor demand shocks to industries that have been persistently important in cities that have historically attracted immigrants. It includes the following variables constructed for 1970 interacted with decade dummies: share of the labor force employed in the agriculture/mining sector, in the transportation sector, in the retail sector, in the manufacturing sector, in the high-skilled services sector (financial services, professional services and publication services), and in the low-skilled services sector (personal services, entertainment services and business services), share of the male labor force that are physicians, share of the male labor force that are lawyers, and share of the male labor force that are college professors, and the natural logarithm of the average hourly wage for people with at least a college degree.

(c) **Additional Controls 3** includes the subset of controls from the previous two sets that are more likely to be related to trends in the labor supply of highly skilled women.[18]

(d) **Additional Controls 4** includes all controls in the sets Additional Controls 1 and Additional Controls 2.

Estimation of the first stage is presented in Table 6. The first column presents the most basic specification, which includes as controls city fixed effects and region-decade fixed effects. The magnitudes of the coefficient suggests that, at current United States immigration levels, an increase of 10 percent in the predicted number of low-skilled immigrants increases the share of low-skilled workers by around 2.5 percent. Columns (2) and (3) exclude from the sample Californian cities and the top 3 immigrant cities, respectively. The magnitudes of the coefficients are smaller, but the coefficients remain highly statistically significant. As observed, the inclusion of the additional sets of controls reduces the magnitude of the instrument's coefficient, but it remains of an economic relevant magnitude and highly statistically significant.

Even if the identification assumption holds, an additional concern for the interpretation of the IV estimations is the violation of the exclusion restriction, i.e., that change in the prices of household related services is not the only channel through which low-skilled immigration might be affecting the time use of American women. A natural candidate is the effect that low-skilled immigration might have on the wages of natives. In section 4.3.1 we present several pieces of evidence that help rule out changes in the production side as a main driver of the relationship between immigrant concentration and high-skilled women labor supply.

[18]In particular, it includes the following variables, all measured in 1970, interacted with decade dummies: the share of the labor force employed in the high-skilled services sector, the share of the labor force employed in the low-skilled services sector, the log of the average wage of educated workers, the share of working age women with at least a college degree, the labor force participation of this group, the share of whites in the native labor force and the share of women who are married.

We should emphasize that even if the exclusion restriction is violated, as long as the identification assumption holds our estimates still capture the causal effect of low-skilled immigration on the time use of American households. Hence, even in this case our results still show different effects for different groups of the population, reinforcing the idea that not all groups are equally affected by immigration, particularly when some of the effects we find had not been previously documented in the literature. However, a violation of the exclusion restriction invalidates the use of our framework as a test for time use models and our estimates as measures of the services' price elasticities of labor supply, thus forcing us to abandon our interpretation of the effects coming (mainly) through the home production-labor supply decision.

4.3 Econometric Specifications and Results

Our theoretical framework suggests that price indexes (in particular, the price index of household services in a city) should be the explanatory variable in our analysis of time-use and consumption. We will present basic specifications using price as the independent variable.[19] Unfortunately, however, the price data is available only for 30 cities in the United States. Therefore, in order to expand the sample to conduct specification and robustness checks, we also estimate reduced-form specifications using as explanatory variable the log of the share of low-skilled workers in the labor force (henceforth denoted by $\mathcal{L}_{it}$), a simplified version of Cortés (2008)'s price equations' main explanatory variable.

4.3.1 Labor Supply of Highly Educated Women

Price as the Explanatory Variable. To estimate the labor supply effects of changes in the prices of housekeeping services, we use the following specification, where the dependent variables of interest are usual hours a week worked, a dummy for labor force participation, usual hours a week worked conditional on working, and the unconditional probability of working full time, at least 50 hours a week and at least 60 hours a week:

$$LS_{nit} = \delta * Ln(\mathcal{P}_{it}) + X'_{nit}\Lambda_t + \phi_i + \psi_{jt} + \varepsilon_{nit} \tag{4}$$

where n is a highly educated native worker, i is city, t is decade, and j is region. Variable LS_{nit} represents the labor supply variable of choice, $\mathcal{P}_{it}$ is the price index for household services and the vector X_{nit} are individual level characteristics, namely age, age squared, race, marital status, and the presence of children in several age brackets. Henceforth, ϕ_i and ψ_{jt} represent city and

[19] Cortés (2008) obtained the price data under a confidentiality agreement with the Bureau of Labor Statistics (BLS). Because of the confidential nature of the data we cannot present descriptive statistics of this variable. For information on how to obtain access to the data visit http://www.bls.gov/bls/blsresda.htm.

region-decade fixed effects, respectively. For the specifications using the price index, we use the 4 region classification of the Census.

To account for the fact that the main predictive variable $Ln(\mathcal{P}_{it})$ varies only at the city-decade level and, moreover, that labor supply is not independent among workers in a given city, the standard errors are clustered at the city-decade level. In our robustness checks we also show the standard errors using city clusters to address the possibility of serial correlation within cities across decades.

Based on our theoretical model, our hypothesis is that $\delta \neq 0$ for women with very high salaries, which we equate to women with high educational attainment. The direction of the effect is theoretically ambiguous; however, if the income effect of leisure is negative or not very large, then we should expect to find a negative effect of prices on labor supply.

Table 7 presents the estimation of equation (4). Each number in the table comes from a different regression; the OLS estimates are shown in the first column, the IV estimates in the second. Given that booming cities are likely to have both higher prices and a stronger labor supply, we should expect OLS estimates to be biased upward. The comparison of the two columns suggests that this is indeed the case; the OLS coefficients, though mostly negative, are significantly larger than the IV estimates.

IV estimates show that low-skilled immigrants, through lowering prices of household services have significantly increased the labor supply of highly educated women, particularly at the intensive margin.[20] Using Cortés (2008)'s estimate of a 9 percent decrease in the prices of immigrant intensive services due to the 1980-2000 low-skilled immigration shock, we calculate that highly educated women increased by 56 minutes a week the time they devoted to market work.

The estimated effect is a combination of labor supply changes for two types of women: (1) women already working who started purchasing household services as a result of the change in price and (2) women who were already consuming the market provided household good. Assuming the first group is not very large (as we will find in a later section), and given that the 2000 CEX suggests that close to 30 percent of women with a professional degree or a Ph.D. consume this type of service, the effect is close to 3 hours per affected woman.

Table 7 also shows how low-skilled immigration has helped professional women increase their probability of working more than 50 and 60 hours. The magnitudes of the effects are economically significant: the low-skilled immigration flow of the 1980s and 1990s increased by 3 percentage

[20]In Table 7, we show estimations where the dependent variable is usual hours worked conditional on working. Our purpose is to present an approximate disaggregation of the effect on usual hours worked between the intensive and extensive margins. We acknowledge, however, that it is not exactly correct to condition samples on the dependent variable when using linear estimations. Note also, that the coefficients on participation and conditional hours do not relate perfectly to the unconditional usual hours worked. The reason is that in the Census, as discussed in Appendix A, the usual hours worked question and labor force participation question refer to slightly different time periods.

points the probability that a woman in this group reported working more than 50 hours a week, and by 1.5 percentage points that she reported working at least 60 hours. Both numbers represent an increase of close to 10 percent of the baseline value. The probability of working full time also increased by 3 percentage points from a baseline of 79 percent.

On the other hand, we find no evidence that low-skilled immigrants have increased the labor force participation of highly educated women. The coefficient for the labor force participation is positive (we expected a negative sign), but small and far from statistically significant. Before presenting our reduced form estimates it is important to note that our results with respect to hours worked and labor force participation imply that the effect on total hours worked by this group comes mostly from the intensive margin of the labor supply decision, in contrast to the results obtained where variation in wages (and taxes) and non-labor income has previously been used.[21] Although the result might seem surprising, we believe it is not unreasonable; first, most of the labor supply literature that has found much larger responses of the labor supply of women at the participation margin than at the hours worked margin focus on low income single mothers or on wives as secondary earners (see Saez (2002)).[22] Second, our sample is characterized by very high levels of participation (close to 90%, see table 3), so we expect effects to happen mostly at the intensive margin. Third, the size of the variation in prices induced by immigration is relatively small, and it might not be enough to generate a transition from zero hours to a number significantly larger than zero (job opportunities with very low hours of work might not be available), but might be enough to affect the decision at the margin for women who are already working.[23]

Reduced Form Approach. As mentioned above, using a reduced-form specification allows us to include many more cities (116 compared to 30) and thus, to perform a rich set of specification tests.

We transform equation (4) as follows:

$$LS_{nit} = \delta * \mathcal{L}_{it} + X'_{nit}\Lambda_t + \tau \times \text{Additional Controls}_{it} + \phi_i + \psi_{jt} + \varepsilon_{nit} \tag{5}$$

where[24]

$$\mathcal{L}_{it} = \ln\left(\frac{LS\ Immigrants + LS\ Natives}{LaborForce}\right).$$

[21] See for example Heckman (1993).

[22] We can also think that the differences in the experimental set-up could be important, as variations in prices of these services are not directly equivalent to wage or income variation.

[23] This is also true for other studies that use variation in the cost of child care arising from public schooling in the US (as in Gelbach (2002)) or from government subsidies in Quebec (as in Baker et al (2008)).

[24] See Cortés (2008) pages 389-393 for a derivation of $\ln\left(\frac{LS\ Immigrants+LS\ Natives}{LaborForce}\right)$ as the main explanatory variable in the determination of the prices of nontraded goods.

Refer to section 4.2 for a detailed description of the different variables included in Additional Controls$_{it}$.[25]

Table 8 presents the estimates of equation (5). The first column restricts the sample to those cities with price data. Its purpose is twofold; first, we want to compare the labor supply effects implied by the model that uses price as explanatory variable and (5). Second, we want to check if the reduced form coefficient changes significantly when we move from 30 to 116 cities.

The estimates from column (1) imply slightly smaller effects than those estimated with the price regressions. For example, whereas with the price regressions we estimate an increase in market work of 56 minutes as a result of the immigration wage of the period 1980-2000, comparable estimates from column (2) in Table 8 suggest a number closer to 40 minutes. Even smaller differences between the two specifications are obtained for the probability of working more than 50 or 60 hours.[26] Comparisons between columns (2), (4) and (6) show that going from 30 to 116 cities does not change the estimates very much, and thus, robustness tests performed on the larger sample are likely to hold for the price regressions if we were to have enough observations to conduct them.

Columns (7) to (10) include the additional sets of controls described in detail in section 4.2. As mentioned before, the purpose of this exercise is to rule out that low-skilled immigration is proxying for other time-varying confounding factors, for example labor demand shifts across cities with different attractiveness to immigrants. Several points are worth mentioning. Estimated coefficients are generally robust to the inclusion of additional controls sets 1, 2, and 3, both in terms of their magnitude and of their statistical significance. Results are less robust to the set of additional controls 4, which includes all controls in sets 1 and 2, with the point estimates in the lower range of the estimates from other specifications but with larger standard errors probably related to the inclusion of a large set of additional controls.[27] Note, however, that results are robust to the inclusion of arguably the most important controls in the two sets (additional controls 3).

[25]For the reduced form specifications we use the 9 regions classification of the Census. In the specifications using the price of household services as the explanatory variable we use the 4 regions classification.

[26]Given that we are ultimately interested in the (semi) elasticity of time-use and consumption to immigration flows (not $\mathcal{L}$), we use the chain rule for its estimation:

$$\frac{dy}{d\left(\ln LS\ Immigrants\right)} = \frac{dy}{d\mathcal{L}} \times \frac{d\mathcal{L}}{d(\ln LS\ Immigrants)} = \delta \times \left(\frac{LS\ Immigrants}{LS\ Immigrants + LS\ Natives}\right),$$

where $\left(\frac{LS\ Immigrants}{LS\ Immigrants+LS\ Natives}\right)$ is the share of immigrants in the low-skilled aggregate labor supply and δ is the coefficient that measures the impact of $\mathcal{L}$ on outcome y.

The last equality is based on the assumption that $\frac{d(\ln\ LS\ natives)}{d(\ln I)} = 0$, i.e. there are no displacement effects. Note that the share of immigrants in the aggregate low-skilled labor supply varies significantly by city. We use the cross-city weighted average of the 1990 value. Weights are given by the size of the city's labor force.

[27]Note that by including all controls in sets 1 and 2 we are including a significant number of variables that vary at the same level as our instrument.

Additional robustness tests are presented in Table 9. Their purpose is to address concerns about endogenous internal migration of highly skilled women and the importance of outliers. Highly educated women who want to work for longer hours might decide to migrate to cities where flexible and affordable housekeeping and child care services are available. To check that our estimates are not driven by endogenous migration, we restrict the sample to women who reported that 5 years ago they were living in the same house. If migration was important, the coefficients on the non-mover sample should be smaller in magnitude. We find that the estimated coefficients for the non-movers sample are neither systematically larger or smaller compared to our baseline results (see Panel B). Furthermore, when we test for the statistical significance of the difference between coefficients estimated using non-movers and coefficients estimated using the sample that excludes them, we cannot reject it being zero for all variables except for labor force participation.[28],[29] To show that our results are not driven by outliers, we exclude from the sample women living in Los Angeles, New York, and Miami (the top immigrant cities) and cities in California. As observed, the estimated coefficients do no change in any significant way. Finally, to address potential correlation in the error terms across decades we report the baseline coefficients but with the standard errors clustered at the city level.

Until now, we have restricted our attention to the behavior of women with the highest possible education levels. For several reasons it is also interesting to study the effects of low-skilled immigration on the labor supply outcomes of other education groups. First, the effects on other groups might shed light on the validity of the exclusion restriction. Second, we do expect to see lower prices of housekeeping services having some effect, albeit smaller, on the labor supply of women with relatively high (but not highest) education levels. Education is not perfectly correlated with skill (or potential outside wage) and, as Table 5 suggests, there is a sizeable fraction of women with only a college degree that report positive expenditures in housekeeping services.

In Table 10 we present the estimation of equation (5) for all education groups. Three observations are worth pointing out. First, we estimate large and statistically significant negative effects of low-skilled immigration on the labor supply of low-skilled native women (those with at most a high school degree). Naturally, we do not expect this effect to come through prices of household services but rather, through direct competition in the labor market. The magnitude of the coefficients imply that the immigration wave of the period 1980-2000 reduced by approximately 30

[28]In specifications not shown in the paper, we regress our labor supply variables on the immigration variable, the immigration variable interacted with a dummy for non-mover, all the basic controls and the interaction of all the basic controls with the non-mover dummy. We use as instruments our instrument and the interaction of the instrument with the non-mover dummy. We test for the statistical significance of the interaction between the immigration variable and the non-mover dummy.

[29]For labor force participation we find that the non-movers' reaction to immigration flows is positive and statistically different from the negative effect we find for the rest of the sample.

minutes the amount of time women devoted weekly to market labor and by 1.5 percentage points the probability that a woman participated in the labor force. To see if our estimates are in line with previous findings in the literature we perform a similar simulation using Borjas (2003)'s coefficient of the effect of the share of immigrants on a given education-experience cell on the fraction of time worked (ratio of weeks worked to 52) by native men belonging to that cell. His estimates imply a decrease in time worked per week of 24 minutes for high school dropouts with 1-5 years of experience to 77 minutes for high school dropouts with 16-20 years of experience.[30]

The second observation from Table 10 that we want to highlight is that low-skilled immigration increases the labor supply of women with a college degree or a master's degree but only at the intensive margin. The effects on hours worked conditional on working and on the probability of working at least 50/60 hours are positive and statistically significant, but as predicted by the theory, considerably smaller in magnitude than the effects for women with a professional degree or Ph.D. The obtained decreasing pattern helps ameliorate the concern that the effect of low-skilled immigrants on highly educated women is coming through the impact that an increase in the supply of low-skilled labor might have on the production side of the economy. It would be difficult to argue that low-skilled immigrants are particularly complementary in production to lawyers and doctors, but not to women with just a college degree or a master's degree.

Finally, Table 10 shows that for the labor force participation equation, the relevant coefficients for women with a college degree or a master's degree are negative and in half of the specifications statistically significant. This result is not predicted by our theory; however, the implied negative effects are not large. For example, the coefficients on women with a master's degree implies that the low-skilled immigration wage of the period 1980-2000 reduced between less than 0.7 percentage points and 1.4 percentage points the labor force participation of this group of women, from a baseline of close to 80 percent.[31]

So far we have provided one argument against the hypothesis that our results on highly educated women are being driven by the effect that low-skilled immigration might have on the production side of the economy. In Table 11 we provide additional evidence by looking at the effects of low-skilled immigration on the hourly wages of women with a professional degree or Ph.D. If indeed low-skilled immigrants and highly educated women are close complements in market production, we should see an increase in wages. As observed, although we find a positive

[30]We perform the calculation in the following way. We measure the shock to the labor supply of high school dropouts of each particular experience group using Appendix 2 of Borjas' paper. We apply the coefficient -0.119 of Table V to the shocks and obtain the estimated change in the fraction of time worked. We then convert changes in number of weeks worked to hours per week using the average hours a week worked by the relevant group constructed from Census data. Note that we use the coefficient estimated using the spatial correlation approach (section V in the paper).

[31]Furtado and Hock (2008) argue that the negative coefficient we find on the labor force participation might be related to women exiting the labor market to bear children when child care prices go down; in their work they refer to a previous version of this paper.

coefficient, it is usually small and not statistically significant from zero.

As a last test of the validity of our exclusion restriction we look at the labor supply effects on highly educated single men. Note that, as shown in Table 3, highly educated men spend significantly more time in household chores compared to their less educated counterparts (see also Gershuny (2000)), so we should not expect a zero effect. Also, labor supply decisions of married men and women are unlikely to be independent: (1) income effects might change men's labor supply decisions, (2) if as suggested by Gelber (2008), the leisure times of the two members are complements, then, if the (highly educated) woman is working more hours it is possible that the man is doing the same, without a change in his time devoted to household work. Table 12 presents the estimates of equation (5) for the highly educated men sample. As observed, the coefficients for unconditional and conditional usual hours worked and the probability of working full time go in the expected direction, but are generally smaller and significantly less robust to the inclusion of controls than the women's effects. The effects on the probability of working very long hours is statistically significant and of similar magnitude to that estimated for women.

4.3.2 Time devoted to household work

In the previous section we have found significant effects of low-skilled immigration on the labor supply of highly educated women. We have also provided strong arguments to support the hypothesis that the main channel that is driving the results are lower prices of services that are close substitutes to household production. Now we turn our attention to the study of the effects on household work. Unlike labor supply, the theoretical effect of a decrease in price of household services is to unambiguously decrease domestic work (conditional on fertility), at least for women who were already purchasing household services in the market.

To test if highly educated women have reduced their time doing household work as a result of increases in low-skilled immigration, we use the following specification

$$HW_{nit} = \pi * \mathcal{L}_{it} + \nu * \mathcal{L}_{it} * Grad_{nit} + X'_{nit}\Lambda_t + \phi_i + \psi_{jt} + \varepsilon_{ijt} \tag{6}$$

where HW_{nit} represents hours a week woman n spends doing household work in city i and year t, $Grad_{nit}$ is a dummy variable for whether the wife or female head of the household has a graduate degree.[32]

Note that because of the reduced number of observations (we only have information for 56 cities and just over 9,000 observations), we cannot run a separate regression for each education group. Therefore, we estimate one regression and restrict the coefficients on individual character-

[32]Unfortunately, the NHAP has very little demographic information on the individuals, so we would not be able to control for marital status or size of the household.

istics and the city and decade-region fixed effects to be equal for all groups. We do allow for the effect of low-skilled immigration to be different for women with more than a college education. Education fixed effects are now included in X_{nit}.

Table 13 presents the estimations of equation (6). Confirming our previous results, we find a negative and statistically significant effect for highly educated women. For the other groups, we find a positive, but not statistically significant effect. The magnitude of the coefficients suggest that the low-skilled immigration flow of the period 1980-2000 reduced by between 39 and 107 minutes a week the time devoted to household work by women with a graduate degree. The lowest number comes from using for the calculation the net effect (main coefficient + interaction coefficient), whereas the second from using only the interaction coefficient. Note that with the ATUS and the NHAPS we cannot further disaggregate this highly educated group into women with a master's degree and women with a professional degree or Ph.D., so the magnitude could be even larger for the latter group.

4.3.3 Consumption of Housekeeping Services

Because we count with only 32 cities and slightly over 10,000 observations, to test for the effects of low-skilled immigration on the consumption of household services, we use a similar specification to the one above:

$$y_{nit} = \kappa * \mathcal{L}_{it} + \nu * \mathcal{L}_{it} * Grad_{nit} + X'_{nit}\Lambda + \phi_i + \psi_{jt} + \varepsilon_{ijt} \tag{7}$$

where n represents a household, i city, j region, and t year. y is an outcome taken from the expenditure data; it can be either a dummy variable for positive reported expenditures in housekeeping services, or the dollar amount spent on them.[33] $Grad_{nit}$ is a dummy variable for whether the wife or female head of the household has a graduate degree.

We expect $\kappa, \nu > 0$, i.e. an immigrant induced increase in the share of low-skilled workers in the labor force, by reducing the prices of housekeeping services, increases the probability a household purchases housekeeping services, more so for the highest skilled households who are most likely to be close to the threshold. If the elasticity of demand for housekeeping services is greater than one, κ and $(\kappa + \nu)$ should also be positive in the regression where the dependent variable is the level of expenditures in housekeeping services.

Using CEX data from 1980, 1990, and 2000, we estimate equation (7) and summarize the results in Table 14. The top panel reports the estimation when the dependent variable is a dummy for positive expenditures in housekeeping services, and the bottom panel when the variable of

[33]Unfortunately, the BLS changed the definition of child care services in the mid-1990s, so we cannot use expenditures in child care as our dependent variable.

interest is the level of expenditures in dollars. The magnitudes and signs of the coefficients suggest interesting patterns. The interaction with the dummy for wife or female head with a graduate degree is positive in both panels, large in magnitude, and statistically significant at the 5 percent level. We find no sizeable effect for other groups. The magnitude of the coefficients suggests that the low-skilled immigration flow of the 1980s and 1990s increased by a city-average of 3.5 percentage points the probability that households whose wife/female head has a graduate degree report positive expenditures in housekeeping services and by about 32 dollars per quarter the amount spent on them. Given that women with a graduate degree reduced their time doing household work by between 6 to 24 hours a quarter, 32 dollars seems a little low. Keep in mind, however, that expenditures on housekeeping services do not include expenditures on services such as gardening or laundry; activities that were included in the computation on time spend doing household work.

5 Concluding Remarks

This paper shows that low-skilled immigration into the United States can generate effects on the labor supply of natives that go beyond the standard analysis of the impact immigrants have on natives of similar skill. Using a simple model of time-use, we argue that by lowering the prices of services that are close substitutes of home production, low-skilled immigrants might increase the labor supply of highly skilled native women, a group that is unlikely to be affected through other channels usually mentioned in the literature: wages and employment (displacement) effects.

Using Census data we estimate that the low-skilled immigration wave of the 1980s and 1990s increased between 40-56 minutes a week the time women with a professional degree or Ph.D. spend working in the market. The average increase hides important changes in the distribution of hours. We find no effect on the extensive margin and significant effects on the intensive margin. In particular, we find that low-skilled immigration has helped professional women increase significantly their probability of working more than 50 and 60 hours. This result is important because many women with professional degrees, especially lawyers, physicians, and women with Ph.D's, work in fields where long hours are required to succeed.

As supporting evidence for our result on the effects of low-skilled immigration on the labor supply of highly skilled women, we find that low-skilled immigration has also decreased the amount of time women with a graduate degree devote to household work and has increased the amount of services purchased in the market; a result that is implicit in their reported dollar expenditures in housekeeping services.

Given that our findings suggest that only women at the top of the skill distribution are being positively affected by the reduction in the prices of services that are substitutes for household

production, we provide additional evidence that the effects of low-skilled immigration on the welfare of the native population are heterogeneously distributed, benefitting some groups more than others. In our particular case we find that very highly educated women seem to be able to choose labor supply profiles that they could not afford before. The question remains open as to whether this allocation is indeed desirable if the quality of some of the goods, like child care, is not the same when provided by the market instead of by the parents (Baker et al (2008)).

Additionally, the fact that highly-educated women change their labor supply decisions in response to the immigration-induced price changes also suggests that at least part of the differences between women and men in certain jobs reflect barriers that should not be fully attributed to differences in preferences; according to our results, part of these differences are coming from restrictions on affordable household help. Women might indeed value family life more than men, but the lack of more affordable services seems to affect the decision.

While on a broader perspective the estimated effects are not likely to be the main channel through which immigration affects natives, they do provide a newer point of view on the same question about the effects of immigration on native workers. Highlighting a plausible and new channel emphasizes the importance of a thorough understanding of the effects of immigration across all groups and not just for those that seem at first sight to be most affected by it. The high level of heterogeneity in the responses implies that the benefits are very concentrated at the top of the educational attainment distribution.

Finally, our model and discussion have abstracted from the possibility that lower prices for household services and babysitting might affect time-use decisions through an impact on fertility. By reducing the costs of having children and therefore by increasing the number of children, low-skilled immigration might potentially increase the total amount of time devoted to household work and decrease labor supply in the market. A theoretical and empirical model of the fertility decision is out of the scope of the present paper, but we hope to address this important question in future work.

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A Data Appendix

In this appendix we describe in more detail the samples used in our regressions and the definition of our main variables.

A.1 Sample Selection

Recall that we define an immigrant as someone who reports being a naturalized citizen or not being a citizen. Furthermore, for our regressions when constructing the dependent variables we restrict our attention to people with ages between 16 and 64 years old and who report being part of the labor force.

1. Sample selection for the Census regressions: Natives ages 16-64, who reported not being in group quarters and not attending school.

2. Sample selection for the construction of the instrument:

   (a) For the 1970 distribution component: all immigrants (no restrictions on age or labor force status).

   (b) For the stock component of the instrument for 1980-2000: high school dropout immigrants aged 16-64 that reported being in the labor force and not in group quarters.

   (c) Countries: All countries included in the 1970 classification; we exclude groups such as South America n.s./n.e.c. that do not allow us to assign them to a specific country. We aggregate values for West and East Germany for 1980.

A.2 Construction of key variables

(Names in italics correspond to the original IPUMS name for the given variable.)

1. Immigrant:

   (a) 1980-2000 Census: reported not being a citizen or reported being a naturalized citizen (*citizen* equal to 2 or 3).

   (b) 1970: reported being born outside the US (*bpld*¿15000)

2. Labor Force: We use the variable labforce, which includes those who had a job or looked for work during the previous week (*labforce*=2)

3. Hours worked a week: We use the variable *uhrswork,* which reports the number of hours per week that the respondent usually worked, if the person worked during the previous year. We would have liked for the labor force and hours per week variables to refer to the same time period; unfortunately, the variable that reports hours worked last week (*hrswork1*) is not available for the year 2000.

4. Education levels: we combine the variable *educrec* (available for all years) with *higrade* (available for 1980) and *educ99* (available for 1990-2000):

   (a) High school drop:

      i. 1970-2000: *educrec* less than 7

   (b) High school graduate:

      i. 1980-2000: *educrec* equal to 7 (we include people who completed 12th grade but did not get a diploma)

   (c) Some college:

      i. 1980-2000: *educrec* equal to 8

   (d) College graduate:

      i. 1980: anyone with a value of *educrec* equal to 9 and *higrade* equal to 19.

      ii. 1990-2000: *educ99* equal to14

      iii. 1980-2000 Anyone with a value of *educrec* equal to 9 and who reports as occupation either nurse or teacher (*occ1990* equal to 95, 155-159, 163, 207)

   (e) Master's Degree:

      i. 1980: *higrade equal* 20 or 21

      ii. 1990-2000: *educ99* equal 15 with the exception of nurses and teachers

   (f) Professional Degree or PhD

      i. 1980: *higrade* larger than *21*

      ii. 1990-2000: *educ99* larger than 15 with the exception of nurses and teachers

B Model

B.1 The Time Use-Labor Supply Problem

The agent's optimization problem is

$$\begin{aligned} &\max u(y) + \psi(l) \qquad \text{(P1)} \\ &\text{subjectto} \\ &[\lambda] \qquad x + f(h) = R \\ &[\mu] \qquad I + wn = px + y \\ &[\phi] \qquad n + h + l = 1 \\ &n \geq 0, \quad x \geq 0; \end{aligned}$$

where λ, μ, and ϕ are the lagrange multipliers on the household service, budget, and time constraints, respectively.[34]

The first order conditions are

$$\begin{aligned} u'(y) - \mu &= 0 && \text{(8a)} \\ \psi'(l) - \phi &= 0 && \text{(8b)} \\ \lambda f'(h) - \phi &= 0 && \text{(8c)} \\ \lambda - \mu p &\leq 0 && \text{(8d)} \\ \mu w - \phi &\leq 0, && \text{(8e)} \end{aligned}$$

where the last two first order conditions hold with equality when the non-negativity constraints on x and n do not bind.

B.1.1 Solution

The agent's wage, unearned income and the price of the market services are the elements that determine whether a woman (or a household) supplies labor in the market and/or purchases some of the household services from market providers rather than producing them at home. In our simple setup there are four cases. We show the conditions under which each case would be observed.

Case 1 – Agent does not work in the market and does not purchase household services ($x^* =$

[34]Notice that the assumptions on $u(\cdot)$, $\psi(\cdot)$ and $f(\cdot)$ guarantee we do not need to consider the non-negativity constraints on y, l, and h.

$0, n^* = 0$): The wage and unearned income of agents in this group satisfy the following inequality:

$$w < \frac{\psi'\left(1-\overline{h}\right)}{u'\left(I\right)} < pf'\left(\overline{h}\right), \tag{9}$$

where $\overline{h}$ is the solution to $f\left(\overline{h}\right) = R$. The first inequality implies that the wage is not high enough to compensate for the cost of foregone leisure in terms of the gain in extra units of consumption good. This inequality is likely to hold the lower the wage and the higher the unearned income. However, unearned income cannot be too high, or the second inequality will not hold. The second inequality guarantees that the agent does not buy market services as they are too expensive given the current rate at which time could be traded for goods bought in the market. Note that in this case changes in the price of the market household do not affect the labor supply decision and the hours worked in household production as long as (9) still holds.

Case 2 – Agent works in the market but does not purchase household services ($x^* = 0, n^* > 0$): Using the first order conditions we can show that this case happens if

$$f'\left(\overline{h}\right) > \frac{w}{p} \quad \text{and} \quad w > \frac{\psi'\left(1-\overline{h}\right)}{u'\left(I\right)}, \tag{10}$$

In words, the market wage relative to the price of the household services is low enough that it is more efficient for the agent to produce all of the household good herself (even in the presence of decreasing marginal returns). However, her wage is high enough, given her non-labor income, that she works in the market in order to consume more units of good y. The optimal level of n can then be obtained from

$$wu'\left(I + wn\right) = \psi'\left(1 - n - \overline{h}\right). \tag{11}$$

From the equation above we can see that for agents in this group changes in the market price of the household services will not affect their time-use decisions as long as (11) still holds. Note also that, as in most time-use models, higher unearned income is associated with fewer hours worked in the market.

Case 3 – Agent purchases household services but does not work in the market ($x^* > 0, n^* = 0$): In this case the wage is low enough such that the first inequality in equation (9) holds, but the agent has sufficient unearned income and/or faces a sufficiently low price of household services to buy enough of good y and to pay for household services in order to enjoy more leisure.

How much time spent in household production (h^*) will be given by the following equation:

$$\frac{\psi'\left(1-h^*\right)}{f'\left(h^*\right)} = pu'\left(I - p\left(R - f\left(h^*\right)\right)\right). \tag{12}$$

Finally, we have that

$$w < pf'(h^*),$$

We can differentiate equation (12) to show that h is increasing in p. Using the optimal h, we can then obtain y and x, and rewrite the condition for w as

$$w < \frac{\psi'(1-h^*)}{u'(I-p(R-f(h^*)))} = pf'(h^*).$$

Case 4 – Agent purchases household services and works in the market ($x^* > 0, n^* > 0$): Agents in this group have high enough wages, and face a low enough p, such that

$$f'\left(\overline{h}\right) < \frac{w}{p},$$

and

$$w > \frac{\psi'\left(1-\overline{h}\right)}{u'(I)}.$$

Thus, the first order conditions with respect to x and n hold with equality.

In this case the agent will choose h^* such that

$$f'(h^*) = \frac{w}{p}.$$

Household work is thus increasing in p and decreasing in w. Given its inverse relation with h, the quantity of household goods purchased in the market, x, is decreasing in p and increasing in w. We can then obtain the labor supply, n^*, using

$$u'(I-p(R-f(h^*))+wn^*)\,w = \psi'(1-h^*-n^*).$$

Notice that the hours of market work will depend on the price of household services. Finally, we obtain the demand for consumption goods using the budget constraint

$$y^* = I + wn^* - p(R-f(h^*)).$$

Table 1. Top Industries Intensive in Low-skilled Immigrant Labor (2000)

All LS Workers			Male LS Workers			Female LS Workers		
	Immigrants	Natives		Immigrants	Natives		Immigrants	Natives
	%*	%		%	%		%	%
Labor Force	5.2	6.4	Labor Force	3.3	3.6	Labor Force	1.9	2.8
Apparel/Textile Ind.	37.8	7.7	Landscaping SS	28.9	9.9	Apparel/Textile Ind.	28.7	2.6
Landscaping SS	29.7	10.8	Crop production	20.0	10.1	Private households	25.4	8.1
Private hhld SS	27.0	9.3	Shoe Repair	19.6	9.5	Fruit/veg pres.	12.4	4.3
Crop production	25.3	12.9	Car washes	17.4	20.1	Drycleaning SS	12.2	8.8
Animal slaughtering	24.7	12.2	Apparel/Textile Ind.	16.4	1.4	Sugar products	11.3	5.8
Fruit/veg pres.	20.1	8.7	Animal slaughtering	16.0	8.1	SS to buildings	11.3	5.8
Car washes	19.9	23.2	Furniture and fixtures	15.4	6.5	Animal slaughtering	8.7	4.0
Services to buildings	19.6	11.9	Recyclable material	13.5	11.8	Traveler acc.	8.0	5.4
Shoe Repair	19.6	10.6	Bakeries, exc retail	12.0	5.8	Pottery, ceramics	7.7	2.2
Furniture and fixtures	19.4	8.4	Construction	11.9	8.8	Nail salons	7.1	5.1
Drycleaning SS	19.2	12.6	Taxi and lim. service	10.6	4.0	Bakeries, exc retail	6.4	3.9
Sugar products	19.2	9.8	Coating activities	10.4	9.6	Seafood products	6.3	2.3

* % of Low-skilled Immigrants in Tot. Employment of Industry. Includes the 30 largest US Cities.

Source: 2000 Census

Table 2. Share of Low-skilled Immigrants in the Labor Force (%)

City	1980	1990	2000
Atlanta	0.38	0.84	3.23
Baltimore	0.76	0.44	0.67
Boston	3.53	2.71	2.62
Buffalo	1.48	0.72	0.47
Chicago	4.99	5.09	5.86
Cincinnati	0.44	0.23	0.34
Cleveland	1.82	0.89	0.65
Columbus	0.43	0.25	0.81
Dallas-Fort Worth	2.13	5.17	8.63
Denver-Boulder	1.18	1.42	4.13
Detroit	1.76	0.93	1.35
Honolulu	4.71	3.66	3.18
Houston	3.96	7.03	9.21
Kansas City	0.58	0.47	1.44
Los Angeles	11.64	15.90	15.09
Miami	15.13	14.44	11.36
Milwaukee	1.07	0.84	1.54
Minneapolis	0.49	0.37	1.43
New Orleans	1.20	1.13	1.08
New York	8.91	7.82	8.15
Philadelphia	1.39	0.91	1.06
Phoenix	2.19	3.30	6.41
Pittsburgh	0.57	0.27	0.21
Portland	1.03	1.53	3.27
St. Louis	0.49	0.24	0.53
San Diego	4.59	5.92	6.34
San Francisco	4.40	6.73	6.19
Seattle	1.22	1.00	1.94
Tampa	1.50	1.69	2.15
Washington DC	1.61	2.52	3.76
Weighted Average 116 cities	3.36	3.80	4.31

Source: US Census. Low-skilled workers are defined as those without a high school degree.

Table 3. Descriptive Statistics - Census Data on Women's Labor Supply

	High School Dropout			*High School Graduate*			*Some College*		
	1980	1990	2000	1980	1990	2000	1980	1990	2000
Sample Share	0.24	0.14	0.09	0.45	0.37	0.30	0.17	0.31	0.33
Labor Force Participation	0.45	0.46	0.48	0.63	0.69	0.69	0.70	0.79	0.77
Usual Hrs. per week |H>0	35.02	35.09	35.97	35.44	36.14	37.03	35.75	37.15	37.87
% work at least 50 hrs.	0.02	0.03	0.04	0.02	0.04	0.06	0.03	0.07	0.09
% work at least 60 hrs.	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.02	0.03
Fulltime	0.32	0.32	0.34	0.47	0.51	0.53	0.65	0.60	0.59
Married	0.59	0.49	0.42	0.66	0.62	0.57	0.52	0.60	0.61
Child younger than 5	0.15	0.16	0.15	0.17	0.17	0.14	0.19	0.19	0.16
Child younger than 17	0.41	0.36	0.36	0.47	0.42	0.40	0.46	0.44	0.44
	College Grad			*Masters Degree*			*Profess. Degree or Ph.D.*		
	1980	1990	2000	1980	1990	2000	1980	1990	2000
Sample Share	0.11	0.12	0.22	0.024	0.034	0.045	0.009	0.014	0.020
Labor Force Participation	0.75	0.83	0.82	0.76	0.85	0.82	0.84	0.89	0.87
Usual Hrs. per week |H>0	35.60	37.87	38.93	36.52	38.89	40.25	39.84	42.52	43.22
% work at least 50 hrs.	0.05	0.10	0.15	0.07	0.15	0.20	0.17	0.28	0.32
% work at least 60 hrs.	0.01	0.03	0.04	0.02	0.04	0.06	0.06	0.11	0.14
Fulltime	0.53	0.64	0.65	0.55	0.65	0.66	0.65	0.72	0.71
Married	0.65	0.62	0.63	0.60	0.60	0.62	0.53	0.60	0.62
Child younger than 5	0.18	0.19	0.18	0.16	0.17	0.15	0.12	0.20	0.18
Child younger than 17	0.41	0.39	0.41	0.38	0.36	0.36	0.30	0.37	0.40

Table 4. Descriptive Statistics - Time-use of Women from the Fall 92 - Summer 94 NHAPS and 2003-2005 ATUS

	High School Drop		*High School Grad*		*Some College*		*College Grad*		*More than College*	
	1993	2000s	1993	2000s	1993	2000s	1993	2000s	1993	2000s
Sample Share	0.06	0.12	0.37	0.28	0.27	0.28	0.18	0.21	0.11	0.11
Hrs/week on HHld. Chores	15.61	18.54	14.46	14.34	11.71	12.67	11.75	12.09	10.89	10.49
	(15.55)	(17.54)	(15.68)	(15.74)	(13.36)	(14.96)	(12.94)	(13.02)	(15.43)	(12.44)
Hrs/week on HHld. Chores	6.61	4.86	4.40	5.36	5.54	5.37	3.91	5.32	4.79	6.34
(by men of same ed level)	(13.75)	(9.77)	(9.12)	(9.78)	(11.54)	(9.82)	(7.69)	(9.33)	(9.32)	(10.08)
Hrs/week Mkt. Work	35.58	35.63	37.64	37.29	38.05	36.16	39.28	37.95	39.99	40.25
	(16.01)	(11.88)	(11.34)	(9.69)	(12.03)	(10.70)	(12.41)	(11.12)	(13.03)	(11.32)
Labor Force Participation	0.59	0.50	0.67	0.72	0.77	0.72	0.85	0.78	0.86	0.84
	(0.49)	(0.50)	(0.47)	(0.45)	(0.42)	(0.45)	(0.36)	(0.42)	(0.35)	(0.36)
Child less than 6 years	0.15	0.23	0.21	0.19	0.23	0.17	0.23	0.19	0.07	0.21
	(0.23)	(0.42)	(0.41)	(0.39)	(0.42)	(0.37)	(0.42)	(0.39)	(0.25)	(0.41)
Children	0.35	0.48	0.43	0.43	0.42	0.41	0.40	0.40	0.25	0.43
	(0.48)	(0.50)	(0.50)	(0.49)	(0.49)	(0.49)	(0.49)	(0.49)	(0.44)	(0.50)

The entries represent the weighted mean. Standard errors are reported in parentheses.

Number of Obs. is 1,454 for the 1993 sample and 7,115 for the 2000s sample.

Table 5. Descriptive Statistics - Consumer Expenditure Survey

	High School Drop			*High School Grad*			*Some College*		
	1980	1990	2000	1980	1990	2000	1980	1990	2000
Sample Share	0.178	0.124	0.075	0.384	0.354	0.291	0.248	0.266	0.315
Dummy for Positive Exp. in Housekeeping	0.028 (0.166)	0.031 (0.173)	0.029 (0.167)	0.055 (0.229)	0.030 (0.170)	0.028 (0.166)	0.072 (0.259)	0.090 (0.286)	0.065 (0.247)
Housekeeping Exp.| E>0 (1990 dollars)	68.6 (98.8)	115.7 (73.5)	131.5 (96.0)	184.3 (250.6)	314.2 (556.9)	170.9 (264.7)	236.0 (270.4)	171.5 (166.8)	181.7 (174.6)

	College Grad			*More than College*		
	1980	1990	2000	1980	1990	2000
Sample Share	0.102	0.151	0.218	0.088	0.104	0.101
Dummy for Positive Exp. in Housekeeping	0.171 (0.377)	0.149 (0.356)	0.154 (0.361)	0.159 (0.366)	0.232 (0.423)	0.265 (0.265)
Housekeeping Exp.| E>0 (1990 dollars)	561.7 (711.4)	220.9 (200.8)	263.4 (277.3)	495.2 (845.4)	269.7 (284.0)	378.7 (803.2)

Number of observations is 10,225

Table 6. First Stage

	Dependent Variable: Log (LS Imm + LS Nat. /Labor Force)						
	(3)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{Log}(\sum_j \text{share}_{i,j,1970} * \text{LS Imm}_{jt})$	0.319***	0.248***	0.277***	0.234***	0.223***	0.211***	0.154***
	(0.054)	(0.042)	(0.057)	(0.049)	(0.045)	(0.044)	(0.041)
Controls	Basic	Basic	Basic	Add. Controls 1	Add. Controls 2	Add. Controls 3	Add. Controls 4
Excludes California	No	Yes	No	No	No	No	No
Excludes Miami, NYC and LA	No	No	Yes	Yes	No	No	No
No. cities	116	106	113	116	116	116	116

Notes: Log (LS Imm + LS Nat. /Labor Force) = Log (Low-skilled Immigrants + Low-skilled Natives / Labor Force)

OLS estimates. Regressions are weighted by the city's labor force size. City and region-decade fixed effects are included in all the regressions.

Robust Std. Errors are reported in parenthesis. Number of Observations is number of cities multiplied by three.

For a description of the sets of additional controls, please refer to the text.

Significance levels: *=10%. **=5% , ***=1%

Table 7. Price of Housekeeping Services and the Labor Supply of Women with Professional Degrees or Ph.Ds

	Coefficient of Log(Price of Housekeeping)	
Dependent Variable:	OLS	IV
Usual Hrs. Work per Week	-0.658	-10.402**
	(0.983)	(4.061)
Labor Force Participation	0.012	0.038
	(0.014)	(0.044)
Usual Hrs. Work | Working	-0.964	-14.176***
	(0.782)	(4.959)
Working Full Time	-0.045	-0.367**
	(0.028)	(0.140)
Prob(H>=50)	-0.031	-0.335***
	(0.022)	(0.125)
Prob(H>=60)	0.016	-0.157**
	(0.016)	(0.067)

Each number comes from a different regression. All estimations include city, region-decade fixed effects and demographic controls.
There are 30 cities in the sample and the region dummies represent the main 4 US regions as defined by the Census.
Demographic controls: age, age squared, white dummy, married dummy, dummy for having a child 5 or younger, dummy for having a child 17 or younger. We allow the effect of demographic controls to vary with decade.
Errors are clustered at the city-decade level. Models are weighted by the individual's Census weight.
Number of Obs. is 44,058 , except for the regression for usual hours conditional on working, which includes 39,692.
Significance levels: *=10%. **=5% , ***=1%

Table 8. Low-skilled Immigration and the Labor Supply of Women with Professional Degrees or PhDs

	Coefficient of Log (LS Imm + LS Nat. /Labor Force)								
Dependent Variable:	OLS	IV	OLS	IV	IV	IV	IV	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Usual Hrs. Work per Week	2.142**	3.735***	1.564**	3.056***	3.322***	3.351*	3.695	5.046**	3.261
	(0.828)	(0.990)	(0.682)	(1.023)	(1.219)	(1.982)	(2.302)	(2.497)	(3.429)
Labor Force Participation	-0.004	-0.014	-0.005	-0.020	-0.015	0.024	-0.032	-0.000	-0.019
	(0.011)	(0.016)	(0.010)	(0.018)	(0.020)	(0.032)	(0.039)	(0.039)	(0.058)
Usual Hrs. Work | Working	3.384***	5.085***	2.970***	5.653***	5.304***	4.073**	6.741***	5.898***	5.917**
	(0.660)	(0.886)	(0.590)	(0.882)	(1.027)	(1.680)	(1.891)	(2.121)	(2.982)
Working Full Time	0.088***	0.132***	0.071***	0.119***	0.116***	0.090*	0.082	0.093	0.028
	(0.025)	(0.029)	(0.021)	(0.028)	(0.034)	(0.054)	(0.063)	(0.069)	(0.090)
Prob(H>=50)	0.071***	0.120***	0.055***	0.113***	0.121***	0.099**	0.100*	0.132**	0.071
	(0.020)	(0.027)	(0.019)	(0.026)	(0.029)	(0.045)	(0.051)	(0.055)	(0.080)
Prob(H>=60)	0.049***	0.056***	0.031***	0.055***	0.057**	0.041	0.066	0.087**	0.090
	(0.013)	(0.016)	(0.011)	(0.017)	(0.022)	(0.036)	(0.041)	(0.043)	(0.065)
Sample	30 cities	30 cities	116 cities	116 cities	116 cities	116 cities	116 cities	116 cities	116 cities
No. of Regional Dummies	4 regions	4 regions	4 regions	4 regions	9 regions	9 regions	9 regions	9 regions	9 regions
Set of controls	Basic	Basic	Basic	Basic	Basic	Add. Cont. 1	Add. Cont. 2	Add. Cont. 3	Add. Cont. 4

Notes: L (LS Imm + LS Nat. /Labor Force) = Log (Low-skilled Immigrants + Low-skilled Natives / Labor Force)

Number of Obs. is 66,038 for the 116 cities sample and 44,058 for the 30 cities sample.

Each number comes from a different regression. All estimations include city, decade-region fixed effects and demographic controls: age, age squared, white dummy, married dummy, dummy for having a child 5 or younger, dummy for having a child 17 or younger. We allow the effects of demographic controls to vary with decade. For a description of the sets of additional controls For a description of the sets of additional controls, please refer to the text.

Errors are clustered at the city-decade level. Models are weighted by the individual's Census weight. Significance levels: *=10%. **=5% , ***=1%

Table 9. Low-skilled Immigration and the Labor Supply of Women with Professional Degrees or PhDs : Robustness Checks (Instrumental Variables Estimates)

Coefficient of Log (LS Imm + LS Nat. /Labor Force)

	A. Baseline - Std. Errors clustered at city level				B. Non-movers			
Dependent Variable:	Basic Controls	Add. Controls 1	Add. Controls 2	Add. Controls 3	Basic Controls	Add. Controls 1	Add. Controls 2	Add. Controls 3
Usual Hrs. Work per Week	3.322**	3.351	3.695	5.046	3.486*	4.421	4.281	4.815
	(1.506)	(2.461)	(2.971)	(3.216)	(1.984)	(3.149)	(3.837)	(4.006)
Labor Force Participation	-0.015	0.024	-0.032	-0.000	0.045	0.079	0.038	0.052
	(0.025)	(0.040)	(0.049)	(0.052)	(0.043)	(0.068)	(0.080)	(0.091)
Usual Hrs. Work | Working	5.304***	4.073*	6.741***	5.898**	4.583***	3.577	6.104*	3.975
	(1.269)	(2.123)	(2.368)	(2.745)	(1.687)	(2.650)	(3.565)	(3.533)
Working Full Time	0.116***	0.090	0.082	0.093	0.138**	0.121	0.050	0.078
	(0.042)	(0.068)	(0.078)	(0.089)	(0.060)	(0.091)	(0.121)	(0.123)
Prob(H>=50)	0.121***	0.099*	0.100	0.132*	0.141***	0.215***	0.215**	0.238***
	(0.035)	(0.056)	(0.065)	(0.072)	(0.045)	(0.073)	(0.089)	(0.090)
Prob(H>=60)	0.057*	0.041	0.066	0.087	0.041	0.025	0.051	0.052
	(0.030)	(0.048)	(0.058)	(0.059)	(0.030)	(0.051)	(0.062)	(0.065)
Number of observations	66038	66038	66038	66038	26722	26722	26722	26722
	C. Excludes California				D. Excludes Miami, NY, and LA			
Dependent Variable:	Basic Controls	Add. Controls 1	Add. Controls 2	Add. Controls 3	Basic Controls	Add. Controls 1	Add. Controls 2	Add. Controls 3
Usual Hrs. Work per Week	3.510**	7.375**	5.102*	8.282**	3.517*	4.600**	4.224*	5.289**
	(1.399)	(2.909)	(2.838)	(3.497)	(1.845)	(2.334)	(2.450)	(2.571)
Labor Force Participation	-0.014	0.068	-0.011	0.035	-0.008	0.032	-0.020	0.017
	(0.023)	(0.047)	(0.049)	(0.052)	(0.028)	(0.038)	(0.040)	(0.040)
Usual Hrs. Work | Working	5.200***	6.036**	7.409***	7.655**	5.533***	4.977**	6.860***	5.992***
	(1.217)	(2.473)	(2.477)	(2.992)	(1.549)	(1.936)	(1.944)	(2.123)
Working Full Time	0.098**	0.128*	0.059	0.105	0.110**	0.124**	0.099	0.111
	(0.043)	(0.076)	(0.080)	(0.094)	(0.051)	(0.062)	(0.066)	(0.071)
Prob(H>=50)	0.132***	0.172**	0.137**	0.178**	0.108***	0.118**	0.092*	0.115**
	(0.032)	(0.067)	(0.063)	(0.079)	(0.039)	(0.050)	(0.049)	(0.052)
Prob(H>=60)	0.077***	0.114**	0.113**	0.161**	0.047	0.060	0.077*	0.090**
	(0.026)	(0.053)	(0.055)	(0.065)	(0.030)	(0.041)	(0.044)	(0.044)
Number of observations	56616	56616	56616	56616	56175	56175	56175	56175

Non-mover Def: individuals that reported they were living in the same house 5 years ago.

Each number comes from a different regression. All estimations include city, decade*region fixed effects and demographic controls (age, age squared, white dummy, married dummy, dummy for having a child 5 or younger, for having a child 17 or younger). We allow the effects of demographic controls to vary with decade. For a description of the sets of additional controls, please refer to the text. Errors are clustered at the city-decade level. Models are weighted by the individual's Census weight. Significance levels: *=10%. **=5% , ***=1%

Table 10. The Effect of Low-skilled Immigration on Women's Labor Supply by Education Group
(Instrumental Variables Estimates)

Coefficient of Log (LS Imm + LS Nat. /Labor Force)

	Dep. Variable: Usual Hrs. Work per Week				Dep. Variable: Lab Force Part.				Dep. Variable: Hrs. Work | H>0			
Education Level of Woman	Basic Cont.	Add. Cont. 1	Add. Cont. 2	Add. Cont. 3	Basic Cont.	Add. Cont. 1	Add. Cont. 2	Add. Cont. 3	Basic Cont.	Add. Cont. 1	Add. Cont. 2	Add. Cont. 3
Professional Degree or PhD	3.322***	3.351*	3.695	5.046**	-0.015	0.024	-0.032	-0.000	5.304***	4.073**	6.741***	5.898***
	(1.219)	(1.982)	(2.302)	(2.497)	(0.020)	(0.032)	(0.039)	(0.039)	(1.027)	(1.680)	(1.891)	(2.121)
Masters Degree	0.461	1.008	1.079	0.801	-0.057***	-0.033	-0.071**	-0.042	2.758***	2.038**	3.256***	2.078*
	(0.774)	(1.095)	(1.208)	(1.316)	(0.021)	(0.028)	(0.032)	(0.035)	(0.656)	(0.922)	(1.159)	(1.177)
College Graduate	0.723	-0.199	1.182	0.274	-0.042***	-0.029	-0.034*	-0.027	2.416***	1.157***	2.616***	1.523***
	(0.506)	(0.687)	(0.817)	(0.782)	(0.011)	(0.018)	(0.019)	(0.020)	(0.405)	(0.416)	(0.583)	(0.495)
Some College	-1.075	-0.387	-0.156	-0.719	-0.045***	-0.012	-0.038**	-0.034**	0.871**	0.645	1.125**	0.753
	(0.674)	(0.767)	(0.765)	(0.772)	(0.014)	(0.014)	(0.017)	(0.016)	(0.344)	(0.493)	(0.460)	(0.472)
High School Grad	-2.699***	-0.860	-2.089**	-2.161*	-0.081***	-0.027	-0.075***	-0.067**	0.487*	0.387	0.352	0.009
	(0.746)	(0.692)	(1.024)	(1.242)	(0.017)	(0.018)	(0.023)	(0.034)	(0.292)	(0.386)	(0.381)	(0.416)
High School Dropout	-2.908**	1.062	-1.885	-0.989	-0.049*	0.030	-0.023	0.000	0.105	0.436	-0.668	-0.031
720459	(1.294)	(1.874)	(1.426)	(1.862)	(0.028)	(0.047)	(0.032)	(0.046)	(0.756)	(0.829)	(0.759)	(0.984)

	Dep. Variable: Working Full-time				Dep. Variable: Prob(H>=50)				Dep. Variable: Prob(H>=60)			
Education Level of Woman	Basic Cont.	Add. Cont. 1	Add. Cont. 2	Add. Cont. 3	Basic Cont.	Add. Cont. 1	Add. Cont. 2	Add. Cont. 3	Basic Cont.	Add. Cont. 1	Add. Cont. 2	Add. Cont. 3
Professional Degree or PhD	0.116***	0.090*	0.082	0.093	0.121***	0.099**	0.100*	0.132**	0.057**	0.041	0.066	0.087**
	(0.034)	(0.054)	(0.063)	(0.069)	(0.029)	(0.045)	(0.051)	(0.055)	(0.022)	(0.036)	(0.041)	(0.043)
Masters Degree	0.029	0.032	0.023	0.034	0.088***	0.053**	0.116***	0.057*	0.045***	0.028**	0.048***	0.027
	(0.019)	(0.028)	(0.032)	(0.035)	(0.017)	(0.024)	(0.031)	(0.031)	(0.009)	(0.013)	(0.017)	(0.017)
College Graduate	0.029*	0.005	0.024	0.013	0.084***	0.053***	0.100***	0.067***	0.036	0.026	0.037	0.027
	(0.017)	(0.022)	(0.025)	(0.027)	(0.012)	(0.013)	(0.017)	(0.015)	(0.005)	(0.005)	(0.008)	(0.007)
Some College	0.012	0.026	0.031	0.019	0.015***	0.013	0.021***	0.012	0.006**	0.007*	0.007*	0.007
	(0.017)	(0.023)	(0.021)	(0.023)	(0.006)	(0.008)	(0.008)	(0.009)	(0.003)	(0.004)	(0.004)	(0.004)
High School Grad	-0.019	0.011	0.007	-0.014	0.004	0.000	0.005	0.004	0.001	0.000	0.000	0.000
	(0.016)	(0.020)	(0.026)	(0.033)	(0.004)	(0.005)	(0.006)	(0.009)	(0.002)	(0.003)	(0.003)	(0.004)
High School Dropout	-0.033	0.054	-0.015	0.010	0.006	0.018	0.004	0.010	0.005	0.004	0.002	0.002
	(0.028)	(0.045)	(0.032)	(0.045)	(0.005)	(0.011)	(0.007)	(0.008)	(0.003)	(0.007)	(0.005)	(0.005)

Notes: Log (LS Imm + LS Nat. /Labor Force) = Log (Low-skilled Immigrants + Low-skilled Natives / Labor Force)

See Appendix A for a description of the education groups. Number of obs. are 66,038 for profess. or Phd, 156,816 for master's, 781,933 for college grads, 1,212,751 for some college, 1,722,489 for high school grads, and 720,459 for high school drops.

Each number comes from a different regression. All estimations include city, decade-region fixed effects and demographic controls (age, age sq., white dummy, married dummy, dummy for having a child 5 or younger, dummy for having a child 17 or younger). We allow the effects of demographic controls to vary with decade. For a description of the sets of additional controls, please refer to the text.

Errors are clustered at the city-decade level. Models are weighted by the individual's Census weight. Significance levels: *=10%. **=5% , ***=1%

Table 11. Low-skilled Immigration's effect on the Wages of Women with a Professional degree or Ph.D.

	Dependent Variable: Log(Hourly Wage)				
	OLS	IV	IV	IV	IV
Log (LS Imm + LS Nat. /Labor Force)	0.042	0.051	0.035	0.170*	-0.003
	(0.030)	(0.053)	(0.074)	(0.096)	(0.099)
Set of controls	Basic	Basic	Add. Controls 1	Add. Controls 2	Add. Controls 3
No. Observations	47161	47161	47161	47161	47161

Log (LS Imm + LS Nat. /Labor Force) = Log (Low-skilled Immigrants + Low-skilled Natives / Labor Force)

Hourly wage is computed as yearly wage and salary income divided by the product of usual number of hours a week and weeks worked last year.

Following Autor and Dorn (2008): topcoded yearly wages are multiplied by a factor of 1.5 and hourly wages that exeed this value divided by 50 weeks times 35 hours are excluded. Hourly wages below the first percentile of the national hourly wage distribution are set to the value of the first percentile.

We exclude women working less than 20 hours a week or less than 26 weeks a year.

Each number comes from a different regression. All estimations include city, decade-region fixed effects and demographic controls: age, age squared, white dummy, married dummy, dummy for having a child 5 or younger, dummy for having a child 17 or younger, and dummies for lawyer, doctor, and phd.

We allow the effects of demographic controls to vary with decade.

The number of observations is 47,161.

For a description of the sets of additional controls, please refer to the text.

Errors are clustered at the city-decade level. Models are weighted by the individual's Census weight.

Significance levels: *=10%. **=5% , ***=1%

Table 12. IV estimates of the effect of Low-skilled Immigration and the Labor Supply of Men with Professional Degrees or Ph.D.s (Instrumental Variables Estimates)

	Coefficient of Log (LS Imm + LS Nat. /Labor Force)			
Dependent Variable:	Basic	Add. Controls 1	Add. Controls 2	Add. Controls 3
Usual Hrs. Work per Week	3.392***	0.154	1.737	0.884
	(0.724)	(1.034)	(1.114)	(1.277)
Labor Force Participation	0.000	-0.025**	-0.014	-0.029**
	(0.008)	(0.012)	(0.014)	(0.014)
Usual Hrs. Work | Working	3.558***	1.353	2.222**	2.001*
	(0.600)	(0.844)	(0.890)	(1.019)
Working Full Time	0.046***	-0.014	0.021	0.004
	(0.016)	(0.021)	(0.025)	(0.026)
Prob(H>=50)	0.152***	0.061*	0.109***	0.082*
	(0.027)	(0.036)	(0.038)	(0.042)
Prob(H>=60)	0.091***	0.053*	0.076**	0.076**
	(0.017)	(0.028)	(0.030)	(0.034)

Notes: Log (LS Imm + LS Nat. /Labor Force) = Log (Low-skilled Immigrants + Low-skilled Natives / Labor Force)
Each number comes from a different regression. All estimations include city, decade*region fixed effects and demographic controls: age, age squared, white dummy, married dummy, dummy for having a child 5 or younger, dummy for having a child 17 or younger. We allow the effects of demographic controls to vary with decade.
Errors are clustered at the city-decade level. Models are weighted by the individual's Census weight.
Number of Obs. is 179,455

For a description of the sets of additional controls, please refer to the text.

Significance levels: *=10%. **=5% , ***=1%

Table 13. The Effect of Low-skilled Immigration on Women's Household Work
(1993 Time-use survey and ATUS Data)

	Dependent Variable: Hours per week spent doing HHld chores			
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
L((LS Imm. +LS Nat.) /LF)	-2.747	4.127	-2.370	5.391
	(2.832)	(5.192)	(2.829)	(5.155)
L((LS Imm. +LS Nat.) /LF)* more than college			-3.188*	-8.540**
			(1.773)	(4.013)

Each column represents a separate regression. All estimations include city, decade*region fixed effects and demographic controls, which include: age, age squared, white dummy dummy for having a child 5 or younger, dummy for having a child 17 or younger. We allow the effects of demographic controls to vary with decade.
Errors are clustered at the city-decade level. Models are weighted by survey's person weight.
Number of observations is 8,569
There are 56 cities in the sample and the region dummies represent the main 4 US regions as defined by the Census
Significance levels: *=10%. **=5% , ***=1%

Table 14. Low-skilled Immigration and the Consumption of Housekeeping Services
(CEX data 1980-2000)

	Dependent Variable			
	Dummy for Expenditures>0			
	OLS	IV	OLS	IV
L((LS Imm. +LS Nat.) /LF)	-0.008	0.012	-0.013	-0.003
	(0.024)	(0.032)	(0.024)	(0.033)
Ln ((LS Imm.+LS Nat.)/ LF)*more than college			0.048	0.165**
			(0.033)	(0.080)
	Level of Expenditures (unconditional)			
	OLS	IV	OLS	IV
L((LS Imm. +LS Nat.) /LF)	9.602	15.318	1.977	0.967
	(10.761)	(15.150)	(10.156)	(15.886)
Ln ((LS Imm.+LS Nat.)/ LF)*more than college			71.658***	153.107**
			(22.851)	(62.803)

Each column represents a separate regression. All estimations include city, decade*region fixed effects and demographic controls. Demographic controls are: age, age squared, white dummy, married dummy, dummy for having a child 5 or younger, dummy for having a child 17 or younger. We allow the effects of demographic controls to vary with decade.
Errors are clustered at the city*decade level.
Number of observations is 10,225
There are 32 cities in the sample and the region dummies represent the main 4 US regions as defined by the Census.
Significance levels: *=10%. **=5% , ***=1%

Appendix C. First Stage of Estimations in Tables 7, 14 and 15 (NOT FOR PUBLICATION)

	Dependent Variable:			
	L(Price Housekeeping SS)	L(LS Imm + LS Nat. /Labor Force)		
	Table 7	Baseline	Table 14	Table 15
$Log(\sum_j share_{i,j,1970} * LS\ Imm_{jt})$	-0.147*	0.344	0.469	0.550
	(0.077)	(0.051)***	(0.077)***	(0.086)***
Region*Decade FE	Yes, 4 regions	Yes, 4 regions	Yes, 4 regions	Yes, 4 regions
Controls	Basic	Basic	Basic	Basic
No. Cities	30	116	56	32
No. Observations	90	348	112	96

Note: OLS estimates. Regressions are weighted by the city's labor force size. City and region*decade fixed effects are included in all the regressions.
Robust Std. Errors are reported in parenthesis.
Significance levels: *=10%. **=5% , ***=1%