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Does Immigration Affect Wages? A Look at Occupation-Level Evidence

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## Does Immigration Affect Wages? A Look at Occupation-Level Evidence

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**Abstract:** Previous research has reached mixed conclusions about whether higher levels of immigration reduce the wages of natives. This paper reexamines this question using data from the Current Population Survey and the Immigration and Naturalization Service and focuses on differential effects by skill level. Using occupation as a proxy for skill, the authors find that an increase in the fraction of workers in an occupation group who are foreign born tends to lower the wages of low-skilled natives—particularly after controlling for endogeneity—but does not have a negative effect among skilled natives.

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## **Does Immigration Affect Wages? A Look at Occupation-Level Evidence**

Immigration has accounted for almost one-half of the total labor force growth in the U.S. in recent years. This influx of immigrants has been disproportionately large in certain regions, such as the Northeast and the Southwest, where immigration accounted for over 90 percent of labor force growth during the period 1996 to 2000. Immigrants have also been disproportionately concentrated in certain occupations, particularly low skilled occupations such as agricultural work, in which the number of immigrants rose even as total employment fell (Mosisa, 2002). This influx of immigrants and their concentration in certain regions and occupations raises the question of how immigration affects the wages of natives, particularly low-skilled natives. This paper uses data on immigration inflows and natives' wages within occupation groups to examine this issue.

Most previous studies of the effect of immigration on wages use a cross-area approach that compares the number of immigrants in an area with wages in that area. These studies, such as Altonji and Card (1991), Butcher and Card (1991), and Schoeni (1997), typically conclude that immigration has little or no significant negative effect on wages. As noted in many papers, the cross-area approach can yield misleading results if immigrants' locational choices are endogenous, with immigrants going to areas with higher wages. For example, immigrants within a certain educational group tend to settle in areas with relatively high returns to that group (Borjas, 2001). In addition, cross-sectional results are biased if immigration causes offsetting migration by natives and previous immigrants or changes in industry mix.

In response to these potential problems, several studies use factor proportions models to estimate the effect of immigration on wages. Factor proportions models do so by making

assumptions about the elasticity of substitution between immigrants and natives (e.g., Borjas, Freeman and Katz, 1992, 1997; Jaeger, 1996; Johnson, 1998). Using reasonable elasticities, such models can yield sizable negative effects at the national level for unskilled workers. The effect of immigration on skilled workers, however, is modest at best in such studies. Moreover, results from factor content analysis tend to be sensitive to changes in the underlying assumptions of the model, such as the functional form and the number of factors (Leamer, 2000).

A few studies focus on the effect of immigration within occupations or skill groups. Using data from the 1990 Census, Card (2001) estimates the relationship between immigrant inflows and wages for six occupational groups in 175 large U.S. cities. Most of his results indicate significant negative effects, which generally increase in magnitude when instrumental variables techniques are used to control for endogeneity. Card does not discuss whether the effects differ between skilled and unskilled workers. Using a similar approach but at the national level with data from the 1991 Current Population Survey (CPS), Camarota (1997) finds a negative association between immigration and wages within low-skilled occupations. Both of these studies use cross-sectional data, creating problems if output mix or occupational choices changed in response to immigration. Using data from several years of national-level data from the Census and the CPS, Borjas (2002) finds that higher immigrant inflows within education and experience groups—which proxy for skill—are negatively associated with wages and employment among male natives. Borjas does not focus on differential impacts across skill groups.

This paper estimates the effect of immigration inflows on wages within occupational groups using data from the Immigration and Naturalization Service (INS) and the Current Population Survey. Our approach offers several contributions to the literature. First, no study

has used INS data on new recipients of legal permanent resident status to examine the effects of immigration on wages even though the data present several advantages. As discussed below, the INS data offer a novel instrumental variable for immigration inflows as well as contain a complete count of new legal immigrants. In addition, we use several years of data whereas most previous cross-area and occupation-level studies relied on a cross-sectional approach. Using multiple years of data allows us to control for unobservable local area effects, an approach not possible in cross-area studies that use only one year of data.

The next section discusses the effects of immigration on wages from a theoretical perspective. We then discuss the data used to examine the relationship between immigration and natives' wages at the occupational group level; we focus on high-, medium-, and low-skilled occupations during a five-year period, 1994-1998, at the metropolitan area level. The results indicate that, after controlling for endogeneity, higher immigration inflows lower average wages among natives working in low-skilled occupations but do not appear to have a negative effect among natives in medium- and high-skilled sectors. Immigrants who are already present in the U.S. and adjusting from nonimmigrant status appear to have a more negative effect on natives' wages than do newly arrived immigrants.

### **Theoretical Framework**

Immigration inflows can negatively or positively impact natives' wages, depending on the degree of substitution or complementarity between immigrant and native workers and a number of other factors. Because there is already a large theoretical literature, we do not present

a formal model of the effect of immigration on natives' wages but simply review the underlying reasons why immigration might affect natives' wages and in what direction.<sup>1</sup>

The degree of substitution between immigrants and natives is a key determinant of the effect of immigration on native wages. Holding capital constant and assuming a constant returns to scale production technology, an increase in labor supply due to immigration will lower wages if immigrants and natives are substitutes and labor supply is not perfectly elastic with respect to wages.<sup>2</sup> The magnitude of the negative effect increases with the degree of substitution between immigrants and natives and with the size of the immigrant inflow. If immigrants are a complement for natives in production, in contrast, immigration will boost natives' wages.

The degree of substitution between immigrants and natives is likely to vary across skill levels. Substitution is likely to be easier in industries with less skilled workers because employees are more interchangeable and training costs are lower than in industries with skilled workers. In skilled jobs, the need for English language proficiency and institutional knowledge may make it difficult for employers to substitute immigrants for native workers. Some skilled professions, such as physicians, also involve licensing requirements, limiting the substitutability for natives of immigrants educated and trained abroad. Moreover, skill transferability, the degree to which immigrants can use human capital acquired in their home country at U.S. jobs, tends to be higher for unskilled jobs than for skilled positions (Gallo and Bailey, 1996). Of course, as immigrants assimilate over time they acquire the knowledge and language skills to better compete with natives for higher-skilled jobs. As they become more substitutable for native workers, adverse wage effects may follow.

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<sup>1</sup> For formal models, we refer readers to, among others, Borjas (1999), Greenwood and Hunt (1995), and Johnson (1998).

<sup>2</sup> These assumptions can be relaxed to accommodate changes in the relative prices of goods and in the use of capital versus labor inputs. See Chapter 4 in Smith and Edmonston (1997) for a more general model.

In order to capture these differential effects by skill level, we use occupation as a proxy for skill in our empirical model below. If the elasticity of substitution is greater among unskilled workers than among skilled workers, as we hypothesize, the effect of immigration on wages should be larger in unskilled occupations than in skilled occupations. The degree of complementarity (or substitution) between immigrants in a given occupation and natives in another occupation also influences natives' wages, a topic we do not explore in this study; studies suggest that most such cross-elasticities are small (Hamermesh, 1993).

Another factor that influences the effect of immigration on wages is changes in capital. Immigrants might add to the capital stock, both initially if they bring savings when they migrate and over time (Chiswick, Chiswick, and Karras, 1992). If immigration adds to the capital stock, natives' wages might rise if capital is a complement to labor, particularly skilled labor. Unskilled labor, in contrast, appears to be a substitute for capital (Hamermesh, 1993). Capital also may move across industries and areas in response to immigration inflows.<sup>3</sup> Such movements in capital could therefore at least partially counterbalance the negative effect of an increase in labor supply on natives' wages. The empirical model we present below does not control for capital because we do not have measures of capital at the occupation and area level; since we only examine a five-year period, ignoring capital may not be unrealistic.

The elasticity of labor supply with respect to wages also influences the impact of immigration on wages. Natives and previous immigrants might respond to immigration-induced changes in wages by altering their labor supply, moving to a different area, or upgrading or downgrading their skills. Such changes would reduce any negative effect of immigrant inflows on wages. Studies have not reached a consensus as to whether offsetting migration occurs in

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<sup>3</sup> Quispe-Agnoli and Zavodny (2002) do not find a significant association between immigration and capital mix at the state level.

response to immigrant inflows (e.g., Card, 2001; Frey, 1995; Kritz and Gurak, 2001). Because we examine only a five-year period here, our estimates of the impact of immigration on wages are probably more negative than the long-run effect. In the long run, endogenous shifts in labor supply would likely lead to less negative estimates than any found here. For this reason, recent immigrant inflows may have a more negative effect on native wages than does the number of earlier immigrants. For example, in labor-intensive occupations where even recent immigrants are close substitutes for native workers, the wage effect of new immigrant inflows may be larger than the current effect of previous inflows since natives have already had an opportunity to adjust their labor supply in response to earlier immigrants.

Finally, immigration inflows may lead to changes in output mix that cushion any wage impact on natives. Previous studies suggest that immigration may lead to changes in the output mix within areas, with industries intensive in low-skilled labor expanding in or moving to areas with large numbers of immigrants (Altonji and Card, 1991; Hanson and Slaughter, 1999). Such changes in production should increase the demand for labor and thereby reduce any negative effects of immigration on wages. Similarly, immigration may lead to scale effects, with demand for output increasing in response to immigration; an increase in output demand would raise demand in factor markets, putting upward pressure on wages. Such effects would also at least partially offset any negative effect of immigration on wages.

As discussed below, we instrument for changes in the labor supply as a consequence of immigration to help control for the above factors. Instrumenting also controls for endogeneity bias due to immigrants settling in areas that pay high wages, which would upward bias the estimated coefficients away from finding an adverse effect.



## Empirical Methodology

To estimate the effect of immigration on natives' wages, we regress the average earnings of natives in occupation group  $o$  on the fraction of workers in that occupation group who are foreign born and other variables, or

$$\ln w_{o,s,t}^n = \alpha + \beta I_{o,s,t} + \gamma X_{o,s,t} + \omega O_o + \sigma S_s + \tau T_t + \varepsilon_{o,i,t}^n \quad (1)$$

where  $s$  indexes areas and  $t$  indexes years. The measure of wages is the log of real average hourly wages for natives in a given occupation group, area, and year.

The variable  $I$  in Equation 1 is the number of immigrants with a given occupation group relative to total employment in that occupation group. If an area experiences an influx of immigrants within a given set of occupations, this fraction rises, reflecting the increase in the relative labor supply of immigrants. The underlying hypothesis is that occupations and areas experiencing larger inflows of immigrants relative to the total number of workers in that occupation and area should experience larger declines in wages, and the magnitude of the decline depends on how substitutable immigrants are for other workers. As discussed below, a large number of cells have the immigrant share variable equal to zero. We therefore do not log the immigrant share variable and interpret its estimated coefficient as an elasticity; instead, the estimated coefficient of the immigrant share variable indicates the average percentage change in wages for a 1 percentage point increase in immigrants as a percentage of all workers.

The vector  $X$  controls for the average demographic characteristics of workers in that occupation. We control for the fraction of native-born workers who are female, black, married, and union members. We also control for the distribution of workers across five-year age groups

and three of four education groups (less than high school, high school, some college, and college graduates).

All regressions include a full set of occupation and year fixed effects in order to control for unobservable determinants of earnings within an occupation or year. We also include area fixed effects in some models. Pooling five years of data allows us to control for unobserved determinants of wages that are constant within areas over time; previous studies could not control for such unobservable factors because they used cross-sectional data. We White-correct the standard errors in order to control for heteroscedasticity and weight observations by the total number of native-born workers in the occupation, area, and year.

We estimate Equation 1 by pooling observations for each of the occupation groups examined here. The immigrant share variable,  $I$ , is interacted with an indicator variable for each occupation group in order to allow the effect of immigration to differ across skill categories. Because we only have five years of data and therefore limited degrees of freedom, we constrain the effects of the variables measuring worker characteristics and the area and year fixed effects to be the same across occupation groups.

Endogeneity bias is a concern because immigration may not be independent of wages. We therefore use immigrants who report a given occupation and are admitted to the U.S. as the spouse of a U.S. citizen as an instrument for the immigrant share in that occupation group in some specifications. There is no quota on the number of spouses of U.S. citizens allowed to immigrate to the U.S., and family reunification reasons probably drive these immigration levels, not potential earnings. In addition, because immigrant spouses are likely to live where their citizen spouse lives, their locational choice should be exogenous with respect to local wages.

This empirical approach offers several advantages. Previous studies that controlled for endogeneity typically did so by using the foreign-born population share in an area at the beginning of a period as the instrument for the change in the share or by using lagged values as instruments. Because new immigrants tend to settle where previous immigrants reside, first-stage regressions using these approaches have good predictive power. However, the instruments are correlated with the error term in the second-stage earnings regressions if previous immigrants reside in certain areas for earnings-related reasons that also influence the locational choices of new immigrants. Our instrument—spouses of citizens—is more likely to be an exogenous determinant of locational choice because the settlement patterns of these immigrants are determined by where their citizen spouses reside, not by labor market conditions. In addition, the occupations of these spouses do not affect whether they are allowed to immigrate, so their occupational choices are also likely to be exogenous.

## **Data**

We use data on employment and earnings from the outgoing rotations groups of the Current Population Survey (CPS) and immigration data from the INS. Both data sets are for the period 1994 to 1998; the CPS data are for calendar years while the INS data are for fiscal years.<sup>4</sup> We focus on three occupation groups: high skill (executives/managers and professionals, such as teachers and doctors); medium skill (clerical workers, which includes all administrative support workers; sales; and precision production, craft, and repair, which consists of skilled blue-collar jobs); and low skill (service workers, laborers, which is composed of unskilled blue collar jobs, and farm workers). We use these relatively broad occupational groups because the groupings

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<sup>4</sup> The difference implicitly allows for a one-quarter lag in effects.

capture the set of occupations for which immigrants who report working in a particular occupation are likely to be substitutable for natives. For example, immigrants who report working as an agricultural laborer can also probably work in an unskilled manufacturing or service sector job but cannot work in a clerical or professional job.

The primary data set we use is the CPS, a monthly survey that focuses on labor market outcomes. Since 1994, the survey has included questions about nativity, including country of birth and year of arrival in the U.S. (in intervals). From all employed native-born individuals aged 16 and older, we constructed measures of average hourly wages and total employment within the three occupation groups. In addition, we constructed from the CPS data the ratio of all immigrants to total employment; this is the typical measure used in cross-area studies to estimate the impact of immigration. The controls for the distribution of workers across 5-year age groups, four educational groups, sex, race, marital status, and union membership included in the regressions are also constructed from the CPS data.

We also constructed two alternate measures of immigrants to total employment by combining the CPS data with INS data. The INS data we use are the universe of all new legal permanent residents, also known as “green card” recipients. Our sample includes all new legal permanent residents aged 16-64 who report an occupation. The INS data list 25 occupations, which are more detailed for skilled workers (e.g., architects) than for unskilled workers (e.g., operators, fabricators, and laborers).<sup>5</sup> We drop individuals who report their occupation as homemaker, student, unemployed, or retired and collapsed the remaining occupations into the three occupational groups. The INS data do not report individuals’ earnings or educational attainment.

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<sup>5</sup> We also tried running the regressions using the most detailed level of occupation available in the INS data, but most of the results were inconclusive because of the small cell sizes in many occupations and areas.

The INS data offer several advantages compared with other data sources that include information on nativity. The INS data are a complete count of all new legal permanent residents, and they include the preference category under which immigrants were admitted, such as spouse of legal permanent resident, spouse of U.S. citizen, priority worker with extraordinary ability, or refugee. We exploit the fact that some of these groups are exempt from immigration quotas to construct our instrumental variable. The INS data also distinguish between whether an immigrant is newly arriving in the U.S. or is already present in the U.S. and converting from another visa status, such as H1-B. The INS data report the most recent year of admission for those individuals converting from nonimmigrant status. The main disadvantages of the INS data are that they do not include non-immigrants and illegal aliens and that they contain a limited set of personal characteristics. Greenwood, McDowell, and Trabka (1991) further describe the advantages and shortcomings of the INS data.

We separate the INS data on new immigrants into newly arriving immigrants and immigrants adjusting status and compute each as a share of total workers (based on the CPS data). We distinguish between newly-arriving immigrants and those adjusting status because the foreign born who are already present in the U.S. but only now receiving legal permanent resident status are likely to be more substitutable for natives than newly arriving immigrants. In addition, immigrants adjusting their status are already working in the U.S. in the occupation reported in the data, whereas immigrants newly arriving in the U.S. report their occupation in their home country unless they are admitted under employment-based preferences. This partially motivates our use of broad occupational categories.<sup>6</sup> We conduct the analysis at the metropolitan

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<sup>6</sup> Most immigrants work in the same occupational group in the U.S. as in their home country. In the 1995-98 March CPS, which asks occupation last year as well as current occupation, over 90 percent of workers who reported not being in the U.S. last year were in the same occupation last year as during the current year.

statistical area (MSA) level because MSAs more closely approximate labor markets than do states.<sup>7</sup> The INS data are by zip code of intended residence, which we merged with the metropolitan area codes in the CPS. The final sample consists of an unbalanced panel of 1251 observations per occupation for 283 MSAs during the period 1994-1998.

Table 1 reports the fraction of workers in each occupation group who are immigrants and natives' average wages. Column 1 shows the fraction of workers who are foreign born based on CPS data. Columns 2 and 3 show, based on the combined INS and CPS data, the number of newly arriving immigrants and immigrants adjusting status relative to all workers. The first column thus measures the relative stock of immigrants while the second two are measures of the relative flow.<sup>8</sup> The foreign born make up a larger fraction of workers in low-skilled occupations, accounting for over 8 percent of low-skilled workers but less than 6 percent of high- and medium-skilled workers. However, a substantial portion of new legal permanent residents (LPRs) are in high skill occupations as well as low skill jobs. Although the U.S. granted over 650,000 persons LPR status each year during our sample period, the number of new immigrants relative to total workers in each occupation group is small, as columns 2 and 3 indicate. The total number of observations with no newly-arriving immigrants or no persons adjusting status is 506.

Columns 4 and 5 of Table 1 show the number of spouses of U.S. citizens newly receiving green cards as a fraction of total employment in each occupation. About 19 percent of legal

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<sup>7</sup> We note that the immigrants who settle in urban areas tend to differ from those who live in other areas. In particular, immigrants tend to initially settle in urban areas where other immigrants live and then move over time to areas with lower concentrations of immigrants

<sup>8</sup> We note that the INS data are not a perfect count of all foreign-born workers entering an occupation for several reasons. Not all immigrants work in the U.S. in the occupation indicated to the INS at the time they received legal permanent resident status (some immigrants also may live in an area other than that reported to the INS). In addition, the data do not include illegal aliens and non-immigrants, and immigrants already present in the U.S. move between occupations. Nonetheless, the numbers should be well correlated with the inflow of immigrants into occupations and areas.

immigrants during fiscal years 1994-1998 were admitted as the spouse of a U.S. citizen, so their numbers are small relative to total employment. These ratios of LPR spouses to total employment form our instrument for the immigrant share of total employment. When instrumenting for the foreign-born fraction of all workers based on the CPS data (column 1), we use the total number of new LPR spouses (the sum of columns 4 and 5). When instrumenting for newly-arriving LPRs as a fraction of all workers (column 2), we use the fraction of newly-arriving spouses (column 4). When instrumenting for immigrants adjusting status as a fraction of all workers (column 3), we use the fraction of adjusting spouses (column 5). The last column in the table reports average hourly wages of natives as calculated from the CPS data.

## **Results**

Table 2 shows OLS estimates of the relationship between natives' wages and immigrant shares by occupation group. As indicated in the table, we show specifications with and without city fixed effects; the regressions without city fixed effects are similar to the cross-sectional methods used in most previous studies. Including the city fixed effects controls for time-invariant MSA-level determinants of earnings, such as differences in the cost of living, and generally lowers the estimated wage effects.

As Table 2 shows, when controlling for city fixed effects, immigrant inflows have different effects on natives' wages depending on the occupation group and the type of immigrant. Higher immigrant shares are generally associated with positive wage effects on high-skilled natives. For example, average wages in executive and professional occupations are significantly positively associated with all measures of the immigrant share—the total stock, newly arriving immigrants and those adjusting status. A one percentage point increase in the

total immigrant share is associated with an increase in native-born executives' average wages of 0.25 percent, controlling for area fixed effects (column 2). A one percentage point increase in the new and adjusting immigrant share meanwhile is associated with positive wage impacts of 10.9 and 7.9 percent, respectively, among natives in high-skilled occupations. It bears noting that a one percentage point increase in the flow measures of immigrants (new and adjusting, columns 3-6) represent much larger increases in the immigrant share than a percentage point increase in the stock measure (all immigrants, columns 1-2). Evaluating the wage effects at the means given in Table 1 gives a more comparable measure: the effect of all, new, and adjusting immigrants, respectively, on high-skilled natives' wages is 1.45, 1.53, and 1.11 percent.

The effect on natives in low-skilled occupations tends to be negative, in contrast. For low-skilled natives (service workers, laborers, and farm workers), the respective wage impacts of all, new, and adjusting immigrants are  $-1.14$ ,  $-0.27$ , and  $-0.80$  when evaluated at the means and controlling for area fixed effects (although for the newly arriving the coefficient is not statistically significantly different from zero). The interpretation of these effects would be that average wages for low-skilled natives are about 1.1 percent lower as a result of the presence of all foreign-born workers in that occupation group, 0.3 percent lower because of inflows of new legal immigrants each year, and 0.8 percent lower because of immigrants adjusting to legal permanent resident status. Natives in medium-skilled occupations (clerical and sales jobs) are less affected—either positively or negatively—by immigration than natives in more or less skilled occupations. Including area-specific linear time trends yielded results similar to those shown in Table 2.

The fact that wage impacts vary by immigrant type is as interesting as the variation by skill level. Newly arriving immigrants (as compared with those adjusting status or as compared



with the stock of all immigrants) have the largest positive wage impacts on natives in all three occupation groups. This is also the only group that does not cause a negative wage effect among low-skilled natives. This result could be due to the lack of substitutability of new immigrant workers for natives, an argument we alluded to earlier. The fact that the positive wage effects are smaller in magnitude (and the negative wage effects larger) for immigrant groups with more U.S. experience suggests that immigrant assimilation increases the substitutability of immigrant for native workers and hence the wage impacts on natives become more adverse over time.

The OLS regression results in Table 2 are biased if immigrants settle in the areas that offer relatively higher wages for their occupations. Although this is a bigger problem in the INS data on new and adjusting immigrants, it is also a concern for the CPS data if the foreign born move within the U.S. in response to higher wages. We therefore instrumented for the immigrant share with the number of immigrants in the INS data who are spouses of U.S. citizens (relative to total employment), as discussed above.

Table 3 shows the two-stage least squares results. The results are very similar to those discussed above. As expected, instrumenting for immigrant shares produces more negative effects, and the statistical significance of the positive wage effects disappears in all groups except the newly arrived (columns 3 and 4). For low-skilled natives, the immigrant stock and the number of immigrants adjusting status now have slightly more negative significant wage effects than before (columns 2 and 6). A 1 percentage point increase in the share of all immigrants reduces average wages of low-skilled natives by .34 percent, and a 1 percentage point increase in the share of immigrants adjusting status reduces native low-skilled wages by 6.4 percent (columns 2 and 6, respectively). Normalizing these effects by evaluating them at the means

given in Table 1, overall low-skilled native wages are 2.8 percent lower as a result of the immigrant stock and 1.2 percent lower as a result of immigrants adjusting status each year.

## **Conclusion**

In this paper, we take another look at how immigration affects the wages of U.S. natives. Findings in this literature are dominated by evidence of a modest but significant negative wage impact on unskilled natives, but there is little evidence on how medium and high skilled workers are impacted by immigration. We address this question in several ways. First, we use INS data on new legal immigrants together with CPS data for 1994-1998. In order to allow wage effects to vary by worker skill level, we devise three occupational categories, ranging from service workers, farm workers, and laborers at the bottom of the skill range to professionals and executives at the top of the skill range.

Using an innovative instrumental variable, the share of new immigrants who are spouses of U.S. citizens, we find two sets of interesting results. When instrumenting for immigrant shares, negative wage impacts are small in size and concentrated among low-skill occupations. We find wage effects that vary from about  $-0.1$  to  $-0.3$  percent for a 10 percent increase in the corresponding immigrant share. Although significant, the effects are small relative to those commonly cited in the literature. We find no evidence of adverse wage impacts on medium- and high-skilled native workers. In fact, increases in the new immigrant share of workers within high and medium skill jobs actually have slightly positive wage effects, suggesting there may be complementarities between native workers and newly arrived immigrants in the top skill categories.

The magnitudes of the wage effects—not just the signs—also appear closely related to both the skill group and the level of U.S. experience of the immigrant group. Wage effects decrease monotonically as skill levels decrease. Wage effects also decrease as immigrant group's time in the U.S. increases. Although increases in the share of newly arrived immigrants have no statistically significant negative impact on the wages of low-skilled natives, increases in the share of those who are already in the U.S. when they adjust status have a small but significant negative effect on low-skilled native wages. The biggest negative effect however, comes from the stock of all immigrants, which is also the immigrant group characterized by the most U.S. experience. Taken together, these findings suggest that the process of assimilation makes immigrants more substitutable for natives and hence increases wage competition.

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**Table 1**  
**Descriptive Statistics**

Occupation	Immigrants as % all workers			Immigrant spouses as % all workers		Average wage Natives
	All	New	Adjusting	New	Adjusting	
High skill	5.62 (5.22)	.14 (.15)	.14 (.13)	.03 (.02)	.03 (.03)	18.53 (2.28)
Medium skill	5.67 (6.39)	.09 (.12)	.05 (.08)	.02 (.02)	.02 (.02)	12.13 (1.36)
Low skill	8.15 (9.24)	.17 (.26)	.19 (.29)	.03 (.05)	.06 (.09)	9.41 (1.12)

Note: Shown are sample means (standard deviations). In column 1, immigrants as a percentage of all workers is the number of foreign-born workers in the CPS relative to all workers in the CPS. Columns 2 and 3 are, respectively, the number of newly-arriving immigrants and immigrants adjusting status in the INS data relative to all workers in the CPS. Columns 4 and 5 are the number of immigrants who are spouses of U.S. citizens in the INS data relative to all workers in the CPS. The average wage is the real average hourly wage of natives, computed as usual weekly earnings divided by usual weekly hours for salaried workers, deflated using the PCE. The data are for an unbalanced panel of 283 metropolitan areas during 1994-1998 for a total of 1251 observations per occupation.

**Table 2**  
**OLS Estimates of the Relationship between Natives' Wages and Immigration**

Occupation	All immigrants		Newly arriving		Adjusting status	
	(1)	(2)	(3)	(4)	(5)	(6)
High skill	.0083** (.0007)	.0025** (.0007)	.247** (.032)	.109** (.022)	.254** (.025)	.079** (.018)
Medium skill	.0054** (.0005)	.0006 (.0005)	.237** (.048)	.068* (.029)	.284** (.086)	.005 (.038)
Low skill	.0018** (.0003)	-.0014** (.0004)	.039** (.014)	-.016 (.012)	.015 (.014)	-.042** (.010)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Area fixed effects	No	Yes	No	Yes	No	Yes

Note: Shown are estimated coefficients from OLS regressions of average natives' wages on the share of workers who are immigrants in an occupation, area, and year. In columns 1 and 2, the immigrant share is constructed using all foreign born workers in the CPS; in columns 3-6, the immigrant share is constructed using all newly-arriving immigrants or immigrants adjusting status in the INS data. The regressions also include controls for average worker characteristics (see text for details) and fixed effects and time trends as indicated. Robust standard errors are in parentheses. Each column is from a separate regression with 3753 observations.

† p < .10; \* p < .05; \*\* p < .01

**Table 3**  
**2SLS Estimates of the Relationship between Natives' Wages and Immigration**

Occupation	All immigrants		Newly arriving		Adjusting status	
	(1)	(2)	(3)	(4)	(5)	(6)
High skill	.0089** (.0012)	.0004 (.0025)	.225** (.037)	.132** (.039)	.248** (.040)	.048 (.032)
Medium skill	.0057** (.0011)	-.0012 (.0023)	.212** (.066)	.090 <sup>†</sup> (.053)	.395** (.065)	-.012 (.057)
Low skill	.0018* (.0008)	-.0034 <sup>†</sup> (.0019)	.025 (.022)	-.008 (.019)	.029 (.018)	-.064** (.020)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Area fixed effects	No	Yes	No	Yes	No	Yes

Note: Shown are estimated coefficients from 2SLS regressions of average natives' wages on the share of workers who are immigrants in an occupation, area, and year. In columns 1 and 2, the instrument is the number of all new immigrants who are spouses of U.S. citizens in the INS data relative to all workers in the CPS; in columns 3 and 4, the number of newly-arriving immigrants who are spouses of U.S. citizens; and in columns 5 and 6, the number of immigrants adjusting status who are spouses of U.S. citizens in the INS data. The regressions also include controls for average worker characteristics (see text for details) and fixed effects and time trends as indicated. Robust standard errors are in parentheses. Each column is from a separate regression with 3753 observations.

<sup>†</sup> p < .10; \* p < .05; \*\* p < .01



**Appendix Table 1**  
**First Stage for 2SLS Estimates of the Relationship between Natives' Wages and Immigration**

Occupation	All immigrants		Newly arriving		Adjusting status	
	(1)	(2)	(3)	(4)	(5)	(6)
High skill	74.282** (5.951)	-29.994** (5.197)	5.711** (0.224)	3.998** (0.303)	4.114** (0.206)	3.596** (0.303)
Medium skill	106.250** (9.185)	-11.935* (5.455)	4.910** (0.167)	3.150** (0.366)	2.615** (0.227)	2.044** (0.359)
Low skill	45.719** (3.369)	9.825** (2.429)	4.456** (0.313)	3.851** (0.317)	2.777** (0.329)	2.580** (0.302)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Area fixed effects	No	Yes	No	Yes	No	Yes

Note: Shown are estimated coefficients from first stage regressions of the fraction of workers who are immigrants on the fraction of workers who are new immigrants admitted as spouses of U.S. citizens in an occupation, area, and year. The regressions also include controls for average worker characteristics (see text for details) and fixed effects and time trends as indicated. Robust standard errors are in parentheses. Each column is from a separate regression with 3753 observations.

† p < .10; \* p < .05; \*\* p < .01