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Do Firms Respond to Immigration?

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Does Immigration Substitute for Offshoring?

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Abstract

Research generally focuses on how immigration a¤ects native workers, while the impact of immigration on domestic …rms is often overlooked. This paper addresses this important omission by examining whether …rms respond to immigration by adjusting the location of their production activities. Consistent with the predictions of the model, the results indicate that low-skilled immigration decreases and high-skilled immigration increases the relocation of production activities at both the extensivetcr70m-(m)18(i)6n oerl-16(d)11i9(r)8odel,n i(t)8(pe)9(l)e70mte(e)9(x)ite9(h)11(e)-40re the

1 Introduction

can be absorbed into a local labor market. Either relative wages can adjust or …rms

tion have a minimal impact on relative wages. Thus, this paper provides compelling evidence that immigrants are absorbed into local labor markets through changes in the location of production activities rather than through changes in relative wages.

An additional industry level analysis allows for the possibility that not all industries respond to immigration in a similar manner. Certain industries that are reliant on natural resources (i.e. agriculture) or that need to be close to consumers (i.e. retail trade) have less ability to adjust the location of their production activities in response to immigration. The results suggest that there is no relationship between immigration and the net birth and expansion rates in these non-mobile industries but there is a strong, signi…cant relationship in the remaining mobile industries. These results provide additional evidence that …rms respond to immigration by adjusting their organizational structure.

Research on immigration's impact on local labor markets generally focuses on how native relative wages are a¤ected. There have been two main approaches for answering this question. Exploiting variation across U.S. cities, Card (1990) and Card (2005) …nd that there is virtually no e¤ect of immigration on native wages. In contrast, Borjas, Freeman, and Katz (1997) and Borjas (2003) use national time series data and …nd that immigration does lead to a signi…cant decrease in the wages of native workers. These con‡icting results have been di¢ cult to reconcile. Speci…cally, how can large in‡uxes of immigrants have virtually no impact on local wages in these regional analyses? Why do studies using these two approaches generate such di¤erent results?

There have been a host of potential explanations and yet the answers to these questions remain elusive. First, it was argued that estimates of immigration's e¤ect on relative wages using the regional approach were biased toward zero due to the endogeneity of the immigrant location decision. However, recent analyses using the historical immigrant share as an instrument for current settlement patterns alleviate

in factor supplies a¤ect the production location decisions facing domestic …rms. This paper contributes to this literature by examining whether immigration a¤ects the organizational structure of …rms.

faces the following pro…t maximizing decision:

$$(1) \qquad \max \; = A(L_N + L_I)\,(H_N + H_I)^{1} \qquad w_L(L_N + L_I) \quad w_H(H_N + H_I),$$

where the subscript N indicates native workers, subscript I indicates immigrant workers, w_L is the wage paid to low-skilled workers, and w_H is the wage paid to high-skilled workers. The standard …rst order condition is

$$(2) \qquad \frac{1}{\qquad}\frac{(L_N + L_I)}{(H_N + H_I)} = \frac{w_H}{w_L}.$$

Totally di¤erentiating (2), assuming that native labor supplies do not change[3], generates the following relationship between immigration and relative wages,

$$(3) \qquad w_H \quad w_L = \frac{dL_I}{L} \quad \frac{dH_I}{H}.$$

Equation (3) highlights the textbook relationship between wages and immigration. An increase in low-skilled immigrants should increase the relative wage gap, while an increase in high-skilled immigrants should decrease the relative wage gap. Thus, labor supply shocks due to immigration are fully absorbed by changes in the relative

2.2 Mobile Production

Assume that it is now possible for domestic …rms to relocate low-skilled jobs, while all high-skilled jobs must be performed locally.[4] Therefore, domestic …rms have the option of hiring a native low-skilled worker, hiring an immigrant low-skilled worker, or relocating the low-skilled job to another city or country. Thus, the …rm maximizes pro…ts,

(4)

$$\max \quad = A(L_N + L_I + L_O)\ (H_N + H_I)^{1} \qquad w_L(L_N + L_I)\ \ (w_L + \ )(L_O)\ \ w_H(H_N + H_I),$$

where the subscript O indicates jobs performed in another location, w_L is the wage paid to these low-skilled workers, and is the cost associated with relocating these jobs. This framework captures the movement of jobs within the country or to another foreign country. Thus, the analysis in this paper can account for …rm mobility within the domestic country and also o¤shoring. The …rst order condition is now:

$$(5) \qquad \frac{1}{\ }\frac{(L_N + L_I + L_O)}{(H_N + H_I)} = \frac{w_H}{w_L}.$$

Following the empirical evidence, I assume that immigration has little impact on wages and focus on the implications for the …rm's organizational structure. Totally di¤erentiating (5) yields the following relationship between changes in immigration and changes in the location of low-skilled jobs:

$$(6) \qquad \frac{dL_O}{L} = \ \frac{dL_I}{L} + \frac{dH_I}{H}.$$

[4] It is generally agreed that the relocation or o¤shoring of white-collar, service jobs is still quite small (Amiti and Wei 2009, Blinder 2005).

Equation (6) highlights the ways in which the …rm's decision to relocate jobs depends on di¤erent labor supply shocks. An increase in low-skilled immigration ($dL_I > 0$) leads to a reduction in the relocation of jobs ($dL_O < 0$). Domestic …rms no longer need to relocate production activities elsewhere in order to access low-skilled labor. These foreign low-skilled workers are migrating to the …rms. Thus, low-skilled immigration and the relocation of jobs are substitutes in the production process. However, an increase in high-skilled immigration ($dH_I > 0$) leads to an increase in the relocation of jobs ($dL_O > 0$). The relatively limited supply of domestic low-skilled workers forces …rms to shift low-skilled production activities elsewhere. As a result high-skilled immigration and the relocation of jobs are complements in the production process.

This simple framework identi…es a way in which local labor markets can absorb immigrants without any persistent e¤ect on relative wages. Domestic …rms adjust the location of their production activities in response to immigration. This provides a mechanism for domestic …rms to adapt to changes in local labor supplies. As a result, relative wages are left unchanged which is consistent with much of the empirical evidence. This simple model generates clear predictions for the relationship between immigration and the …rm's organizational structure. High-skilled immigration will increase the relocation of jobs while low-skilled immigration will decrease the relocation of jobs. The remainder of the paper will examine whether …rm's organization structure adjusts to immigration in the manner predicted in (6).

3 Data

The data set used in this analysis spans 192 U.S. Metropolitan Statistical Areas and 7 years (1998-2004). Using an MSA as the unit of analysis is appealing because it represents a reasonably closed labor market while introducing a substantial amount of variation. Current Population Survey (CPS) data on individuals between the age of 18 and 65 is obtained from the Integrated Public Use Microdata Series (IPUMS). From this dataset the share of the population that is foreign born by skill level, MSA, and year is calculated. Immigrants are categorized as low-skilled if they have a high school degree or less and categorized as high-skilled if they have more than a high school degree.

The top two panels in Figure 1 show the distributions of low-skilled and high-skilled immigrant shares along with the top …ve and bottom …ve MSAs in each category. There is substantial variation in the share of low-skilled and high-skilled immigrants across MSAs. Not surprisingly, the share of low-skilled immigrants is highest in Miami, FL and in cities located in California and Texas while the share of high-skilled immigrants is particularly large in high-tech cities such as San Jose, CA (Silicon Valley), San Francisco, CA, and Stamford, CT. The CPS data is also used to calculate a variety of other demographic characteristics, such as the age, gender, race, and educational attainment of the native population in each MSA.

The relocation of production activities is measured using data on the universe of

establishments and …rms is withheld for con…dentiality reasons, the SUSB does provide aggregate data on the number of establishment births, deaths, expansions, and contractions by county, year, and establishment industry. Counties are then assigned to the appropriate MSA which alleviates the problem that MSA de…nitions have changed over the sample.

net_expansion_rate

4 Estimation Strategy

4.1 Specification

The models discussed in Section 2 present two alternative theories on how local labor markets can absorb immigrants. Immigration may lead to changes in the relative wage, changes in firms' organizational structure, or some combination of the two. While not the focus of this paper, I begin by examining the impact of low-skilled and high-skilled immigration on relative wages. Specifically, the following equation is estimated:

$$(7) \qquad relative\_wage_{c;t} = \beta_0 + \beta_1 L\_img_{c;t} + \beta_2 H\_img_{c;t} + \beta_3' X_{c;t} + \gamma_t + \varepsilon_{c;t}.$$

The dependent variable is the difference between the log median wage of high-skilled and low-skilled workers. The independent variables of interest are the share of low-skilled immigrants in the total population (L_img) and the share of high-skilled immigrants in the total population (H_img). X is a vector of control variables including the age, gender, race, and educational attainment of the native population. Finally, γ_t are year fixed effects.[5] Equation (3) from the model suggests that low-skilled immigration increases the relative wage ($\beta_1 > 0$) and high-skilled immigration decreases the relative wage ($\beta_2 < 0$). However, if previous research is any indication, it is likely that this effect is small.

While research generally assumes that immigration will primarily affect the wages of native workers, the model outlined in Section 2.2 provides an alternate theory. Immigration may lead to changes in the organizational structure of domestic firms. Specifically, the goal of this analysis is to test whether firms' relocation decisions

[5] Given the instrument used in this analysis it is not possible to also include MSA fixed effects (see footnote 10).

respond to immigration in the manner predicted in (6). Thus, the following two equations will be estimated:

$$(8)\quad net\_birth\_rate_{c;t} = \beta_0 + \beta_1 L\_img_{c;t} + \beta_2 H\_img_{c;t} + \beta_3' X_{c;t} + \gamma_t + \varepsilon_{c;t}$$

$$(9)\quad net\_expansion\_rate_{c;t} = \beta_0 + \beta_1 L\_img_{c;t} + \beta_2 H\_img_{c;t} + \beta_3' X_{c;t} + \gamma_t + \varepsilon_{c;t}.$$

Equation (8) captures the …rm's response to immigration at the extensive margin while Equation (9) captures the …rm's response to immigration at the intensive margin. Given the predictions of the model in (6), we expect that $\beta_1 > 0$ and $\beta_1 > 0$ because low-skilled immigration reduces the need to relocate jobs and thus the net birth rate and the net expansion rate will increase. Conversely, we expect that $\beta_2 < 0$ and $\beta_2 < 0$ because, according to the model, high-skilled immigration increases the relocation of production activities and thus reduces the net birth rate and the net expansion rate. Certainly, immigration need not a¤ect establishment relocations at both the extensive and intensive margins. The results that follow will provide insight into which, if either, of these margins is important.

It would be naïve to think that all industries responded to immigration in a similar manner. It is likely that some industries would have less ability to relocate jobs in response to labor supply shocks than others. For instance, industries (such as Agriculture, Mining, and Utilities) that require speci…c natural resources would be restricted in their ability to relocate production activities in response to immigration. Similarly, industries (such as Construction, Retail Trade, Real Estate, Education, Health Care, Arts & Entertainment, Accommodations, and Other Services) that need

to be located in close proximity to the consumer will have limited ability to respond to immigration. These industries will be classi..ed as "non-mobile" industries. The remaining industries (Manufacturing, Wholesale Trade, Transportation, Information, Finance, Professional, Management, and Administrative) will be classi..ed as "mobile" industries.[6]

Given this additional industry dimension, equations (8) and (9) are re-estimated in the following manner:[7]

$$(10)\quad net\_birth\_rate_{c;t;i} = \beta_0 + \beta_1 L\_img_{c;t} + \beta_2 H\_img_{c;t} + \beta_3' X_{c;t} + \gamma_t + \gamma_i + \varepsilon_{c;t;i}$$

$$(11)\quad net\_expansion\_rate_{c;t;i} = \beta_0 + \beta_1 L\_img_{c;t} + \beta_2 H\_img_{c;t} + \beta_3' X_{c;t} + \gamma_t + \gamma_i + \varepsilon_{c;t;i},$$

where γ_i are industry ..xed e¤ects and the dependent variables vary by industry. Separate estimates of (10) and (11) will be obtained using the mobile and non-mobile in-

4.2 Instrument

in city c in 1980 (the second term in the numerator of these equations). Thus, for each year the actual number of foreign born residents from region r is distributed across cities based on where immigrants from the same region of the world were located in 1980. This product is then summed over regions r and divided by the population to obtain a predicted immigrant share for both skill groups.[10] Using the predicted share of immigrants as an instrument will capture variation in immigration that is driven by family and cultural reasons rather than by labor demand factors. This mitigates endogeneity concerns and allows the impact of immigration on the relocation of production activities to be identified.

Table 2 reports the first stage regressions results. The instruments do a remarkable job of predicting actual immigrant shares. The predicted low-skilled immigrant share has a large, positive, and significant effect on actual low-skilled immigration. Similarly, the predicted high-skilled immigrant share has a large, positive, and significant effect on actual high-skilled immigration. The F-stat in both regressions is above 200. These results indicate that historical immigrant enclaves are useful in predicting immigrant settlement patterns more than 20 years later. Given the length of this lag, it is unlikely that the instrument is correlated with current local labor demand conditions.

5 Results

This section includes three sets of empirical results. First, the impact of immigration on native relative wages is examined. While not the focus of this paper, these results

5.2 Net Births & Net Expansions

As outlined in Section 2.2, …rms may respond to immigration by adjusting their organizational structure. Speci…cally, immigration may lead to changes in the location of …rms' production activities with no persistent e¤ect on local relative wages. To test this hypothesis, the impact of immigration on the net birth rate (Equation 8) and on the net expansion rate (Equation 9) is estimated.

In the …rst column (OLS) of Table 4, low-skilled immigration has a positive impact on the net birth rate while high-skilled immigration has no impact on the net birth rate. However, these results should be interpreted with caution due to the endogeneity of the immigrant location decision. The second column of Table 4 presents the IV results. Low-skilled immigration has a signi…cant positive e¤ect and high-skilled immigration has a signi…cant negative e¤ect on the net establishment birth rate. A one percentage point increase in the share of low-skilled immigrants leads to a 0.133 percentage point increase in the net birth rate while a one percentage point increase in the share of high-skilled immigrants leads to 0.297 percentage point decrease in the net birth rate. Thus, based on average levels, a one percent increase in L_Img leads to a 1.0% increase in the net birth rate while a one percent increase in H_Img leads to a 1.5% decrease in the net birth rate.

In the …rst column (OLS) of Table 5, low-skilled immigration increases the net expansion rate while high-skilled immigration has no impact on the net expansion rate. Yet these results may be biased due to endogeneity. The second column presents the results when using the historical settlement patterns as an instrument for current settlement patterns. A one percentage point increase in the share of low-skilled immigrants increases the net expansion rate by 0.179 percentage points while a one percentage point increase in the share of high-skilled immigrants decreases the net expansion rate by 0.371 percentage points. On average, a one percent increase in L_Img leads to a 0.7% increase in the net expansion rate while a one percent increase

in H_Img leads to a 1.0% decrease in the net expansion rate.

The di¤erence between the OLS results and the IV results in Tables 4 and 5 indicate that the OLS estimation strategy is plagued by endogeneity. A city with a growing economy may experience faster establishment growth and may attract high-skilled immigrants, which would explain the upward bias in the OLS coe¢ cient on high-skilled immigration. Conversely, low-skilled immigrants may be attracted to more a¤ordable cities with a less robust economy and slower establishment growth,

the net expansion rate (Equation 11). The coe¢ cients on L_Img and H_Img in the …rst column, which incorporates all 19 industries, are similar to the aggregate results reported in Table 5. Again, columns 2 and 3 report the non-mobile and mobile results. There is no signi…cant relationship between immigration and the net expansion rate among non-mobile industries. Firms in these industries do not respond to labor supply shocks because they need to be located in close proximity to natural resources or consumers. However, there is a strong relationship between immigration and the net expansion rate in mobile industries. Consistent with the predictions of the model, low-skilled immigration increases while high-skilled immigration decreases the net expansion rate.

Overall, the results in Table 6 and 7 provide further evidence that …rms respond

the U.S. are the jobs that are most at risk of being o¤shored in the future (Jensen and Kletzer 2005). Understanding the forces that lead a …rm to relocate production facilities across cities will o¤er important clues into the decision to o¤shore. Overall, the results presented in this paper indicate that there is an important relationship between o¤shoring and immigration. Speci…cally, low-skilled immigration likely substitutes for o¤shoring while high-skilled immigration likely complements o¤shoring.

6 Conclusion

Research generally focuses on how immigration a¤ects native workers, while the impact of immigration on domestic …rms is often overlooked. This paper presents a simple model that highlights how immigrants are absorbed into local labor markets either through changes in the relative wage or through changes in …rms' organizational structure. The model predicts that low-skilled immigration decreases and high-skilled immigration increases the relocation of production activities. These predictions are tested using a comprehensive dataset of nearly two hundred U.S. cities.

The empirical analysis provides three important results. First, consistent with previous …ndings, this paper shows that immigration has a minimal impact on relative wages. Second, immigration has a signi…cant e¤ect on the location of production activities both at the extensive and intensive margins. Low-skilled immigration increases the establishment birth rate and expansion rate while high-skilled immigration decreases the establishment birth rate and expansion rate. Together these results provide compelling evidence that labor supply shocks due to immigration are absorbed through changes in …rms' organizational structure rather than through adjustments in relative wages. Third, the relationship between immigration and the net birth rate and the net expansion rate are stronger in industries that are relatively more mobile. Firms in industries that rely on natural resources or need to be close to

consumers have less ability to adjust their production activities in response to labor supply shocks

The results of this paper improve our understanding of immigration and …rm mobility and provide answers to prominent puzzles in the literature. These results explain why research often …nds that immigration has a relatively small impact on the wages of native workers. Rather than relative wages absorbing labor supply shocks, …rms adjust the location of their production activities in response to immigration. In addition, these results explain why the estimated impact of immigration on relative wages di¤ers between regional and national level analysis.

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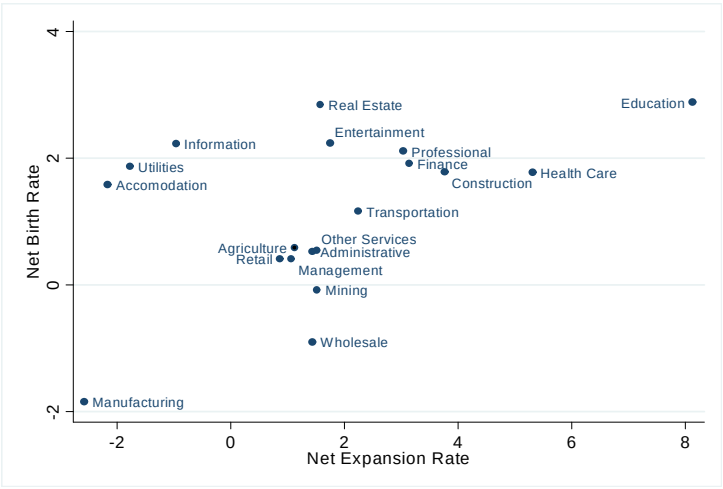
TABLE 1
Annual Averages

Year	L_Img	H_Img	Net Birth Rate	Net Expansion Rate
1998	6.9	4.6	0.9	3.3
1999	7.2	4.6	0.6	4.4
2000	7.6	4.7	0.7	1.0
2001	8.0	5.1	0.8	-1.0
2002	7.7	5.2	1.2	2.0
2003	7.5	5.4	1.4	2.9
2004	7.9	5.6	1.4	0.6

Annual average of low skilled immigrant share, high skilled immigrant share, net establishment expansion rate, net establishment expansion rate weighted by the sample size.

FIGURE 2

Net Birth Rate & Net Expansion Rate by Industry



Net establishment birth rate and net establishment expansion rate by 2-digit NAICS industries.

TABLE 3
Native Relative Wages

	OLS	IV
L_Img	0.000	0.016*
	[0.002]	[0.009]
H_Img	0.006**	-0.025
	[0.002]	[0.018]
Observations	1344	1344

Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include year fixed effects and the following controls: the average age of natives, the average educational attainment of natives, the native unemployment rate, and the share of the native population that is male, black, asian, and hispanic.

	OLS	IV
L_Img	0.021***	0.133**
	[0.007]	[0.054]
H_Img	0.019	-0.297***
	[0.013]	[0.101]

TABLE 5
Net Expansion Rate

	OLS	IV
L_Img	0.055***	0.179**
	[0.011]	[0.078]
H_Img	-0.019	-0.371**
	[0.023]	[0.146]
Observations	1344	1344

Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include year fixed effects and the following controls: the average age of natives, the average educational attainment of natives, the native unemployment rate, and the share of the native population that is male, black, asian, and hispanic.

TABLE 6
Net Birth Rate by Industries (IV Regressions)

	All Industries	Non-Mobile Industries	Mobile Industries
L_Img	0.121*	0.046	0.225**
	[0.073]	[0.094]	[0.091]
H_Img	-0.282**	-0.115	-0.513***
	[0.133]	[0.167]	[0.170]
Observations	25526	14774	10752

Standard errors clustered at the msa*year level in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include year and industry fixed effects and the following controls: the average age of natives, the average educational