Low skilled Immigration and labor market outcomes: Evidence from the Mexican Tequila Crisis

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Abstract

Does Mexican low skilled immigration cause US low skilled wages to decrease? This paper uses the Mexican economic crisis of 1995, which encouraged many young low skilled Mexicans to emigrate to particular states in the US, to answer this question. As a result of the shock, labor market outcomes of young low skilled workers deteriorated: the 1.5% immigration induced supply shock is estimated to reduce US young low skilled wages by between 1.5-3% on impact. Similarly, native low skilled labor reallocated within the US. For every 10 Mexicans that arrived around 7 young low skilled natives left from high immigration states to low immigration states. This suggests that: 1) Immigration causes wages to decrease but 2) spatial mobility ensures that local shocks spread to the rest of the US labor market quite rapidly.

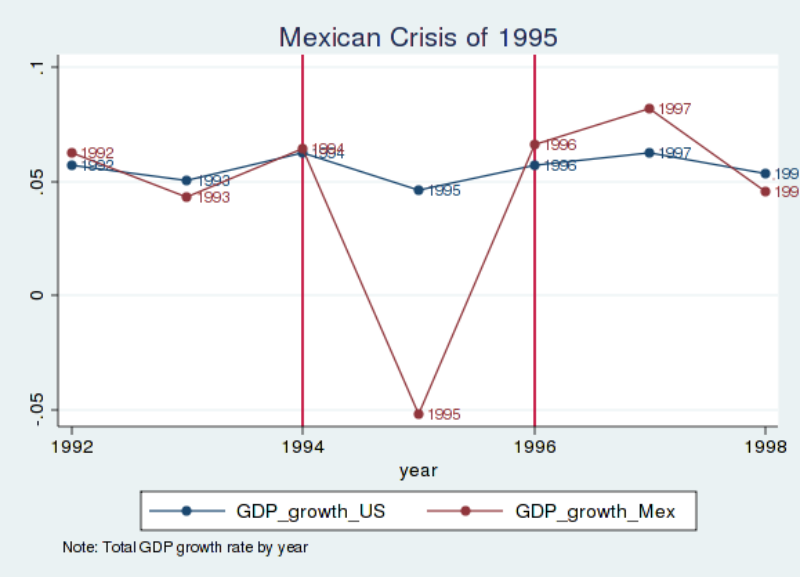
*Columbia University. Correspondence: jm3364@columbia.edu. This is still work in progress and should not be quoted. I would like to thank Don Davis for guidance and Bernard Salanié, Miguel Urquiola, Jaume Ventura, Eric Verhoogen, Antonio Ciccone, Jonathan Dingel, Ben Marx, Pablo Ottonello for great comments. I would also like to thank CREi for its hospitality during July 2012 and the audience at the Columbia International Colloquium and the Applied Micro Colloquium. All errors are mine.

1 Introduction

Despite the large inflows of immigrants into many OECD countries over the last 30 years there is no consensus on the causal impact of immigration on labor market outcomes. The reason is twofold. First, immigrants decide where and when to migrate given the economic conditions in the source and host countries. They may decide to postpone migration decisions if the economy in the host country is in bad shape or they may chose where to go within the host country given the different local economies. Second, natives decide whether to stay or move out as immigrant flows arrive. They may also decide to change sectors or occupations if immigrants flood their former jobs. The combination of these two endogenous decisions makes it hard for the researcher to estimate the causal impact of immigration on native labor market outcomes.

In this paper, I use the 'Mexican Tequila crisis' to address these endogeneity concerns. In December 1994, the government led by Ernesto Zedillo unexpectedly allowed a more flexible fluctuation of the Peso vis à vis the Dollar. This resulted in an attack on the Peso that caused an economic crisis in Mexico. Figure 1 shows the US and Mexican GDP growth rates between 1992-1998. In words, Mexican GDP growth moved from a positive 6% in 1994 to a negative 5% in 1995, while US GDP maintained a fairly constant growth rate of around 5%:

Figure 1: Mexican and US GDP growth rates 1991-1999



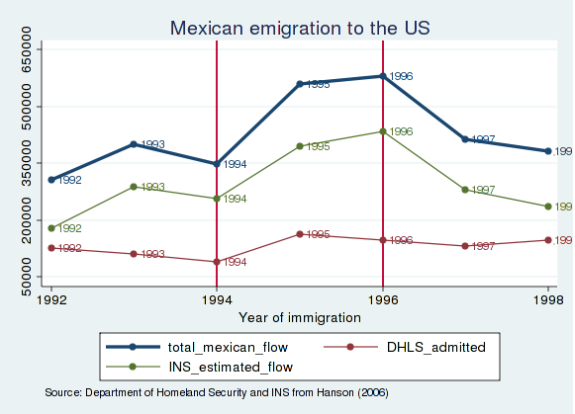
This huge economic downturn encouraged many Mexicans to emigrate. Precise estimates on how many Mexicans actually emigrated are hard to obtain (see [Passel, 2005] or [Hanson, 2006]). Many Mexicans go to the US illegally, so the precision of any estimates should be taken with caution. However, many sources point to the fact that 1995 was a high immigration year. Using data from the 2000 US Census[1], from the US Department of Home Land Security (documented immigrants) or estimates of undocumented immigrants from the Immigration and Naturalization Service as reported in [Hanson, 2006] we see an unusual spike in the inflow of immigrants in 1995[2], as can be seen in the top panel of Figure 2 below. The mirror image, though perhaps with some lag, of these Mexican inflows is the average real hourly wage for young low skilled workers, especially for the younger ones, as can be seen in the bottom part of the figure[3].

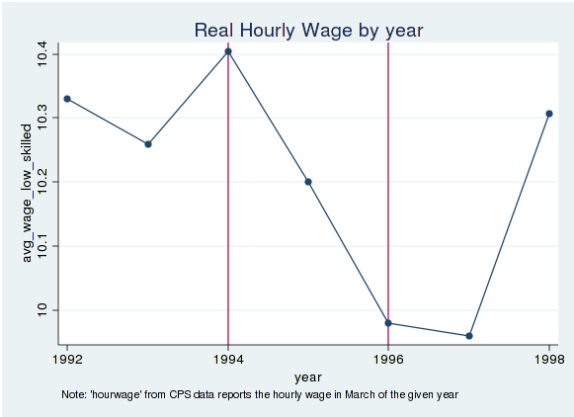
[1]The Census reports the year of immigration of all immigrants appearing in the Census in 2000. Figure 2 does not show US Census data, but the numbers coincide to a large extend with those shown in the figure.

[2]I will discuss the numbers on immigration arrivals later in this paper. Several things are worth taking into account. The Immigration Act of 1990 increased the number of immigrants allowed into the US, probably encouraging more people to immigrate or ask for admission (despite being in the US for some time) in 1991. This is why I report my numbers starting in 1992, centred in 1995 -the year of the shock-. Another piece of indirect evidence that incentives to emigrate increased in 1995 is the spike in 'coyote' prices, the price of obtaining illegal passage into the US, in 1995. Between 1994 and 1995 'coyote' price doubled according to [Hanson, 2006]. This may be in part due to increased border enforcement (especially in Texas), but it may also be reflecting the increased willingness to emigrate. Total immigrants are assumed to be the sum of the undocumented estimated by the INS and the legally admitted reported by the DHLS.

[3]The base year for real wages is 1999. The sensitivity of migration flows to home country economic conditions is well known, see [Hanson and Spilimbergo, 1999] or [Hanson and Grogger, 2011]

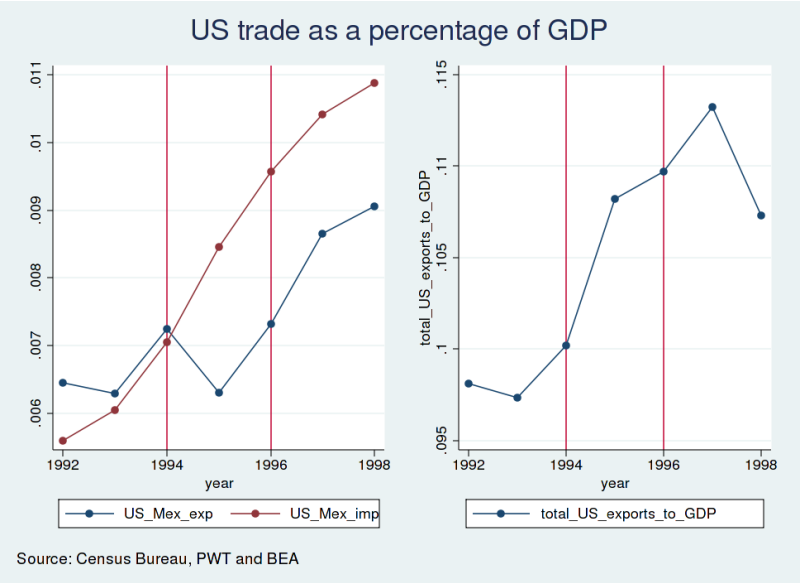
Figure 2: Mexican emigration to the US by year of arrival and US low skilled wage





The direct impact of the Mexican Tequila crisis on the US economy was probably rather small. The Mexican crisis could have affected the US through trade in two different ways. Demand in Mexico for US products dropped, worsening the economic conditions of certain locales in the US. We observe in Figure 3 that while it is true that US exports to Mexico decreased in 1995, they represent less than 1% of US GDP. Moreover, 1995 was a normal year for total US exports as they kept raising at a normal pace, suggesting that some of the exports to Mexico were redirected somewhere else. A second possibility is that Mexico increased its exports to the US, as a result of the peso devaluation. This does not seem to be supported by the data as can also be seen in the Figure 3.

Figure 3: US trade



Note: Exports are exports from the US to Mexico divided by US GDP.

The Mexican Crisis of 1995 offers the possibility to estimate the impact on labor market outcomes of an unexpected immigration inflow into the US labor market. In particular, I heavily rely on three aspects of Mexican immigration in the 1990s. First, Mexican immigrants tend to be low skilled[Borjas and Katz, 2007]. Second, they tend to settle in some particular enclaves [Card, 2001]. Third, as I will document in some detail, Mexican immigrants tend to be very young upon arrival, see also [Smith, 2012].

Using this unexpected flow of young low skilled Mexican immigrants I study how the US labor market reacts. The empirical exercise will come in three parts. In a first exercise, I document a) how during the years after the shock, 1995-1997, the wages of young low skilled workers decreased relative to older low skilled workers b) the wage of low skilled workers in high immigration states decreased more than in low immigration states and c) if anything, wages of young workers in high immigration states are the most affected of all.

I use this suggestive evidence to estimate the effect of immigration on wages, my second empirical exercise. In particular, I use the period of the shock interacted with the geographic distribution of

Mexicans in 1980 as an instrument for the actual inflow of Mexicans to the US. Using this strategy that heavily relies on the exogeneity of a push factor such as the Mexican Crisis of 1995, I show that a 1% immigration induced supply shock, reduces (young) low skilled wages by around 1% on impact. This instrumental strategy is closely related with [Boustan, 2010] study of the Black Migration.

The third thing I show is that Mexican immigration does encourage some across state reallocation. In particular I show that for every 10 Mexican immigrants that arrive, around 7 young low skilled natives are displaced. In other words, when there is an unexpected large immigration inflow, not only wages adjust, but also natives reallocate.

This helps explain why, while the effect on wages is large on impact, it quickly disappears. By 1999 wages of low skilled workers in high immigration states are not significantly lower than low skilled workers in low immigration states. This suggests that the US labor market for young low skilled workers adapts to unexpected supply shocks quite rapidly.

Several papers have tried to estimate the impact of immigration on wages, though arguably few with such a clean identification strategy. The cleanest is probably the unexpected arrival of Cubans to Miami during the Mariel Boatlift [Card, 1990]. Surprisingly, even if the influx represented a supply shock of around 7%, [Card, 1990] reports virtually no impact on labor market outcomes. He suggests, instead, that the fact that Miami received many immigration waves helped its labor market to absorb unexpected immigration inflows like the one in April 1980. He also points to the fact that some natives who would have migrated to Miami might have not done so as a result of the Mariel Boatlift. More generally, Miami is well linked to the rest of the US economy[4]. This is extremely important. If we consider, as a result of these links, that the entire US is the relevant labor market then the Mariel Boatlift was a 0.07% supply shock, probably too small for the econometrician to see anything significant in the data.

[4]There are several mechanisms through which local labor markets are linked to the national labor market. To mention a few, it could be that native workers left Miami as a result of the Mariel Boatlift shock, that exports of low skilled intensive goods from Miami to the rest of the US increased or that Miami adopted different technologies than otherwise [Lewis, 2004]. The difficulty in disentangling these mechanisms and the particularities of Miami make it hard to generalize the evidence coming from such a localized experience within the US. Other papers casting doubt about [Card, 1990] results include [Angrist and Krueger, 1999] and [Donald and Lang, 2007]. Other papers using spatial variation to determine the impact of immigration on the host country using a natural experiment include [Hunt, 1992]. She cannot use annual data though. See [Friedberg and Hunt, 1995] for an early literature review.

Whether we should focus on local labor markets or the national labor market has been the focal point of discussion when evaluating the impact of immigration in the US. On the one hand, [Altonji and Card, 1991] pioneered the spatial correlations approach. The idea of this approach is to compare the labor market outcomes in different cities or states within the US. A simple regression is, however, hard to interpret. Immigrants and natives endogenously decide when and where to move within the US, so estimates from a simple OLS regression are likely to be biased, as emphasized in [Borjas et al., 1996]. [Card, 2001] develops an instrumental variable strategy to try to address these concerns. Immigrants tend to settle where former immigrants settled and this is why the stock of immigrants in an enclave is a good predictor of the flow of immigrants to that enclave. Using this instrument [Card, 2001] shows that immigrant inflows had small impacts on both wages and native outflows[5]. Even [Card, 2001] acknowledges that his estimates might be biased towards 0 due to endogeneity biases. The concern is that economic conditions can be quite persistent across territories for reasons unrelated to immigration and this both attracted early and current immigrants.

On the other hand, [Borjas, 2003] strongly argues for an integrated national level market. He relies on the fact that different skill groups at different experience levels received different immigration inflows over the last 20 or 30 years. Using this approach he finds radically different results than the spatial correlations literature. He reports that a 10% supply shock reduces wages by around 3-4%. He does not take into account, however, the endogenous decisions of immigrants. Immigrants of a certain skill might decide to move to the US if the relative supply of workers of their experience level is particularly low [6]. Failing to account for this might underestimate the true impact of immigration. His estimates could also be biased in the other direction. If first waves of immigrants were relatively more skilled and less numerous we would observe that experience cells with more immigrants have lower wages, and this would not reflect the impact of immigration, but rather the changing composition of immigration and perhaps the widening of the US income distribution due to skill biased technological change[7].

Similar to [Card, 2001] and [Card, 2009], [Ottaviano and Peri, 2010] argue that the impact of

[5] See also [Card and DiNardo, 2000] and [Cortes, 2008].

[6] [Borjas, 1987] could be extended to account for this margin of the immigration decision.

[7] A similar argument is used in [Borjas, 1995] to critize [Chiswick, 1978] finding that immigrants tend to experience larger wage growths using a cross section from the 1970 Census. Numerous papers document the widening of the US income distribution. A nice review is provided in [Acemoglu and Autor, 2011]

immigration on wages is small but for a different reason: imperfect substitutability between natives and immigrants. They build on [Borjas, 2003] structural part of the paper by incorporating an extra nest in the production function and estimate the elasticity of substitution between natives and immigrants[8]. As in [Borjas, 2003], however, the identification strategy in [Ottaviano and Peri, 2010] only relies on time series variation. They estimate a large but finite immigrant-native elasticity of substitution key to understand their result: former immigrants experience most of the negative effect of new immigrants, while natives' wage hardly responds. Their estimates of this crucial elasticity, however, have been criticized, see for example [Borjas et al., 2008], [Borjas et al., Forthcoming] or [Dustmann and Preston, 2012]. Using the 1995 Mexican crisis we can reassess this imperfect substitutability between natives and immigrants, at least to some extent. Using Hispanic origin instead of the most commonly used citizenship status [9] I show that the shock impacted both non-Hispanic and Hispanic wages similarly. In other words, I obtain estimates that suggest that immigrants and natives are perfect substitutes, at least when considering young low skilled workers.

To guide my empirical analysis and build some intuition I introduce a model of the US consisting of two regions: the high immigration region and the low immigration region. An immigration shock in one region decreases its wage, but also gives incentives for reallocation towards the other region. The model, presented in Section 2, is a combination of the models used in immigration but within a dynamic setting, something new in the literature.

In section 3 I present the empirical evidence. In particular, section 3.1 describes the data. Section 3.2 documents the larger effect of the shock on young low skilled workers. Section 3.3 documents the effect in high immigration states relative to low immigration states. The main results are reported in section 3.4. Labor reallocation is discussed in section 3.5, while the long run effects of immigration are discussed in section 3.6. Section 4 concludes by providing a brief summary of the findings.

[8] [Peri and Sparber, 2009] provide some micro evidence explaining why immigrants and natives might be imperfect substitutes as they specialize in different types of tasks. [Cortes, 2008], using [Card, 2001] instrument, also reports higher impacts of immigrants on former immigrant wages than on natives

[9] Citizenship status or place of birt is only available after 1994.

2 Model

The model represents a simplified version of the empirical exercise. It consists of 2 regions that I will call: high immigration state (HIS) and low immigration state (LIS). Variables for the LIS will be denoted with an asterisk. In the empirical exercise I will distinguish young and old workers in each skill level, following the literature in immigration (see [Borjas, 2003], [Ottaviano and Peri, 2010] and [Card and Lemieux, 2001], something that I do not discuss in the model. In fact, it is not difficult to include more nests in the production function and more variables into the mobility decision (see the model below). However, it may distract the reader from the main insights of the model. The model helps fix the main ideas and guides the empirical exercise.

In contrast to other models examining immigration and international trade, this will be a model with no trade but mobility of workers across regions [10]. Ruling out trade across regions maintains incentives for factors of production to migrate upon a supply shock to one of the factors. Unlike most immigration models that rule out trade and internal reallocation, I will allow for some reallocation of factors across regions. This is suggestive of a world where within labor geographic reallocation is less costly than production geographic reallocation or production adaptation to geographic factor endowment changes. The model builds on [Blanchard and Katz, 1992] and on [Katz and Murphy, 1992].

The long run equilibrium coincides with the equilibrium in standard spatial equilibrium models, where indirect utility is equalized across space[11]. In contrast to more standard spatial equilibrium models, there are some transition dynamics that will play a key role.

2.1 Production Function

The production function in both states is the same. In particular, I consider that a perfectly competitive representative firm at time t has the following production function:

$$Q_t = A_t[\theta_t H_t^{\rho} + (1-\theta_t)L_t^{\rho}]^{1/\rho} \tag{1}$$

Where L_t is low skilled labor and H_t is high skilled labor[12]. θ_t represents the different weights

[10] With only one product in the economy there are no motives for trade.

[11] In this model only wages will matter for indirect utility, but this is not necessarily the case. See for example [Glaeser, 2008].

[12] In the base line model high skilled workers will be workers with some college or more while low skilled workers

that the two factors have in the production function, while ρ governs the elasticity of substitution between low and high skilled workers. A_t is Total Factor Productivity (TFP) in each state. We could also introduce factor augmenting technologies, like in [Acemoglu and Autor, 2011]. None of the results that I will report below changes if those technological levels are exogenous to immigration. On the contrary, if technology responds to immigration shocks, some of the results will change. As common in the literature, I do not consider other factors of production like capital. As long as other factors enter the production function in a Hicks-neutral way this does not affect relative factor wages[13].

2.2 Labor market

The marginal product of low skilled workers is:

$$w_t = p_t A_t (1-\theta_t) Q_t^{\frac{1}{\sigma}} L_t^{\frac{-1}{\sigma}} \tag{2}$$

where $\sigma = 1/(1-\rho)$. This is the elasticities of substitution between high and low skilled workers. This defines the Labor Demand Curve.

Similarly, the marginal product of high skilled workers is:

$$s_t = p_t A_t \theta_t Q_t^{\frac{1}{\sigma}} H_t^{\frac{-1}{\sigma}} \tag{3}$$

where $\sigma = 1/(1-\rho)$.

2.3 Mobility across regions

There is some costly mobility of workers across states. A simple way to model this imperfect mobility is to assume that workers have expectations expectations about their wage tomorrow:

In particular, suppose workers think that the wage tomorrow in HIS is:

$$w_{t+1} = w_t * exp(\varepsilon_t) \tag{4}$$

will be high school graduates and high school dropouts. This is a standard classification of workers into these two skill groups, see for example [Acemoglu and Autor, 2011] or [Card, 2009]

[13] I could extend the model to allow the L_t low skilled labor force to be a composite of young workers ($L_{nx,t}$) and old workers ($L_{x,t}$) that are imperfect substitutes. For simplicity, I will not consider this possibility, though the main intuition does not change if we were to introduce it.

Similarly in LIS:

$$w^*_{t+1} = w^*_t * exp(\varepsilon^*_t) \tag{5}$$

This will encourage some low skilled workers to move from HIS and some to move from LIS to HIS. If ϵ_t and ϵ^*_t are i.i.d. and drawn from and extreme value distribution, the probability that any one low skilled worker moves from HIS to LIS is given by:

$$\lambda_{l,t}(w_t, w^*_t) = \lambda_l * \frac{exp(ln(w^*_t))}{exp(ln(w_t)) + exp(ln(w^*_t))} \tag{6}$$

Since there are L_t such workers the aggregate number of movers from HIS to LIS is:

$$N_t = \lambda_{l,t} * L_t \tag{7}$$

Tomorrow in HIS, there will be the same number of workers than today (possibly taking into account the natural population growth rate n^l_t) plus those that arrived minus those that left:

$$L_{t+1} = L_t(1 + n^l_t) - \lambda_{l,t} * L_t + \lambda^*_{l,t} * L^*_t \tag{8}$$

Where $\lambda^*_{l,t}(w_t, w^*_t) = \lambda_{l,t}(w^*_t, w_t)$. We can obtain a similar equation for LIS.

Note that $\lambda_{l,t}(w_t, w^*_t)$ is increasing in w^*_t and decreasing in w_t. This is a higher wage in LIS will encourage more HIS to move to LIS, while a lower wage in HIS will also encourage workers to leave the region.

We can obtain mirror images of these equations for high skilled workers.

Crucially, λ_l is the fraction of workers that do not move (no matter what wages prevail in the economy). This, in turn, implies that adjustments to wage changes take some periods to be fully absorbed.

In the long run $s_{t+1} = s_t$ and $w_{t+1} = w_t$. In words, in the long run, there will be some labor reallocation. Positive net flows of low skilled workers from HIS to LIS will come together with net flows of high skilled workers from LIS to HIS. HIS and LIS will have the same size in the long run, provided that TFP levels are the same.

2.4 The Mexican immigration shock: from the model to the empirics

In the empirical exercise I analyse the reaction of the US labor market to an unexpected shock to the supply of young low skilled workers. This is a finer disaggregation of the labor force than what I presented in the model but all the intuitions are the same in the model and empirical part. In this section I explain them in some detail.

2.5 The Mexican immigration shock on low skilled wages

In the empirical section I use $50 + 1$ states instead of the two states I introduced in the model. In particular, states with where the shock is larger will see their wage decrease accordingly. This is we can extend equation 2 to:

$$lnw_{st} = \alpha + \beta * ln(N_{st}(1 + \frac{Mex_{st}}{N_{st}})) + \gamma * X_{st} + \varepsilon_{st} \tag{9}$$

Where subscripts s denote time and where I have used the decomposition $L_{st} = N_{st} + Mex_{st}$. This is, the low skilled workforce is the sum of low skilled natives and Mexican immigrants. X_{st} are controls such as the output level in each state.

Note that the variation I use for this exercise is mainly temporal. In other words, I want to use the fact that at a certain point in time there is an expansion in the supply of Mexican workers. This is true for every state in the US, but it is specially important in high immigration states.

Note that this is the instantaneous effect of an unexpected labor supply shock. So far I have not used any of the dynamic equations.

2.6 The Mexican immigration shock dynamics

In the longer run, the low skilled immigration shock will be partially absorbed through wages and labor reallocation. Assuming that the immigrated Mexicans do not re-emigrate to LIS after arriving to HIS, native low skilled workers will move from HIS to LIS, mitigating the negative effect on wages in HIS. Thus if we look at the share of low skilled natives in HIS we should see that it decreases while it increases in LIS.

Empirically, other literature has used the following equation[14]:

$$\frac{N_{st}}{N_{st}+H_{st}} = \alpha + \beta * \frac{Mex_{st}}{N_{st}+H_{st}} + \gamma * X_{st} + \delta_s + \varepsilon_{st} \tag{10}$$

Where, again N_{st} denotes native low skilled workers, H_{st} denotes high skilled workers and Mex_{st} denotes Mexican immigrants. Without labor reallocation across regions, the amount of Mexicans that arrive to a certain state should not affect the share of native low skilled workers. Again, I am interested in the temporal variation.

Note that this equation is in line with the model presented. If there are some displacement effects $\beta < 0$. That is the arrival of some immigrants in a state s makes some natives move out from that state. Another way to put it is that, if natives were indifferent to the arrival of Mexican immigrants, the share of low skilled workers within the native population would be independent (i.e. $\beta \approx 0$) from the relative Mexican supply shock.

3 Empirical results

3.1 Data Description

The data that I use comes from various sources. I detail each of them in this section. I also use this section to take a look at raw data and to present some summary statistics.

3.1.1 Mexican Flows: 1990 US Census, 2000 US Census, INS estimates and DHLS data

To obtain a measure of the Mexican flows to each state at each point in time I do the following. First, I predict the place of arrival by the immigrant geographic distribution in 1990 [15] and, then, I assign the aggregate inflows accordingly. To do this, I use the 1990 US census and combine it with Immigration and Naturalization service (INS) estimates on undocumented aggregate Mexican flows

[14] There are many papers looking at labor reallocation. See for example [Card, 2001], [Card, 2005], [Card, 2007], [Cortes, 2008], and [Borjas, 2006]. [Peri and Sparber, 2011] discuss the best empirical practice. Note, though, that the best empirical practice is not backed up by a theoretical model like the one I present in this paper. In the empirical section I will show results on both [Peri and Sparber, 2011] suggested specification, and on the specification coming from the model.

[15] I could also use the distribution in 2000 instead and nothing changes.

to the US during the 90s. I also add the documented aggregate inflows reported by the Department of Home Land Security (DHLS).

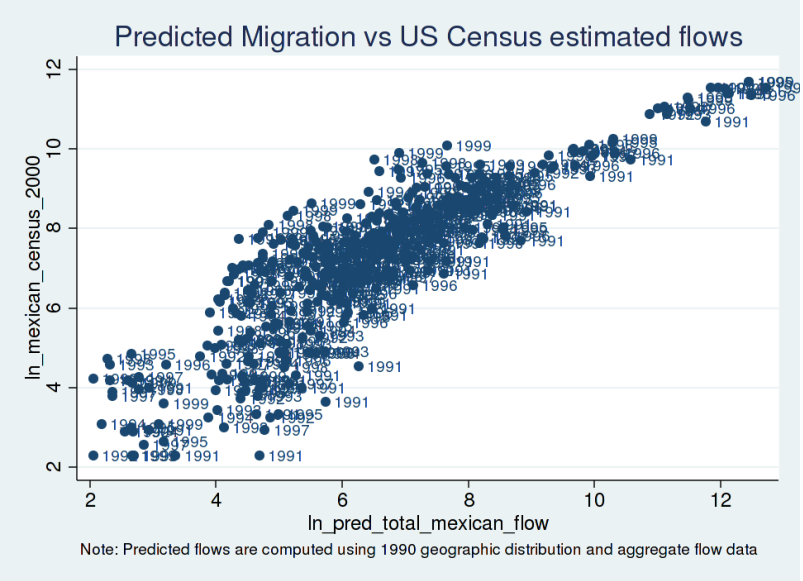
In particular, using the 1990 US Census data we know what share of Mexicans were living in each state in 1990. Let $StockMex_{s,1990}$ be the stock of Mexicans living in state s in 1990 and let $StockMex_{1990}$ be the total stock of Mexicans in the US in 1990. Then $ShareMex = \frac{SockMex_{s,1990}}{StockMex_{1990}}$ is the share of Mexicans in state s in 1990. To predict the flow of Mexicans to state s at time t we only need to multiply this share by the aggregate flow of Mexicans (Mex_t) to the US at time t:

$$\widehat{Mex}_{st} = ShareMex_{s,1990} * Mex_t$$

This is the measure that I will use for the number of Mexicans arriving to state s at time t. An alternative to this measure can be obtained by using the 2000 US Census. I can use the question on the year of immigration to obtain a measure of the inflows of immigrants in each year during the 90s. If I also use the actual reported state of residence for the years 1995-1999 and the reported state of residence 5 years prior to 2000 for the years 1992-1995, I obtain a measure of the inflows of immigrants to every US state at each point in time. This estimate will have some problems. First, it will undercount immigration at the beginning of the 90s more severely than at the end of the 90s. The reason is simple: some immigrants stay in the US only for a certain time and the return to Mexico [Thom, 2010]. Mainly for this reason, I do not use the 2000 US Census to measure the Mexican immigration flows.

It is worth noting, however, that the measure I obtain using the 2000 US Census and the one I obtain when combining the 1990 US Census with INS estimates and the DHLS data is quite similar. A simple way to see this is through the following figure:

Figure 4: Predicted and 2000 US Census estimated flows



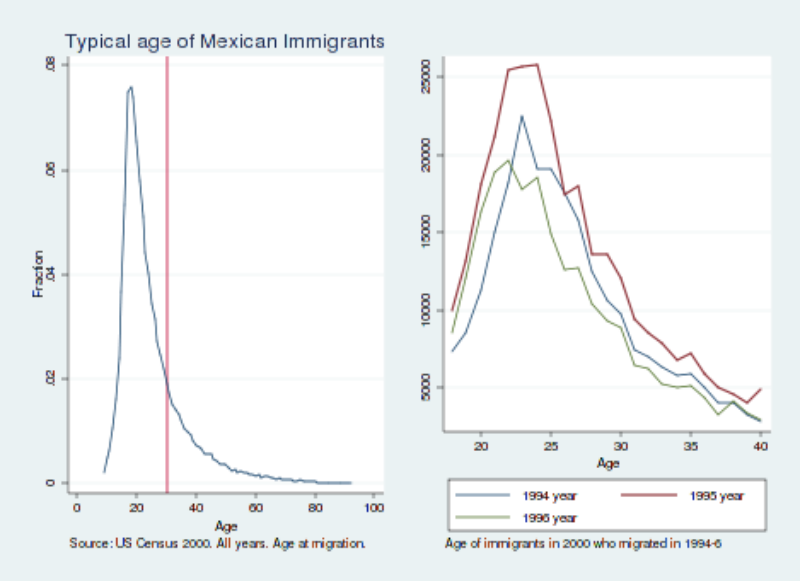
Where I plot the (ln) number of Mexican inflow using the US Census estimates against the (ln) predicted Mexican flow just explained.

3.1.2 Immigrant Age Distribution: 2000 US Census

Perhaps less stressed in other studies is the fact that Mexican immigrants tend to be young when they arrive to the US, a recent exception being [Smith, 2012]. The US Census of 2000 allows me to build the age distribution of the immigrants at the time of their arrival. To do so I use information on the year of arrival and the age in 2000. The following graph shows that most Mexican immigrants are indeed quite young when migrating to the US. In fact around 90% of them are below 30 years old[16]. As can be seen in the right panel in the following figure, this is quite stable across years and it certainly did not change in 1995 or 1996.

[16] Within those that are above the working age.

Figure 5: Typical Age of Immigration



Given that the unexpected shock was mainly of low skilled young Mexican workers, it is likely then that the largest effect on the US labor market is on low skilled young workers. The impact should decrease for low skilled workers in the US over or around 30 years old. For low skilled workers this is equivalent to around 10-12 years of labor market experience.

The 2000 US Census also allows me to see whether the effect of the shock is identifiable in the longer run. I will discuss this with some detail in the last section.

3.1.3 CPS data

I use CPS data to compute three measures of wage: the hourly wage, the weekly wage, and the composition adjusted weekly wage in a state. The first two measures are at the individual level, while the third one is an aggregate measure at the state level. All wages are in real terms.

The first measure that I use is the reported hourly wage the week previous to the week of the interview, in March of every year.

The second measure that I use is the weekly wage constructed from the yearly wage and the number of weeks worked in a year. The wage and the number of weeks worked reported in a given

year refer to the previous year. Thus, I will use the answers in 1996 to know the wage in 1995[17].

Figure 2 already shows the raw data on hourly wages. The raw data on the constructed raw wages for young low skilled, old low skilled and high skilled workers are shown in the figure **??**:

We can see in the graph how the average real wage of young low skilled workers is the only one that does not increase precisely right after the immigration shock. In contrast, wages of older low skilled workers, and wages of high skilled workers increased during the 90s. In fact, as well known in the literature, wages of high skilled workers increased relatively more than the wages of low skilled workers.

From individual level information on wages I construct an aggregate measure of the low skilled wage for each state and each year to obtain my third measure of wages. I want this to be comparable across years, so I follow the literature by running first stage Mincerian regressions to control for compositional effects and I use the state fixed effects as this aggregate measure of wages. In particular I run the following regression[18]:

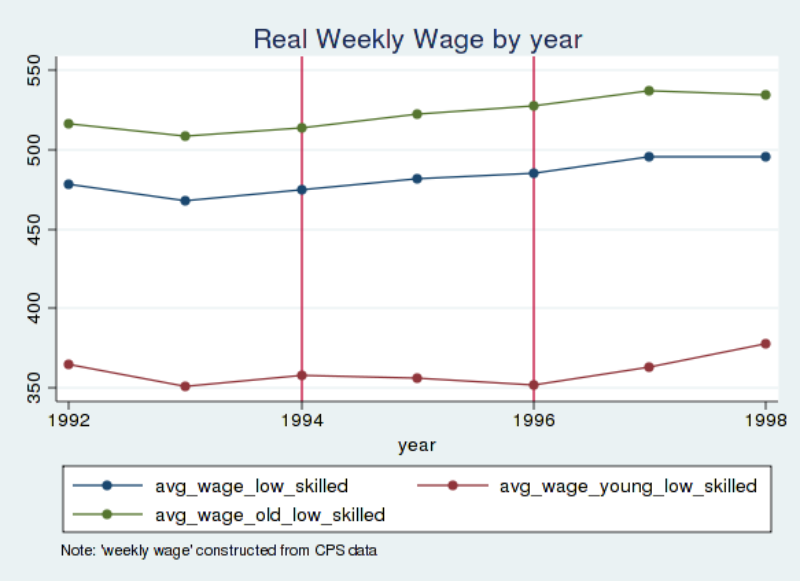
$$lnwage_i = X_i * \beta_t + \delta_{t,s} + \varepsilon_i, \forall t \in (1991, 1999)$$

Importantly $i \in I_L$ indicates individuals in the set of low skilled workers and $s \in S$ indicates US states. The subscript t indicates that I run each year in a separate regression[19]. Low skilled workers are defined as high school drop outs and high school graduates. X_i are the standard controls [Card, 1999]: I include potential experience, experience squared, a dummy for black, a dummy for females, a dummy for rural and a dummy for other races. $\delta_{t,s}$ is a set of fixed effects capturing the premium in different states.

[17]Both measures are similar. Using the weekly wage we obtain more observations at the cost of possibly introducing more measurement error, due to the imprecision of reporting wages of the previous year and weeks worked in the previous year, while using the hourly wage we reduce the measurement error at the cost of losing many observations. The weights for each individual observation for the two variables are different.

[18]I follow [Acemoglu and Autor, 2011] and I only consider full time full year workers. They are defined as workers who have worked at least 35 hours and 40 weeks a year and report a valid income wage. I further drop self employed workers and workers above and bellow 65 and 18 years old. I also correct for top coding following the literature. Histograms of the raw data are available upon request. In particular histograms of raw weekly wage, experience levels and age. See also [Autor and Katz, 1999] or [Katz and Murphy, 1992]

[19]Since I want a measure of wages for each period and I want that the returns to experience vary by year, I run these mincerian regressions year by year. [Helpman et al., 2012] do these same first stage mincerian regressions in a similar exercise.


Real Weekly Wage by year
550
500
450
400
350
1992
1994
1996
1998
year
avg_wage_low_skilled
avg_wage_young_low_skilled
avg_wage_old_low_skilled
Note: 'weekly wage' constructed from CPS data


Real Weekly Wage by year
800
700
600
500
400
300
1992
1994
1996
1998
year
avg_wage_high_skilled
avg_wage_young_low_skilled
Note: 'weekly wage' constructed from CPS data

By just using the fixed effects I am considering the wage of workers with no experience evaluated at the omitted dummy variables, i.e. white metropolitan male workers. If we then want to evaluate the impact of immigration at different experience levels we can evaluate the predicted wages at these experience levels.

Note finally, that I could potentially use CPS data to obtain a measure for the number of Mexicans in each state and point in time. Two things limit this possibility. First, it is unfortunate that before 1994 CPS questions did not include the birth place of the respondents. Thus I cannot use this variable to obtain a measure of Mexicans for some of my sample years. Instead, I can use the variable on hispanic origin. This is actually a good proxy for Mexican origin, especially when disregarding the Cuban hispanics and other groups not related to Mexico. The only problem when using this, is the uncertainty about the undercount of undocumented immigrants (see [Hanson, 2006]).

The main results consist in three parts. First I present some descriptive evidence that the wage of young and low skilled workers is the most affected by the Mexican immigration shock. I then estimate the wage elasticity of the labor demand function. I use as instrument the initial share of Mexicans interacted with the exogenous shock that increased the number of Mexicans migrating to the US. I finally look at dynamic wage effects and labor reallocation.

3.2 The effect of Mexican immigration on low skilled young workers relative to older workers

A first piece of evidence is to compare the effect of Mexican immigration on low skilled wages of younger and older workers at the time of the shock. This comparison is like a difference in difference strategy. For a difference in difference strategy to deliver unbiased estimates we need a control group and a treated group. The control group should not be affected by the treatment, in this case the unexpected immigration shock. In this case we are far from having a perfect control group.

I have argued, however, that it made a difference whether young or old for the impact of low skilled immigration on low skilled labor market outcomes. The reason is simple: most Mexicans arrive to the US when they are young, between 18 and 30 years old. We can, thus, consider US workers between 18 and 30 years old, or between 0 and 12 years of experience in the case of low

skilled workers, as our treated group. The closest group that should be comparable but should not have been (so) affected by the immigration shock are low skilled US workers with 12 or more years of experience. This will be my control group. In other words, I am going to show the differential impact of the shock between younger and older workers.

In terms of estimation I have the following equations:

$$lnwage_{it} = \alpha + \beta_1 * Young_{it} + \beta_2 * Shock_t + \beta_3 * Young_{it} * Shock_t + X_{it} * \beta + \gamma * time + \varepsilon_{it} \quad (11)$$

Where $lnwage_{it}$ is the weekly or the hourly wage of individual i at time t. $Young_{it}$ is a dummy variable indicating whether individual i is young (i.e. less than 12 years of experience) at time t. When running the regression on wages I only include full time full year workers. Instead when using weeks I include all individuals. $Shock_t$ is a dummy for the time of the shock, i.e. 1995 through 1997. X_{it} is a vector of individual characteristics: race, gender, rural status, state fixed effects, metropolitan area fixed effects or metropolitan-state fixed effects. *time* is a time trend. Only low skilled workers are included in the regression.

The coefficient of interest if β_3. We expect $\beta_3 < 0$, so that young low skilled workers experienced a larger drop in their wage during the shock period than the control group.

Table 1 reports the results for hourly wages. Remember that hourly wages come directly from the CPS raw data[20].

[20]The question on hourly wages is answered by a subset of the CPS respondents. This is why the CPS reports a different weight when using this variable instead of the constructed weekly wage.

Table 1: The impact of Mexican immigration on low skilled hourly wages

	Low Skilled	Low Skilled	Low Skilled	Low Skilled	Low Skilled
	Wage	Wage	Wage	Wage	Wage (no.Hisp)
shock	-0.013+	-0.004	-0.005	-0.006	-0.000
	0.007	0.010	0.010	0.010	0.012
young	-0.240***	-0.262***	-0.256***	-0.253***	-0.265***
	0.014	0.013	0.013	0.013	0.014
shock young	-0.024*	-0.023*	-0.021+	-0.024*	-0.021+
	0.011	0.011	0.011	0.011	0.011
cons	2.305***	2.391***	0.235	0.417	0.246
	0.020	0.135	1.059	1.076	1.268
Controls	no	yes	yes	yes	yes
State FE	no	no	yes	yes	yes
MSA FE	no	no	no	yes	yes
r2	0.070	0.166	0.191	0.223	0.246
N	29881	29881	29881	29881	26131

Note: Shock is a dummy for the year 1995, 1996 and 1997. Hourly wages reported at CPS. Robust standard errors clustered at the msa level. 3 stars is 0.1%, 2 stars is 1% and 1 star is 5% significance levels. A + is a 10% significance level. Only low skilled workers included in the regressions.

The first column shows the results when not controlling for any personal characteristics. We already see that younger workers saw their wage reduced by 2 log points compared to the older workers. This coefficient is very stable as I introduce controls and fixed effects in columns 2-4. Robust standard errors are clustered at the metropolitan area.

Table 1 also shows that the aggregate effect on low skilled wages, i.e. when putting together young and old workers is not distinguishable from 0 as seen in the coefficient on the variable $shock_t$ when we control for observable characteristics. It also shows that younger workers receive a much lower wage than older ones. In fact the hourly wage of young low skilled workers is around 20 log points lower than the average wage of older workers. The Mexican immigration shock represented

a 10% of the wage difference between older and younger workers.

Column 5 drops the workers identified as hispanic by the CPS data. One concern might be that the drop in wages that I am reporting comes from a drop in the wages of former immigrants to the US, something suggested in the research by [Ottaviano and Peri, 2010], [Peri and Sparber, 2009], [Cortes, 2008] or [Card, 2009]. My result suggests that Mexican immigrant workers and native workers are not imperfect substitutes[21].

There may be many reasons that can explain why I am finding different results than previous literature, see for example [Aydemir and Borjas, 2011], [Borjas et al., Forthcoming] and [Dustmann and Preston, 2012]. However, something not emphasized in previous literature is that Mexican workers and native workers may be close substitutes only when we are considering young and low skilled workers, which is precisely what I concentrate on in this paper. In fact there is some evidence suggesting that the life wage profile of Mexican workers and native low skilled workers in the US are very different. The following figure gives an idea of this point, though the literature starting by [Chiswick, 1978] and developed in among others [Borjas, 1985] discusses this point in greater length [22]:

[21] Another exercise that I have done, but that I do not report in the paper in order not to distract the reader from the main results is to compare Hispanic wages to non-Hispanic during the year of the shock, using a difference in difference type specification. The wage on the interaction, Hispanic dummy times Shock, is slightly positive and statistically indistinguishable from 0. This is evidence suggesting that Hispanic and non-Hispanic low skilled workers are not imperfect substitutes. The interested reader can find this table in the appendix.

[22] In this figure the red vertical lines show young low skilled workers in 1995 and 1996. The figure is constructed by averaging the wage of all workers of a certain age.

Figure 6: Mexican and US wage profiles

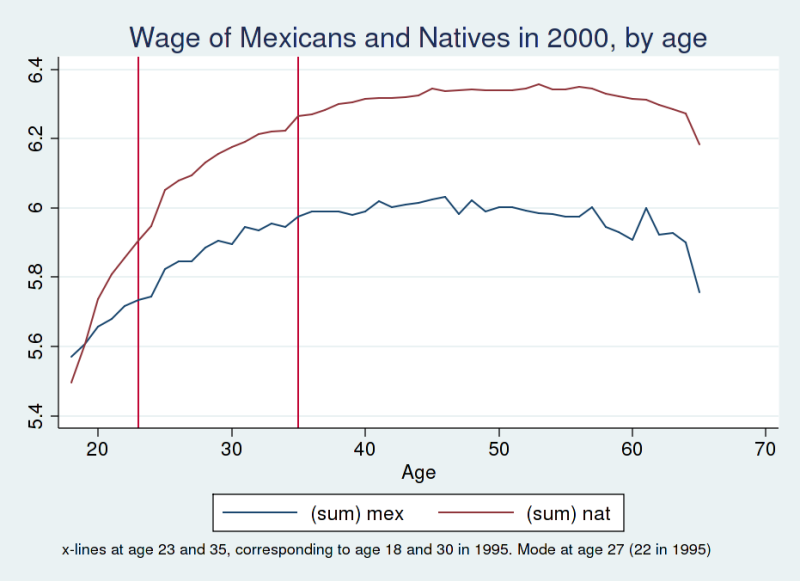


Table 2 uses weekly wages. It should be reassuring that I obtain very similar results using two very different measures of wages. As argued before, weekly wages can be computed by a much larger set of the population, but at the cost of possibly computing them with some measurement error.

A possible concern with these results might be that there is something that is affecting young workers in general between 1995 to 1997. Although the US economy was going through good years during the second half of the decade, it is true that it was going, at the same time, though important structural changes as the world economy was becoming increasingly relevant. This might have affected the workers trying to enter the workforce.

The following table 3 shows that when using the sample to high skilled workers we do not obtain this differential effect of the immigration shock on the wage of young high skilled workers:

Table 3 also shows that wages of high skilled workers are higher than wages of low skilled workers (larger constant than in the previous table in the first column) and that the wage difference between young and older workers is quite similar for high and low skilled workers. Importantly the estimates for β_3 are very close to 0.

Table 2: The impact of Mexican immigration on low skilled weekly wages

	Low Skilled	Low Skilled	Low Skilled	Low Skilled	Low Skilled
	Wage	Wage	Wage	Wage	Wage (no.Hisp)
shock	0.002	0.007	0.007	0.006	0.011
	0.006	0.007	0.007	0.008	0.008
young	-0.389***	-0.418***	-0.414***	-0.417***	-0.436***
	0.012	0.012	0.011	0.010	0.013
young shock	-0.030**	-0.026*	-0.026*	-0.025*	-0.034**
	0.011	0.010	0.010	0.010	0.012
cons	6.039***	6.271***	4.365***	4.238***	4.767***
	0.023	0.234	1.025	0.987	0.924
Controls	no	yes	yes	yes	yes
State FE	no	no	yes	yes	yes
MSA FE	no	no	no	yes	yes
r2	0.052	0.137	0.146	0.162	0.169
N	147206	147206	147206	147206	118700

Note: Shock is a dummy for the year 1995 and 1996. Weekly wages are constructed by dividing yearly wage by weeks worked for full time full year workers. Robust standard errors clustered at the msa level. 3 stars is 0.1%, 2 stars is 1% and 1 star is 5% significance levels. Only low skilled workers included in the regressions.

3.3 The effect of Mexican immigration in high relative low immigration states

The model suggests that if there is a shock to a certain region of the United States, the high immigration states (HIS), the wage of the workers affected by this shock should decrease more in HIS than in the low immigration states (LIS). In fact, only after some workers start to move from HIS to LIS will the effect on wages spread to the entire country.

At the same time, the fact that the immigration relative supply shock and wage movements are well correlated within states also suggest that wages in HIS should decrease more than in LIS. This

Table 3: The impact of Mexican immigration on high skilled weekly wages

	High Skilled	High Skilled	High Skilled	High Skilled
	Wage	Wage	Wage	Wage
shock	-0.009	-0.010	-0.010	-0.013
	0.007	0.010	0.010	0.010
young	-0.330***	-0.307***	-0.309***	-0.314***
	0.010	0.009	0.010	0.009
young shock	0.002	-0.005	-0.003	0.000
	0.013	0.013	0.013	0.013
cons	6.642***	6.089***	5.811***	5.375***
	0.029	0.192	1.293	1.299
Controls	no	yes	yes	yes
State FE	no	no	yes	yes
MSA FE	no	no	no	yes
r2	0.049	0.127	0.135	0.158
N	60866	60866	60866	60866

Note: Shock is a dummy for the year 1995 and 1996. Weekly wages are constructed by dividing yearly wage by weeks worked for full time full year workers. Robust standard errors clustered at the msa level. 3 stars is 0.1%, 2 stars is 1% and 1 star is 5% significance levels. Only low skilled workers included in the regressions.

is what I explore in a more direct way in this section. To do so I use the following empirical model:

$$lnwage_{it} = \alpha + \beta_1 * Shock_t + \beta_2 * HIS_{it} + \beta_3 * HIS_{it} * Shock_t + X_{it} * \beta + \gamma * time + \varepsilon it \quad (12)$$

Where $Shock_t$ is a dummy variable that takes 1 in 1995-1997 and HIS_{it} is a dummy variable that takes 1 if individual i lives in a HIS. High immigration states are defined by the states where the average number of Mexican immigrants relative to the total number of low skilled workers in the state is above 8% [23]. Only low skilled workers are included in the regression.

[23] I have used different definitions of HIS and the results do not change.

Note that this is also a difference in difference strategy, where the control groups is states with low immigration inflows while the treatment are high immigration states.

The coefficient of interest is β_3. If β_3 is negative it means that HIS average wage of low skilled workers is lower than in LIS during the years of the shock. This is precisely what I obtain when using both hourly and weekly wages:

Table 4: The impact of Mexican immigration on low skilled hourly wages

	Low Skilled	Low Skilled	Low Skilled	Low Skilled
	Wage	Wage	Wage	Wage
shock	-0.015**	-0.004	-0.009	-0.004
	0.006	0.010	0.010	0.010
high imm state	-0.026	-0.059**	-0.056**	-0.045*
	0.021	0.022	0.021	0.021
shock high imm state	-0.030*	-0.032*	-0.029*	-0.036**
	0.014	0.013	0.012	0.012
cons	2.230***	1.739***	1.787***	1.790***
	0.017	0.105	0.102	0.111
Controls	no	yes	yes	yes
Occupation FE	no	no	yes	no
Industry FE	no	no	no	yes
r2	0.002	0.198	0.326	0.287
N	29881	29881	27712	29881

Note: Shock is a dummy for the year 1995, 1996 and 1997. Hourly wages reported at CPS. Robust standard errors clustered at the msa level. 3 stars is 0.1%, 2 stars is 1% and 1 star is 5% significance levels. A + is a 10% significance level. Only low skilled workers included in the regressions.

Table 5: The impact of Mexican immigration on low skilled weekly wages

	Low Skilled	Low Skilled	Low Skilled	Low Skilled
	Wage	Wage	Wage	Wage
shock	0.006	-0.005	-0.004	-0.006
	0.005	0.006	0.006	0.007
high imm state	-0.054*	-0.123***	-0.062	-0.069***
	0.026	0.024	0.033	0.014
shock high imm state	-0.034*	-0.036*	-0.037*	-0.030+
	0.016	0.017	0.017	0.017
cons	5.966***	5.701***	4.518***	4.370***
	0.025	0.159	1.088	1.091
Controls	no	yes	yes	yes
Occupation FE	no	no	yes	no
Industry FE	no	no	no	yes
r2	0.001	0.082	0.088	0.104
N	147206	147206	147206	147206

Note: Shock is a dummy for the year 1995, 1996 and 1997. Hourly wages reported at CPS. Robust standard errors clustered at the msa level. 3 stars is 0.1%, 2 stars is 1% and 1 star is 5% significance levels. A + is a 10% significance level. Only low skilled workers included in the regressions.

One may wonder whether young workers in HIS are especially affected. We have less observations to answer this question convincingly, and some of my estimates are more imprecise. However, the following table 5 shows the result of comparing high and low immigration states using only young low skilled workers is in line with what I have been arguing until now:

Table 6: The impact of Mexican immigration on young low skilled hourly wages

	Low Skilled	Low Skilled	Low Skilled	Low Skilled
	Wage	Wage	Wage	Wage
shock	-0.033**	-0.008	-0.020+	-0.010
	0.010	0.015	0.013	0.013
high imm state	-0.018	-0.058*	-0.063**	-0.054*
	0.020	0.023	0.024	0.023
shock high imm state	-0.017	-0.035+	-0.017	-0.033+
	0.022	0.019	0.018	0.018
cons	2.069***	1.550***	1.668***	1.626***
	0.013	0.112	0.107	0.110
Controls	no	yes	yes	yes
Occupation FE	no	no	yes	no
Industry FE	no	no	no	yes
r2	0.003	0.173	0.296	0.267
N	9663	9663	8980	9663

Note: Shock is a dummy for the year 1995, 1996 and 1997. Hourly wages reported at CPS. Robust standard errors clustered at the msa level. 3 stars is 0.1%, 2 stars is 1% and 1 star is 5% significance levels. A + is a 10% significance level. Only low skilled workers included in the regressions.

If we pay attention to the coefficient β_3 we observe that is always negative and in the order of magnitude of the one reported in the previous table, both using weekly and hourly wages. It is, however, imprecisely estimated. The number of observations that I can use is a lot smaller.

The results reported so far only use individual level information on wages. They are, thus, a descriptive evidence of who was affected by the immigration shock. In the next section I use information on the geographic distribution of Mexican immigrants within the US to further establish the causal effect of immigration on wages.

Table 7: The impact of Mexican immigration on young low skilled weekly wages

	Low Skilled	Low Skilled	Low Skilled	Low Skilled
	Wage	Wage	Wage	Wage
shock	-0.020*	-0.021+	-0.023*	-0.024*
	0.010	0.011	0.010	0.011
high imm state	0.001	-0.063*	-0.660	-0.794
	0.024	0.027	0.423	0.435
shock high imm state	-0.034	-0.040+	-0.040+	-0.036
	0.024	0.025	0.025	0.024
cons	5.650***	5.356***	2.473	2.705
	0.017	0.125	2.030	2.110
Controls	no	yes	yes	yes
Occupation FE	no	no	yes	no
Industry FE	no	no	no	yes
r2	0.000	0.036	0.042	0.065
N	29513	29513	29513	29513

Note: Shock is a dummy for the year 1995, 1996 and 1997. Weekly wages constructed from CPS data. Robust standard errors clustered at the msa level. 3 stars is 0.1%, 2 stars is 1% and 1 star is 5% significance levels. A + is a 10% significance level. Only low skilled workers included in the regressions.

3.4 Low skilled wage of young workers

Following the model, low skilled wages should depend on the stock of low skilled workers in each state at each point in time. When this stock increase due to an unexpected supply shock wages should decrease.

There are various ways to implement this simple idea. I explain them in what follows:

Wages and relative Mexican stocks

A first alternative is to use the following decomposition. We have that the stock of low skilled

workers is the sum of the native low skilled workers and low skilled Mexican immigrants. So, $L_{st} = (N_{st} + SMex_{st}) = N_{st}(1 + \frac{SMex_{st}}{N_{st}})$ and we obtain:

$$lnwage_{st} = \alpha + \beta * ln(1 + \frac{SMex_{st}}{N_{st}}) + X_{st} * \gamma + \lambda * t + \delta_s + \varepsilon_{st} \quad (13)$$

$SMex_{st}$ is the stock of low skilled Mexican workers in state s at time t, while N_{st} is the population of native young low skilled workers. X_{st} is a vector of controls that includes the total population of low skilled workers in a given state and the output of the state. I also include a state-specific time trend and state fixed effects. The total number of observations is 357: 50+1 states times 7 years (1991-1999). The wage used is the wage resulting from the Mincerian regressions described in the data section.

Wages and relative Mexican inflows

A second alternative is to use the inflows of Mexicans. Again, suppose at time t in state s Mex_{st} Mexicans arrive. We then have that $L_{st} = N_{st} + Mex_{st} = N_{st}(1 + \frac{Mex_{st}}{N_{st}})$. We obtain that the same equation as before but using flows instead of stocks.

$$lnwage_{st} = \alpha + \beta * ln(1 + \frac{Mex_{st}}{N_{st}}) + X_{st} * \gamma + \lambda * t + \delta_s + \varepsilon_{st} \quad (14)$$

The fact that there is an upward trend in the share of Mexican workers in the US and in particular in high immigration states, implies that the results using stocks or inflows are going to be quite similar if we include a time trend or a state-specific time trend. I like this specification in particular because it emphasizes that I am interested in a large unexpected supply shock. In words, periods in which, for exogenous reasons, inflows are particularly large, wages are unexpectedly low.

Wages and national Mexican stocks or inflows

A third strategy is to consider only the national inflows or stocks of Mexican workers. This clearly shows that the variation that I am interested in is temporal. In terms of the equation estimated it would be:

$$lnwage_{st} = \alpha + \beta * ln(1 + \frac{SMex_{t}}{N_{t}}) + X_{st} * \gamma + \lambda * t + \delta_s + \varepsilon_{st} \quad (15)$$

I could estimate these equations using OLS, but my estimates could be biased. Mexican workers endogenously decide where to move within the US, and US natives arbitrage away differences in wages across locations. The unexpected arrival of more Mexicans than usual as a result of the crisis is the basis for my instrument. I describe the details in what follows.

3.4.1 Instrument

The basic idea to construct the instrument is to use the fact that in 1995 and 1996 more young low skilled Mexicans than usual immigrated to high immigration states. A simple way to capture this is to instrument the relative stock or inflow of Mexicans by the shock and the interaction of the shock and the share of Mexicans in each state in 1980. Specifically I use two instruments for the relative Mexican inflows or stocks in each state and period:

$$Z_{1,st} = \begin{cases} 1 & \text{if } t \in [1995, 1996] \\ 0 & \text{if otherwise} \end{cases}$$

and

$$Z_{2,st} = Z_{1,st} * \frac{SMex_{s1980}}{N_{s1980}}$$

Where $\frac{SMex_{s1980}}{N_{s1980}}$ is simply the share of Mexicans in each state in 1980. Another way to understand this instrument is to think that I am using the typical instrument of immigration networks, but interacted with an exogenous push factor. [Boustan, 2010] paper uses a very similar instrument.

3.4.2 Results

Table 8 reports the results of estimating equation 14:

Table 8: The impact of Mexican immigration on low skilled wages

	est1	est2	est3	est4	est5	est6	est7	est8	est9	est10
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
	OLS	OLS	OLS	IV	OLS	IV	IV	IV	IV	IV
shock	0.003**	-0.008	-0.026***							
	0.001	0.006	0.006							
shock share 1980	0.125***	0.139***	-0.088***							
	0.008	0.026	0.024							
rel mexican flow				-0.061	-1.143***	-1.232***				-0.822*
				0.219	0.166	0.133				0.333
rel mexican stock							-2.739**			
							0.973			
rel mexican flow agg								-1.944***		
								0.469		
rel mexican stock agg									-3.482***	
									0.871	
r2	0.985	0.987	0.688	0.173	0.683	0.739	0.337	0.764	0.771	0.738
N	357	357	357	357	357	357	357	357	357	350

Dependent variables: est1 = Relative Mexican Inflow; est2 = Relative Mexican Stock; est3-est10 = Low skilled weekly wages are net out of personal characteristics using mincerian regressions and are evaluated for white men with no experience.

Note: Shock is a dummy for the year 1995 and 1996. Shock Share 1980 is the interaction between the shock variable and the share of Mexicans by state in 1980. 'shock' and 'shock share 1980' are used in the IV specification as instruments for my measure of relative inflow or stock of low skilled Mexicans. Panel regressions at the state level between years 1991-1999. All regressions except est4 include state-specific time trends, state fixed effects and log GDP. est4 does not include state fixed effects, and only includes a national time trend. est4 is instrumented with the immigration networks instrument. Specification est4-est10 also include employment levels of young and older low skilled workers. est10 excludes California from the regression. Robust standard errors clustered at the state level. 3 stars is 0.1%, 2 stars is 1% and 1 star is 5% significance levels. See further details in the text.

The first and second column are the first stage regressions. They show that during the shock the supply of Mexican workers increased (coefficient on shock), but increased especially in high immigration states (interaction). This is partially driven by how I have constructed the proxy for the relative flows to each state from the aggregate inflow. Using the US Census of 2000 instead does not change this first column. In column 1 I report the inflow of Mexican workers, while in column 2 I report the stock of Mexican workers.

The third column is a reduced form regression of the instrument on my dependent variable. It shows that young low skilled wages decreased during the time of the shock, but they especially did so depending on the share of Mexicans in each state in 1980. It is worth emphasizing that the dependent variable is the state fixed effects in the mincerian regressions of low skilled workers, i.e. the fitted wages at 0 years of experience, i.e. of young workers. I reported more details of this in section 3.1.

The fourth column mimics [Card, 2001] results. Using the share of Mexican workers in 1980 I instrument the relative inflows of workers in the 90s *without* including state fixed effects. This is, I am doing a cross state comparison, pooling all years together. There is no apparent effect of immigration on low skilled wages. This column intends to show the importance of considering exogenous push factors like the Mexican crisis in 1995 or like the push factors used in [Boustan, 2010] in the context of the Black Migration to north-Eastern states.

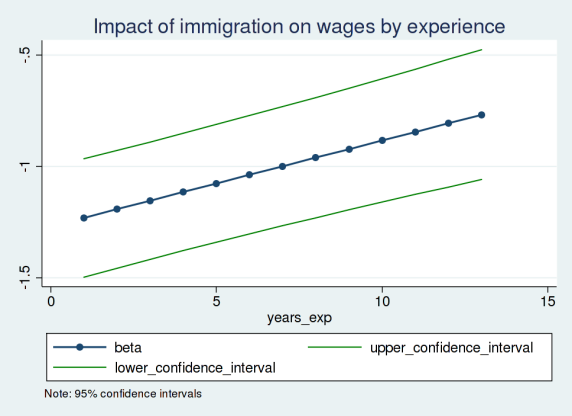
In column 5 I report OLS results including state fixed effects. We already observe that when making within state comparisons we do observe that whenever inflows are larger wages are lower. In column 6 and 7 I further specify the years of the exogenous shock. This is I am comparing the years of the shock with the years that do not experience an exogenous shock. The estimates suggest that a 1% supply shock reduces wages by a bit more than 1%. In column 7 I use as explanatory variable the stocks rather than the inflows. I think this is less suitable in my exercise than in other contexts, precisely because I want to capture the exogenous unexpected increase in the supply of young low skilled wages, but it might also be useful to report it.

In columns 8 and 9, I report the results using only the aggregate inflows and stocks of Mexicans workers. This further emphasizes the importance of using both push factors and within state variation. In column 10 I exclude California from my regressions, following, among others [Cortes, 2008] in reporting results excluding the state where most Mexicans go. One may think that the relationship between California and Mexico is tight enough so that the Mexican crisis affected

California directly, and thus violating my exclusion restriction. When excluding California the results do not change.

In table 8 I have not directly reported any results using different age or experience levels. A direct way to see the importance of experience is to plot the coefficients of the effect of Mexican low skilled immigration on US wages evaluated at different levels of experience. This is what following figure shows using specification in column 6 of Table 8:

Figure 7: Impact of Immigration by Experience levels



We see that the largest effect is on workers that just entered the labor market. For them, wage drops are significant. The negative effect is progressively lower on older workers.

Summarizing, these results mean that the average effect of the Mexican immigration shock on impact is around a 7%-10% decrease in wages for a 10% supply shock. They also indicate that the wage changes are in line with both the geographic distribution and the age distribution of Mexican immigrants.

3.5 Labor reallocation

The most important critique to the cross state or cross city comparisons in the immigration literature is the suggestion that workers might reallocate when hit by negative wage shocks [Borjas et al., 1996]. This is what the spatial equilibrium literature would also suggest. The exogenous immigration shock is unevenly distributed across US states, offering an opportunity to see how workers reallocated from high immigration states (HIS) to low immigration states (LIS), as suggested by the model.

Figure 8 shows suggestive evidence that this is the case. In the dependent axis I have plotted the share of native low skilled workers in HIS versus LIS. Several key points are worth emphasizing from this figure that carry over to the regression analysis presented later.

First, the share of native low skilled workers keeps decreasing over the decade. This is the well known increase in education levels in the US. This has been documented in the literature on skilled biased technological change, see [Katz and Murphy, 1992] or [Acemoglu and Autor, 2011].

Second, the share of native low skilled workers is *higher* in low immigration states. This is perhaps not surprising, but it has not been emphasized in other papers. It indicates that when there are immigrant low skilled workers in the economy, natives tend to either migrate to other states or acquire more education.

Third, during the shock or perhaps a bit later, the share of native low skilled workers in felt less in low immigration states than in high immigration states, suggesting that either some low skilled natives moved from HIS to LIS or some high skilled natives moved from LIS to HIS. This is the effect of immigration on labor reallocation that I want to capture in my econometric exercise. It is worth noting that I am interested, like when examining wages, on the temporal variation caused by the labor supply shock.

Figure 8: Share of low skilled workers HIS vs LIS

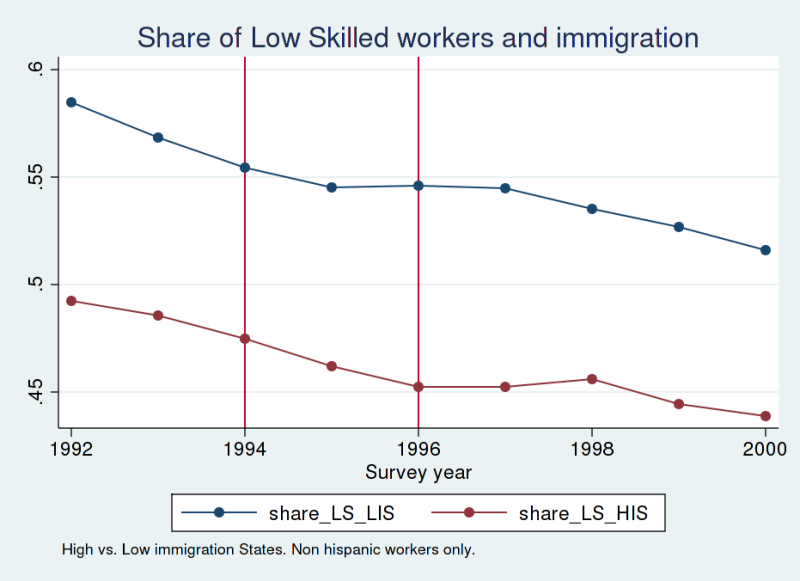


Figure 8 maps into the empirical specification most used in the literature[24]:

$$\frac{N_{s,t}}{N_{s,t}+H_{s,t}} = \alpha + \beta * \frac{Mex_{s,t}}{N_{s,t}+H_{s,t}} + \delta_s + \delta * time + \varepsilon_{s,t} \tag{16}$$

Where $N_{s,t}$ indicates native low skilled workers, $N_{s,t} + H_{s,t}$ indicates total native population and $Mex_{s,t}$ indicates Mexican inflows, previously used for the wage regressions. I instrument using the shock and the interaction of the shock with the 1980 geographic distribution of Mexicans within the US in 1980.

We would expect β to be negative if there are some displacement effects. Table 16 shows the results:

[24]The specification coming from the model is a bit different, but I think it is worth keeping the specification most used in the literature. See [Peri and Sparber, 2011] for further details.

Table 9: The impact of Mexican immigration on interstate reallocation

	est1	est2	est3	est4	est5	est6	est7	est8
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
	OLS	OLS	OLS	IV	OLS	OLS	OLS	IV
shock	0.008				0.001			
	0.007				0.002			
shock share 1980	-0.177**				-0.039***			
	0.058				0.010			
share mexican		-9.625***	-1.466+	-1.739*		-1.721***	-0.881*	-0.908**
		1.529	0.827	0.823		0.443	0.400	0.326
time	-0.006***	-0.006***	-0.017***	-0.016***	-0.004***	-0.004***	-0.012***	-0.012***
	0.001	0.001	0.004	0.004	0.000	0.000	0.003	0.003
r2	0.323	0.543	0.973	0.973	0.409	0.472	0.883	0.883
N	357	357	357	357	357	357	357	357

Dependent variables: In est1-est3 the dependent variables is the share of native low skilled workers. In est5-est8 is the share of young low skilled workers. Note: All regressions include a time trend. Columns 3 and 6 also include a state specific time trends. The IV is a dummy for the shock, 1995-1996 and the interaction between the dummy and the share of Mexican low skilled workers in 1980. 3 stars is 0.1%, 2 stars is 1% and 1 star is 5% significance levels. A + is a 10% significance level. Robust standard errors clustered at the state level reported. See further details in the text.

The results reported in Table 9 are in line with figure 16 previously discussed. In column 1, I show that states with more Mexican immigrants in 1980 lost a higher share of its native low skilled workers during the shock, while the overall share of low skilled workers remained the same (once controlling for the downward time trend). This suggests that some low skilled native moved from HIS to LIS.

In column 2, I report the results without including state fixed effects. This is the difference between the two lines in figure 16. This is not then, the effect of immigration on displacement. It just suggests that HIS states have less low skilled native workers, in relative terms. This is the gap between the two lines in Figure 16.

The causal effect of immigration on labor reallocation is shown in columns 3 and 4. In column 3 I do not instrument, while in column 4 I instrument by the shock and the interaction of the shock and the initial share of Mexicans across states. This numbers suggest that for every Mexican a bit more than 1 native is displaced. This might seem a bit high, but it might be due to an underestimation of the true size of the shock.

Columns 5 to 6 repeat the exercise, but using the share of young low skilled workers as the dependent variable. They show that most of this reallocation happens with the workers that are more closely competing with the immigrated Mexican workers.

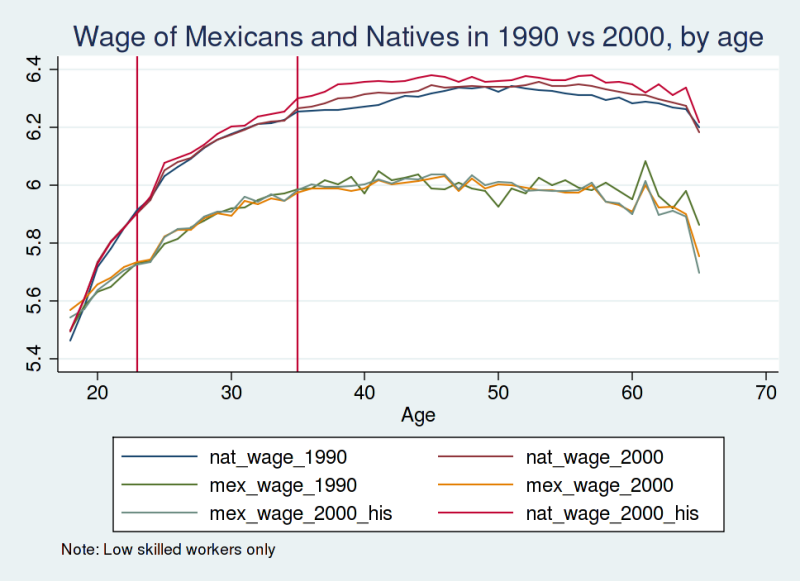
This labor reallocation implies that wage differences across states should disappear over time. The 2000 US Census allows me to study this longer term effects of immigration.

3.6 Long run effect on wages across states

In this section I show that workers that were low skilled and young in 1995 and 1996 and that live in high immigration states do not have a lower wage that workers in high immigration states.

The following figure shows that the wage profiles by age did not differ much when comparing 1990 and 2000, finding no trace of the 1995 immigration shock, indicated by the vertical red lines.

Figure 9: Mexican and US wage profiles



It also shows that in 2000 the wage of low skilled workers in high immigration states (HIS) is not lower than the low skilled workers in low immigration states. The same holds true for Mexican workers' wage. I interpret this as evidence suggesting that the shock is fully absorbed within the territory quite fast. This is in line with the labor reallocation documented in the previous section.

4 Conclusion

This paper uses the Mexican crisis of 1995 to document the effect of immigration on US wages. In particular, I use the fact that Mexican migration to the US is low skilled, young and concentrates in certain states, to show that a 1% immigration induced supply shock decreases wage by a bit more than 1%.

As a result, natives reallocate across states. For every Mexican entering the economy, around .7 young low skilled natives reallocate from high imigration states to low immigration states. This in turn helps to understand why in 2000 there is no evidence of lower wages of workers in high immigration states that suffered the shock, relative to the workers in low immigration states.

The fact that this paper uses both [Borjas, 2003] and [Card, 2001] type comparisons and obtains

the exact same result using either approach, should help to clarify the effect of immigration on labor market outcomes, both on impact and dynamically.

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