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Mexican migration to the United States: Underlying economic factors and possible scenarios for future flows

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Documento de Investigación 2013-20

Working Paper 2013-20

Mexican Migration to the United States: Underlying Economic Factors and Possible Scenarios for Future Flows*

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Abstract: In this paper we examine some economic factors that have influenced migration flows from Mexico to the United States since 1990 for the purpose of constructing scenarios on how such flows could evolve in the near term. In particular, we link the behavior of migration to changes in sectoral growth in the US, as well as to a heterogeneous participation of Mexican workers in employment by sector. To forecast future migration flows, we propose and estimate a model of demand for Mexican labor by US sector and use it to construct possible scenarios for migration flows. While the estimation is subject to a high degree of uncertainty, the main conclusion is that net migration flows of Mexicans to the United States over the coming years are likely to increase compared to what was observed during the recent global economic crisis, but that such flows are very unlikely to reach the levels registered during the 1990s.
Keywords: Migration flows, labor demand, US sectoral growth.
JEL Classification: O15, J23, J61, J82.

Resumen: En este artículo se examinan algunos factores económicos que han influido en los flujos migratorios de México a Estados Unidos desde 1990 con el propósito de construir escenarios de cómo estos flujos podrían evolucionar en el corto plazo. En particular, se relaciona el comportamiento de la migración con cambios en el crecimiento sectorial en los Estados Unidos, así como con la participación heterogénea de los trabajadores mexicanos en el empleo por sector en ese país. Para predecir los flujos migratorios futuros, se propone y se estima un modelo de demanda de mano de obra mexicana por sector estadounidense, el cual se utiliza para construir posibles escenarios de flujos migratorios. Si bien la estimación está sujeta a un alto grado de incertidumbre, la principal conclusión es que a pesar de que es probable que los flujos de migración neta de mexicanos hacia Estados Unidos en los próximos años aumenten en comparación con lo que se observó durante la reciente crisis económica mundial, es muy poco probable que tales flujos alcancen los niveles registrados durante la década de 1990.
Palabras Clave: Flujos migratorios, demanda laboral, crecimiento sectorial de EEUU.

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Executive Summary

In this report we examine some economic factors that have influenced migration flows from Mexico to the United States, for the purpose of constructing scenarios on how such flows could evolve in the near term. Throughout our analysis, we look at three different periods in the recent history of migration from Mexico to the United States. A first period, from 1990 to 2000, can be characterized by high levels of migration flows, which could be associated with the Mexican economic crisis of 1994-95 (also known as the peso crisis or the tequila crisis). During a second period, from 2000 to 2007, such flows stopped increasing, possibly in part as a consequence of stricter US immigration policy enforcement after 2001. During the most recent period, which corresponds to the global economic crisis and its aftermath, a significant decline in net migration flows occurred.

To understand the evolution of migration flows during these periods, apart from indirectly assessing the role that supply-side factors — such as Mexico's peso crisis and more robust US immigration enforcement after 2001 — could have had in shaping the behavior of migration flows during these periods, we link the behavior of such flows to changes in sectoral growth in the United States, as well as to a heterogeneous participation of Mexican workers in employment by sector.

We present evidence of an across-the-board increase in the quantity of Mexican labor demanded in US labor sectors during the first period (i.e., an increase in the intensity with which each sector employed Mexican immigrants relative to other workers). This evidence is consistent with our indicators of balanced sectoral growth and the migration literature that points to the importance of a positive supply shock that translated into lower wages for Mexican workers during that time. We still find an overall increase in the participation of Mexican workers in US sectors during the second period, although at a lower rate, which is in line with somewhat balanced growth across sectors and with reduced growth in migration flows, which can possibly be linked to stricter US immigration enforcement. Finally, for the most recent period, we document that the decline in net migration inflows from Mexico to the United States can be linked to the particularly poor performance during the recent economic crisis of a couple of sectors intensive in the use of Mexican labor, in particular the construction industry. Of course, other factors played a role in these changes in migration, such as a relatively more stable performance of the Mexican economy and a lower rate of growth of the Mexican population, though we do not examine these more deeply in this study.

To forecast future migration flows, we propose a model of demand for Mexican labor by US sector. We estimate the demand functions and use reasonable assumptions of how their main determinants (sectoral growth and relative input prices) could behave in the future, to construct a baseline scenario. By adding the results by sector, the model allows us to predict an overall demand for Mexican workers. Furthermore, by making additional assumptions based on the historical relationship between Mexican workers and the Mexican population living in the United States, we are able to construct forecasts regarding overall migration from Mexico to the United States in the coming years. This exercise focuses overwhelmingly on economic factors and it is beyond the scope of this report to fully flesh out more specific policy scenarios and realities. Undoubtedly, increased enforcement at US borders and in the US interior has played and will play a role in the size of the flows — as will Mexico's evolving demographic trends, which are likely to reduce emigration pressures to an extent not yet fully knowable.

Our baseline scenario indicates that, for the 2011-17 period, net inflows from Mexico to the United States could be on the order of 260,000 persons per year — a figure which includes legal and unauthorized migrants, and workers of all skill levels, both employed and unemployed, as well as dependents. This figure is clearly lower than the net inflow of Mexicans during 1990-2000, which amounted to around 466,000 annually. Additionally, we constructed alternative scenarios in which we varied the expected growth rate of the construction sector, which can be particularly important in determining Mexican migration. Moreover, in an indirect way, through changes in relative wages, we also simulated the effects of a supply shock and of an increase in border enforcement. These alternative scenarios, which do not take into account policy proposals currently under debate in the United States, suggest that net migration inflows from Mexico could potentially range from 230,000 yearly to as much as 330,000.

Thus, while a high degree of uncertainty still prevails concerning the size of flows that may be observed in the near term, the main conclusion we draw from our analysis is that net migration flows of Mexicans to the United States over the coming years are likely to increase as compared to what was observed during the recent global economic crisis, but that such flows are very unlikely to reach the levels registered during the 1990s.

I. Introduction

It has been well documented that migration flows from Mexico to the United States increased significantly during the 1990s.[1] Recently published data by the Pew Hispanic Center (Passel et al., 2012) confirm this pattern. Such data also indicate that migration flows seem to have stopped increasing after 2001, and that they began exhibiting a downward trend in the years immediately before the recent global economic crisis. Furthermore, after 2007 migration flows from Mexico to the United States seem to have continued diminishing, to such low levels that absolute decreases in the number of Mexican immigrants traveling to and living in the United States seem to have been observed since 2010 (i.e. net migration seems to have become slightly negative, see Figure 1).

Figure 1. Mexican Migration Stocks and Flows to the United States

Source: Passel, Cohn and Gonzales (2012).

One of the main factors that could be presumed to have driven the increase in Mexican migration to the United States during the 1990s is related to the consequences of the Mexican recession and currency devaluation of 1995, which may have significantly reduced income levels in Mexico — and, in the context of a booming American economy, may have induced larger migrant flows to the United States. Indeed, a spike in the migration flow from Mexico to the United States can be observed in 1995, followed by somewhat larger flows on average in

[1] See, for example, Hanson and McIntosh (2010).

the next few years. However, stricter US border and interior enforcement in the wake of the 9/11 attacks seem to have contributed to a halt in the increase in migration flows. Moreover, during the 2000s the population growth rate in Mexico decreased with respect to that of the previous decade, which, together with a more stable performance of the Mexican economy, could have also contributed to the slowdown in migration. Finally, the decline in migration from Mexico to the United States observed since 2007 appears to be linked to the recent economic crisis in the United States and, in particular, to the poor performance that the construction sector, a relatively large employer of Mexican workers, exhibited during this period.

This report identifies some of the economic factors underlying the described trends and, in particular, provides some evidence supporting the claims made above. We analyze how growth in different sectors of that economy, which in turn differ in their labor and, in particular, in their skilled labor intensity, could have played a role in shaping the behavior of demand for Mexican labor since 1990 and until the most recent period. We also provide indirect evidence of some supply shocks that may have also contributed to this behavior. We use this evidence to assess the size that Mexican migration flows to the United States may exhibit in the near future. In particular, we propose a simple model of US demand for Mexican workers to forecast future migration flows, based on expected growth rates for different US sectors.

In the following section, we look briefly at how differences in growth rates across sectors in the United States are correlated to their capital and their skilled labor intensities. This analysis is relevant to explain the US demand for Mexican labor. Indeed, provided that Mexican immigrants are relatively unskilled (see Hanson, 2006), then growth biased against labor-intensive, and especially against unskilled labor-intensive, sectors, should induce a lower demand for Mexican workers and, in turn, may induce lower migration flows. Afterwards, we look at how the demand for Mexican workers varies across sectors and how the heterogeneous growth performance of each sector could have affected migration flows of Mexicans. Finally, we propose a model to estimate the demand for Mexican workers by sectors in the United States, which we then use to suggest several scenarios related to the possible size of future migration flows of Mexicans to the United States.

II. Value-Added Capital and Labor Composition in the United States

In this section, we briefly show how US growth performance has differed across sectors that have different total labor and skilled labor intensities, and try to link this behavior to observed migration patterns. In particular, for each of three relevant time periods, in Figure 2 we illustrate the correlation between value-added growth rates and the initial labor and skilled labor intensities by sector.[2] Each bubble represents a sector, with the size of the bubble indicating the importance of the sector in terms of employment levels. We also show weighted and unweighted regression lines. The hypotheses that follow from this visual analysis will be studied more fully in the next section.

For the first period, from 1990 to 2000, we do not find a statistically significant relationship between sector-specific rates of growth, either with labor intensity or with skilled labor intensity. In other words, growth in this period seems to have been balanced across sectors, so no biases favoring the use of unskilled labor were observed. In this context, the increase in Mexican labor use in the United States during this period seems to have been driven by an increase in the supply of Mexican workers, which could have resulted in lower relative wages for these workers, in turn inducing an increase in the use of Mexican labor in most sectors. This is consistent with the findings we present below.

On the contrary, from 2000 to 2007, we find that capital-intensive sectors — such as real estate and leasing, information, and transportation — grew faster than labor-intensive sectors (with a statistically significant correlation). This could, in principle, have led to a decrease in the labor demand growth rate, which in turn may have negatively affected Mexican hiring. This may partially explain the reduction of Mexican migration flows to the United States during these years. We must also note that during these years we still do not find a significant correlation between sectoral growth rates and skill intensity. Furthermore, it is relevant to mention that the relative reduction of migration flows during this period may have also been at least partially explained again by supply-side factors, within which stricter US immigration enforcement at the US-Mexico border and within the US interior seems to stand out.

[2] The value-added growth rate measures how much each sector expanded in terms of value added, or more simply, how much each sector produced after taking into account the cost of inputs. Labor intensity is measured as the ratio of total labor to total physical capital used by sector (left-hand set of graphs in Figure 2). Skilled labor intensity (right-hand set of graphs in Figure 2) is measured by the ratio of skilled to unskilled workers used by sector. We assume skilled workers are those who hold at least a high school diploma. We consider that this is the relevant threshold in the context of migration from Mexico to the United States, given the education levels of Mexican migrants; see Chiquiar and Hanson (2005).

Figure 2. Value-Added Growth Rate vs. Total Labor and Skilled Labor Intensity by Sector

Notes: Size of the bubble given by employment in the sector in the starting year. Red dotted line corresponds to the weighted regression line.
m: slope of the weighted line: ***1%, **5%, *10%, a15%
Value added in dollars of 2005, capital in $100,000 of 2005.
Source: Bureau of Economic Analysis (BEA), "Industry Economic Accounts Data, Real Value Added by Industry," and "Fixed Assets Accounts Tables," www.bea.gov/iTable/index_industry.cfm and www.bea.gov/iTable/index_FA.cfm. US Census Bureau and BLS, Current Population Survey, 1991, 1998, and 2011 March supplements.

Finally, for the most recent period (2007-10), we observe that while capital-intensive sectors are still those growing at higher rates, it is now the case that skilled labor-intensive sectors — such as financial services, education, and information — grew significantly faster than unskilled labor-intensive sectors. So, in contrast with prior years, during this period, the behavior of the relative demand for Mexican workers may indeed be related to differences in the growth rates of sectors that differ in the intensity with which they use Mexican labor. In particular, the especially bad performance of unskilled labor-intensive sectors after the recent economic crisis may have been a relevant factor explaining the reduction of the demand for Mexican labor and of migration flows to the United States.

III. Skill Intensity and Mexican Intensity

To obtain a better understanding regarding the demand for Mexican workers in different sectors in the United States, we first look at the skill composition by sector and link it to the share of Mexicans employed in each sector. For this purpose, we use data from the Current Population Survey (CPS, March supplement). We chose 1993 as the year for this particular analysis because we want to identify the sectors in which Mexican workers were employed at the beginning of the period of analysis (a baseline year given data availability). Then we can relate the importance of sectors in terms of employment of Mexicans to how they have performed over time. We identify Mexican workers by their country of birth, so that only those workers who were actually born in Mexico are classified as Mexicans. In Table 1 we report the ratio of skilled-to-unskilled workers for each sector and sort sectors by this measure of skill intensity. We then categorize sectors into three groups, each representing an equal share of value added, always sorting sectors from the least to the most skill intensive. This way, sectors from agriculture to retail sales compose the first group, sectors from mining to real estate and leasing the second one, and sectors from health to financial services the final one.[3]

[3] Information on value added was obtained from the Bureau of Economic Analysis (BEA). As explained above, we use 1993 as a baseline year to identify where Mexican workers were employed before economic shocks affected the behavior of the sectors and migration. However, the finding that Mexican workers are concentrated in low-skilled sectors also holds for other years of analysis. For the analysis throughout this report, we also use data from the March supplements of the Current Population Survey (CPS) from 1994 to 2011, assuming that a person who reported earning a positive wage in the year previous to the survey was actually working that year, so that we have information for the years 1993 to 2010.

Table 1. Skill Intensity and Mexican Distribution by US Sector, 1993

Sectors	L skilled to L unskilled ratio (US in 1993)	GROUP: 1 / 3 of Value Added (US in 1993)	Distribution of Mexican workers % (US in 1993)	Cumulative Distribution of Mexicans
Agriculture	1.5	**1**	12.4	12.4
Traveler services and Restaurants	2.3	**1**	13.8	26.3
Manufactures: food, beverages, tobacco, textiles, footwear, leather products	2.7	**1**	10.0	36.2
Other services	2.8	**1**	6.9	43.1
Construction	3.5	**1**	9.0	52.2
Manufactures:wood, paper, chemicals, pharmaceuticals, paints, plastics, glass, cement products.	4.7	**1**	7.1	59.3
Amusement	4.7	**1**	1.3	60.6
Retail sale	5.2	**1**	8.7	69.3
Mining	5.6	**2**	0.3	69.6
Manufactures: metals, industry machinery, electronic components, motor equipment, medical equipment.	7.1	**2**	9.5	79.1
Whole sale	7.6	**2**	4.2	83.3
Total Transportation	8.6	**2**	2.5	85.7
Real estate and leasing	8.7	**2**	1.4	87.1
Health	10.7	**3**	4.3	91.4
Utilities	11.3	**3**	0.4	91.8
Business_services	12.1	**3**	3.3	95.1
Information	14.2	**3**	1.3	96.4
Education	19.5	**3**	2.7	99.1
Financial services	57.5	**3**	0.9	100

Note: Ordered from the least skill intensive to the most skill intensive, each group consists of one-third of total value added in the United States.
Source: BEA, "Industry Economic Accounts Data, Real Value Added by Industry;" US Census Bureau and BLS, Current Population Survey, 1994 March supplement.

Looking at the distribution of Mexican workers across all sectors in 1993 (far-right column), we find that 70 percent were working in the first group of sectors, which corresponds to the least skill-intensive one. Indeed, as can be noted in Figure 3, there is a strong negative correlation between the skill intensity (ratio of skilled-to-unskilled workers) and the "Mexican intensity" of the sectors, where this last concept is measured as the proportion of Mexican workers with respect to all workers in each sector. This is a clear indication that Mexican immigrants tend to be employed to a relatively larger extent in unskilled labor-intensive sectors. This is relevant to understand changes in the demand for Mexicans in the United States over time, since if unskilled-intensive sectors were the ones performing worse, or lagging during the crisis, then it is understandable that the relative demand for Mexicans could have fallen, leading to a worsening of labor market conditions for migrants and thus to lower migration flows.

Figure 3. Relationship between Share of Mexican Workers and Skill-Unskilled Labor Ratio

Notes: Size of the bubble given by US employment in the sector in 1993.
Statistical significance level: ***1%, **5%, *10%.
Source: US Census Bureau and BLS, Current Population Survey, 1994 March supplement.

To look deeper into this point, we present in Figure 4 the evolution of value added for each of the three groups of sectors, as defined above. In the left-hand figure, which spans the 1990s, we observe that all three sectoral groups were performing similarly in terms of their rates of growth. The figure in the middle, which focuses on the 2000-07 period, already points to the group of least skill-intensive sectors lagging, precisely during the phase where the flow of Mexicans appears to have started declining. In the figure at right, which looks at the most recent period (2007-10) it is very clear that during the recent economic crisis the group of least skill-intensive sectors clearly suffered a much larger drop in value added. This is precisely the period when the most important decline in migration flows can be observed.

The evidence presented may be consistent with the hypothesis that, on the one hand, from 1990 to 2007 the rise in migration flows from Mexico to the United States can be associated with an increase in the participation of Mexican workers across most sectors, although this tendency may have been weaker after 2001. This argument is reinforced by the evidence presented in Figure 5, which shows the proportion of Mexican workers as a share of overall workers in each sector in 1993 and 2007.

Figure 4. Value Added in the United States by Skill Intensity

Note: Group 1 is composed of the least skill-intensive sectors; Group 3, the most skill-intensive sectors.
Source: BEA, "Industry Economic Accounts Data, Real Value Added by Industry;" US Census Bureau and BLS, Current Population Survey, 1991 March supplement.

Figure 5. Share of Mexican Labor in US Sectors, 1993 and 2007

Source: Authors' analysis of US Census Bureau and BLS, Current Population Survey, 1994 and 2008 March supplements.

As can be noted, there was a significant increase from 1993 to 2007 in the proportion of Mexican workers in most sectors. Specifically, the share in the construction sector increased from 4.7 to 14.9 percent. Also noticeable are the increases in agriculture (from 17.8 to 26.6 percent) and in traveler services (from 5.8 to 9.5 percent). As mentioned earlier, this could have been driven by an increase in the supply of Mexican labor, which decreased these workers' wages in the United States, together with a balanced growth across US sectors, at least until 2000. Indeed, as evidence of a supply shock that could have been triggered by the

1995 Mexican crisis, Figure 6 shows an important decline in wages in Mexico relative to those of Mexican workers in the United States during that year.

Figure 6. Comparison of Wages in Mexico with Wages of Mexican and Non-Mexican Workers in the United States, 1990-2010

Source: 1990 US Census Bureau data. US Census Bureau and BLS, Current Population Survey, 1994-2011 March supplements. Mexican employment surveys conducted by Instituto Nacional de Estadística y Geografía (INEGI), "Encuesta Nacional de Empleo Urbano (ENEU) 1990-99 Survey Database," "Encuesta Nacional de Empleo (ENE) 2000-04 Survey Database," and "Encuesta Nacional de Ocupación y Empleo (ENOE) 2005-10 Survey Database."

This is a factor that could have induced more Mexican workers to leave Mexico and migrate to the United States. Moreover, we also observe a decline in the relative wages of Mexicans in the United States during the same period, possibly associated with increased migration flows and, thus, a larger relative supply of Mexican workers in the US labor market. For a later period, the fact that during the 2000s the wages of Mexican workers in the United States stopped decreasing, or even increased, could be associated with reduced migration flows (which in turn could be due to stronger US border enforcement). We will use these two distinct supply shocks later in the analysis when we look at possible future scenarios for migration, to identify the effect of potential supply changes. On the other hand, we hypothesize that the most recent decline in migration flows during the recent economic crisis could be associated with the especially bad performance of those sectors in which Mexican workers are most intensively concentrated. Indeed, it is the case that during the most recent crisis the labor market conditions faced by Mexican immigrants in the United States seem to have worsened even more than for the rest of the labor force, suggesting that the crisis hit especially hard those sectors that tend to employ relatively more Mexicans (e.g. construction and manufacturing). In particular, while the overall US unemployment rate and the unemployment rate for Mexican immigrants were at similar levels of around 4.5 percent during 2006 and the first half of 2007, by 2009-10 the unemployment rate faced by Mexican immigrants rose to an average of around 11.4 percent, while the overall unemployment rate hit an average 9.4 percent (see Figure 7).

Figure 7. US Unemployment Rates Overall and for Mexican Immigrant Workers, 2006-12

Source: Authors' analysis of US Census Bureau and BLS, Current Population Survey, 2006-12 monthly issues.

To support the hypotheses described above more formally, we follow the methodology proposed by Berman, Bound, and Griliches (1994), whose goal was to understand changes in skill intensity in the United States. More precisely, their purpose was to learn whether increases in overall skill intensity were coming from a higher growth rate in skill-intensive sectors (that is an across- or between-sectors effect) or whether all sectors were hiring more skilled workers (a within-sectors effect). Likewise, here we try to look at changes in "Mexican intensity;" that is, we try to answer whether the observed changes in the ratio of Mexican workers to all workers in the United States in each of the periods analyzed can be explained by the fact that sectors that use Mexican workers intensively may have grown at different rates than other sectors, or whether all sectors, irrespectively of their Mexican labor intensity, hired more Mexicans. The details (and formula) on the decomposition are presented in Appendix A.

The results of this exercise are summarized in Table 2. As can be seen, between 1993 and 2000 the percentage of Mexican workers among all workers in the United States grew from 2.989 to 4.186 percent; that is, 0.171 percentage points per year. This change can be explained by an increase within sectors. In other words, all sectors increased their Mexican intensity. A similar result is found for the 2000-07 period, although in this latter period we do find that the overall annual increase of the Mexican labor share in US employment was smaller (0.125 percentage points per year). On the contrary, between 2007 and 2010 we find that the percentage of Mexicans employed in the United States did not change. This is the result of two offsetting forces. First, we still observe a positive within-sectors effect, but its size is smaller than what was registered in the previous periods. Second, we now find a larger negative between-sectors effect, which offsets the first effect completely. Thus, while a small, positive increase in across-the-board Mexican labor demand seems to still have been taking place during this period, this was completely offset by the fact that the sectors that employ a larger

percentage of Mexican immigrants exhibited a relatively worse performance than sectors that do not employ Mexican workers as intensively.

Table 2. Decomposition of Changes in Mexican Labor in the United States, 1993-2000, 2000-07, 2007-10

Period	% of Mexicans in US employment		Annual Change in % of Mexicans in US employment		
	Baseline year	End year	Total	Between sectors	Within sectors
1993 - 2000	2.989	4.186	0.171	-0.013	0.184
2000 - 2007	4.186	5.062	0.125	-0.005	0.130
2007 - 2010	5.062	5.058	-0.001	-0.044	0.043

Note: Results are annualized.
Source: Authors' analysis of US Census Bureau and BLS, Current Population Survey, 1994-2011 March supplements.

To examine this result more closely, in Table 3 we show for the 2007-10 period how much each sector contributed to the decline in Mexican intensity due to their performance in terms of employment. We find that most of the decline is explained by the negative performance of the construction sector. The manufacturing sector also played a role, but not as large as that of the construction industry.

Table 3. Mexican Labor Decomposition by US Sector, Between-Sectors Effect, 2007-10

Sectors	Between sectors	Sectors	Between sectors
Agriculture	0.007	Financial services	-0.001
Mining	0.000	Real estate and leasing	0.000
Construction	**-0.054**	Business services	0.005
Manufactures: food, beverages, tobacco, textiles, footwear, leather products	0.003	Amusement	0.001
Manufactures: wood, paper, chemicals, pharmaceuticals, paints, plastics, glass, cement products.	-0.005	Traveler services and restaurants	0.008
Manufactures: metals, industry machinery, electronic components, motor equipment, medical equipment.	**-0.010**	Health	0.008
Whole sale	0.001	Education	0.003
Retail sale	0.000	Other services	-0.002
Total Transportation	-0.007	Information	-0.001
Utilities	0.000	**SUM**	**-0.044**

Note: Results are annualized.
Source: Authors' analysis of US Census Bureau and BLS, Current Population Survey, 1994-2011 March supplements.

IV. Estimating Future Mexican Migration Flows

Using the evidence we have presented so far, we propose two hypotheses related to Mexican migration to the United States over the near-term future. It should be noted that we do not distinguish between types of immigrants in this flow — by legal status, labor force participation, or skill level. First, we believe that in order to observe an increase in migration flows, Mexican-intensive sectors, such as construction, would need to increase their growth rates to "attract" more Mexicans. This is related to the demand for Mexican workers in the future, and, consequently, we look deeper into the behavior of such demand in order to examine whether migration will resume from its recession-induced declines over the coming years. The details of the hypothesis will be described in the next section.

The second hypothesis relates to the possibility that skilled Mexican migrants will become an important driver of migration flows. We do not attempt to test this point in this report, but it may be worth looking at in the future whether the skills composition of future Mexican flows will increase. Indeed, even as the total number of Mexicans in the United States stopped growing or even declined during recent years, the skilled Mexican population in the United States continued to increase (both in number of persons and as a proportion of Mexicans in the United States). Additionally, Mexican workers on both sides of the border have become more skilled over time (see Figure 8). Given the fact that skill-intensive sectors in the United States are currently relatively better-performing, increased skills of Mexican workers could translate into higher migration flows from Mexico.

Figure 8. Mexican Skilled Population and Employment in the United States

Source: Authors' analysis of US Census Bureau 1990 census data. US Census Bureau and BLS, Current Population Survey, 1994-2011 March supplements. Mexican employment surveys conducted by INEGI, "Encuesta Nacional de Empleo Urbano (ENEU) 1990-99 Survey Database," "Encuesta Nacional de Empleo (ENE) 2000-04 Survey Database," and "Encuesta Nacional de Ocupación y Empleo (ENOE) 2005-10 Survey Database."

Evidently, other factors could play a relevant role in analyzing future migration flows. An important one is demographic changes or possible push factors originating in the home countries. Another relevant factor may be related to immigration policy reform in the United States.

A. Estimation of Possible Future Flows from Mexico to the United States Based on a Model of the Demand for Mexican Labor

Our analysis indicates that we can construct a strategy to forecast future migration flows based on the demand for Mexican labor by sector in the United States. Therefore, to construct scenarios of possible future migration patterns, we propose an estimation of such demand functions. Based on these estimations, we are able to construct scenarios assuming different paths of relative prices (wages) and sectoral output growth. Although the model is based on the estimation of demand functions for Mexican workers, we take into account changes in the supply of Mexican labor through our assumptions concerning possible future adjustments in the relative wages of Mexican workers in the United States.

The estimation is based on the methodology proposed by Berndt (1991). This analysis is centered on the estimation of the parameters of generalized Leontief cost functions that can then be used to construct the demands for each of the inputs in the production function (Mexican labor, non-Mexican labor and capital). The details are presented in Appendix B. Each of these demands is a function of output and of the prices for all three inputs. Therefore, we can make assumptions on how output by sector will behave in the future, as well as the relative prices of the inputs, in order to obtain predictions on the demand for Mexican workers.

We construct a baseline scenario for the 2011-17 period using the following assumptions. First, growth rates for each sector are such that the overall growth rate of the US economy is 2.5 percent, as suggested by long-term forecasts.[4] We assume a sectoral growth composition according to US Bureau of Labor Statistics (BLS) estimates (Henderson, 2012). For the construction industry, however, as will be seen below, we also performed several sensitivity exercises, as the baseline BLS estimate seemed to be very optimistic. With respect to wages, we assume that those for non-Mexican workers will grow at their 2001-06 mean rates. Furthermore, in our baseline scenario we assume that wages of Mexican workers grow at a rate equal to that of non-Mexicans, plus we add an upward adjustment to capture a lower supply of Mexicans due to an expected relatively good performance of the Mexican economy. Finally, we assume that the price of capital will increase at its 2001-06 mean growth rate.

[4] Wolters Kluwer, "Blue Chip Economic Indicators," October 2012.

Table 4. Projected Estimations of Labor Demand in the United States, 2011-17

	Assumptions			Estimates			Mexican labor in the US		Estimated Net inflow of Mexican workers per year
	$\Delta\%Y$	$\Delta\%w_m$	$\Delta\%w_{us}$	$\Delta\%L_m$	$\Delta\%L_{us}$	$\Delta\%L_{tot}$	2010 (actual)	2017 (estimated)	
Agriculture	1.6	1.9	0.5	1.88	0.78	1.04	646,176	736,219	12,863
Amusement	2.2	1.2	-0.2	1.55	1.00	1.02	85,336	95,053	1,388
Business services	3.2	1.3	-0.1	3.83	3.16	3.18	511,701	665,905	22,029
Construction	1.0	1.3	-0.1	2.44	0.88	1.16	1,131,631	1,339,467	29,691
Education	1.5	1.8	0.4	2.09	1.44	1.45	262,723	303,695	5,853
Financial services	2.8	1.5	0.1	3.73	1.47	1.49	64,796	83,707	2,702
Health	2.5	2.3	0.9	3.61	2.40	2.42	360,012	461,381	14,481
Information	4.1	2.2	0.8	-0.67	5.59	5.53	44,396	42,340	-294
Manufacturing	2.4	0.9	-0.4	-0.44	3.76	3.56	989,421	959,682	-4,248
Mining	1.1	3.5	2.1	4.22	3.43	3.46	36,274	48,451	1,740
Other services	2.1	1.3	0.0	2.84	1.84	1.93	344,032	418,437	10,629
Real estate leasing	2.8	1.1	-0.3	-0.35	0.73	0.70	55,511	54,150	-194
Retail sales	3.2	2.4	1.0	4.58	0.64	0.79	508,081	694,963	26,697
Transportation	2.8	0.7	-0.6	-10.76	3.29	3.08	241,194	108,750	-18,921
Traveler services	2.2	1.2	-0.1	3.82	1.69	1.92	928,765	1,207,828	39,866
Utilities	1.7	1.6	0.2	2.43	-0.44	-0.39	25,045	29,618	653
Whole sale	2.9	1.4	0.1	2.33	1.71	1.74	250,010	293,758	6,250
Total (sum)							6,485,103	7,543,404	151,186

Note: See Section IV.A. and Appendix B for a fuller explanation of the methodology.

The first three columns in Table 4 present the assumptions by sector with respect to output growth rates and wages for both Mexican and non-Mexican workers. The second group of columns reports the expected growth rates for Mexican, non-Mexican, and total workers by sector, computed using the parameters of the estimated demand functions and the previously described assumptions. These growth rates are then used to compute the new stock of Mexican workers in the United States, which are reported in the column labeled "Mexican Labor in the United States for 2017." The net increase of Mexican workers per year is then computed as the difference between the estimated stock for 2017 and that observed in 2010, divided by 7 to obtain a yearly flow. Finally, the expected total annual increase of Mexican workers is computed as the sum of the estimated flows for each sector. As the table shows, the baseline scenario suggests an increase of around 150,000 Mexican workers per year over the 2010 numbers.

Note that this last figure should not be interpreted as an estimate of the net inflows of Mexican migrants to the United States, since it refers specifically to workers. Historically, yearly net migration flows from Mexico have been larger than the figures corresponding to the annual increase in Mexican workers in the United States. Indeed, some workers migrate with dependents (e.g. children or spouses) who will not work in the United States, while others remain unemployed. However, a relatively systematic relationship does seem to exist between average migrant flows and the growth of Mexican workers in the United States (see Figure 9).

Figure 9. Mexican-Born Population in the United States, 1993-2010 and Forecast

Source: Authors' analysis of US Census Bureau 1990 census data; US Census Bureau and BLS, Current Population Survey, 1994-2011 March supplements. Forecasts based on authors' estimates based on the methodology described in Section IV.A. and Appendix B.

Thus, by making additional assumptions concerning the future behavior of this relationship, it is possible to use our estimate for the annual increase in the number of Mexican workers in 2010-17 to compute a corresponding estimate for total net migration flows during that period. In particular, to construct the forecast on changes in the number of Mexican immigrants to the United States, we assume that the ratio of total immigrants to Mexican workers in the United States starts the forecast period at similar levels to the ones recently observed but that, in future years, it exhibits a slight diminishing trend. In other words, we assume that in the future, among the Mexican population living in the United States, a larger share will be working. A rationale for assuming this is a possible drop in unemployment rates among Mexican workers in the United States as a result of an improved US economy as compared to recent years.

Under these assumptions, we estimate a net flow of around 258,000 Mexican migrants to the United States per year between 2011 and 2017. To put our results in context, a look at Figure 9 allows us to make a comparison of the historic behavior of the stocks of Mexican immigrants and of Mexican workers in the United States with the estimated future paths of these stocks. As can be noted, the estimated annual net inflow of 258,000 for 2011 to 2017 is clearly lower than the net inflow of Mexicans observed during 1990-2000 (466,000 immigrants per year).[5]

[5] The figures on annual net inflows for 1990 to 2000 are computed using the number of Mexican-born persons living in the United States in 1990 according to US Census Bureau data (1990) and Current Population Survey information for 2000 (US Census Bureau and BLS, Current Population Survey, 2001 March supplement. These figures differ from the 517,000 calculated by Passel et al. (2012), the main reason being that their figure is computed as the average gross inflow in the period, rather than using stocks at the beginning and end of the period to obtain a net inflow figure. Additionally, the figures of Passel et al. correct for possible undercounts in the sources. Despite these differences in information, our main qualitative conclusions hold.

Our approach has the advantage of being flexible in the sense that we can vary the underlying assumptions regarding future rates of growth of the different sectors. This allows us to construct different scenarios that can be valuable to perform a sensitivity analysis on the results. In particular, given the importance of the construction sector for Mexican immigrant employment, we now examine possible outcomes associated with different growth rates for the construction sector. Figure 10 presents the different scenarios, one of which corresponds to the baseline and another one to the estimated growth rate based on the BLS forecasts on sectoral growth (adjusted to obtain a 2.5 percent overall growth rate).

Figure 10. Estimates of Overall Mexican-Born Population in the United States Based on Different Scenarios for US Construction Sector Growth Rates

Source: Authors' analysis of US Census Bureau 1990 census data and US Census Bureau and BLS, Current Population Survey, 1994-2011 March supplements. Forecasts based on authors' estimates constructed according to the methodology described in Section IV.A. and Appendix B. Information on value added for the construction sector based on BEA, "Industry Economic Accounts Data, Real Value Added by Industry."

The estimates range from a low net inflow of around 200,000 to a high of 330,000 Mexicans per year under the more optimistic assumptions concerning construction output growth. It should be noticed that even under such an optimistic scenario, the estimated net migration flows from Mexico to the United States are clearly below those observed in the 1990s.

B. *Incorporating Possible Shocks into the Model to Estimate Possible Future Flows*

Several shocks of different types could affect future migration flows. For this report, we propose an indirect method to show possible effects of some supply shocks that could determine future migration patterns. In particular, we look at a type of shock that could cause an increase in the flow of Mexicans migrating to the United States. Another shock we introduce indirectly is related to changes in US immigration policy. We recognize that a more sophisticated approach could be used to introduce these shocks. In particular, it could be relevant for future work to look more closely at the evolution of demographic patterns in Mexico, which may be especially important given that we expect a lower rate of growth of the Mexican population. This demographic transition is likely to reduce push pressures on migration from Mexico to the United States.

To implement our indirect method of introducing supply shocks, we identify two events where wages for Mexican workers in the United States were affected by past supply shocks. The first one corresponds to the sharp increase of Mexican immigrants that took place in 1995, after the onset of Mexico's economic crisis. The second one is related to increases in US immigration enforcement observed after 2001 (see Figure 6). This way, we benefit from past events that allow us to learn about what could happen with Mexican worker wages in the United States if some factor pushes more Mexicans to migrate, or under stricter enforcement of US immigration laws. When we introduce a positive labor supply shock that reduces the relative wages of Mexicans in the United States in the same fashion as occurred in 1995, we estimate that the net inflow of Mexican migrants could increase to 300,000 yearly. However, if we introduce a change in relative wages similar to that observed in 2001, net Mexican inflows could be at a lower level of around 246,000 (see Figure 11).

Figure 11. Mexican-Born Population in the United States Based on Baseline Scenario and Scenario with Possible Shocks

Source: Authors' analysis of US Census Bureau and BLS, Current Population Survey, 1994-2011 March supplements. Forecasts based on authors' estimates constructed according to the methodology described in Section IV.A and Appendix B.

In sum, the demand model we propose, together with the baseline estimates, the sensitivity analysis, and the exercises we make to introduce possible supply changes, allows us to provide an assessment on how Mexican migration flows to the United States could behave in the future. We conclude, according to the evidence we have provided, that while we may expect a new increase in the flows of Mexican migrants coming to the United States during 2011-17, these flows are very unlikely to reach high levels such as those observed during the 1990s. In particular, we estimate that net migration inflows from Mexico may reach 230,000 to 330,000 annually — in other words, a net inflow 50 to 30 percent lower than the large net inflows of around 460,000 immigrants per year observed during the 1990s.[6]

V. Conclusions and Final Remarks

Migration from Mexico to the United States is a complex phenomenon that has been widely studied in the research literature. Several push and pull factors have played a role in shaping the Mexican-US migration history, such as economic crises, border enforcement policies, and network effects. In this report, we have focused on the relationship between the economic performance of different US labor sectors and the demand for Mexican workers. The evidence we provide indicates that migration flows during the 1990s can be linked to an increase in the proportion of Mexicans in most US sectors, possibly induced by push factors related to the Mexican economic crisis, which could have increased the supply of Mexicans and reduced their wages in the United States. Additionally, the recent decline in migration flows that began in 2007 seems to have been influenced by lower demand for Mexican labor observed in sectors that had a high proportion of Mexican workers and that underperformed during the most recent years (particularly the construction sector, which hires a large proportion of Mexicans and was especially affected by the crisis). Increased US immigration enforcement also, of course, played a role, but it is beyond the ambit of this economic report to fully flesh out factors such as enforcement or evolving Mexican demographic changes that will play a role in reduced emigration push factors to some degree.

To estimate expected migration flows for the next years, we use a model of demand for Mexicans by labor sectors in the United States. In this model, Mexican workers are an input in the production function. Our baseline scenario indicates that the annual net inflow of Mexican immigrants in the United States — legal and unauthorized, and of workers and dependents, skilled and unskilled — could reach around 260,000 during 2011-17. The demand model we propose, together with the baseline estimates, sensitivity analysis, and the scenarios offered that introduce possible supply changes, could raise the flow to as much as 330,000 annually — still well below the large net yearly inflows of around 460,000 observed during the 1990s. Further, the composition of the flows may change, bringing in new inflows of skilled Mexican workers.

As mentioned earlier, there are many factors that encourage or curb migration. Therefore, future migration flows may differ from these estimates for several possible reasons. In particular, the possibility of US legislative immigration reform, which appears increasingly likely to occur, could certainly change the scenario. The uncertainty that still prevails

[6] The estimated range is based on the baseline scenario, assuming that the growth rate of the US construction sector is between 0 and 4 percent (see Figure 10). This range in fact contains the estimated inflows resulting from the simulation of supply and immigration policy enforcement shocks.

concerning future growth paths that the US and Mexican economies may exhibit also implies uncertainty concerning the size of future migration flows. However, based on the evidence presented and on the different scenarios we construct, we conclude that over the next few years, migration flows are very unlikely to reach the high levels registered during the 1990s.

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Appendices

Appendix A. Estimating Mexican Intensity in the United States

We use the decomposition proposed by Berman, Bound, and Griliches (1994) to understand changes in "Mexican intensity" in the United States. This allows us to learn whether such changes come from "between-sectors effects," that is, from a reallocation of total employment between sectors using different Mexican intensities, or from increases "within sectors;" that is, changes in the proportion of Mexican workers within all US labor sectors. The precise formula for the decomposition is the following, where the first term captures changes between sectors, while the second term captures changes within sectors:

$$\Delta P = \sum_i \Delta S_i \bar{P}_i + \sum_i \Delta P_i \bar{S}_i$$

For i = 1, … , N sectors.
Where:
P = "Mexican intensity" (Mexican workers / all workers)
S_i= Share of workers in sector i (Workers in sector i / all workers)
Δ indicates change between the final and the baseline year in the period of analysis, and a bar over a term denotes the mean value for those two years.

Appendix B. Estimating Demand for Mexican Workers by US Labor Sector

We use the methodology proposed by Berndt (1991) to estimate the demand for Mexicans by sector in the United States. In particular, we assume that each sector has a generalized Leontief cost function with three inputs: Mexican labor (L_{mex}), non-Mexican labor (L_{us}), and capital (K). Imposing constant returns to scale, the cost minimizing input-output quantities are given by:

$$\frac{K}{Y} = d_{K,K} + d_{K,L_{mex}} \left(\frac{P_{L_{mex}}}{P_K}\right)^{\frac{1}{2}} + d_{K,L_{us}} \left(\frac{P_{L_{us}}}{P_K}\right)^{\frac{1}{2}}$$

$$\frac{L_{mex}}{Y} = d_{L_{mex},L_{mex}} + d_{L_{mex},K} \left(\frac{P_K}{P_{L_{mex}}}\right)^{\frac{1}{2}} + d_{L_{mex},L_{us}} \left(\frac{P_{L_{us}}}{P_{L_{mex}}}\right)^{\frac{1}{2}}$$

$$\frac{L_{us}}{Y} = d_{L_{us},L_{us}} + d_{L_{us},K} \left(\frac{P_K}{P_{L_{us}}}\right)^{\frac{1}{2}} + d_{L_{us},L_m} \left(\frac{P_{L_{mex}}}{P_{L_{us}}}\right)^{\frac{1}{2}}$$

With three cross equation symmetry constraints:

$$d_{K,L_{mex}} = d_{L_{mex},K} \quad , \quad d_{L_{mex},L_{us}} = d_{L_{us},L_{mex}} \quad , \quad d_{K,L_{us}} = d_{L_{us},K}$$

In order to estimate the input-output equations we use the iterative seemingly unrelated regression estimator. Once we have the estimated parameters, we can compute the input demands. Specifically, the optimal cost minimizing demand for input i is given by:

$$\frac{\partial C}{\partial P_i} = X_i = Y \left[\sum_{j=1}^{n} d_{ij} \left(\frac{P_j}{P_i} \right)^{\frac{1}{2}} \right]$$

Where:
P_i is the price for input *i = 1 … n*
X_i is the quantity of input *i = 1 … n*
C is total costs.
Y is output.

We use information from the Current Population Survey (CPS) March supplement from 1994 to 2011 to obtain the data series of wages and workers. We assumed that a person who reported earning a positive wage in the last calendar year was actually working in that year. Under these assumptions we obtained a time series for workers and wages from 1993 to 2010. Value added and capital series were obtained from the Bureau of Economic Analysis.
With the complete series of value added (VA), price of Mexican labor (w_{mex}), Mexican labor (L_{mex}), price of non-Mexican labor (w_{us}), non-Mexican labor (L_{us}), price of capital (r), and capital (K) per sector from 1993 to 2010, we proceeded to estimate a system of equations for each sector in the United States. Total labor demand is then obtained as the sum of estimated demands across all sectors. Figure A-1 presents the fitted and actual data for total Mexican labor (i.e. the sum across all sectors), indicating that the model is able to capture the behavior of our variable of interest.

Figure A-1. Estimated Labor Demand for Mexican Workers in the United States and Observed Data, 1993-2010

Source: US Census Bureau and BLS, Current Population Survey, 1994-2011 March supplements, and authors' estimation as described in Section IV.A and this Appendix.