Deport or legalize? An Economic Analysis

of US Immigration Reform

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DEPORT OR LEGALIZE? AN ECONOMIC ANALYSIS
OF US IMMIGRATION REFORM

Abstract

The prevalence of undocumented workers in the United States is a sensitive issue for U.S. policy makers with numerous policy responses contemplated by several different administrations. This paper examines the impact of possible reforms to U.S. immigration policy with respect to undocumented workers on the U.S. and Mexican economies. Using a global trade and migration model that considers undocumented workers, we find that undocumented workers have a positive impact on the U.S. economy and on the agricultural sector. Legalization of these undocumented workers emerges as the preferred option, although additional considerations may be required to assist the agricultural sector.

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I. Introduction

Immigration has been an integral part of the history and success of the United States and its economy. According to the International Organization for Migration, the United States is home to 38 million foreign immigrants, making it the largest host economy worldwide.[1] The estimated number of undocumented immigrants in the United States ranges between 7 to 12 million[2], or approximately one quarter of foreign immigrants living in the United States. It is therefore not surprising that the debate surrounding the potential costs and benefits of immigration, regardless of immigration status, and the optimal policy response towards immigrants has taken center stage on numerous occasions throughout the history of the United States and continues to do so even today.

In January 2004, President George W. Bush supported the creation of a temporary worker program for foreigners to fill the increasing number of jobs which, according to employers, would otherwise go unfilled at the current wage. The U.S. Congress, however, failed to pass the president's proposal, and instead requested more rigorous enforcement of immigration law with the consequent deportation of undocumented immigrants. This led to high-profile raids that in turn led to the arrest of thousands of workers at processing plants and factories. In contrast, the first administration of President Barak Obama stopped the raids and focused on fines and other civil penalties aimed at employers who hire undocumented immigrant workers (Simpson, 2009). While the onset of the global financial crisis and recession has postponed the debate and implementation of immigration policy reforms in the United States, comprehensive immigration reform is finally on the agenda.

Two questions are at the center of the U.S. immigration debate: a) what impact does international migration have on the U.S. economy and its citizens; and b) how should immigration policy be tailored to provide the most benefit (Borjas, 1994; Martin, 2006). The American public is particularly concerned about the extent to which immigrants depress U.S. wages and cause unemployment of American workers. Borjas et al. (1997) argue that immigration flows composed of low skilled workers has a negative impact on the wages of least skilled U.S. workers, at least in the short run.[3] Overall, the literature agrees that the effect on wages is statistically significant and negative, although small (Greenwood et al., 1997, Hanson et al., 2002). Others find complementarities among workers of different skill levels and origin that have a positive impact on the wages of U.S. workers with at least a high-school diploma (Peri, 2007; Devadoss and Luckstead, 2008).

To answer the second question – how should immigration policy be tailored to provide the most benefit to the U.S. – Dixon et al. (2011) use an applied general equilibrium model of the U.S. to evaluate the long term impact of restricting the demand and supply of undocumented immigrants on the U.S. economy. They find that a reduction in undocumented migrants of 29% reduces the size of the U.S. economy in 2019 by 1.6%, or a $200 billion reduction in real GDP, regardless of whether the decline is the result of supply or demand-side policies. Dixon et al. (2011) favor the use of demand side policies over border control, due to the potential revenue gains from the additional taxes and fines placed on employers that hire undocumented migrants.

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[1] Worldwide the estimated number of international immigrants is 200 million people.
[2] Depending on which methodology is used, USOIS, 2006; Passel, 2005; Jordan et al., 2007.
[3] Least skilled workers are high school dropouts and those in the bottom 20% of the wage distribution.

This paper is similar to that of Dixon et al. (2011) in that it too seeks to better understand the impact of alternative policies aimed at managing undocumented migration. However, we use a global economic model linked by trade and labor flows, which explicitly accounts for bilateral migration and remittances, allowing us to examine the impact of changes to U.S. immigration policy on the origin and destination economies.

The two policy scenarios considered here are the deportation and legalization of Mexican workers in the U.S. We find that deportation is detrimental to the U.S. economy as it lowers real GDP, returns to capital and investment, while raising wages. Legalization, on the other hand, has a positive effect on the U.S. economy, increasing real GDP by allowing newly legalized workers to reallocate more efficiently from agricultural to services sectors. In this paper we explore the implication of the alternative policies not only at the macro level, but also on the individual sectors. Finally, this paper shows that the impact on the Mexican GDP is positive regardless of the policy chosen, but for different reasons. In the legalization scenario, remittances increase; while in the deportation scenario, remittances decrease but there is a positive effect due to returning migrant labor.

II.   Model and Data

We use the global trade and migration model (GMig2), which is an applied general equilibrium model developed by Walmsley et al. (2007), based on the GTAP Model (Hertel, 1997). GMig2 explicitly tracks the bilateral movement of skilled and unskilled workers across countries, as well as their real wages, incomes and remittances. As this is a general equilibrium model, wages are determined by the market clearing condition that ensure that new labor is fully employed and allocated across sectors so as to equalize the percentage change in the wage across sectors.[4] Wages then affect income and in turn remittances sent home by migrants, which are assumed to be constant share of their income. The underlying bilateral migration data base is based on census data collected by Parsons et al. (2007) and initial remittances are collected from Ratha (2004).[5]

For this study, GMig2 is modified to incorporate undocumented workers using data provided by Passel (2006). Passel's data includes estimates of the undocumented foreign population in the U.S., as well as their country of origin and occupation. Figure 1 displays the distribution of the undocumented foreign population in the United States, estimated to be 11.5m, by country of origin. More than half of U.S. undocumented foreigners are from Mexico.

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[4] Therefore, countries receiving more migrants will experience a decline in the marginal product/wage of labor as they move down their marginal product schedule because firms gain greater access to less expensive workers. Subsequently, other factors, such as capital, would become scarce relative to labor which triggers an increase in the returns.

[5] See Walmsley et al. (2005) for further details on the GMig2 Data Base.

Figure 1. U.S. Undocumented Population Distribution by Country of Origin in 2005
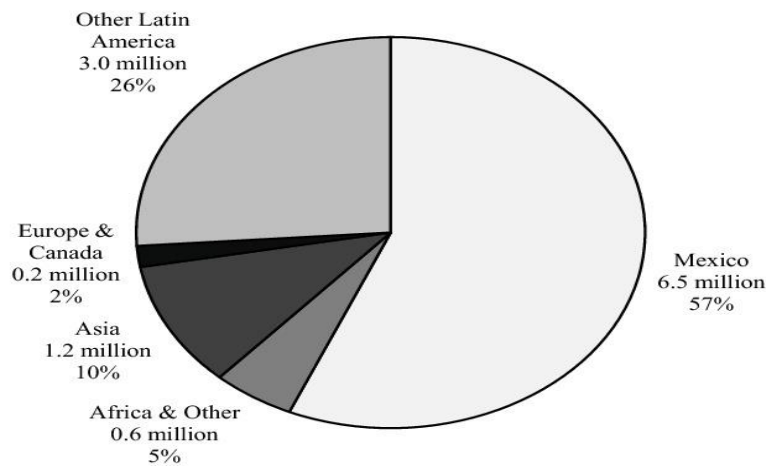
Source: Passel (2006).

Figure 2 shows the distribution of undocumented workers by occupation; while undocumented workers exist at all types of occupations, they are concentrated in low skilled. Figure 3 shows how intensively undocumented workers are used in each of the seven occupations/industries. Farming, fishing and forestry occupations have the highest share of undocumented workers -- 21% of their total employed labor -- followed by construction (17%), maintenance and cleaning (16%), and food preparation (13%). Although only 4% of unauthorized workers were employed in farming occupations, they make up 21% of all workers employed in those occupations. We use this information to correctly allocate undocumented workers across industries. We also assume that the productivity of undocumented workers is 30% lower than that of foreign documented workers, although we investigate the impact of this assumption on the results in footnote 13.

Figure 2. U.S. Undocumented Workers Distribution by Occupation
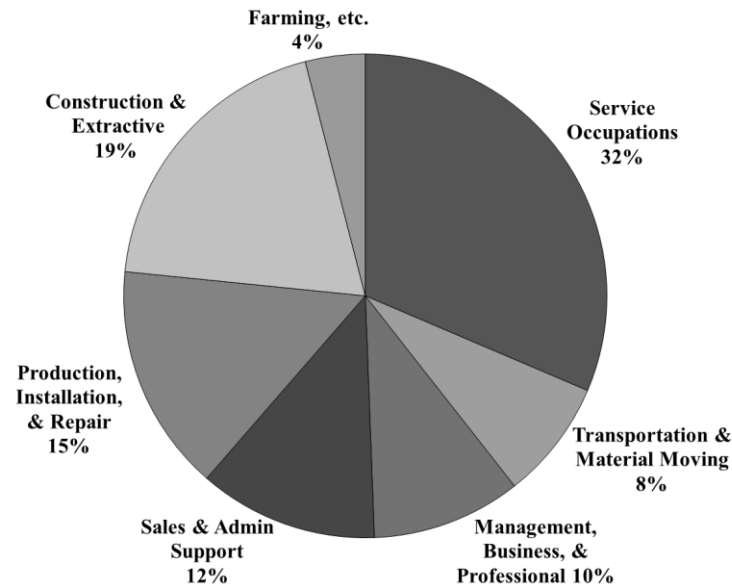
Source: Passel (2006).

Figure 3. Intensity of U.S. Undocumented Workers by Occupation
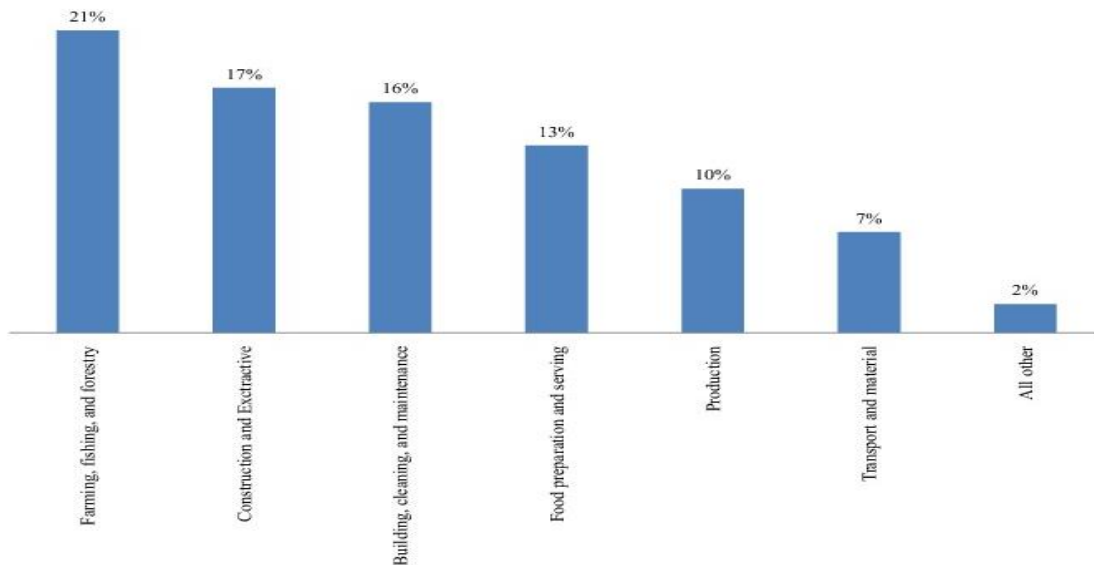
Source: Passel (2006).

The production structure of the model is then adapted to include undocumented workers as a separate component of value added. Figure 4 shows that to produce final output (qo), firms need domestic (qfd) and imported (qfm) intermediate inputs[6] as well as value added (qva). Within the value added tree, unskilled labor has been differentiated between domestic and foreign, and within foreign we distinguish documented and undocumented workers. We draw from the econometric work of Ottaviano and Peri (2008) to determine the elasticity of

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[6] Imports are modeled following the Armington assumption i.e., imports are differentiated by country of origin.

substitution between unskilled workers. We apply their lower bound estimates to distinguish between domestic and foreign workers and their upper bound estimates to differentiate between documented and undocumented. While there are estimates of the specific elasticities used here, our choice of elasticities reflects the fact we believe there is greater substitution between domestic and foreign workers than there is between documented and undocumented workers, simply because we believe that firms are less willing to break the law to hire workers. Some sensitivity analysis is conducted around these estimated elasticities and this is discussed in section 6.   Skilled workers, on the other hand, are assumed to be documented and are treated as perfect substitutes following Borjas et al. (2008).[7]

Finally we assume that the economy is initially in equilibrium with demand for labor equal to supply at the current wage.[8] When new migrants enter the country we assume that there are no impediments to wages adjusting to clear the labor market and to ensuring that demand continues to equal supply. Where unemployment/underemployment is an issue, for instance in Mexico, we also consider the alternative assumption that the market for labor does not clear.

Figure 4. Model Structure*
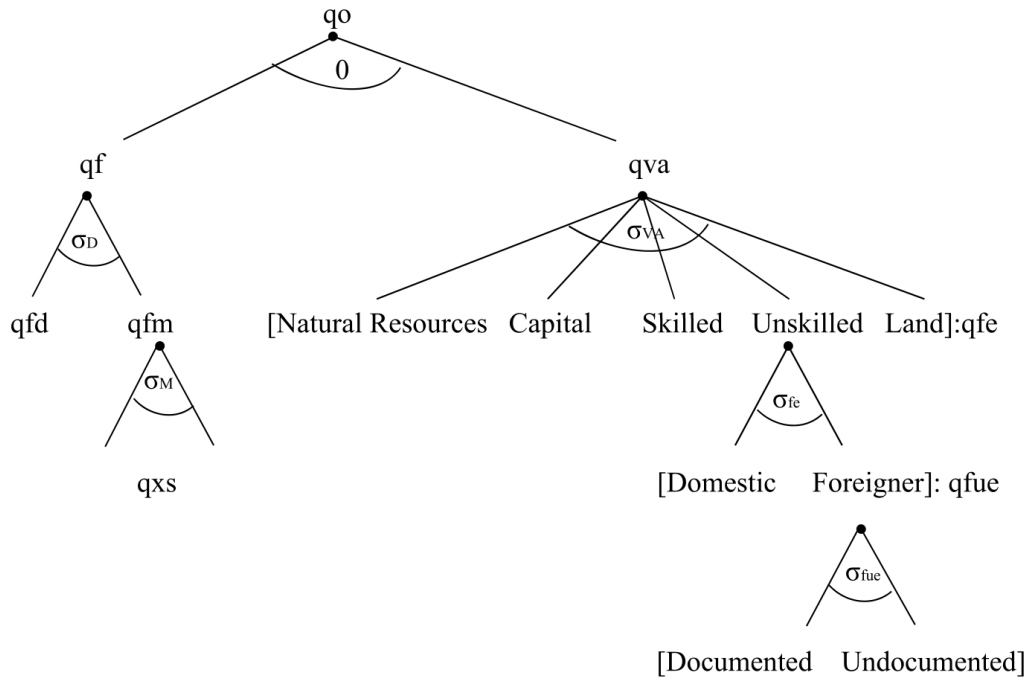
*Source: Modification of Figure 2.6 in Hertel and Tsigas (1997).

III.   Policy Scenarios
In the United States, immigration policy is implemented through both supply and demand-side tools. On the supply-side the United States assigns quotas on the different types of visas and green cards based on specific criteria to control the flow of documented workers, while border enforcement is used to control the flow of undocumented workers. On the demand side, monitoring the hiring practices of employers is also used to control undocumented workers.

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[7] Moreover it is assumed that skilled undocumented workers do not exist.
[8] Note that this does not mean there is no unemployment. It implies that the number of unemployed reflected in the base year remains unchanged as a result of the policy shock.

This study analyzes the impact of two alternative U.S. immigration policy scenarios on the U.S. economy. Table 1 displays the changes in undocumented Mexican migrants under the policy scenarios considered in this study. The 'Base Data' column indicates the estimated number of unskilled Mexican workers in the United States with (3.53 million) and without (3.59 million) proper documentation before the implementation of any new policies.

Table 1. Policy Scenarios

	I	II	III	IV
	Base Data (Millions)	**Deportation Scenario**	**Legalization Scenario**	
			Tight border control	**Loose border control**
Undocumented Mexican workers	3.59	-100.00%	-100.00%	-50.00%
Documented unskilled Mexican workers	3.53	0.00%	101.70%	101.70%
Unskilled Mexican workers in Mexico	37.14	9.67%	0.00%	-4.85%

Source: Authors' computation based on 2005 data.

The first policy scenario involves the deportation of undocumented workers. This reflects the U.S. Congress' requests for stricter control after failing to pass the proposed temporary worker program in 2004. We assume that the U.S. Customs and Border Protection successfully deports all undocumented Mexican workers and tightens border control preventing new entry or re-entry of previously deported immigrants. In reality, strenuous efforts have been made to find and deport undocumented immigrants and in spite of this, in the decade leading up to the global financial crisis, the numbers continued to rise. Note that by concentrating the policies on Mexican undocumented workers we are able to draw out and separate the direct and indirect effects of the two policies scenarios, thereby giving us a tool to understand the results better[9] – it is not our intention to suggest that policies are being or should only be focused on Mexican undocumented workers. For instance, in the case of deportation we are able to draw out the direct impact on those sent home (Mexicans); and the indirect impact, on those who manage to avert deportation (other Latin Americans).[10] In Table 1, following deportation, all 3.59 million undocumented Mexican workers leave the U.S., causing the number of undocumented Mexican workers to fall by 100% and the Mexican unskilled labor force in Mexico to rise by 9.67%.

In the second scenario, we consider what the economy would look like if the new temporary migrant worker program had been approved. Again we restrict the implementation of this policy to Mexican workers to allow us to separate the direct and indirect effects. Under this scenario 3.59 million undocumented Mexican workers are transferred from undocumented to documented status, raising their productivities and wages, and giving them greater mobility

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[9] We are able to target only Mexican migrants because of the international bilateral migration data base we use, called GMig2 Data Base.

[10] Expanding the scenarios to include all countries would result in larger (absolute gains/losses) to the U.S. economy, and the impact on the Latin American economies would be more in line with the impact on the Mexican economy, since the direct effects are generally much larger and outweigh the indirect effects.

across sectors. This reduces undocumented unskilled Mexican workers by 100% and raises documented unskilled Mexican workers by 101.7%[11], (columns III, Table 1).

The legalization of undocumented workers is likely to encourage new migrants to enter the United States with hopes of obtaining legal status in the future, we therefore consider a second extension (or third scenario) to the legalization scenario in which despite increased border control new undocumented migrants are still able to cross the border and join the U.S. undocumented workforce. Hence the legalization scenario is broken into two scenarios including:

    a. Scenario 2: Legalization with strict and effective border enforcement
    b. Scenario 3: Legalization with ineffective border enforcement.

Under scenario (b), the increased flow of new undocumented workers from Mexico[12] means that the number of undocumented Mexican workers in the U.S. does not fall to zero after legalization. Since we cannot really know the exact number of undocumented Mexican that would flow into the U.S., we assume that sufficient new migrants enter the US economy to maintain 50% of previous undocumented workers (Column IV of Table 1). The choice of 50% reflects the fact that while there is likely to be an increased flow of new undocumented migrants to replace the newly legalized migrants, we do not believe that supply would be sufficient to reduce the wages of undocumented workers, hence we restrict supply to 50%. This implies that Mexico loses a further 1.8 million Mexican workers or 4.85% of its unskilled labor force.

IV.   Macroeconomic Results

The deportation of all undocumented Mexican workers from the U.S., a reduction of 2.4% of the U.S. labor force, causes a loss in U.S. real GDP of 0.86% (see, Table 2).[13] Legalization on the other hand, has a positive effect on real GDP regardless of the effectiveness of border control. In fact the extent to which the border remains porous causes further gains in real GDP, 0.79% as opposed to 0.29% when the border is tightly closed. This is not surprising since lax border controls allow the influx of more undocumented workers and an increase in the labor force, which is an essential component of growth in real GDP.

As a result of deportation, the remaining undocumented workers from other Latin American countries become scarce and their real wages increase by 11.87%. In response to the deportation of undocumented Mexican workers, firms must substitute away from undocumented workers towards foreign legal and domestic unskilled workers. This substitution is partially offset by the general decline in production (real GDP) caused by the loss of undocumented workers which reduces demand for all endowments. In the case of unskilled domestic and foreign legal workers the substitution effect dominates, and real wages increase as a result, 0.59

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[11] The rise in documented unskilled workers is slightly greater than 100% because there are estimated to be more undocumented Mexican workers (3.59m) than documented unskilled Mexican workers (3.53m). Note that the workers continue to be considered unskilled after deportation/legalization. Although some undocumented migrants may be skilled, it is assumed that they remain in the unskilled category even after they obtain the proper documentation to work. To the extent that legalization allows migrants to move into the skilled category, the model will underestimate the benefits of legalization.

[12] We continue to assume that these policies only affect Mexican workers so as to separate the results into direct and indirect effects.

[13] If the productivities of all foreign workers regardless of their legal status are assumed to be the same, there is an even greater negative impact on real GDP (-1.24%) from deportation. Sensitivity analysis with respect to the size of the shocks also indicates that our results are stable. If we were to deport half the number of Mexican workers, the effect on real GDP would have also been halved.

and 2.61% respectively. The larger rise in the wages of foreign legal workers is due to the greater substitution between documented and undocumented foreign unskilled workers assumed in the model.

Table 2. Macroeconomic Results for the United States (% Changes, unless otherwise stated)

	I	II	III
		Legalization Scenario	
	Deportation Scenario	**with border control**	**Without border control**
U.S. Real GDP	-0.86	0.29	0.79
Real Wage of Skilled Labor	-0.61	0.22	0.57
Real Wage of Unskilled Domestic labor	0.59	-0.18	-0.51
Real Wage of Unskilled Foreign documented labor	2.61	-3.96	-5.21
Real Wage of Unskilled Foreign undocumented labor	11.87	8.13	0.69
Remittances from the U.S. to Mexico	-41.42	1.02	24.87
Capital rental price	-0.71	0.23	0.63
Land rental price			
Investment	-1.26	0.33	1.04
Real Exports	0.19	-0.09	0.18
Real Imports	-0.91	0.29	0.81
Change in Trade Balance ($U.S. Millions)	13,956.73	-4,441.12	-12,282.39

Source: Authors' simulation results.

This re-adjustment also involves firms substituting unskilled labor for other endowments such as capital and skilled labor. In the case of skilled labor and capital, the extent of substitution is limited and hence the general decline in production prevails and the real wages/rental prices fall by 0.61% and 0.71% respectively. The lower rental price causes the rate of return to decline, leading to a considerable decrease in investment (1.26%). This decline in investment is likely to have significant long run implications on the accumulation of capital stocks and hence real GDP. The large decline in investment also causes the current account to increase (or decrease in the U.S. current account deficit). The reduction in remittances flowing back to Mexico, by 41.42%, and the decline in savings caused by lower incomes are unable to offset the effect of investment on the current account. The U.S. current deficit decreases (Table 2) driving a real depreciation and a rise in real exports (0.19%). Imports decrease, by 0.91%, due to the decline in demand and the real depreciation.

Unlike the deportation scenario, legalization of undocumented Mexican workers increases real GDP by 0.29% with border control and by 0.79% without effective border control (Columns II and III in Table 2). The increase in real GDP is the result of a) newly legalized workers being able to move across sectors to obtain jobs in new sectors where they can be more productive; b) the higher wages/productivities of documented workers in general; and c) in the without border control, the newly arrived undocumented migrant workers.

Legalization causes a decline in the supply of undocumented foreign workers and a corresponding rise in documented foreign workers. The real wages of the remaining undocumented workers rise by 8.13%, while the real wage for unskilled documented foreign workers falls by 3.96%. The rise in the real wages of undocumented is slightly lower than that in the deportation case since firms can more easily substitute towards documented workers, due to the fact that the lost undocumented workers have not left the country merely changed their legal status. The increase in production would also raise demand for all labor slightly, albeit this is not sufficient to raise the wages of domestic unskilled workers. The impact of this scenario on the real wages of unskilled domestic labor is slightly negative (0.18%, Figure 5) because the Services sector substitutes unskilled domestic workers for the cheaper foreign documented workers, releasing a large number of unskilled domestic workers into the market to be hired by the other sectors. The small negative effect on the real wage of unskilled domestic workers is consistent with the findings of Greenwood et al. (1997) and Hanson et al. (2002).

The resulting change in real wages of undocumented workers under the legalization with border control (8.13%) is similar to the one obtained under the deportation scenario (i.e., 11.87%), reflecting the fact that undocumented workers have become scarce in both these scenarios. Contrast this with the case where border controls are unable to stop the influx of new undocumented workers, where new undocumented workers replace the newly legalized workers, which in turn significantly dampen the rise in real wages of undocumented workers (0.69% as opposed to 8.13%, Table 2). Moreover, the influx of new undocumented workers due to the weak border controls also causes the real wages of documented unskilled workers to decline further (for domestic -0.51% and documented -5.21%). The larger impact, in absolute terms, on the real wages of the unskilled foreign documented workers is consistent with the findings of Borjas et al. (1997) and is the result of greater substitutability between documented and undocumented foreign workers.

The two legalization scenarios have positive effects on the real wage of skilled labor, both domestic and foreign, and the rental price of capital, due to the increase in production and demand for all endowments. The higher rental price also causes an increase in the rate of return, which has a positive effect on investment (0.33 and 1.04% respectively), and hence capital stocks and real GDP in the long run.

V.   Sectoral Impact
The Rybczynski Theorem, based on the Hecksher-Ohlin (H-O) model, describes how changes in an endowment affect production. An increase in one of the endowments increases the production of the industry which uses it intensively and decreases the production of the industry that uses it less intensively. Conversely, if the level of the endowment decreases, the industry that uses it intensively would decrease production and the industry which uses it less intensively would increase its production. This theorem is predominant in the sectoral impacts of the various scenarios considered here, although the ability to substitute between endowments also plays a role in which sectors gain and lose from the policies.

Figures 5 and 6 show the use of each type of labor and the share of each endowment in value added by sector in the underlying database. Figure 5 shows that the Food & Agriculture, Construction and Textiles sectors use domestic and foreign unskilled labor most intensively relative to skilled labor, although undocumented workers are most intensively used by only Food and Agriculture and Construction (reflecting the data from Passel and depicted in Figure 3). The Construction and Textiles sectors also use unskilled labor more intensively relative to other

endowment factors such as land, capital, and natural resources (Figure 6) than do other sectors; while Food & Agriculture also use significant quantities of land and capital. Services and Manufacturing, on the other hand, are relatively more skilled labor intensive.

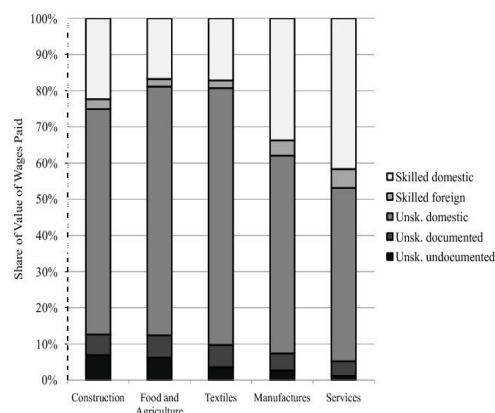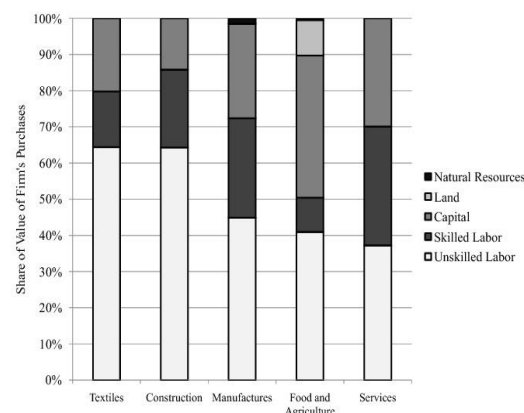| **Figure 5. Share of Labor Type used by Sector in the United States**	**Figure 6. Share of Endowment used by sector in the United States**

Table 3 reports the impact on U.S. sectoral output under the three alternative scenarios. In response to the deportation of Mexican undocumented workers, production in all sectors is negatively affected – with Textiles, Food & Agriculture and Construction most adversely affected. In the case of Food & Agriculture and Construction, their intensive use of undocumented workers (Figure 5) and the Rybczynski Theorem is clearly the underlying cause of the large declines. Somewhat surprising is the extent of the decline in Textiles, which is less intensive in the use of undocumented worker than both the Food & Agriculture and Construction sectors, yet it experiences the largest decline in percentage terms. Figure 5 shows that the costs of producing Textiles depends heavily on the wages of foreign and domestic unskilled workers, both of which are important substitutes for the undocumented workers recently lost by the Food &Agricultural and Construction sectors. The Textiles sector therefore comes up against more competition for unskilled workers from the larger Food & Agricultural and Construction sectors after the undocumented workers are deported. Hence the deportation of undocumented workers not only adversely affects those sectors that use undocumented worker intensely, but also those sectors that use the close substitutes of undocumented workers (i.e. foreign and domestic unskilled workers) intensively, as well.

Table 3. Percentage change in Output by Sector

Sector Name	Value ($US Millions)	Deportation	Legalization	
			With border control	Without border control
Agriculture	788,425	-1.27	0.13	0.86
Manufactures	3,840,353	-0.85	0.21	0.70
Textiles	186,415	-1.59	0.30	1.22
Services	11,624,810	-0.79	0.31	0.77
Construction	1,207,281	-1.14	0.32	0.97

Source: Authors' simulation results.

The legalization scenarios have a positive effect on output for all sectors (Table 3), as the new documented workers are more productive and mobile across sectors than they had been as undocumented workers. The gains are greatest in those sectors that are most intensive in the use of foreign documented unskilled workers: textiles and construction. It is interesting to note that when border enforcement is effective the two sectors intensive in undocumented and documented foreign workers – Food & Agriculture and Construction – behave quite differently. This is because Construction is more intensive in all types of unskilled labor relative to all other endowments and can more easily substitute the lost undocumented workers with other types of unskilled workers, including the newly expanded documented unskilled labor force. Food & Agriculture, on the other hand, is less intensive in other unskilled workers, relying more on the fixed endowment – land (Figure 6).[14] As demand for Food & Agriculture increases so does demand and hence the price of the fixed endowment land. This combined with the need to substitute away from the deported undocumented workers towards more expensive unskilled labor causes prices to rise and the Food & Agricultural sector to decline as a share of the U.S. economy. After legalization the newly legalized workers move out of Food & Agriculture in response to higher demand and hence wages being offered by the non-agricultural sectors, that do not need to use the fixed endowment, land.

When border enforcement is not effective, the output response of every sector is even greater due to the increase in labor. Moreover, since the supply of undocumented workers does not fall to the same extent, the impact on Food & Agriculture is also greater. Both Food and Agriculture and Construction do not have to substitute away from undocumented workers towards the more expensive documented workers to the same extent and hence the gains to all three unskilled labor intensive sectors – Food & Agriculture, Textiles and Construction – are greater. As in the deportation case, this is particularly important for textiles where less demand for the newly legalized unskilled workers by the Construction and Food and Agriculture sectors means cheaper foreign unskilled workers for them. The textiles sector expands considerably as a result (1.22%).

Finally, the services sector is by far the largest sector in the economy and is also the least intensive in undocumented workers and unskilled labor. Under all of the scenarios the Services sector tends to increase or decrease with the overall change in real GDP and income. In the deportation scenario the low use of unskilled labor by the sector provides it with some immunity from the negative impact of the loss of undocumented workers, however it also means that it

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[14] Note that when Food production is separate from Agriculture it is affected by the shocks in a similar way to Construction since Food Processing is not dependent on land either.

does not reap the benefits of the increased supply of undocumented workers under the legalization with ineffective border control.

VI. Sensitivity Analysis

Before proceeding to the sectoral results it would be interesting to see how sensitive these results are to our choice of elasticities between unskilled workers and between value-added (Figure 5). We find that the extent to which labor is substitutable has little impact on the overall effect of the policies on real GDP, although it does affect the wages.

Decreasing the substitutability between unskilled foreign documented and undocumented workers, in Table 4, results in a smaller increase in the demand for unskilled foreign documented and higher demand for unskilled domestic workers after the deportation of undocumented Mexican workers, when compared to the original results. This is noticeable by the larger increase on the real wage of undocumented workers and the smaller increase on the real wage of unskilled domestic workers with respect to the base case after deportation. Under the legalization scenario, there is a greater drop on the wages of foreign documented workers because of the lower substitutability between foreign workers.

Table 4. Sensitivity of Results to Elasticities

	Standard elasticities		Lower substitution between unskilled foreign documented and undocumented workers (δ_{FE})		Increased substitution between domestic and foreign workers (δ_{FUE})		Increased substitution between value added (δ_{VA})	
	Deportation	Legalization with border control	Deportation	Legalization with border control	Deportation	Legalization with border control	Deportation	Legalization with border control
Real GDP	-0.86	0.29	-0.88	0.24	-0.85	0.29	-0.85	0.29
Real Wage of Skilled Labor	-0.61	0.22	-0.62	0.18	-0.60	0.22	-0.28	0.10
Real Wage of Unskilled Domestic labor	0.59	-0.18	0.62	-0.13	0.79	-0.25	0.13	-0.02
Real Wage of Unskilled Foreign documented labor	2.61	-3.96	0.63	-6.24	0.80	-3.35	2.13	-3.81
Real Wage of Unskilled Foreign undocumented labor	11.87	8.13	19.09	18.18	9.66	8.51	11.40	8.32
Capital Rental price	-0.71	0.23	-0.75	0.14	-0.68	0.21	-0.26	0.06
Land rental Price	-2.07	0.37	-2.07	0.35	-2.07	0.37	-0.96	0.22

a. Standard elasticities are taken from Ottaviano and Peri (2008). δ_{FUE} is the lower bound, δ_{FE} is the upper bound and δ_{VA} are taken from GTAP.

b. δ_{FUE} is raised to upper bound;

c. δ_{FE} is lowered to the lower bound;

d. δ_{VA} is doubled for all commodities.

The second case increases the substitutability between unskilled domestic and foreign workers. With the increased substitutability between unskilled domestic and foreign workers, the deportation scenario results in almost the same effect on GDP as in the base case. The one notably difference with the increase substitutability is the greater demand for unskilled domestic workers, which increases their real wage and the consequent lower demand for unskilled foreign documented, which increases their real wage but less than in the base case.

We also examine the sensitivity of these results to the GTAP elasticities between value added. When the elasticities at the top level of value added are doubled, then substitution between unskilled and the other endowments increases and while this has small effect on GDP or the real wages of foreign workers, it results in smaller wage effects for the domestic value added.

VII.   Fiscal Implications of U.S. Immigration Scenarios

There are many potential fiscal implications related to the scenarios we have discussed. In this model, private and government consumption are determined by the regional household in fixed proportions. The model also computes income taxes and in this section we supplement this with a back of the envelope calculation for commodity taxes. Other important considerations that we do not account for here are detailed information such as crime, health care, enforcement costs of the border control, and the fines and fees of the legalization plan.

Among the concerns related to immigrants, and emphasized by Borjas (1994), is that recent migration waves have participated in welfare programs more strongly than previous waves because the relative skills of recent immigrants has declined compared to pre-war waves of immigrants. We find that the deportation of undocumented workers reduces the demand for government services by $13.74 billion. Furthermore the collection of commodity sales taxes also declines, while income taxes are only marginally affected due to the fact that undocumented workers are assumed not to pay income tax. A back of the envelope calculation of the forgone commodity sales taxes, assuming a 6% sales tax, indicates a loss of approximately $3.64 billion. Therefore, the net benefits of deportation would be approximately $10 billion.

Legalization on the other hand would increase income taxes by approximately $19.28 billion, primarily due to the new taxes collected from the newly legalized Mexican workers. Government spending on services would increase by $5.17 billion and the estimated increase in commodity tax collection would be $1.27 billion. Hence the net benefit of legalization is approximately $15.38 billion. Without effective border control, the net fiscal implications of legalization would fall to approximately $9.98 billion, due to the additional increase in government spending related to undocumented workers. Hence the fiscal implications of the two scenarios are fairly similar but do not consider the costs of implementing the legalization scheme.

VIII.   Implications of U.S. Immigration Policy Abroad

In addition to the effects on the United States, the proposed U.S. immigration policy scenarios will have important effects on Mexico, the country of origin of the migrants affected. Mexico is affected in two ways: a) changes in the labor force due to changes in the number of Mexican migrants abroad; and b) changes in the flow of remittances.

The deportation of undocumented Mexican workers increases the supply of unskilled domestic labor in Mexico and real GDP by 0.97% assuming return migrants can be fully

employed.[1] Consequently, the flow of remittances from the United States into Mexico falls considerably, 41.42%: lowering incomes and improving Mexico's current account. Since only Mexican workers were deported, undocumented foreign workers from other countries benefit from the deportation of Mexican workers as their real wages and remittances rise.[2]

With legalization of undocumented workers, remittances received by Mexico rise for two reasons: first, salaries earned by the newly documented Mexican workers are higher than those obtained when they were undocumented and hence remittances are greater; and second, in the case of ineffective border control the influx of new Mexicans immigrants into the United States. The first effect is of an increase in Mexico's GDP by 1.02%, because, while wages rise, so do income taxes. The effect on GDP is also small, 0.01%, because there is no change to the labor endowment in Mexico. In the legalization without effective border control remittances increase by 24.87%, primarily due to the increase in remittances sent home by the new migrants. Higher levels of remittances would cause Mexico's current account to decrease. Mexico's GDP falls by -0.60% due to its loss of labor from increased outward migration. The preferred policy for Mexicans ultimately depends on the importance of remittances in incomes relative to changes in real GDP and the extent to which they are negated by unemployment.

IX. Conclusions

This paper investigates the impact of potential reforms to U.S. immigration policy aimed at resolving the dilemma surrounding undocumented workers in the United States. The results show that undocumented workers are beneficial to the U.S. economy, and as such their deportation would have negative consequences for the U.S. economy and in particular unskilled intensive goods such as textiles, agriculture and construction.

The comparison between deportation and legalization has also illustrated how much the Food & Agricultural sector in the U.S. relies on having access to cheap, foreign, unskilled labor, and that without this labor increased competition for unskilled workers would not only lead to a decline in those industries which use undocumented workers; but also those, like the Textiles sector, that are intensive in the use of unskilled workers in general. Legalization with strict and effective border control on the other hand increases production in all sectors, although growth is higher in the non-agricultural unskilled intensive sectors, where the newly legalized workers would relocate. Legalization of the current cohort of undocumented workers is therefore unlikely to solve the problem of high demand for cheap workers by the Agricultural sector, although it does raise real GDP.

The offer to provide documents to current undocumented workers is likely to increases incentives for crossing the border illegally, as the wages of remaining undocumented workers rise and migrants' perceive that further amnesties may occur in the future. With the inflow of new undocumented worker, all sectors, including the Agricultural sector, expand.

If one of the national objectives is to provide the U.S. agricultural sector with inexpensive labor, then a temporary migrant program which restricts legal migrants to work in agriculture

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[1] Even though Mexico's unemployment rate is only 3.7%, its underemployment rate is high, 25%. When unemployment is allowed, Mexico's Real GDP falls by 0.05% instead of the 0.97% increase. Since the period examined here is 3-5 years, some decline in real wages is expected. The extent to which real GDP increases will depend on that decline in real wages. Note also that returning Mexican migrants are assumed to have the same productivity as incumbent Mexican workers. If migrants return with higher productivities, the affect on real GDP would be greater.

[2] Of course U.S. policies would not discriminate against Mexicans and hence all countries would see total remittances fall, but remittances per migrant remaining would rise with wages.

would be necessary. Such programs have existed in the past between the U.S. and Mexico (i.e., the bracero program of program of 1942 or 1964) and exist now with the current H2A visa which is reserved for temporary agricultural workers. While such policies may be justifiable on political ground, they come at the expense of higher growth in other sectors.

References

Borjas, G. J. (1994): "The Economics of Immigration", *Journal of Economic Literature*, 32, 1667–1717.

Borjas, G. J., Freeman, R. B., Katz, L. F., DiNardo, J. and Abowd, J. M. (1997): "How Much Do Immigration and Trade Affect Labor Market Outcomes?", *Brookings Papers on Economic Activity*, 1997, 1–90.

Borjas, George J., Jeffrey Grogger, and Gordon H. Hanson. (2008): "Imperfect Substitution Between Immigrants and Natives: A Reappraisal". National Bureau of Economic Research, Inc, NBER Working Papers: 13887.

Devadoss, S. and Luckstead, J. (2008): "Contributions of Immigrant Farmworkers to California Vegetable Production", *Journal of Agricultural and Applied Economics*, 40, 879–894.

Dixon, P. B., Johnson, M. and Rimmer, M. T. (2011): "Economy-Wide Effects of Reducing Illegal Immigrants in U.S. Employment", *Contemporary Economic Policy*, 29, 14–30.

Greenwood, M. J., Hunt, G. L. and Kohli, U. (1997): "The factor-market consequences of unskilled immigration to the United States", *Labour Economics*, **4**, 1–28.

Hanson, G. H., Robertson, R. and Spilimbergo, A. (2002): "Does Border Enforcement Protect U.S. Workers from Illegal Immigration?", *Review of Economics and Statistics*, **84**, 73–92.

Hertel, T. (1997) *Global Trade Analysis: Modeling and Applications*, Cambridge: Cambridge University Press.

IOM (2008): *International Organization for Migration.World Migration Report 2008: Managing Labour Mobility in the Evolving Global Economy*.

Jordan, M., Bauerlein, V., Carrns, A., Jordan, M., Bauerlein, V. and Carrns, A. (2007): *Bank of America Casts Wider Net For Hispanics*.

Martin, P. L. (2006): *Managing Labor Migration in the Twenty-first Century*, Global Management Series, Yale University Press.

Ottaviano, Gianmarco, and Giovanni Peri. 2008. "Rethinking the Effects of Immigration on Wages." National Bureau of Economic Research, inc, NBER Working Paper No. 12497

Parsons, C., Skeldon, R., Winters, A. and Walmsley, T. L. (2007): "Quantifying International Migration: A Database of Bilateral Migrant Stocks", in *International Migration, Economic Development, and Policy* (Eds.) C. Ozden and M. Schiff, Palgrave and World Bank, chap. 1, pp. 17–58.

Passel, J. S. (2006): "The Size and Characteristics of the Unauthorized Migrant Population in the U.S. Estimates Based on the March 2005 Current Population Survey".

Peri, G. (2007): "How Immigrants Affect California Employment and Wages", Working Paper 3, Public Policy Institute of California.

Ratha, D. (2004) Understanding the Importance of Remittances, Migration Policy Institute, http://www.migrationinformation.org/Feature/display.cfm?id=256

Simpson, Cam. (2009) "Obama Hones Immigration Policy." Wall Street Journal, July 21, sec. Politics. http://online.wsj.com/article/SB124813721196067083.html.

USOIS (2006): US Office of Immigration Statistics website. Yearbook: various years, http://uscis.gov/graphics/shared/statistics/index.htm, retrieved on March 1 2006.

Walmsley, T. L., Ahmed, S. A. and Parsons, C. R. "The GMig2 Data Base: A Data Base of Bilateral Labor Migration, Wages and Remittances", *GTAP Research Memorandum No. 6*, Center for Global Trade Analysis, Purdue University, Indiana, USA, 2005.

Walmsley, T. L.; Winters, L. A.; and Ahmed, S. A., "Measuring the Impact of the Movement of Labour Using a Model of Bilateral Migration Flows", *GTAP Technical Paper No. 28,* Center for Global Trade Analysis, Purdue University, Indiana, USA, 2007.