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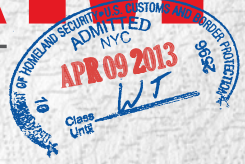
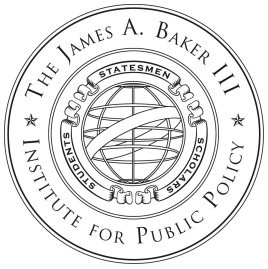


The Costs and Benefits of Immigration Enforcement

Raúl Hinojosa–Ojeda, Ph.D.



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Latin America Initiative Immigration Research Project
Working Paper

The Costs and Benefits of Immigration Enforcement

by

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Abstract

For more than two decades, the U.S. government has attempted to put a stop to unauthorized immigration from (and through) Mexico by implementing "enforcement-only" measures along the U.S.-Mexico border and at work sites throughout the country. These measures have not only failed to end unauthorized immigration, but have placed downward pressure on wages in a broad swath of industries. In recent decades, the U.S. government's avoidance of immigration reform and dependence upon enforcement-only approaches to immigration has served only to deepen a vicious cycle of underground labor markets, lower wages, lower consumption, lower tax revenue, and reduced productivity. Were the government to end this failed enforcement-only crusade and create a pathway to legal status for unauthorized immigrants in the United States, as well as new legal limits on immigration that respond to market forces, it would *raise* the social floor for the entire U.S. economy—to the benefit of both immigrant and native-born workers.

Introduction

For more than two decades, the U.S. government has attempted to put a stop to unauthorized immigration from (and through) Mexico by implementing "enforcement-only" measures along the U.S.-Mexico border and at work sites throughout the country. These measures have not only failed to end unauthorized immigration, but have placed downward pressure on wages in a broad swath of industries. In recent decades, the U.S. government's avoidance of immigration reform and dependence upon enforcement-only approaches to immigration has served only to deepen a vicious cycle of underground labor markets, lower wages, lower consumption, lower tax revenue, and reduced productivity. Were the government to end this failed enforcement-only crusade and create a pathway to legal status for unauthorized immigrants in the United States, as well as new legal limits on immigration that respond to market forces, it would *raise* the social floor for the entire U.S. economy—to the benefit of both immigrant and native-born workers.

The experience of legalization under the 1986 Immigration Reform and Control Act (IRCA) indicates that comprehensive immigration reform has the potential to raise wages, increase consumption, create jobs, and generate additional tax revenue, all of which are compelling

economic reasons to move from the current "vicious cycle" in which an enforcement-only approach to unauthorized migration exerts downward pressure on already-low wages, to a "virtuous cycle" of worker-empowerment in which legal status and labor rights exert upward pressure on wages. The critics of legalization often point to the failure of IRCA to stem the tide of unauthorized immigration. However, it is this very failure combined with the lack of effectiveness of enforcement-only policies that demonstrate the critical need for a truly comprehensive immigration reform policy now that addresses the present crisis facing the United States, in addition to establishing a modern immigration system for future flows that provides for and responds to the ups and downs of the U.S. economy and needs of the labor market.

"Enforcement Only" is Costly, Ineffective, and Counterproductive

"When you try to fight economic reality, it is at best an expensive and very, very difficult process, and almost always doomed to failure." [1]

Michael Chertoff, Secretary of Homeland Security (2005-2009), March 2006

The current enforcement-only approach to unauthorized immigration is not cost-effective and has not deterred unauthorized migrants from coming to the United States when jobs are available. Rather, these policies have wasted billions of taxpayer dollars while pushing unauthorized migration further underground. In the process, the enforcement-only strategy has produced a host of unintended consequences: more deaths among border crossers, greater demand for people smugglers, less circular migration in favor of more permanent settlement among unauthorized immigrants, and further depressing of wages in low-wage labor markets. To date, significant declines in unauthorized immigration have occurred only during downturns in the U.S. economy when U.S. labor demand is dampened. Ironically, demographic trends in Mexico will likely accomplish what tens of billions of dollars in border enforcement clearly have not: a decline in the *supply* of migrants from Mexico who are available for jobs in the United States.

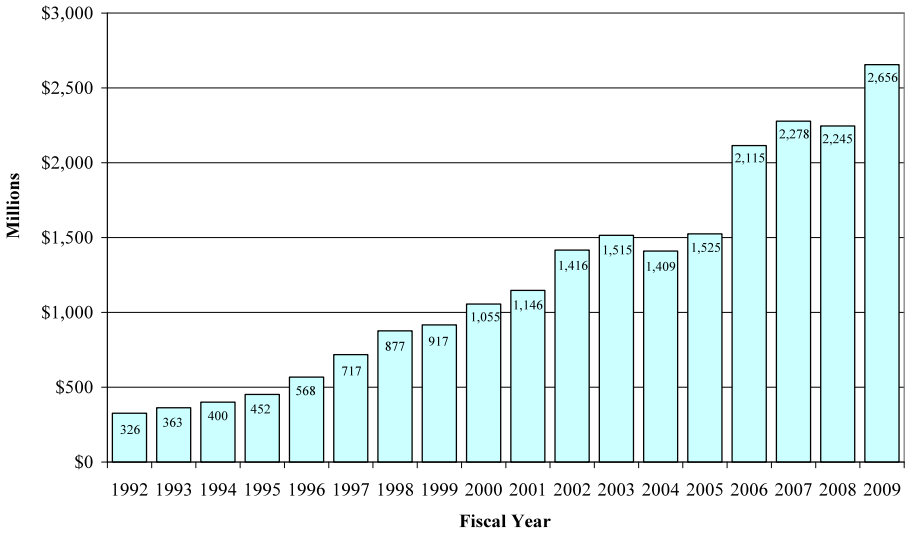
High Costs and No Benefits

The number of unauthorized immigrants in the United States has increased dramatically since the early 1990s despite equally dramatic increases in the amount of money the federal government spends on immigration enforcement:

- Between fiscal year (FY) 1992 and FY 2009, the annual budget of the U.S. Border Patrol increased 714 percent (from $326.2 million to $2.7 billion) (see Figure 1),[2] while the cost ratio of Border Patrol expenditures to apprehensions increased 1,041 percent from $272 in FY 1992 to $3,102 per apprehension in FY 2008 (see Figure 2).[3]
- The number of Border Patrol agents stationed along the Southwest border has grown by 390 percent (from 3,555 in FY 1992 to 17,415 in FY 2009) (see Figure 3).[4]
- Since the creation of the Department of Homeland Security (DHS) in 2003, the budget of Customs and Border Protection (CBP), the parent agency of the Border Patrol within DHS, has increased 92 percent (from $6.0 billion in FY 2003 to $11.3 billion in FY 2009). Furthermore, the budget of Immigration and Customs Enforcement (ICE), the DHS interior-enforcement counterpart to CBP, has increased 82 percent (from $3.3 billion in FY 2003 to $5.9 billion in FY 2009) (see Figure 4).[5]
- Despite tens of billions of dollars of immigration enforcement spending since the early 1990s, nearly all unauthorized migrants still eventually succeed in entering the United States. Wayne Cornelius, Ph.D., and his colleagues at the University of California, San Diego, have conducted a long-term study of unauthorized migration and found that the vast majority of unauthorized immigrants (92-98 percent) keep trying to cross the border until they make it.[6] Cornelius has concluded that "tightened border enforcement since 1993 has not stopped nor even discouraged migrants from entering the United States. Neither the higher probability of being apprehended by the Border Patrol, nor the sharply increased danger of clandestine entry through deserts and mountainous terrain, has discouraged potential migrants from leaving home"—provided that U.S. jobs are available.[7]

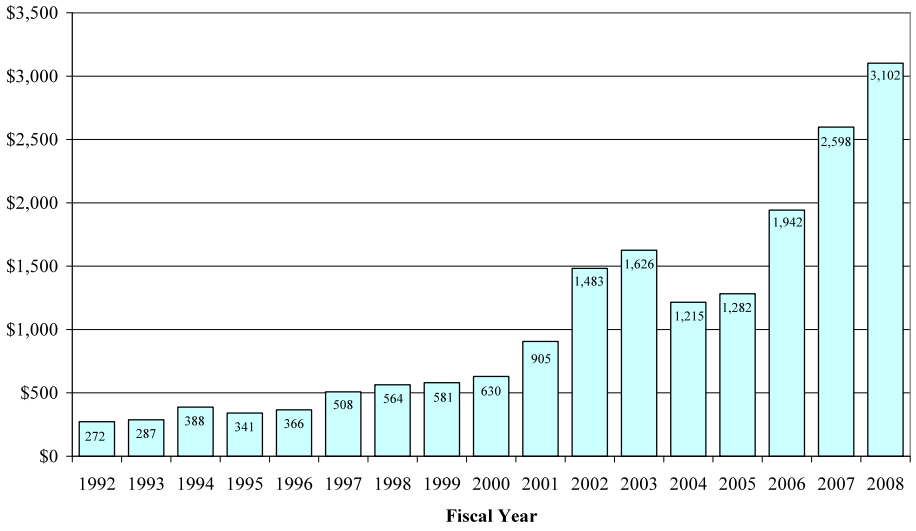
- The unauthorized immigrant population of the United States has roughly *tripled* in size over the past two decades, from an estimated 3.5 million in 1990 to 11.9 million in 2008 (see Figure 5).[8]
- Historically, significant declines in unauthorized immigration have occurred only during downturns in the U.S. economy, when U.S. labor demand is dampened. For example, the number of unauthorized immigrants in the country appears to have declined slightly since 2007 in response to the recession, which began at the end of that year.[9] Cornelius and his team have also found that, due to the contraction of the job market in the United States with the onset of recession in December 2007, far fewer Mexicans are coming to the United States.[10]

Figure 1: U.S. Border Batrol Budget, FY 1992-2009



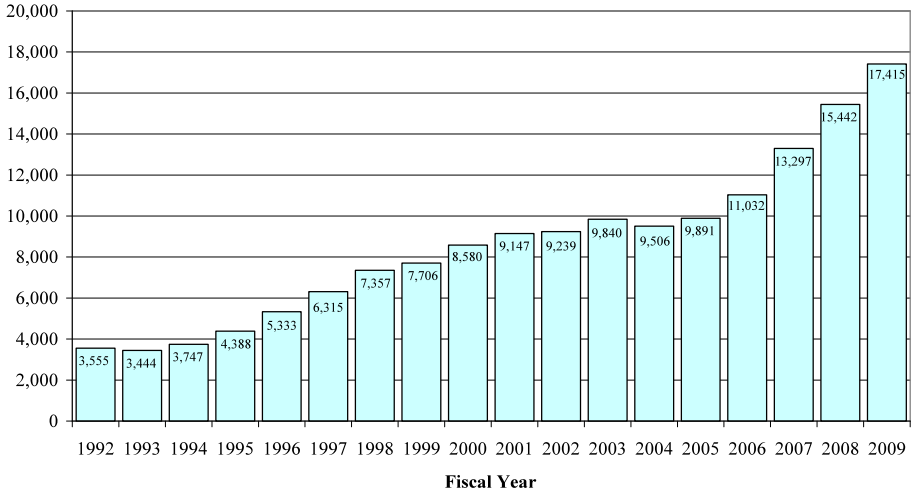
U.S. Border Patrol Headquarters, Office of Public Affairs, September 25, 2009

Figure 2: Cost per Apprehension, U.S. Border Patrol, FY 1992-2008



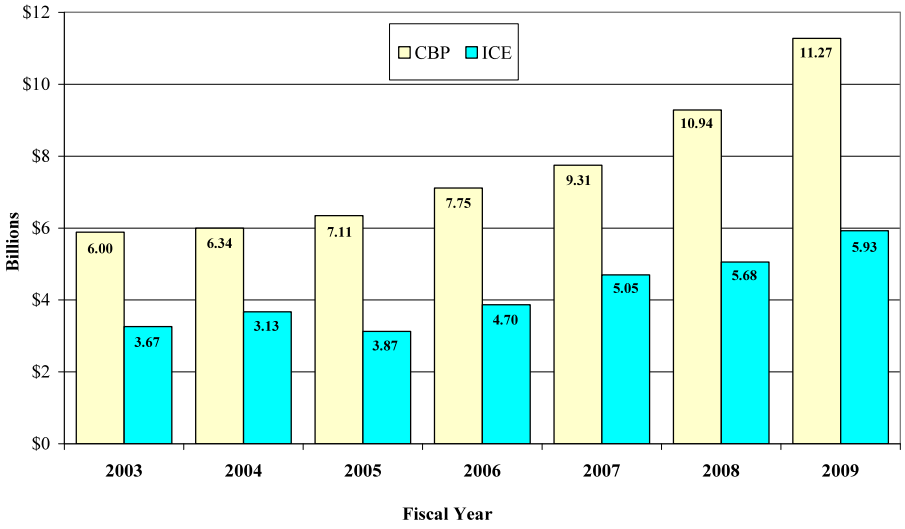
Source: Budget data from U.S. Border Patrol; apprehension data from 2008 and 2004 *Yearbook of Immigration Statistics*

Figure 3: U.S. Border Patrol Agents Stationed Along Southwest Border, FY 1992-2009



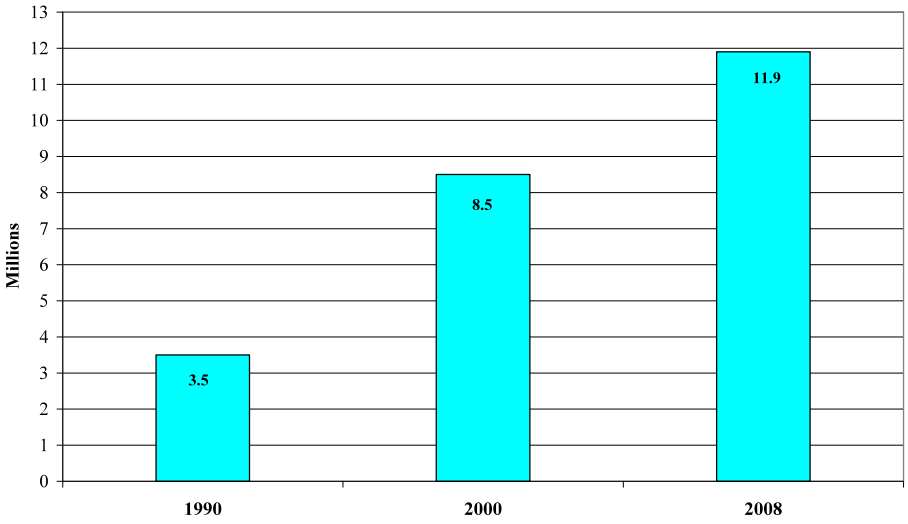
U.S. Border Patrol Headquarters, Office of Public Affairs, September 25, 2009.

Figure 4: CBP & ICE Budgets, FY 2003-2009



Source: U.S. Department of Homeland Security, *Budget-in-Brief* for Fiscal Years 2005 through 2010.

Figure 5: Unauthorized Immigrants in the United States, 1990, 2000 & 2008



Source: Estimates by the Pew Hispanic Center; Office of Immigration Statistics (U.S. Department of Homeland Security); U.S. Immigration & Naturalization Service.

The Unintended Consequences of Border Enforcement

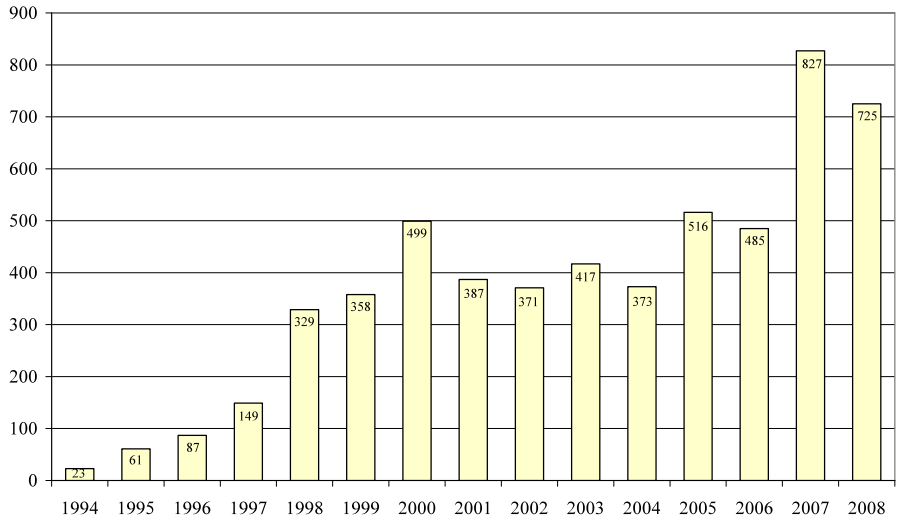
While enforcement-only border policies have not stopped nor even slowed the pace of unauthorized immigration, they have distorted the migration process in ways that produce unintended consequences, which are detrimental for both the U.S. economy and unauthorized migrants themselves. To date, the primary accomplishments of the enforcement-only strategy have been to make the U.S.-Mexico border more lethal; to create new opportunities and higher

profits for people-smugglers; to break historical patterns of circular migration and promote permanent settlement in the United States instead; and to depress low-wage U.S. labor markets.

- Making the Southwestern border more lethal: By channeling unauthorized migrants through extremely hazardous mountain and desert areas, rather than the relatively safe urban corridors used in the past, the concentrated border-enforcement strategy has contributed to a surge in migrant fatalities since 1995. The U.S. Government Accountability Office (GAO) has estimated that the number of border-crossing death doubled in the decade following the beginning of enhanced border-enforcement operations.[11] A report released in October 2009 by the American Civil Liberties Union (ACLU) of San Diego and Imperial Counties and Mexico's National Commission of Human Rights estimates that 5,607 migrants died while crossing the border between 1994 and 2008 (Figure 6).[12]
- Creating new opportunities for people-smugglers: Stronger enforcement on the U.S.-Mexico border has been a bonanza for the people-smuggling industry. Heightened border enforcement has made smugglers essential to a safe and successful crossing by closing safer, traditional routes. Cornelius' research in rural Mexico shows that more than nine out of 10 unauthorized migrants now hire smugglers to get them across the border. Only a decade ago, use of smugglers was the exception, rather than the rule.[13] And the fees that smugglers charge have tripled since 1993. By January 2006, the going rate for Mexicans was between $2,000-3,000 per head, and there is evidence of a further rise since that time.[14] But, even at these prices, it is still economically rational for migrants—and, often, their relatives living in the United States—to dig deeper into their savings and go deeper into debt to finance illegal entry.
- Breaking circular migration and promoting permanent settlement in the United States: Given the high costs and physical risks of unauthorized entry, migrants have a strong incentive to extend their stays in the United States; and they longer they stay, the more probable it is that they will settle permanently.[15]
- Depressing low-wage labor markets: The enhanced enforcement regime moves unauthorized workers further underground, lowering their pay and, ironically, creating a greater demand for unauthorized workers. A 2008 report from the Atlanta Federal Reserve analyzes how this vicious cycle is activated and then expands as firms find

themselves forced to compete for the supply of cheaper, unauthorized labor. When a firm cuts costs by hiring unauthorized workers for lower wages, its competitors become more likely to hire unauthorized workers for lower wages, as well, in order to benefit from the same cost savings.[16]

Figure 6: Border-Crossing Deaths, 1994-2008



Source: Maria Jimenez, *Humanitarian Crisis: Migrant Deaths at the U.S.-Mexico Border*,October 1, 2009, p. 17.

Demographic Trends in Mexico

While migration flows from Mexico to the United States can be explained in large part by differences in labor demand and wages between the two countries, economists also estimate that about one-third of total immigration from Mexico over the past four decades is the result of higher Mexican birth rates.[17] However, Mexico has begun to experience what will soon be a major reduction in the supply of new entrants into the North American labor force. As a result, Mexican migration to the United States is expected to continue declining in near future. The birth rate in Mexico has fallen from nearly seven children per mother in the mid-1960s to just 2.2 today, barely above replacement rate and only slightly higher than the U.S. level of 2.1. Mexico's birth rate is expected to fall below replacement level over the coming decade.[18] This is one of the fastest declines in fertility ever recorded in any nation. In the 1990s, when unauthorized migration from Mexico reached record levels, its working-age population was growing by 1 million each year—today that growth rate is 500,000.[19]

Although the United States will continue to attract many Mexicans seeking higher wages and a better life, the population pressures of the past two decades are already starting to recede, and a reduction in the pressures to migrate to the United States will likely follow. An early indication of this shift is seen in the increasing age of apprehended migrants. The share of apprehended immigrants under the age of 25 was 3.0 percentage points lower in 2008 compared to 2005, while the share of those over the age of 35 was 2.5 percentage points higher.[20]

Lessons from the Immigration Reform and Control Act of 1986

Beyond illustrating the failure of the enforcement-only approach to unauthorized immigration, the recent history of U.S. immigration policy also offers important insights into the economic benefits of providing unauthorized immigrants with legal status—as well as the drawbacks of immigration-reform efforts that are not sufficiently comprehensive in scope. The 1986 Immigration Reform and Control Act (IRCA) ultimately granted legal status to 1.7 million unauthorized immigrants through its general legalization program, plus another 1.3 million through a Special Agricultural Workers program.[21] Studies of immigrants who benefited from IRCA's general legalization program indicate that they soon earned higher wages and moved on to better jobs—and invested more in their own education so that they could earn even higher wages and get even better jobs. Higher wages translate into more tax revenue and increased consumer purchasing power, which benefits the public treasury and the U.S. economy as a whole. But IRCA failed to create flexible limits on future immigration that were adequate to meet the growing labor needs of the U.S. economy during the 1990s. As a result, unauthorized immigration eventually resumed in the years after IRCA (despite an initial decline), thereby exerting downward pressure on wages for all workers in low-wage occupations.

Legalized Workers Earn More and Move on to Better Jobs

Surveys conducted by Westat Inc. for the U.S. Department of Labor found that, on average, the real hourly wages of immigrants who acquired legal status under IRCA's general legalization program had increased 15.1 percent by 1992 (four to five years after legalization in 1987 or 1988). On average, men experienced a 13.2 percent wage increase and women a 20.5 percent increase.[22] Based on the same survey data, economists Sherrie Kossoudji, Ph.D., and Deborah

Cobb-Clark, Ph.D., found that 38.8 percent of Mexican men who received legal status under IRCA had moved on to higher-paying occupations by 1992.[23] Other researchers have also analyzed this survey data and supplemented it with data from additional sources—such as the 1990 Census and the National Longitudinal Survey of Youth—in an effort to determine how much of the wage increase experienced by IRCA beneficiaries was the result of legalization per se, as opposed to the many other variables that influenced wage levels for different workers in different occupations during the same period of time. Although the findings of these researchers vary according to the economic models they use, the results are uniformly positive:

- Economist Francisco Rivera-Batiz estimated that, by 1992, the very fact of having legal status had resulted in a wage increase of 8.4 percent for male IRCA beneficiaries and 13 percent for female IRCA beneficiaries—independent of any increase in earning power they might have experienced as a result of acquiring more education, improving their mastery of English, etc.[24]
- Economists Catalina Amuedo-Dorante, Cynthia Bansak, and Stephen Raphael estimated that, by 1992, real hourly wages had increased 9.3 percent for male IRCA beneficiaries and 2.1 percent for female IRCA beneficiaries—independent of broader changes in the U.S. economy that might have impacted wage levels generally.[25]
- Kossoudji and Cobb-Clark estimated that, by 1992, legalization had raised the wages of male IRCA beneficiaries 6 percent—independent of broader changes in the U.S. and California economies that might have impacted wage levels generally.[26]

Legal Status Yields Increasing Returns Over Time

The experience of IRCA also indicates that legalization greatly increases the incentive for formerly unauthorized workers to invest in themselves and their communities—to the benefit of the U.S. economy as a whole. As Kossoudji and Cobb-Clark explain, the wages of unauthorized workers are generally unrelated to their actual skill level. Unauthorized workers tend to be concentrated in the lowest-wage occupations; they try to minimize the risk of deportation even if this means working for lower wages; and they are especially vulnerable to outright exploitation by unscrupulous employers. Once unauthorized workers are legalized, however, these artificial barriers to upward socioeconomic mobility disappear. IRCA allowed formerly unauthorized workers with more skills to command higher wages, and also provided a powerful incentive for

all newly legalized immigrants to improve their English-language skills and acquire more education so they could earn even more. Kossoudji and Cobb-Clark estimate that if the men who received legal status under IRCA had been "legal" throughout their entire working lives in the United States, their wages by 1992 would have been 24 percent higher because they would have been paid in relation to their actual skill level since arriving in the country—and would therefore have had an incentive to improve their skills to further increase their earning power.[27]

A recent NAID research project on the 20-year impact of IRCA documents a number of important long-term improvements among previously unauthorized immigrants. Based on household surveys in Los Angeles before and after IRCA, the study illustrates how removing the uncertainty of unauthorized status not only allows legalized immigrants to earn higher wages and move into higher-paying occupations, but also encourages them to invest more in their own education, open bank accounts, buy homes, and start businesses. These are long-term economic benefits that continue to accrue well beyond the initial five-year period examined by most other studies of IRCA beneficiaries.[28]

Effective Immigration Reform Must Address Future Flows

Initially, unauthorized immigration to the United States *declined* following the passage of IRCA.[29] However, IRCA failed to create flexible legal limits on immigration that were capable of responding to ups and downs in future U.S. labor demand. Rather, IRCA attempted to stop unauthorized immigration through employer sanctions that imposed fines on employers who knowingly hire unauthorized workers. Given the U.S. economy's continuing demand for immigrant labor in excess of existing legal limits on immigration—together with the ready availability of fraudulent identity documents and the inherent difficulty of proving that an employer has "knowingly" hired an unauthorized worker—IRCA did not put an end to unauthorized immigration. A new, easily exploited unauthorized population arose in the United States during the economic boom of the 1990s. Moreover, the costs of employer sanctions were passed along to all Latino workers (regardless of legal status or place of birth) in the form of lower wages. This resulted in part from increased anti-Latino discrimination against job applicants who looked like they might be unauthorized, and in part from the increased use of labor contractors by employers who wanted to distance themselves from the risk of sanctions by

having someone else hire workers for them—for a price which was ultimately paid by the workers.[30]

Three Immigration Policy Scenarios

Taking the historical experience of legalization under IRCA as a starting point, and using a computable general equilibrium (CGE) model (see Appendix 1), we estimate the impact on the U.S. economy as a whole of three different immigration policy scenarios over the course of 10 years:

1. *Comprehensive immigration reform*, in which a pathway to legal status is created for unauthorized immigrants already living in the United States, and new, flexible legal limits on permanent and temporary immigration are established that respond to changes in U.S. labor demand in the future.
2. *Temporary workers only*, in which a new temporary-worker program is created for both currently unauthorized immigrants and future immigrants, but which includes neither a pathway to permanent status for unauthorized immigrants, nor more flexible legal limits on permanent immigration in the future.
3. *Mass deportation*, in which all unauthorized immigrants are expelled from the United States, and the U.S.-Mexico border is effectively sealed to future immigration. Although this is not a realistic scenario, it is useful for comparison purposes.

Scenario 1: Comprehensive Immigration Reform

In this scenario, the U.S. government enacts immigration reform that allows unauthorized immigrants to come forward and register, pay an application fee and a fine, earn legal status—if they pass a criminal background check—and, eventually, U.S. citizenship. Applicants would also be required to learn English and pay any back taxes owed. Moreover, future levels of permanent and temporary immigration to the United States would be based on the demand for labor in the United States. All immigrant workers in this scenario have full labor rights, which results in higher wages—and higher worker productivity—not only for immigrants, but for all workers in industries where large numbers of immigrants are employed. As wage and productivity levels

rise, the U.S. economy's demand for new immigrant workers actually *declines* over time as the market shrinks for easily exploited, low-wage, low-productivity workers.

This scenario uses the parameters of the IRCA experience to simulate the impact on the U.S. economy of the higher wages that would be earned by newly legalized workers, as well as the higher worker productivity which would result from the movement of workers into new occupations and from increased investment by workers in their own education and skills. However, this model does not capture a range of other economic benefits that have been documented among IRCA beneficiaries, such as increased household investments in the education of family members and increased rates of home ownership and small-business formation. Therefore, the results of our modeling should be viewed as a conservative, baseline estimate of the actual economic benefits that would flow from comprehensive immigration reform.

Scenario 2: Temporary Workers Only

In this scenario, the U.S. government creates a new temporary-worker program that encompasses both currently unauthorized immigrants and future immigrants, but with limited labor rights and on a temporary basis only. Neither unauthorized immigrants nor future temporary immigrants would be granted a pathway to permanent status or U.S. citizenship. Immigrant workers in this scenario have limited labor rights, which drives down wages (and productivity) for all workers in industries where large numbers of immigrants are employed. In other words, legal immigration responds to changes in U.S. labor demand, but at relatively low wages and without the build up of human capital and labor productivity that occurs over time among legalized workers. As a result, future levels of immigration are actually higher under this scenario than under comprehensive immigration reform, since more workers are needed to produce the same level of output under low-wage, low-productivity conditions.

Scenario 3: Mass Deportation

In this scenario, over 4 million immigrant workers (and their dependents) are deported, or alternatively, never allowed to enter the United States. While this scenario is not a realistic policy option, it serves as an extreme or boundary case against which the other two scenarios can

be evaluated. It is important to note that, while this scenario estimates the broader economic impact of mass deportation, it does not take into account the actual cost of mass deportation. The Center for American Progress has pegged this cost at somewhere between $206 billion and $230 billion over five years.[31]

The Economic Benefits of Comprehensive Immigration Reform

The results of our modeling (see Appendix 2) suggest that:

1. The comprehensive immigration reform scenario generates an annual increase in U.S. Gross Domestic Product (GDP) of at least 0.84 percent. Over 10 years, this amounts to $1.5 trillion in additional GDP (see Figure 7). Moreover, wages rise for both native-born and newly legalized immigrant workers under this scenario.
2. The temporary-workers-only scenario generates an annual increase in U.S. GDP of 0.44 percent. Over 10 years, this amounts to $792 billion of additional GDP (see Figure 7). However, wages fall for both native-born and newly legalized immigrant workers under this scenario.
3. The mass deportation scenario reduces U.S. GDP by 1.46 percent annually. Over 10 years, this amounts to $2.6 trillion in lost GDP (see Figure 7).[32] Although wages rise for less-skilled native-born workers under this scenario, they fall for higher-skilled natives and the U.S. economy loses large numbers of jobs.

Under the comprehensive immigration reform scenario, U.S. GDP increases by at least 0.84 percent per year. Using 10-year GDP projections prepared by the Congressional Budget Office (CBO),[33] this translates into a steadily increasing amount of added annual GDP over the coming decade (Figure 8 and Appendix 3). The 10-year total is at least $1.5 trillion in added GDP over 10 years, which includes roughly $1.2 trillion in additional consumption and $256 billion in additional investment.

Figure 7: Change in U.S. GDP Under Different Scenarios, Over 10 Years

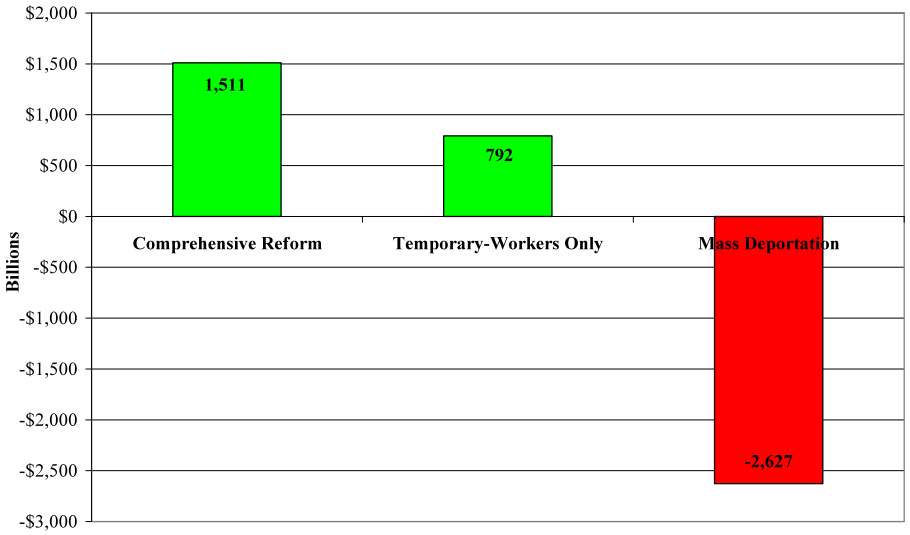
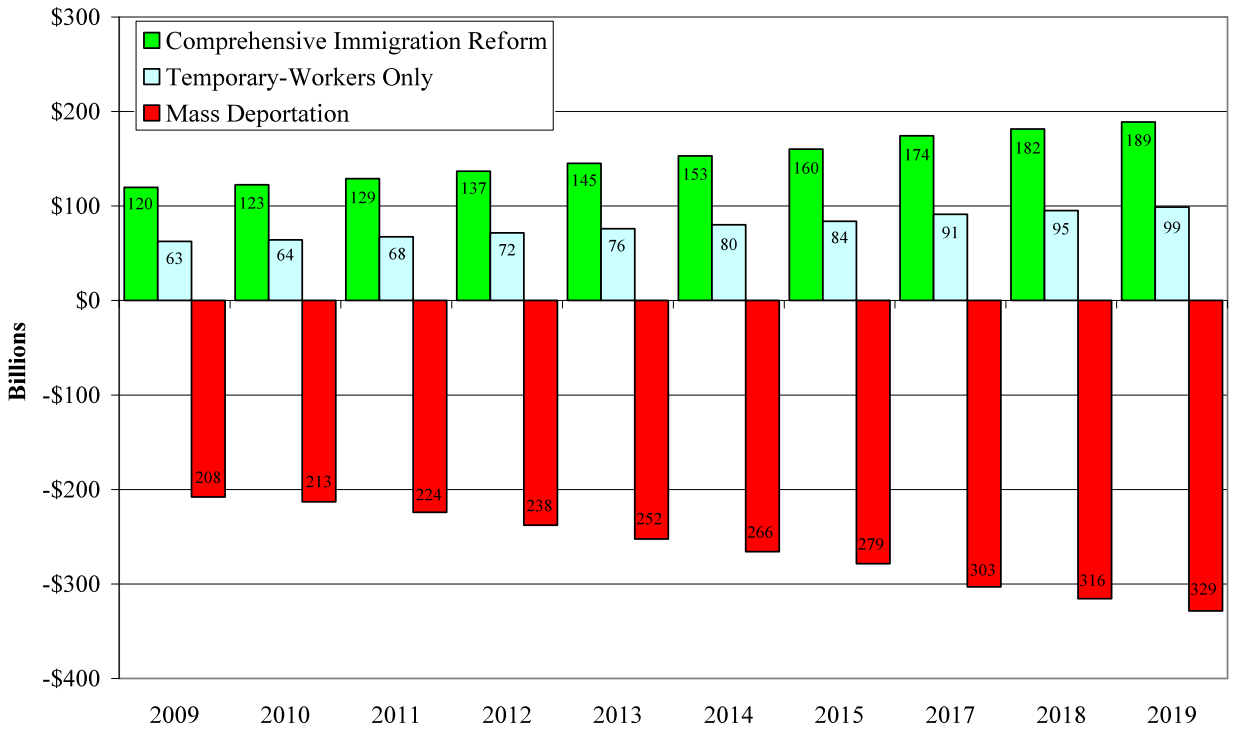


Figure 8: Annual Change in U.S. GDP Under Different Scenarios, 2009-2019



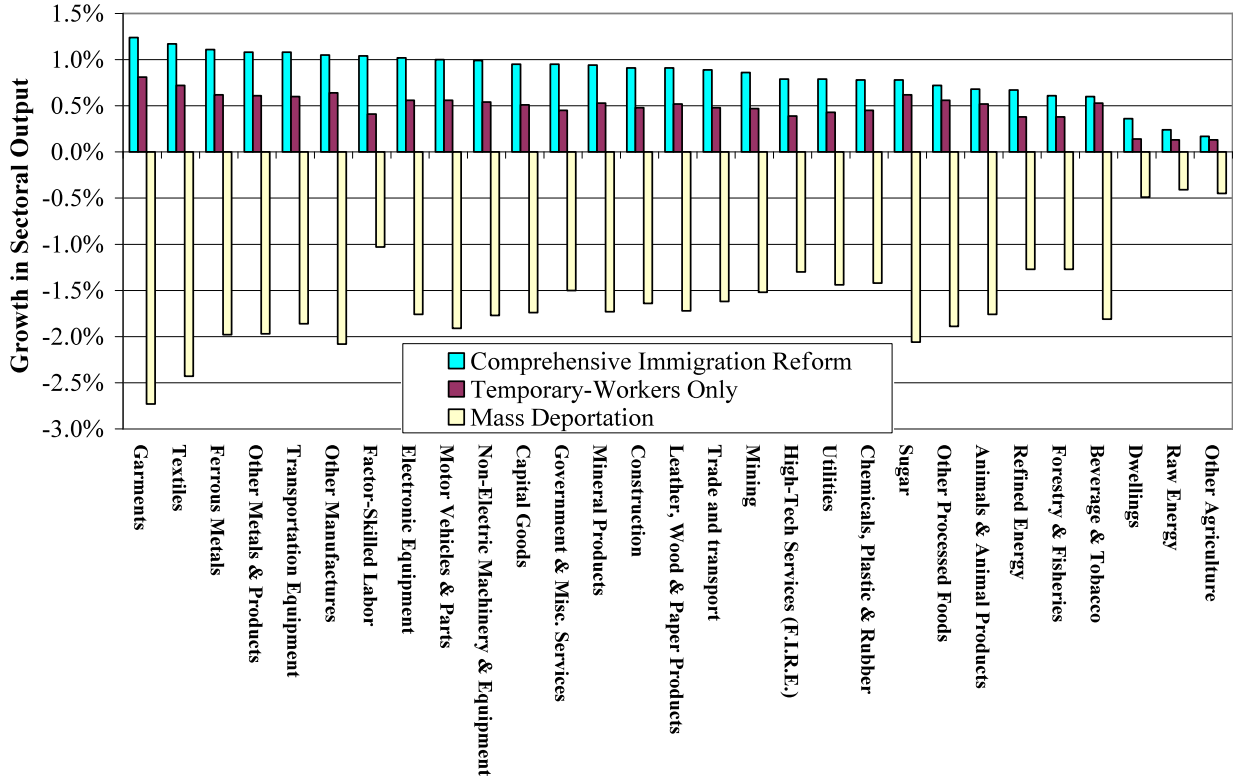
Even in the short run—that is, during the first three years or so following legalization—the economic gains from comprehensive immigration reform are substantial. The real wages of

newly legalized workers increase by roughly $4,405 per year among those in less-skilled jobs, and $6,185 per year for those in higher-skilled jobs. The higher earning power of newly legalized workers translates into an increase in net personal income of $30-36 billion, which supports 750,000-900,000 additional new jobs and generates $4.5 to $5.4 billion in additional net tax revenue.

It is important to note that the wages of native-born workers also increase under the comprehensive immigration reform scenario because the wage floor for all workers rises—particularly in industries where large numbers of easily exploited, low-wage, unauthorized immigrants currently work. Among native-born U.S. workers, wages increase by roughly $162 per year for the less-skilled and $74 per year for the higher-skilled. In contrast, wages for both less-skilled and higher-skilled native-born U.S. workers fall under the temporary-workers-only scenario. Wages for less-skilled native-born workers rise under the mass deportation scenario—but only at the cost of significantly fewer jobs as the economy contracts and investment declines (see Appendix 2).

The benefits of additional U.S. GDP growth under the comprehensive immigration reform scenario are spread very broadly throughout the U.S. economy, with virtually every sector expanding. Particularly large increases are seen in textiles, ferrous metals, transportation equipment, electronic equipment, motor vehicles and parts, nonelectric machinery and equipment, capital goods, mineral products, and construction. In comparison, every sector experiences significantly smaller gains under the temporary-workers-only scenario, while every sector contracts under the mass deportation scenario (see Figure 9 and Appendix 4).

Figure 9: Annual Impact of Different Scenarios on U.S. Economic Sectors



Conclusion: From a Vicious Cycle to a Virtuous Cycle

The experience of IRCA and the results of our modeling both indicate that legalizing currently unauthorized immigrants, as well as creating flexible legal limits on future immigration in the context of full labor rights, would raise wages, increase consumption, create jobs, and generate additional tax revenue—particularly in those sectors of the U.S. economy now characterized by the lowest wages. This is a compelling economic reason to move from the current "vicious cycle," in which an enforcement-only approach to unauthorized migration exerts downward pressure on already-low wages, to a "virtuous cycle" of worker-empowerment, in which legal status and labor rights exert upward pressure on wages. The legalization of the nation's unauthorized workers and the creation of new legal limits on immigration that rise and fall with U.S. labor demand would help lay the foundation for a robust, just, and widespread economic growth. In essence, moving unauthorized workers out of a vulnerable underground status strengthens the ability of all working families to become more productive, with higher levels of

job-generating consumption, thereby laying a foundation for long-term community revitalization, middle-class growth, and a stronger, more equitable national economy.

Appendix 1: Methodology

CGE Modeling

This study presents the results of a computable general equilibrium (CGE) modeling project of the United States and Mexico, in the context of a multi-regional world economy, designed to analyze scenarios of alternative immigration policies, as well as alternative trade policies. The results of this integrated CGE model allow us to analyze the impacts on differently skilled labor of both migration and trade policies within a common comparative framework. As is typical in CGE models of this type, trade is motivated by both price differentials and regional characteristics of goods.[34] Services trade is included, such that none of the 29 sectors in the models are "purely nontraded." Trade liberalization can consist of reducing or eliminating manufacturing tariffs, all tariffs, or all barriers, including nontariff barriers. Immigration is motivated by real wage differentials and influenced by immigration policies. Migrant remittances are explicitly modeled, and are impacted by any policy that affects migration levels or migrant earnings.

Typically, CGE models are used to run "comparative static" experiments. An experiment is constructed, changing key variables and observing how the equilibrium adjusts. This gives the researchers an approximate picture of how the economy in the base year would have looked if the changes being simulated in a particular scenario had occurred years ago and the economy had fully adjusted to the change. Our longer-term research goal is to extend this work to include dynamics: how the economies would adjust over a period of time to policy changes made in the model's base year. This extension will allow even greater focus on important issues such as savings and investment, demographic change, and human capital formation.

Our model simulates the impacts of immigration policies primarily through two variables:

1) Impacting wage differentials directly by raising or lowering the level of domestic wages earned by migrants. For example, wages (and productivity) of legalized migrants increase

with immigration reforms that grant those workers additional rights and encourage investments in their human capital.

2) Impacting the responsiveness (elasticity) of migration with respect to any given wage differential. For example, additional enforcement lowers immigration, for a given wage differential.[35]

Immigration and trade interact in several important ways in the model. The presence or absence of immigrants in a country impacts the relative price of goods, and thus trade flows. Openness to trade impacts wage levels, and thus immigration incentives. Remittances impact the balance of payments and thus trade flows. Remittances further fuel investment and growth in migrant-sending regions, thus impacting wages, prices, trade, and migration.

In this paper, we use a global applied general equilibrium model that has been adjusted to take into account bilateral labor flows.[36] The global migration model, termed GMig2, represents a significant improvement on the model developed in Terrie L. Walmsley and Alan L. Winters.[37] The GMig2 model takes advantage of the recent bilateral migration database developed by Christopher R. Parsons, Ronald Skeldon, Terrie L. Walmsley, and L. Alan Winters to allow bilateral labor movements to be tracked.[38] The GMig2 is documented by Terrie Walmsley, Alan Winters, Syud Amer Ahmed, and Christopher Parsons.[39]

The GMig2 Database

The database used with the Bilateral Labor Migration Model (GMig2) is based on the GTAP 6 Database[40] and is augmented with the bilateral migration data base developed by Parsons et al. (2005), skill data from Frédéric Docquier and Hillel Rapoport,[41] and remittance data from the World Bank.[42] The GMig2 data base construction process is documented by Terrie Walmsley, S. Amer Ahmed, and Christopher R. Parsons.[43] Table 1 shows the configuration of the GMig2 Database as aggregated for this paper. The nine regions are shown in Panel A, and the 29 commodities in Panel B.

Table 1: Panel A

1	USA
2	Canada
3	Mexico
4	China
5	India
6	Rest of South America
7	Rest of OECD
8	Asian Newly Industrialized Countries (Singapore, Taiwan, and Hong Kong)
9	Rest of World

Table 1: Panel B

1	Irrigated agriculture in Mexico (vegetables, fruit, and sugar cane)
2	Traditional agriculture in Mexico (cereal grains, oil seeds, and plant-based fibers)
3	Animals and animal products
4	Other agriculture
5	Forestry and fisheries
6	"Raw" energy
7	Mining
8	Other processed foods
9	Sugar
10	Beverages and tobacco
11	Textiles
12	Garments
13	Leather, wood, and paper product
14	"Refined" energy

15	Chemicals, plastic, and rubber
16	Mineral products
17	Ferrous metals
18	Other metals and products
19	Motor vehicles and parts
20	Transport equipment
21	Electronic equipment
22	Nonelectric machinery and equipment
23	Other manufactures
24	Utilities
25	Construction
26	Trade and transport
27	High-tech services (finances, insurance, recreation)
28	Government and miscellaneous services
29	Dwellings

The GMig2 Model

As in the GMig2 Database, the model tracks both the home and host region of each person and worker. The home region is defined as the country of origin of the person/worker; in the database, this is their place of birth. The host region is the region in which the person resides/works. The labor force of skill i, located in region r ($LF_{i,r}$), and available to firms for production, is therefore the sum across home regions (c) of all workers located in the host region r (equation (1)); similarly for population, equation (2).

$$LF_{i,r} = \sum_{c} LF_{i,c,r} \quad (1)$$

$$POP_{r} = \sum_{c} POP_{c,r} \quad (2)$$

An increase in the number of migrant workers from region c to region r would reduce the number of workers in the labor supplying region ($LF_{i,c,c}$ would fall) and increases the labor force of the labor importing region ($LF_{i,c,r}$ would rise). The populations would change in a similar way, since it is assumed that migrant workers move with their families.

Changes in the number of migrants can occur in two ways in the GMig2 model: as an exogenous change in the supply and/or demand for migrant workers (e.g., changes in quotas); or as endogenous movements of migrant workers in response to wage differentials. In this paper, movements in migrant workers occur endogenously, except in the zero Mexican migration scenario, where a hypothetical enforceable quota of zero migrants from Mexico is set without allowing compensating flows based on changing wage differentials.

Migrants are assumed to respond to differences in the real wages between the home ($RW_{i,c,c}$) and host ($RW_{i,c,r}$) region. ESUBMIG is a parameter reflecting the extent to which migrants respond to differences in real wages; this parameter would also reflect any restrictions on migration flows imposed by the host or home country policies.

$$LF_{i,c,r} = A_{i,c,r} \times \left[\frac{RW_{i,c,r}}{RW_{i,c,c}}\right]^{ESUBMIG_{i,r,s}} \qquad (3)$$

Note that with endogenous movements responding to changes in real wages, migrants can either migrate or return home depending on the impact of the trade and/or migration policy on real wages; policies that increase real wage differentials lead to higher levels of migration, while those that reduce the wage differential lead to lower migration levels.[44]

Migrant workers are assumed to gain a portion of the difference between their nominal wages at home and the nominal wages in the host region, reflecting the fact that their productivities have also changed as they move from the home to the host region and interact with the resources and technology of that host region. Changes in real wages and incomes are also considered, since different purchasing power between regions is also an important factor in the migrant's decision

on whether to migrate and on the impact of migration (Timmer and van der Mensbrugghe, 2006).[45]

In this paper, changes in migration policies are implemented in two ways:

1. The responsiveness of migration to real wage differentials (ESUBMIG) can be shocked to reflect changes in migration policy that increase or decrease the ability of people to migrate in response to wages.

2. The ratio of a migrant's wage in the host country to their home country wage can be altered to reflect changes in the productivities of migrants resulting from changes in migration policy. This ratio is referred to as BETA.

Hence a tightening (loosening) of migration policy involves reducing (increasing) the responsiveness of migrants to wage differentials (ESUBMIG) and/or a reduction (increase) in the productivity or lowering the ratio of migrant wages to home wages (BETA). The model is also consistent with standard trade theory—countries benefiting from inward migration experience a decline in the marginal product/wage of labor as they move down their marginal product curves, and production increases as firms gain greater access to cheaper labor. Returns to capital also increase as capital becomes scarce relative to labor. The reverse is true for those countries experiencing outward migration.

Remittances are also an important feature in the model and for examining the impact of migration. Remittances are assumed to be a constant proportion of the income received by migrant workers and flow out of the host country back to the permanent residents of the home country. Hence as the number of new migrants or their wages increase, total remittances increase. Remittances therefore reduce the income of the migrants and increase the incomes of permanent residents back home. These remittances can have an important offsetting effect on the home economies (labor suppliers) and on the incomes of permanent residents remaining at home; and on the current account balances of both the home and host countries. Thus migration works to narrow real wage differentials between countries in two ways: raising labor productivity in the

sending country and lowering it in the receiving country ("leveling down") and promoting improvements in living standards in sending regions through remittances (potentially "leveling up").

Appendix 2: Macroeconomic Results of Different Scenarios

	Mass Deportation	Temporary Workers Only	Comprehensive Reform
ANNUAL CHANGE IN GDP			
U.S.	-1.46%	0.44%	0.84%
Mexico	2.75%	-0.41%	-0.2%
ANNUAL MIGRATION			
Mexico - Unskilled	-3,500,000	571,000	249,000
- Skilled	-570,000	54,000	41,000
ANNUAL CHANGE IN REMITTANCES			
Mexico	-99.21%	14.49%	27.68%
ANNUAL CHANGE IN WAGES			
Unskilled			
U.S.: natives	$399	-$102	$162
U.S.: Mexican immigrants	$364	-$93	$4,405
Mexico	-$254	$47	$23
Skilled			
U.S.: natives	-$73	-$7	$74
U.S.: Mexican immigrants	-$68	-$6	$6,185
Mexico	-$800	$83	$100
ANNUAL CHANGE IN REAL			

RETURNS TO:			
U.S.: Capital	-1.1%	0.33%	0.64%
Land	-5.12%	1.67%	2.19%
Resources	-4.33%	1.4%	2.62%
Mexico:			
Capital	1.59%	-0.24%	-0.07%
Land	12.17%	-1.69%	-0.45%
Resources	6.3%	-0.68%	-0.59%

Appendix 3: Annual Impact on GDP of Different Scenarios, 2009-2019

		Change in GDP under…		
Year	Total Projected U.S. GDP*	Comprehensive Reform (0.84% per year)	Temporary Workers Only (0.44% per year)	Mass Deportation (-1.46% per year)
2009	$14,241,000,000,000	$119,624,400,000	$62,660,400,000	-$207,918,600,000
2010	$14,591,000,000,000	$122,564,400,000	$64,200,400,000	-$213,028,600,000
2011	$15,347,000,000,000	$128,914,800,000	$67,526,800,000	-$224,066,200,000
2012	$16,293,000,000,000	$136,861,200,000	$71,689,200,000	-$237,877,800,000
2013	$17,280,000,000,000	$145,152,000,000	$76,032,000,000	-$252,288,000,000
2014	$18,211,000,000,000	$152,972,400,000	$80,128,400,000	-$265,880,600,000
2015	$19,077,000,000,000	$160,246,800,000	$83,938,800,000	-$278,524,200,000
2017	$20,749,000,000,000	$174,291,600,000	$91,295,600,000	-$302,935,400,000
2018	$21,617,000,000,000	$181,582,800,000	$95,114,800,000	-$315,608,200,000
2019	$22,500,000,000,000	$189,000,000,000	$99,000,000,000	-$328,500,000,000
	Cumulative Total	$1,511,210,400,000	$791,586,400,000	-$2,626,627,600,000

* Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2009 to 2019* (Washington, D.C.: January 2009), Table B-1, p. 44.

Appendix 4: Impact of Different Scenarios on Various Sectors

	Mass Deportation	Temporary Workers Only	Comprehensive Immigration Reform
Garments	-2.73%	0.81%	1.24%
Textiles	-2.43%	0.72%	1.17%
Ferrous Metals	-1.98%	0.62%	1.11%
Other Metals and Products	-1.97%	0.61%	1.08%
Transportation Equipment	-1.86%	0.60%	1.08%
Other Manufactures	-2.08%	0.64%	1.05%
Factor-Skilled Labor	-1.03%	0.41%	1.04%
Electronic Equipment	-1.76%	0.56%	1.02%
Motor Vehicles and Parts	-1.91%	0.56%	1.00%
Nonelectric Machinery and Equipment	-1.77%	0.54%	0.99%
Capital Goods	-1.74%	0.51%	0.95%
Government and Misc. Services	-1.50%	0.45%	0.95%
Mineral Products	-1.73%	0.53%	0.94%
Construction	-1.64%	0.48%	0.91%
Leather, Wood, and Paper Products	-1.72%	0.52%	0.91%
Trade and transport	-1.62%	0.48%	0.89%
Mining	-1.52%	0.47%	0.86%
High-tech Services (F.I.R.E.)	-1.30%	0.39%	0.79%
Utilities	-1.44%	0.43%	0.79%
Chemicals, Plastic, and Rubber	-1.42%	0.45%	0.78%
Sugar	-2.06%	0.62%	0.78%
Other Processed Foods	-1.89%	0.56%	0.72%
Animals and Animal Products	-1.76%	0.52%	0.68%
Refined Energy	-1.27%	0.38%	0.67%

Forestry and Fisheries	-1.27%	0.38%	0.61%
Beverage and Tobacco	-1.81%	0.53%	0.60%
Dwellings	-0.49%	0.14%	0.36%
Raw Energy	-0.41%	0.13%	0.24%
Other Agriculture	-0.45%	0.13%	0.17%

Notes

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3. Budget data provided to the authors by U.S. Border Patrol Headquarters, Office of Public Affairs, September 25, 2009; apprehension data from the Office of Immigration Statistics, U.S. Department of Homeland Security, *2008 Yearbook of Immigration Statistics* (Table 35) and *2004 Yearbook of Immigration Statistics* (Table 37).

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