



Immigration Task Force

Measuring the Metrics:

Grading the Government on Immigration Enforcement



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AUTHORS

Bryan Roberts, Senior Economist, Econometrica, Inc.

Principal Author and Original Research

Substantial editorial contributions by Theresa Brown, Matt Graham, and Lazaro Zamora of BPC.

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This report was prepared by a consultant for the Bipartisan Policy Center and is a product of the Immigration Task Force staff. The findings and conclusions reached in this document do not necessarily reflect the views of BPC's Immigration Task Force Members or BPC, its founders, or its board of directors.

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Former Governor
of Mississippi

Ed Rendell

Former Governor
of Pennsylvania

Henry Cisneros

Former U.S. Secretary
of Housing and Urban
Development

Condoleezza Rice

Former U.S. Secretary
of State

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Corporation

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STAFF

Theresa Brown

Director of Immigration
Policy

Matt Graham

Policy Analyst

Lazaro Zamora

Policy Analyst

Kristen Dahlman

Administrative Assistant



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Co-chairs Haley Barbour, Ed Rendell, Condoleezza Rice, and Henry Cisneros.

Letter from the Co-Chairs

In 1986, Congress and President Reagan asserted that the enforcement and legalization provisions contained in the Immigration Reform and Control Act (IRCA) would control future unauthorized immigration. Within a few years, however, it became clear that the unauthorized immigrant population was rising more quickly than ever before. This failure to stem the flow of unauthorized immigration has impacted the immigration debate in this country ever since.

We continue to believe that comprehensive immigration reform is in the best interest of our country. We also believe that truly comprehensive reform must include effective immigration enforcement as a key component. Our Task Force believes strongly that a robust set of outcome-based border security metrics is necessary to provide a holistic picture of the flow of unauthorized immigration and hold accountable those responsible for securing the nation's borders. As this BPC report shows, despite decades of research and a wealth of data, federal immigration agencies have failed to report a consistent set of performance measures over time.

This report lays out a set of performance measures that covers each of the major ways unauthorized immigrants enter and exit the country, as well as overall changes to the unauthorized immigrant population. If Congress and the executive branch worked to create and report on a similar set of measures, and to release data to external researchers that would support supplemental analysis, our understanding of the state of immigration enforcement would improve tremendously.

Stakeholders on all sides of the debate agree that our current immigration system does not serve the national interest. To support good policy now and in the future, Congress and the executive branch should work together to publish a stable, consistent, and complete set of performance measures for immigration enforcement.

Condoleezza Rice



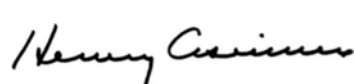
Haley Barbour



Ed Rendell



Henry Cisneros





Arizona border fence line. Photo courtesy of U.S. Customs and Border Protection.

Table of Contents

Executive Summary	vii	Chapter 4. Measures and Migration Decisions . .	37
Introduction.	1	What is the Optimal Level of Deterrence?	37
Chapter 1. The Immigration Enforcement System: Overview and History of Measurement	3	Measuring Before-the-Border Deterrence.	39
Overview of the Immigration Enforcement System	3	Developing a Holistic Enforcement Model	40
Evolution of the Enforcement System	4	Conclusion	43
How Big Is the Immigration Enforcement System Today?	6	References	47
History of Enforcement Measurement	10	Appendix A: The Allocation of Federal Law Enforcement Resources	51
Chapter 2. Defining Measurement: Key Concepts and Criteria.	15	Appendix B: The Repeat-Trials Model of Illegal Entry.	55
Inputs, Outputs, and Outcomes	15	Appendix C: An Integrated Model of Immigration Enforcement and Deterrence	59
Why Are Outcome Measures Needed?	15	Endnotes.	69
What Basic Criteria Should Outcome Measures Meet?	17		
Have Reported Measures Met These Criteria?	17		
Chapter 3. Measuring Enforcement Outcomes. . .	21		
Measuring Overall Effectiveness: Stock and Flow Estimates of the Unauthorized Population	21		
Measuring Entries through Specific Channels	23		
Measuring Inflows and Outflows: Stock-Flow Accounting	33		

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Lights and fencing along the U.S.-Mexico border near Yuma, Arizona.

Executive Summary

Introduction

Border security is one of the most contentious issues in the immigration reform debate. Since the 1986 passage of the Immigration Reform and Control Act (IRCA), real spending on immigration enforcement has grown sevenfold, and now constitutes nearly half of all federal law enforcement spending. Despite significant investments, the federal government has failed to develop a comprehensive system of performance indicators that measure the effectiveness of its efforts to combat unauthorized immigration. The lack of consistent, widely accepted accountability measures for border security and interior enforcement contributes to the disagreements over the state of immigration enforcement and impacts the ongoing immigration reform debate.

Over the years, both the Department of Homeland Security (DHS) and independent researchers have developed methodologies and identified data sources that could be used to measure the government's success—or failure—at preventing unauthorized immigration. Government metrics have not always been publicly reported, and agencies have been reluctant to adopt measures developed by outside researchers. After reviewing the data and methodologies available to the government and in academia, the Bipartisan Policy Center (BPC) suggests a slate of metrics that, if used and reported, would constitute an objective set of comprehensive, outcome-based performance measures.

Key takeaways include:

- **Need for consistent, credible measures.** Federal immigration agencies have frequently adopted new performance measures, only to drop them a few years later. The lack of stable measures undermines the ability to assess the effectiveness of efforts to combat unauthorized immigration.
- **Need for broad outcome measurements.** Assessments of U.S. immigration enforcement too often rely on input

measures, such as the amount of funding, the number of agents deployed, or miles of fencing. Instead, outcome measures are necessary to judge whether federal agencies are meeting overall immigration enforcement goals.

- **Data and methodologies are already available.** The lack of adequate performance reporting generally does not reflect a lack of data. Over the past few decades, DHS and external researchers have invested significant resources in collecting a wealth of data and developing methodologies to measure immigration enforcement outcomes, but federal agencies have not taken full advantage of the potential benefit provided by further analysis and reporting.
- **The migrant's incentives matter.** The incentive structure behind a migrant's decision to come to the United States provides important context for interpreting enforcement metrics and establishing goals. The ultimate tool—to determine the appropriate resource allocations for immigration enforcement—would be an integrated model that links migration decisions, U.S. policy levers that affect migration incentives, and outcome measures.
- **Congress should provide clear reporting requirements.** In order to hold relevant federal agencies accountable, Congress should require consistent and stable reporting on the state of immigration enforcement based on a set of comprehensive, outcome-based performance measures such as those outlined in this paper.

Background: A Brief History of Measuring Enforcement

The primary purpose of the immigration enforcement system is to prevent unauthorized immigration. The system is a complex network of law enforcement and administrative programs that spans the Departments of Homeland Security, Justice, and State. Federal immigration agencies

have always collected data and reported various statistics relevant to their mission and specifically to border and interior enforcement. But these agencies have failed to utilize this data to develop and report consistent, reliable performance measures for immigration enforcement over time.

In the 1980s and early 1990s, federal agencies and researchers developed several methodologies to measure immigration enforcement outcomes. Since then, agencies have adopted and dropped various measures but have not settled on a consistent framework that tracks performance over time. For example, in the context of border control, the agencies have developed, utilized, and reported four different core measures for the southwest border in the past 15 years. DHS announced in 2012 that it was working to develop a “Border Conditions Index” (BCI), which would aggregate together a range of enforcement indicators. But by 2013, the effort was abandoned and nothing was made public.

Defining Measurement: Key Concepts and Criteria

Too often, assessments of U.S. immigration enforcement are based on input measures, such as the amount of funding, the number of agents deployed, or the number of miles of fencing. However, to determine accurately whether enforcement is successful or cost-effective, it is necessary to use outcome measures that assess progress toward an overall goal of reducing unauthorized migration.

Outcome measures help assess the achievement of and progress toward overall immigration enforcement goals,

which helps educate the public and policymakers about the true state of enforcement. For example, one input measure might be the number of Border Patrol agents, and an output measure would be the number of apprehensions by those same agents. Apprehensions are easy to quantify, but do not clearly indicate whether Border Patrol is achieving its goal of deterring and preventing illegal entry. The appropriate outcome measure would be to assess the total number of illegal entries.

Ideal outcome-based performance measures should be:

- Meaningful, clear, and readily understandable;
- Based on objective methodologies that enjoy scientific consensus;
- Derived from valid data that are not biased or distorted, and are collected in a consistent manner over time;
- Timely and actionable; and
- Stable over time.

Measuring Enforcement Outcomes

The table and discussion below present a suggested set of metrics that, taken together, would constitute a comprehensive, outcome-based set of performance measures that could inform the public and policymakers about the state of border security and the success of immigration enforcement. The measures suggested cover overall changes to the unauthorized immigrant population, as well as the specific ways individuals enter and exit the unauthorized immigrant population. In general, these measures could be reported using existing data collected by the government and external researchers.

Table 1. Potential Outcome Measures for Unauthorized Immigration

Outcome	Performance Measures
Overall Effectiveness	
Unauthorized population	Number of Unauthorized Immigrants Residing in the U.S.
Specific Inflow (Entry) Channels	
Total inflow	Total Entries by Unauthorized Immigrants
Illegal Entry Between Ports	Number of Apprehensions
	Probability of Apprehension
	At-the-Border Deterrence Rate
	Number of Successful Illegal Entries
Illegal Entry At Ports	Number of Refused Entries and Apprehensions
	Probability of Apprehension
	Number of Successful Illegal Entries
Overstays	Number of New Overstays
Specific Outflow (Exit) Channels	
Measures of Each Possible Outflow Channel	Number of Unauthorized Immigrants Removed
	Number of Unauthorized Immigrants Adjusted to Legal Status
	Number of Unauthorized Immigrants Leaving of Their Own Accord
	Number of Unauthorized Immigrants Who Died

Measuring Overall Effectiveness: Stock-and-Flow Estimates of the Unauthorized Population

Two important measures of the overall state of unauthorized immigration in the United States are the “stock” and “flow” of unauthorized immigrants. “Stock” refers to the number of unauthorized immigrants present in the United States at a given point in time. “Flow” refers to the total number of individuals entering or leaving the unauthorized immigrant population, or the year-to-year change in the stock of unauthorized immigrants.

Most estimates of the resident unauthorized population are based on the “residual methodology,” which compares the number of foreign-born people in the country with legal entries and assumes all foreign-born people who cannot be accounted for are unauthorized immigrants. Although there are some challenges associated with this methodology, it is the most widely accepted methodology for estimating the number of unauthorized immigrants and has been consistently used over time by both government and academic researchers. The overall estimate of unauthorized immigrants in the country has been used as a performance measure by the federal government in the past, but has not been used by DHS since its founding in 2003.

Measuring Entries through Specific Channels

Because the total stock of unauthorized immigrants can only speak to the overall success of immigration enforcement, measures specific to individual means of inflow (entry) and outflow (exit) for unauthorized immigrants are necessary both to assess the success of specific enforcement strategies aimed at these individual channels of entry and exit, and to determine what combination of strategies would most effectively reduce the unauthorized immigrant population. Enforcement strategies have different goals: to prevent or deter inflows (e.g., border security), to increase outflows (e.g., interior removals), or some combination of both (e.g., employment verification).

Inflow between Ports of Entry (unauthorized border-crossers)

The primary outcome measure between the ports of entry should be the number of successful unauthorized border-crossings. Because illegal entries cannot be directly measured (by definition, they are undetected), the number of successful entries must be estimated indirectly from other available data. Specifically, if the probability of apprehension at the border can be estimated, then it can be combined with the number of apprehensions (which Border Patrol already reports) to estimate the total number of successful entrants. For example, if the probability of apprehension is 50 percent and there are 500,000 apprehensions in a year, one can estimate that another 500,000 people successfully entered illegally. This final number, the number of illegal entrants between the ports of entry, is the critical immigration enforcement outcome that Border Patrol should seek to minimize.

Several existing methodologies can be used to estimate the probability of apprehension: (1) analysis of known-flow data, (2) recidivism analysis, and (3) analysis of migrant survey data. The discussion below briefly summarizes the strengths, weaknesses, and measurement challenges associated with each of these measures, and the full report contains a more detailed discussion.

- *Recidivism rate.* The recidivism rate is the percentage of unauthorized border-crossers caught more than once during the same fiscal year. The major limitation is that the recidivism rate is determined not only by the rate at which immigrants are deterred from trying to cross, but also by the probability of apprehension. For example, a falling recidivism rate could mean that border enforcement is successfully deterring would-be border-crossers, but it could also mean that Border Patrol is catching a lower percentage of the people who try. With additional statistical analysis, it is possible to separate the

influence of these two factors. DHS recently adopted the recidivism rate as a performance measure, but it does not provide this context or use it to publish an estimate of successful legal entries.

- *Known-flow data and the effectiveness rate.* Border Patrol collects known-flow data, which comprises three key categories: (1) apprehensions; (2) “turnbacks,” or instances where Border Patrol observes people giving up and returning to Mexico; and (3) “got-aways,” which are estimates of those who successfully enter illegally. The effectiveness rate, which DHS recently adopted as a performance measure, is the percentage of people who did not “get away.” The major limitation of known-flow data is that the estimates of got-aways are bound to miss some migrants who avoid Border Patrol detection altogether. Despite this undercount, got-aways are the closest known official estimate of the number of successful illegal border-crossings; however, DHS only publishes the effectiveness rate, not the underlying data.
- *Migrant survey analysis.* Migrant surveys ask individuals who attempted illegal entry in the past how many times they were apprehended on a particular trip and whether they ultimately successfully entered or gave up. These surveys can be used to estimate the probability of apprehension and the extent of deterrence. Various organizations have conducted migrant surveys over the years. This method has a handful of challenges, including whether the sample is representative of the overall migrant population, the composition of the migrant population, and the impact of enforcement on peoples’ willingness to participate in the survey. However, migrant surveys contain the only direct data on those who successfully enter the United States.

Inflow at Ports of Entry

After hitting a peak of roughly 500 million in the early 1990s, the number of entry inspections at all official ports of entry currently is slightly above 350 million per year. While some portion of those inspected are determined inadmissible and denied entry, unauthorized entries can occur at the ports of entry via clandestine entry (e.g., concealment within a vehicle) or via fraudulent entry (e.g., using false or stolen documents or false statements).

Much more is publicly known or can be estimated about the probability of apprehension and number of illegal entries between ports than at ports. U.S. Customs and Border Protection (CBP) may have estimates of unauthorized entry at ports that it has developed for internal use, but it has not shared them publicly. For example, CBP conducts randomized secondary inspections (intensive screening) of vehicles at land ports of entry and at international passenger arrivals at airports through its Compliance Measurement Examination (COMPEX) program. Under this program, a random sample of vehicles or air passengers is selected for intensive secondary inspection, and as long as that sample is truly random, the percentage of those detected attempting illegal entry in this sample can be applied to the overall traveler flow to get an estimate of successful unauthorized entrants.

Although DHS reported COMPEX compliance and apprehension rates for air- and land-vehicle passengers from 2005 to 2009, no estimates of the number of illegal entries through ports have ever been made public. Developing quality estimates of these flows should be possible based on these inspections. The inclusion of more port-of-entry data would enhance the public’s understanding of this oft-overlooked way in which unauthorized immigrants evade law enforcement and enter the country.

Overstays

Overstays are individuals who entered the United States legally but subsequently violated the terms of their admission and fell out of legal status. Because overstays constitute a significant share of the unauthorized immigrant population, measurement and public reporting of overstay estimates are important to a comprehensive border enforcement evaluation framework. Even if additional enforcement at the border and ports of entry were successful in deterring or preventing unlawful entry, failure to address the overstay population results in increases in the overall number of unauthorized immigrants living in the United States.

Stocks and flows of overstays were first measured in 1985 through 1988 by matching arrival and departure stubs from the paper I-94 form that all visa travelers were required to complete. In 1996, the last year for which overstay estimates were developed, 41 percent of the estimated five million unauthorized population at the time were overstays. Other estimates have subsequently been produced, but all of the most commonly cited estimates still rely on overstay rates that were calculated for the 1996 estimate.

While the federal government has not publicly reported an estimate of the overstay population since 1996, the introduction of the United States Visitor and Immigrant Status Indicator Technology (US-VISIT) system and the expanded collection of exit records for most ports of entry has significantly improved DHS's capability to identify overstays. Additionally, though the methodologies and results have not been made public, DHS and the State Department are required to consider overstay rates to determine country eligibility for the Visa Waiver Program. Although significant hurdles exist—particularly the lack of exit data collection at the southern land border—developing and publishing updated estimates would represent a major improvement compared with the currently available overstay

measures, providing a clearer and more up-to-date picture of the overstay problem.

Measuring Inflows and Outflows: Stock-Flow Accounting

The three groups of inflows described above—between ports of entry, at ports of entry, and overstays—are the primary mechanisms for entry into the United States. There are four main channels through which individuals may “flow out of” the unauthorized immigrant population—forcible removal, adjustment to legal status, departure on their own recognizance, or death. Taken together, estimates of the inflow and outflow channels could provide a “complete stock-and-flow accounting” of the unauthorized immigrant population. Recently, researchers took a significant step toward publishing such an estimate, breaking outflows into the same four categories listed above.¹ While this is still in development, additional research and cooperation with the federal government could improve the data and create a regularly reported outcome measure.

Measures and Migration Decisions

To develop enforcement policies and measure their success, it is important to understand how those policies and measurements relate to individuals' decisions to illegally migrate to the United States. Generally, four key factors influence a potential migrant's decision: (1) the probability of entering successfully (including the number of crossing attempts the migrant expects to make), (2) the expected monetary and non-monetary costs, (3) the expected consequences of failure, and (4) the expected benefits if the trip is successful. Policies that aim to reduce future flows of unauthorized immigrants ultimately attempt to influence these four factors.

Migrants' incentives for coming to the United States provide important context for interpreting enforcement metrics, setting goals for those metrics, and immigration

enforcement as a whole. For example, in assessing whether or not border enforcement is adequate, policymakers could set a goal for the percentage of would-be border-crossers who are caught (i.e., the probability of apprehension). To determine what probability of apprehension is sufficient to deter future migrants, it is useful to consider the “repeat trials model,” which illustrates how changes to the probability of apprehension affect how difficult it is to cross the border illegally. Of course, when the probability of apprehension is zero, the average migrant must only make one attempt to cross the border. However, data show that as the probability of apprehension increases, the expected number of trips needed increases more and more quickly.

The repeat trials framework suggests that a 100 percent apprehension rate may not be needed to deter a substantial number of crossing attempts; indeed, the history of borders around the world suggests that attaining such a threshold may not be possible. Instead, if the goal is to reduce unauthorized immigration, the apprehension rate may only need to reach a threshold that makes it less likely that most migrants will try.

The ultimate tool—to determine the appropriate resource allocations for immigration enforcement—would be an integrated model that links migration decisions, U.S. policy levers that affect migration incentives, and the outcome measures described above. This would allow policymakers and the public to assess the cost-effectiveness of different enforcement policies. While challenging, researchers have made progress on building such a model, and it is clear that it can be done if analysts with appropriate skills are engaged to do it and provided with the data that they need.

While an overall understanding of the impact of enforcement on the goals of preventing unauthorized immigration is

needed, it should be noted that some enforcement and deterrence strategies can have unintended consequences. For example, the strategies used in the 1990s to deter unlawful crossings at the then-busiest sectors of the U.S.-Mexico border (Operation Gatekeeper in San Diego Sector and Operation Hold the Line in El Paso) deterred crossing in those sectors, but redirected the crossings to more dangerous areas, which increased migrant deaths. Other potential secondary effects of enforcement activities can include: increases in criminality or violence at the border, disruption to local ways of life, environmental impacts, and impacts on civil rights. Thus, policymakers may also wish to consider performance measures that track the consequences of various enforcement choices on factors other than unauthorized crossings. The sort of holistic model described above could help policymakers identify ways to achieve an equivalent deterrent effect while avoiding undesirable outcomes.

Conclusion

Sufficient data are available for DHS to regularly report on a comprehensive set of performance measures that assess all aspects of the flow of the unauthorized immigrant population. The availability of objective outcome measures would help policymakers and the public better understand the success or failure of immigration enforcement policies and implementation. Analysis based on these performance measures would help identify the most appropriate strategies and goals for immigration enforcement. Utilizing existing data to develop and provide consistent reports on immigration enforcement outcomes is essential to helping policymakers and the public address this important and complex national issue.

Immigration Task Force



San Ysidro, CA border port of entry. Photo courtesy of U.S. Customs and Border Protection.

Introduction

Border security is one of the most contentious issues in the immigration debate. Since the 1986 passage of the Immigration Reform and Control Act (IRCA), real dollar spending on immigration enforcement has grown sevenfold, today constituting about half of all federal law enforcement spending. Despite these significant investments, the government has failed to report a consistent set of performance measures that describe the effectiveness of its efforts to combat unauthorized immigration. The lack of consistent, widely accepted accountability measures for border security and interior enforcement has contributed to the divergence of views on the state of immigration enforcement.

This paper contends that, based on extant data and established methodologies, it would be possible for Congress and the executive branch to establish a set of outcome measures that describe the effectiveness of U.S. immigration enforcement. In addition to the total number of unauthorized immigrants living in the United States and the percentage of would-be border-crossers who are caught, this paper observes that the government could report measures specific to the number of unauthorized immigrants coming through each of the three major entry channels—illegal entry between ports of entry (i.e., border-crossings), illegal entry at the ports of entry, and overstays (individuals who enter legally and violate the terms of their admission). Further, the government could also report on the four major ways individuals leave the unauthorized immigrant population—through removal, adjustment to legal status, departure of their own accord, and death. Together,

these measures would describe the overall success of U.S. immigration enforcement, as well as outcomes specific to the various ways that unauthorized immigrants enter and exit the country.

The government and external researchers have invested considerable resources in developing performance measures and identifying the data needed to calculate them, but the government has never publicly reported a comprehensive set of immigration enforcement indicators for an extended period of time. Instead, agencies have switched performance measures every few years. Performance measures alone are not guaranteed to fix the immigration debate, but if they are to realize their potential to improve it, it is imperative that the government make a credible, long-term commitment to reporting outcome measures and sharing underlying data with external researchers. Without a sustained commitment to consistent reporting across time, performance measures lose much of their value.

Following a review of the history of immigration enforcement performance measures, this report presents a slate of potential performance measures and reviews key considerations for calculating the measures, understanding their meaning, and establishing goals based on them. If reported in a consistent and transparent manner, a similar set of performance measures could help resolve disputes about the current state of border security, a major issue in the debate over immigration reform.



Immigration Task Force



Border Patrol along fence in Arizona. Photo courtesy of U.S. Customs and Border Protection.

Chapter 1. The Immigration Enforcement System: Overview and History of Measurement

Overview of the Immigration Enforcement System

The U.S. immigration enforcement system is a complex network of law enforcement and administrative programs that spans several federal agencies, including the Department of Homeland Security (DHS), the Department of Justice (DOJ), and the Department of State. For the U.S. government, the primary purpose of this system is to “prevent unlawful immigration” by “preventing unlawful entry, strengthening enforcement, and reducing drivers of unlawful immigration” and by “arresting, detaining, and removing priority individuals, including public safety, national security, and border security threats.”²

Immigration enforcement achieves its goals through a variety of activities. Border enforcement seeks to prevent the entry of unauthorized people (1) at ports of entry, where people who have legal authorization to enter present themselves for inspection and admission, and (2) between ports of entry, where entry is by definition not legally authorized. Interior enforcement seeks to identify, locate, and remove those who successfully enter the country without authorization, as well as those who violate the terms of their legal authorization to enter. These efforts include programs to prevent individuals without work authorization from obtaining employment. Numerous agencies carry out border and interior enforcement activities, requiring extensive cooperation and information-sharing among government agencies for their successful implementation.

DHS agencies carry out the majority of immigration enforcement functions. U.S. Customs and Border Protection (CBP) includes the Office of Field Operations, which administers the ports of entry and screens and inspects all movement of people, vehicles, and goods into the United States. CBP also includes the U.S. Border Patrol (Border Patrol), which prevents unauthorized entry between ports. Immigration and Customs Enforcement (ICE) is

responsible for investigating and removing those who are unlawfully present inside the United States and prosecuting immigration cases in federal administrative immigration courts. Although CBP and ICE are the two primary immigration enforcement agencies of DHS, they also carry out activities unrelated to immigration enforcement.³

Other public agencies and departments also contribute to achieving the goals of immigration enforcement. DHS’s U.S. Citizenship and Immigration Services agency (USCIS) processes all applications for immigration benefits and seeks to identify fraudulent applications, and it also implements an employment screening program to verify employment eligibility. The Department of State screens visa applicants in order to deny entry to those who are inadmissible or who are likely to violate U.S. immigration law. The DOJ operates the immigration courts through the Executive Office for Immigration Review. Some state and local law enforcement agencies assist DHS with the identification of suspected criminals who are also unlawfully present through memorandums of understanding under the so-called 287(g) program. Persons arrested by state and local law enforcement agencies may also be identified to ICE through the Secure Communities information-sharing program, which will soon be replaced by the Priority Enforcement Program under President Obama’s executive actions on immigration announced in November 2014.⁴

While securing the U.S. borders encompasses more missions than just immigration enforcement—including preventing the entry of contraband such as drugs or weapons, enforcing customs and import laws, and counter-terrorism—this paper focuses exclusively on the ways to measure the effectiveness of the immigration enforcement mission, that is, preventing the unlawful entry of immigrants and/or removing immigrants present in the United States without authorization. Although some immigration enforcement efforts have collateral effects on other enforcement missions, and vice versa, the success

of the immigration enforcement mission is most relevant to immigration policy decisions.

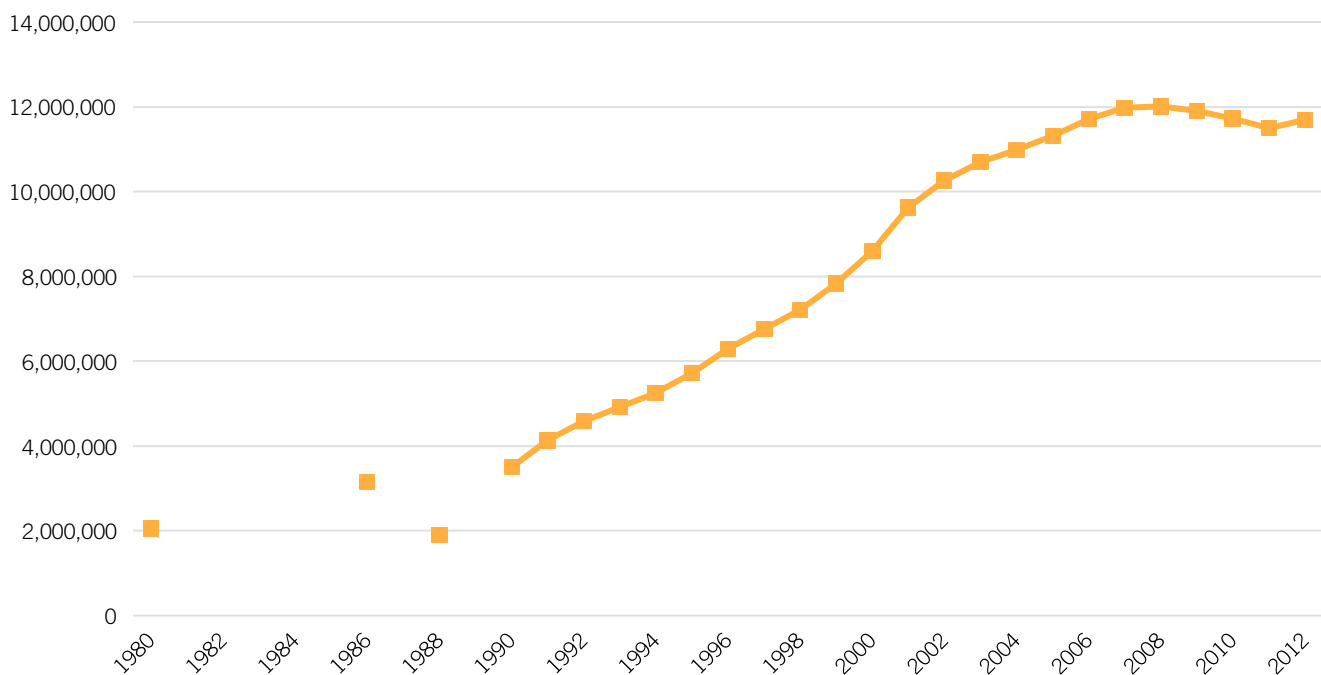
Evolution of the Enforcement System⁵

Prior to the 1920s, the United States had a relatively liberal immigration regime with few restrictions and corresponding enforcement needs. There were no specific legal “channels” for immigration, and the main functions of the immigration officials at the ports of entry were to process new arrivals, record their information, and inspect them for any disqualifying characteristics, such as communicable diseases. The immigration system also processed applications for naturalization from those who were admitted as immigrants. Starting in the 1880s, restrictions on immigration were enacted. For example, Chinese immigration was banned in the 1880s and early enforcement efforts were largely directed at excluding Chinese immigrants. Laws changed radically in the early 1920s, when quotas based on national origin were introduced and set at levels much lower than was naturally occurring at the time. The Border Patrol was established in 1925 in part because of the need to enforce these new policies. The predecessor agency of ICE (an Immigration and Naturalization Service investigative office for the detention and removal of immigrants from within the United States) was established in 1952.

Large-scale illegal immigration to the United States from Mexico began during World War II, when a guest-worker program for Mexican nationals known as the Bracero program was established to address labor shortages in agriculture and industry during the war years. Initial Bracero quotas never exceeded 63,000 during the war, and as demand for workers significantly exceeded this level, entry of unauthorized Mexican workers increased significantly.

After the war, the Bracero entry quota was significantly cut, and Border Patrol apprehensions grew dramatically (see Figure 2 below). By the early 1950s, illegal immigration from Mexico had become a significant national issue, and in 1954, President Eisenhower sought to curb illegal entries by launching a major enforcement operation while also doubling the Bracero quota. These policies appear to have eliminated illegal immigration as a significant issue, as the level of Border Patrol apprehensions fell to very low levels in the late 1950s and early 1960s. After the Bracero program was ended in 1965, apprehensions rose rapidly, and a new era of mass illegal immigration began.⁶ It is less clear when large-scale illegal immigration from Central American countries began, but migrant flows from El Salvador and Nicaragua to the United States due to civil conflict in those countries in the early 1980s may have established the initial diaspora populations that facilitated subsequent migration.

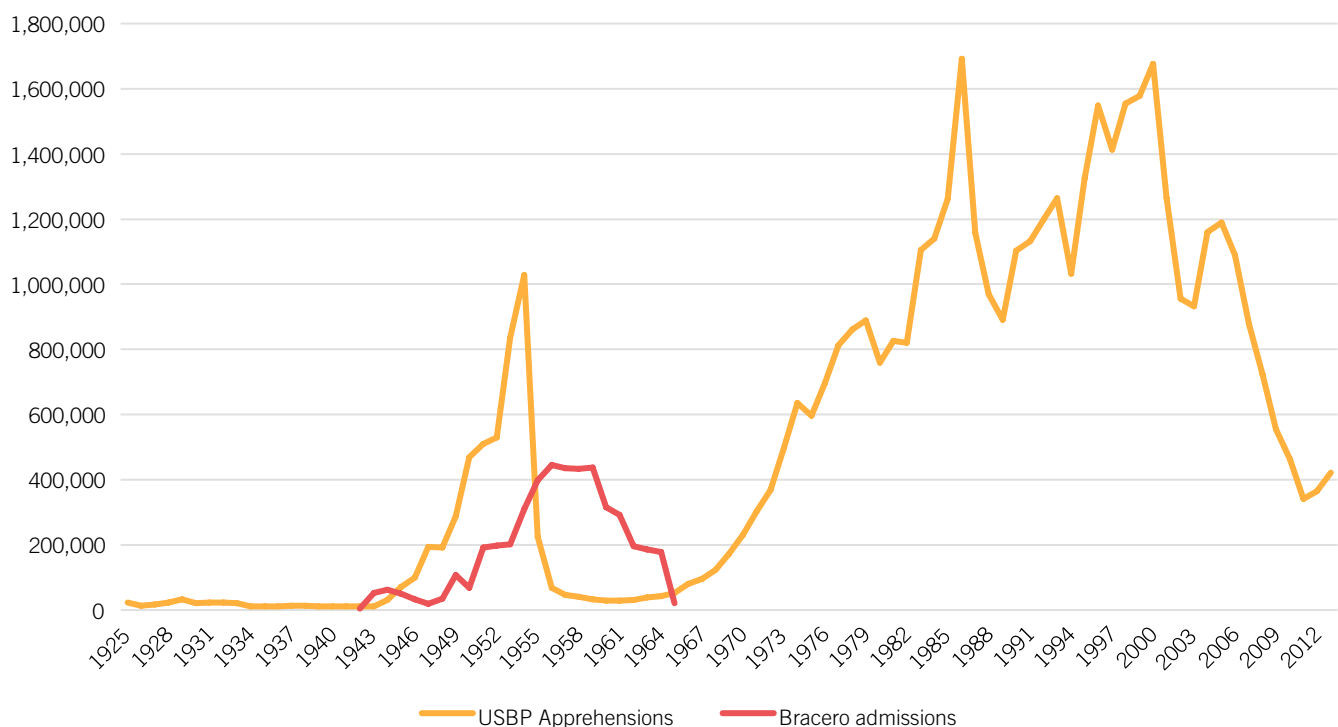
By the 1980s, the scale of illegal immigration had again become a national concern, and a vigorous debate took place over how to address it. IRCA passed in late 1986, granting legal status to most unauthorized immigrants already resident in the United States and introducing policies designed to prevent unauthorized immigrants from obtaining employment.⁷ Many expected IRCA to curtail illegal inflows, but this did not happen. Figure 1 shows the estimated population of unauthorized immigrants resident in the United States from 1980 to 2013. This population did fall in 1988 (presumably due to the legalization program), but by the early 1990s, it had recovered its pre-IRCA level. Figure 2, which shows the number of Border Patrol apprehensions between ports of entry (a proxy for the inflow of illegal entrants), suggests that although the inflow of unauthorized immigrants did fall slightly after IRCA's passage, it quickly returned to large levels, consistent with the overall increase in the unauthorized population.

Figure 1. Estimated Unauthorized Resident Immigrant Population, 1980-2012

Source: 1980 estimate from Warren and Passel (1987). 1986 and 1988 estimates from Woodrow and Passel chapter in Bean et al. (1990). 1990-2010 estimates from Warren and Warren (2013). 2011-2012 estimates from Passel et al. (2013).

In response to IRCA's failure to stem the inflow of unauthorized immigrants, a major border enforcement buildup was carried out in the late 1990s. Although this buildup did shift the geographical pattern of entries on the border, Figures 1 and 2 show that the unauthorized immigrant population continued to grow, and Border Patrol apprehensions attained high levels.⁸ After the 2001 recession and the 9/11 attacks, Figures 1 and 2 suggest that the pace of growth in illegal immigration did fall. Following failed efforts to pass immigration reform in 2006 and 2007, the Bush administration and Congress

implemented a second major border enforcement buildup in the late 2000s, which nearly doubled the number of Border Patrol agents and featured a large-scale deployment of fencing, technology, and infrastructure. CBP's budget in real 2013 dollars rose by 59 percent from 2005 to 2010. Expenditures on interior enforcement increased by 64 percent over the same period, and federal agencies implemented programs to identify and remove unauthorized immigrants who have committed crimes and encourage the use of the E-Verify employment verification system.⁹

Figure 2. U.S. Border Patrol Apprehensions and Bracero Admissions

Source: Roberts et al. (2013) and U.S. Customs and Border Protection.

How Big Is the Immigration Enforcement System Today?

Immigration enforcement is a major federal law enforcement function. Its size can be assessed both in terms of the level of resources that it consumes and relative to the overall federal law enforcement system. Measures of federal law enforcement expenditures related to immigration and customs enforcement and to other law enforcement missions are developed in Appendix A. Box 1 summarizes these calculations, and Figure 3 shows the estimates of the share of immigration/customs enforcement in total federal law enforcement expenditures from 1975 to 2013.¹⁰ In

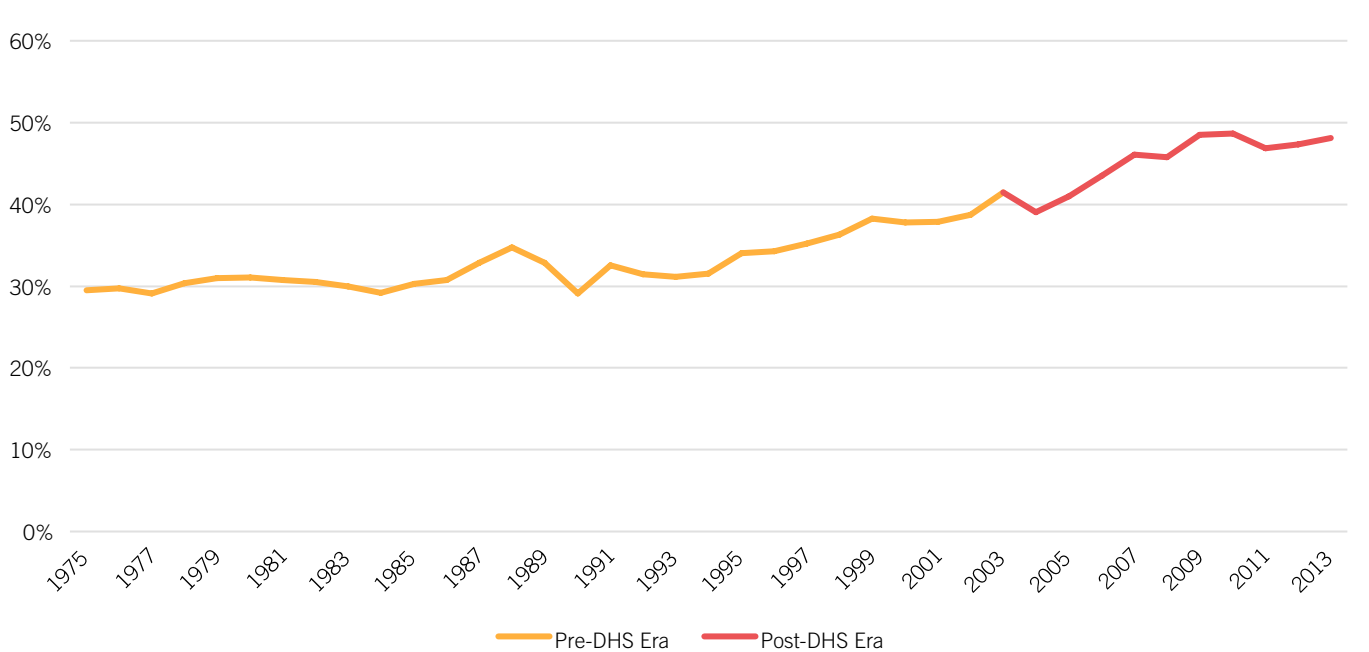
FY 2013, immigration/customs enforcement expenditures are estimated to have been \$20.4 to \$23.8 billion.¹¹ This represents about 48 to 52 percent of the expenditures of all major federal law enforcement agencies.¹² Similarly, immigration enforcement employed 45 percent of federal law enforcement officers in FY 2012.¹³

Expenditures for immigration/customs enforcement have also grown significantly since the mid-1990s, rising more quickly than expenditures on other areas of federal law enforcement. To evaluate trends over time, the appropriate measure of expenditures is real expenditures, which controls for inflation. Between 1975 and 1995,

immigration enforcement grew slightly more quickly than other enforcement, but after 1995, immigration/customs enforcement grew significantly more rapidly due to two enforcement buildups in the late 1990s and late 2000s (see text box in the next page). Over the entire 1975 to

2013 period, the average annual rate of growth in real expenditures on immigration enforcement was 6.5-6.9 percent compared with 4.3 percent for other federal law enforcement activities. Today, immigration enforcement expenditures are about 4.5 times larger than at the time of IRCA's passage.

Figure 3. Share of Immigration/Customs Enforcement Spending in Total Major Federal Law Enforcement Agency Spending (excl. Citizenship-Benefits/USCIS)



Source: Appendix A.

Immigration and Customs Enforcement as a Share of Overall Federal Law Enforcement

Major federal law enforcement agencies comprise several components of DOJ and DHS. Annual budgetary expenditures of these agencies are a useful summary measure of the resources used to carry out law enforcement activities. Appendix A discusses these agencies in detail and describes how this analysis divided expenditures between immigration and customs enforcement and other enforcement areas. Expenditures are measured in real dollars, which controls for inflation.

Table B1 displays real budgetary expenditures on immigration/customs enforcement and other areas of federal law enforcement from 1975 to 2013. Two sets of values for immigration/customs expenditures are presented, one that excludes expenditures on processing of applications for various benefits by legal immigrants and another that includes those expenditures. Although this component is not classified as a federal law enforcement program, it could be treated as such given that it is expected to identify fraudulent applications from immigrants and deny benefits to ineligible immigrants.

Table B2 presents average annual growth rates of real expenditures for several key eras in immigration enforcement. These data show that real immigration/customs enforcement expenditures grew slightly faster than other enforcement expenditures from 1975 to 1995, significantly faster from 1995 to 2009, and at about the same pace from 2009 to 2013.

Table B1

Law Enforcement Agency Expenditures						
Billions of real 2013 dollars	1975	1986	1995	2002	2009	2013
Immigration and Customs Enforcement						
including Cit.&Benefits/USCIS	\$1.9	\$3.1	\$6.9	\$14.2	\$24.0	\$23.8
excluding Cit.&Benefits/USCIS	\$1.8	\$3.0	\$6.6	\$12.3	\$20.9	\$20.4
Other Federal Law Enforcement	\$4.4	\$6.8	\$12.7	\$19.5	\$22.2	\$22.0
<i>Total Federal Law Enforcement</i>						
including Cit.&Benefits/USCIS	\$6.3	\$10.0	\$19.6	\$33.7	\$46.1	\$45.7
excluding Cit.&Benefits/USCIS	\$6.2	\$9.9	\$19.3	\$31.8	\$43.0	\$42.3
Share of total expenditures						
Immigration and Customs Enforcement						
including Cit.&Benefits/USCIS	30%	31%	35%	42%	52%	52%
excluding Cit.&Benefits/USCIS	30%	31%	34%	39%	48%	48%

Source: see Appendix A.

Table B2

	Average Annual Growth Rates in Real Expenditures					
	1975-1986: Pre-IRCA Era	1986-1995: Immediate Post-IRCA Era	1995-2002: First Enforcement Buildup	2002-2009: Post-9/11 Era	2009-2013: Great Recession Era	1975- 2013
<i>Immigration/customs related</i>						
incl. Cit.&Ben./USCIS	4.6%	9.1%	10.9%	7.7%	-0.2%	6.9%
excl. Cit.&Ben./USCIS	4.7%	9.0%	9.4%	7.8%	-0.6%	6.5%
<i>Other law enforcement</i>	4.1%	7.2%	6.3%	1.9%	-0.2%	4.3%

Source: calculated from data in Table B1.

History of Enforcement Measurement

The U.S. federal immigration bureaucracy has collected and reported a significant amount of statistical data since its inception in 1892. During the course of carrying out activities such as patrolling the border, inspecting border-crossers, and processing immigration-related applications, officials collect a great deal of data related to specific people or events.¹⁴ This raw data is aggregated to produce workflow data, which quantifies the volume of various activities that the agencies carry out and the immediate results of those activities. The immigration bureaucracy has reported a set of workflow data in its public annual reports since 1892, and this set has changed over time as the bureaucracy has grown and its responsibilities have expanded. The government has also reported a more extensive set of immigration workflow data in its annual congressional budget justification documents, which are public but not widely distributed.

Starting in the 1920s, immigration agencies began to report various statistics related to border and interior immigration enforcement. Workflow data that has been compiled continuously since at least the 1950s include variables such as the number of aliens and citizens inspected at ports of entry, aliens denied entry into the United States, apprehensions of people attempting illegal entry between ports on land borders, apprehensions of smuggled aliens, of smugglers, deportable aliens located in the interior of the United States, the number of deportations (now referred to as removals) carried out, and unexecuted final orders of deportation outstanding at year's end. Although many workflow series were reported continuously from the 1950s to the end of the Immigration and Naturalization Service (INS) in 2002, in some instances, INS ceased publication of workflow data without explanation.¹⁵

For several decades after large-scale illegal entry into the United States began in the 1940s, the sole indicator on

the size of this inflow was Border Patrol apprehensions. Efforts to measure and report more comprehensive illegal immigration measures began in the 1970s, including an initial effort to measure the size of the unauthorized population. Subsequent efforts based on various demographic approaches were made in the early 1980s; and to document the effects of IRCA after its 1986 passage, RAND and the Urban Institute carried out a major measurement project.¹⁶ This effort firmly established the residual methodology as the most credible way to estimate the size of the unauthorized immigrant population. The residual methodology, discussed in greater detail later on, compares the number of foreign-born people in the country with legal entries and assumes all foreign-born people who cannot be accounted for are unauthorized immigrants. The project also provided the first estimates specific to two of the three main ways unauthorized immigrants enter the country: the probability of apprehension between the ports of entry (to measure how often illegal border-crossers get caught) and the number of overstays who entered through the ports of entry (to measure how many people enter the country legally but overstay their authorized period of admission). The methodologies that the project established remain the basic methodologies in use today.¹⁷

By the early 1990s, it had become clear that IRCA had not achieved its goals with respect to reducing illegal immigration. The Government Accountability Office (GAO), then known as the General Accounting Office, issued a 1993 report that reviewed progress on measurement of stock and flows of unauthorized immigrants and made substantive recommendations to improve measurement.¹⁸ Following the major border enforcement buildup in the late 1990s, GAO issued a report that called for performance measures to evaluate the outcomes of this buildup, extensively reviewed available methodologies and data, and made additional substantive recommendations (GAO 1997).¹⁹ These reports coincided with a government-wide

push toward results-oriented performance measurement after the 1993 enactment of the Government Performance and Results Act (GPRA). GPRA sought to make federal agencies more accountable by requiring all government agencies to annually report on performance measures to Congress and the public.

Performance measure plans for INS during the period from 1997 to 2000 reveal that the agency was working hard to develop meaningful enforcement-related measures.²⁰ The 1997 plan adopted as a performance measure the recidivism rate, which is the percentage of apprehended border-crossers who get caught more than once in a year, for those caught between ports and at ports. The 1999 plan adopted the interdiction rate for those attempting illegal entry at ports.²¹ The 2000 plan adopted the between-port operational effectiveness rate, which is the ratio of apprehensions to the number of illegal entries attempted. These plans also included measures related to interior enforcement, which generally measured the levels of enforcement activities that were carried out.²² In addition to such core measures on achieving INS missions, additional measures were continuously added to the performance plan in these years.²³ Although these plans reflect attempts to determine what would constitute good measures of border security, they did not focus on a small set of core measures, but instead relied on highly variable measures and sometimes included measures not directly related to core INS missions.

Major developments occurred in the 2001 and 2002 annual performance reports. The INS adopted the level of the unauthorized immigrant population and the gross inflow of unauthorized immigrants as performance measures, publishing historical values and future targets for each.²⁴ The INS also established a border control measure: the number of “high priority entry corridors demonstrating optimal deterrence.”²⁵ This holistic measure incorporated many variables, including the operational effectiveness

rate, the number of apprehensions, the level of border-related crime, the recidivism rate, the level of smuggling fees, changes in property values and development along the border, and the extent to which illegal activity shifted to non-traditional entry points and entry methods. Although “optimal deterrence” was defined as the “level at which applying more Border Patrol agents and resources would not yield a significant gain in arrests/deterrence,” the methodology used to determine when “optimal deterrence” had been achieved in a specific corridor was not described. With respect to interior enforcement, two performance measures were reported: (1) the number of criminal and non-criminal alien removals, and (2) unexecuted final orders for removal.²⁶

When the newly formed DHS took over most immigration functions from DOJ in 2003, it stopped reporting estimates of the stock and inflow of unauthorized immigrants as performance measures. It continued to report “high priority entry corridors demonstrating optimal deterrence” through 2004, but replaced it in 2005 with a new border control measure, the “number of miles of the southwest border under operational control.”²⁷ A border mile was considered to be under “operational control” if Border Patrol had “the ability to detect, respond to, and interdict border penetrations in areas deemed as high priority for threat potential or other national security objectives.” Operational control was achieved in a border zone if the zone was classified as “managed” or “controlled.” The “miles under operational control” measure had some continuity with the previous border control measure, as similar underlying information determined whether a corridor demonstrated optimal deterrence or whether a mile was under operational control. However, the change in the measure also responded to the change in the border mission under DHS, from one of primarily illegal immigration and drug interdiction to one that prioritized national security and counterterrorism.

In 2005, DHS also began to report “COMPEX [Compliance Measurement Examination] compliance rates” for passenger vehicles inspected at land borders and international air travelers inspected at airports. These rates are the percentage of those inspected who are not in violation of any law that DHS is charged with enforcing at a port of entry and are based on randomized secondary inspections of passengers and vehicles.²⁸ These rates could be used to estimate underlying successful illegal entries and interdiction rates, and starting in 2007, DHS began to report apprehension rates for air and land passengers based on COMPEX compliance rates. However, these rates have never been broken down into rates for specific type of violation and thus cannot be used to evaluate illegal entries as opposed to other types of violations (e.g., contraband). Finally, with respect to interior enforcement, DHS reported the number of aliens removed and the percentage of ICE investigations that resulted in an enforcement consequence. In 2008, a measure of the percentage of new employment hires in the country that were run through the E-Verify system was introduced.

Significant changes to performance measures took place under the Obama administration in 2009. DHS did not publish an annual performance report in 2009. In 2010, DHS dropped the “miles under operational control” measure and replaced it with the number of apprehensions between ports of entry on the southwest border. In 2011 and 2012, the Department focused on developing a “Border Conditions Index” (BCI), which would aggregate together a range of indicators, including many of the indicators included in the “high priority entry corridors demonstrating optimal deterrence” and “miles under operational control” measures first developed by DOJ in 2001. The BCI would have gone further than its predecessors in the range of indicators that it included, but it was never made public.²⁹ Starting in 2010, DHS also stopped reporting measures related to COMPEX compliance rates, the number of new

hires run through the E-Verify system, and the percentage of ICE investigations that resulted in an enforcement consequence. A measure was introduced on the number of employers arrested or sanctioned for criminally hiring illegal labor. DHS also ceased reporting the total number of aliens removed as a formal performance measure, replacing it with the number of convicted criminal aliens removed.³⁰

In addition to its formal performance measures, other DHS initiatives over the years have contributed to measuring key immigration outcomes. The Office of Immigration Statistics (OIS), instituted under the Act that created the department, began estimating the size of the unauthorized population using the residual methodology in 2006, complementing estimates produced outside of government. OIS also supported research on various aspects of illegal immigration, including research on smuggling fees and the impact of economic and enforcement factors on illegal migration from Mexico to the United States.³¹ In 2006, DHS sponsored an important study that measured the probability of apprehension (the chance of being caught attempting illegal entry) using the methodology that was pioneered by the Rand-Urban Institute project, but this study has never been publicly disseminated.³²

Other government agencies have contributed to providing important information relevant to enforcement measures. In late 2012, GAO published a report that made public for the first time the data that the Border Patrol has used to calculate measures such as the operational effectiveness rate (briefly reported in 2000) and inform other measures (“high priority entry corridors demonstrating optimal deterrence” and “number of miles of the southwest border under operational control”).³³ These data, referred to as “known-flow” data, include three components: (1) a precise count of apprehensions, which are arrests of those attempting illegal entries, (2) estimates of “turn backs,” which are observations of those giving up illegal entry attempts and returning to Mexico, and (3) estimates of “got-

aways,” which are those who successfully evade the Border Patrol and enter illegally.

After a period of mixed success in developing consistent outcome and performance measures, DHS has recently introduced new measures that better reflect key outputs of its border enforcement activities. For FY 2013 and FY 2014, DHS introduced two measures that were included in early performance plans in the late 1990s: the recidivism rate and the effectiveness rate.³⁴ Although both of these measures are reported for the southwest border only, they have clear meanings, are based on known methodologies, and are directly relevant to DHS’s fundamental border

control goal of preventing illegal entry. However, both also have significant limitations that are further discussed below.

Finally, DHS also currently reports a range of measures related to immigration enforcement in the interior of the United States, including measures related to detention and removal of unauthorized immigrants and to enforcement of immigration-related employment laws. However, unlike its new measures for border control, these interior enforcement measures do not capture how effective these enforcement programs are in terms of preventing or deterring violation of immigration laws.³⁵



Border surveillance camera.

Chapter 2. Defining Measurement: Key Concepts and Criteria

Inputs, Outputs, and Outcomes

An essential question for policymakers and the public concerns how much enforcement expenditure is “enough.” Current outcomes reflect the achievements of current immigration enforcement policies and programs. Are these outcomes acceptable? If not, to what degree should enforcement expenditures be increased, and should the allocation between different enforcement programs change? Such questions have been the subject of public controversy for decades. As stated above, at \$20 to \$24 billion annually, immigration enforcement expenditures now account for roughly 50 percent of all federal law enforcement expenditures, which seems quite high. However, \$20 to \$24 billion also equals about 1.7 percent of total federal spending on goods and services in 2013, which may not sound as significant.³⁶ Neither measure alone seems to adequately answer the key question about immigration enforcement in recent debates: Is it too much or too little? How much is enough?

The fact that the level of enforcement expenditures alone cannot tell us whether there is enough enforcement raises an important distinction between input, output, and outcome measures. As Roberts et al. (2013) explain: “Inputs are the resources that agencies expend in their operations and are the easiest to measure. Outputs are immediate results of agency programs and are also frequently relatively easy to measure and report. Outcomes are related to the ultimate goals of what agency programs are trying to achieve.” For example, in the illegal immigration context, one input measure might be the number of Border Patrol agents. An output measure would be the number of apprehensions by those same Border Patrol agents—an immediate result of Border Patrol activity that is easy to quantify, but does not always clearly indicate whether Border Patrol is achieving its goal of deterring and preventing illegal entry. For Border Patrol, an appropriate outcome measure in this context would be a measure of the

total number of illegal entries.³⁷ An increase in illegal entries between reporting periods would mean that the Border Patrol was not effectively achieving its goal; a decrease in the measure would mean that it was achieving its goal.

Why Are Outcome Measures Needed?

Too often, assessments of U.S. immigration enforcement are based on input measures, such as the amount of funding, the number of agents deployed, or the number of miles of border fencing. However, in order to determine whether enforcement is successful or cost-effective, or how much of a particular type of enforcement is “enough,” it is necessary to use outcome measures. There are two basic reasons why outcome measures are needed. First, outcome measures can assess the extent to which the federal government meets its immigration enforcement goals. To serve this purpose, performance measures should be related to DHS’s stated missions and goals. Second, outcome measures are needed to inform decision-making and U.S. public debate.

DHS clearly defines its immigration enforcement goals in the 2014 Quadrennial Homeland Security Review (QHSR), which defines the core strategic missions of the agency and establishes goals for each mission. Missions 2 and 3 concern immigration enforcement. Mission 2 requires “securing and managing U.S. borders,” and goal 2.1 requires “securing air, land, and sea borders and approaches” through the “prevention of illegal import and entry” and the “prevention of illegal export and exit.”³⁸ Mission 3 requires “enforcing and administering U.S. immigration laws,” and goal 3.2 requires “preventing unlawful immigration” through “preventing unlawful entry, strengthening enforcement, and reducing drivers of unlawful immigration” as well as “arresting, detaining, and removing priority individuals, including public safety, national security, and border security threats.” Performance

measures for immigration enforcement should attempt to quantify the degree to which these goals have been achieved.³⁹

Outcome measures also educate the public and decision-makers, ultimately helping all stakeholders and observers determine what policies and objectives are most appropriate and effective. Table 1 summarizes who examines what type of outcome measures and the types of decisions or purposes to which those measures are ideally put. At the

lowest level, components of enforcement agencies need to determine the optimal deployment of available resources. As one progresses up the government organizational hierarchy, measures are needed to inform resource allocation across components, agencies, and departments. At each level, cost-effectiveness analysis determines how best to achieve a goal given available resources and whether resources already allocated obtained the optimal results.

Table 1

Level of Government	Example	Measurement Focus	Measurement Purpose	Example of Decision
Component	U.S. Border Patrol	Outcomes in U.S. Border Patrol sectors	Inform allocation of resources across U.S. Border Patrol sectors	Should resources be increased in the Rio Grande Valley sector?
Agency	Customs and Border Protection	Outcomes between ports and at ports	Inform allocation of resources between agency components	Should resources be increased between the ports or at the ports?
Department	Department of Homeland Security	Outcomes across all agency missions	Inform allocation of resources across agencies	How should resources be split between border and interior enforcement?
U.S. Government	White House, Congress	Outcomes across departments	Inform allocation of resources across departments	What resources should be allocated to DHS and other departments involved in immigration enforcement versus other government priorities?
		Key overall illegal immigration outcomes	Inform public debate	Is there sufficient enforcement in place such that a legalization program will not spur additional unauthorized immigration?

At the broadest level, outcome measures are needed to inform public debate over immigration. Recent efforts to draft and pass comprehensive immigration reform legislation illustrate this need. Without objective measures of defined enforcement outcomes, determining whether and how enforcement has been successful has resulted in continued debate about the state of the border and whether and what resources or legislative solutions are still needed. This leads to dissonances between public opinion and government reporting. For example, recent polling suggests that a majority of the U.S. public believes that U.S. borders are “not too secure” or “not at all secure,” and that the government should be doing more to secure U.S. borders.⁴⁰ Even more striking, polling also suggests that a majority believe that the level of illegal immigration has grown over the past ten years and that border security has not improved since 2005.⁴¹ However, existing data suggest that overall inflows of unauthorized immigrants have fallen significantly in recent years and that the ability to successfully enter illegally has fallen. Without objective measures of border control that are publicized widely, policymakers and the public are unlikely to agree on the state of border security, compounding the challenge of agreeing on what or how much should be done to improve it.

What Basic Criteria Should Outcome Measures Meet?

Students of public administration and policy analysis have identified several criteria for optimal performance measures that are formally reported by government agencies.⁴² These criteria apply to all measures, including those that are reported but not necessarily used formally as a performance measure:

- Measures should be meaningful, clear, and readily understandable.
- Measures should be based on objective methodologies that enjoy scientific consensus.

- Measures should be derived from valid data that are not systematically biased or distorted. Collection of data should be reliable, consistent, and uniform over time and across reporting units.
- Measures used by government agencies to inform decisions and resource allocation should be timely and actionable.
- Measures should be stable over time.

If outcome measures are not stable over time, then it is not possible to consistently evaluate trends and determine progress toward relevant goals.

Have Reported Measures Met These Criteria?

Generally speaking, the U.S. government has not reported immigration enforcement measures that meet these criteria. With respect to border control, as discussed above, the measures “high priority entry corridors demonstrating optimal deterrence” and “number of miles of the southwest border under effective control” reported by DOJ and DHS from 2001 to 2010 did not have clear meanings and were based on methodologies whose consistency and uniformity over time could not be verified. The two measures that are currently reported, the effectiveness rate and the recidivism rate, represent significant progress, as they have clear definitions. However, as described in the next section, they suffer potentially major limitations that limit their usefulness as outcome measures.⁴³

In addition to the strengths and weaknesses of individual measures that have been reported over the years, one of the most striking features of previous immigration enforcement measures is the inconsistent reporting over time. As described in the previous section, measures have frequently been adopted and then dropped. For example, in the context of border control, the INS and DHS have reported

four different core measures for the southwest border in the past: “high priority entry corridors demonstrating optimal deterrence” from 2001 to 2004, “miles under operational control” from 2005 to 2010, apprehensions from 2011 to 2012, and the recidivism and effectiveness rates starting in 2013 and 2014. Because this measure has changed so often since 2001, even if each of the individual measures met the criteria for being a good outcome measure, the totality of what has been reported does not illustrate long-run trends in border control. Further, there does not appear to be any specific office or agency within DHS to promote

the adoption of quality measures and ensure continuity in their reporting. Although the GAO has reviewed, commented on and made various recommendations regarding appropriate enforcement measures, it is unclear which agency or office within DHS develops, informs or enforces consistency of measures. Secretary Jeh Johnson, in an April 2014 memorandum to the DHS agency heads and senior officials, has indicated that the Office of Strategy, Planning, Analysis and Risk in the Office of Policy, which is responsible for development of the QHSR, may take on some of this responsibility going forward.⁴⁴

Immigration Task Force



Border Patrol agents and unaccompanied migrant children. Photo courtesy of U.S. Customs and Border Protection.

Chapter 3. Measuring Enforcement Outcomes

As described above, U.S. government performance measures for immigration enforcement have not been sufficient to inform public debate over border security or immigration reform. However, based on data that are already collected, it would be possible for a more coherent set of performance measures to be developed and reported. Table 2 presents such a set of measures. This set includes measures reflecting overall illegal immigration outcomes, as well as measures that are specific to particular entry channels and categories of immigration enforcement. If made consistent with one another and combined, the flow measures (i.e., the number of entries and exits through each channel) could be combined into a “complete stock-flow accounting,” which would estimate the sources of each year’s change to the unauthorized immigrant population.

There are some challenges confronting efforts to measure the key outcomes listed in Table 2, but more than 30 years of research has established methodologies that can be used with confidence. These measures could be improved over time through partnerships between government and external researchers, particularly if additional administrative enforcement data were made publicly available. The text below discusses the methodologies that are currently used to estimate the enforcement outcomes in Table 2, including key associated challenges and limitations.

Since the U.S.-Mexico border accounts for more than 90 percent of unauthorized entries, the measures of illegal entry between ports relate primarily to the southern border. Nonetheless, measures there can provide substantial understanding of the overall outcomes. Over time, similar data collection at the U.S.-Canada and maritime borders could be developed to provide a more holistic picture.

Measuring Overall Effectiveness: Stock and Flow Estimates of the Unauthorized Population

Two of the most important outcome measures related to illegal immigration and the overall effectiveness of the enforcement system are the stock and inflow of unauthorized immigrants. “Stock” refers to the number of unauthorized immigrants present in the United States at a given point in time, otherwise known as the “unauthorized population.” Researchers usually focus on a subset of the total stock of unauthorized immigrants: the population that has taken up permanent residence in the United States. “Flow” refers to the increase in the stock over a period of time, with “inflows” being the individuals who enter the unauthorized immigrant population and “outflows” being those who exit. This subsection discusses overall estimates of the stock of unauthorized immigrants, and the following subsections describe various measures that can be used to estimate flows.

Table 2: Potential Outcome Measures for Illegal Immigration

Outcome	Performance Measures	Currently Measured Outside of the Government?	Currently Measured by the Federal Government?	Publicly Reported by the Federal Government?
Overall Effectiveness				
Unauthorized population	Number of Unauthorized Immigrants Resident in the U.S.	Yes ^H	Yes ^G	Yes ^K
Specific Inflow (Entry) Channels				
Total inflow	Total entries by unauthorized immigrants	Yes ^H	Unknown	No ^L
Illegal entry between ports	Number of apprehensions	No	Partial ^A	Yes
	Probability of apprehension	Yes	Yes (but not separately) ^C	Yes (but not separately) ^C
	At-the-border deterrence rate	Yes ^B		
	Number of successful illegal entries	Partial ^D	Partial ^E	No
Illegal entry at ports	Number of refused entries and apprehensions	No	Yes ^F	Yes
	Probability of apprehension	No	Unknown	No
	Number of successful illegal entries	No	Unknown	No
Overstays	Number of new overstays	No	Unknown	No
Specific Outflow (Exit) Channels				
Measures of each possible outflow channel	Number of unauthorized immigrants removed	Yes ^H	Yes ^F	Partial
	Number of unauthorized immigrants adjusted to legal status	Yes ^H	Unknown	No
	Number of unauthorized immigrants leaving of their own accord	Yes ^H	Yes ^G	No
	Number of unauthorized immigrants who died	Yes ^H	Yes ^G	No

A: Between-port apprehensions are reported for the land border but not the maritime domain.

B: Migrant surveys provide estimates of the percentage of trips to the southwest border by Mexican nationals that do not result in successful entry.

C: DHS currently reports the recidivism rate, which reflects both the probability of apprehension and the rate of at-the-border deterrence (see discussion below and Appendix B).

D: Estimates are available for illegal entries of Mexican nationals on the southwest border (see discussion below).

E: Border Patrol records the number of got-aways on the southwest border, which is a measure of successful between-port illegal entries (see discussion below).

F: Reported by the Office of Immigration Statistics of DHS (see http://www.dhs.gov/sites/default/files/publications/ois_enforcement_ar_2012_1.pdf).

G: Estimated by DHS's Office of Immigration Statistics (see http://www.dhs.gov/sites/default/files/publications/ois_ill_pe_2012_2.pdf).

H: Warren and Warren (2013) reported estimates for each; see Table 4.

K: The INS reported this as an official performance measure in 2002 and 2003. It has been estimated and reported by the Office of Immigration Statistics since 2006, but not as a performance measure.

L: This was reported as an official performance measure by the INS in 2002 and 2003 but has not been reported publicly since then.

Stock Estimates

Both external scholars and the government have publicly reported estimates of the resident unauthorized population since 1980. Most widely used estimates are based on the residual methodology. The residual methodology starts with an estimate of the total foreign-born population, which is derived from a population census or household survey (e.g., the American Community Survey or the Current Population Survey).⁴⁵ Next, researchers examine inflows and outflows of legal immigrants to estimate how many foreign-born people entered the country legally. They do so by examining number of legal immigrants entering the country, the number of deaths of legal immigrants, and the number of legal immigrants who have emigrated. The “residual” number of foreign-born people, who cannot be accounted for through estimates of legal flows, are then assumed to be unauthorized immigrants.

The greatest challenge involved in residual estimates is the degree of undercount of unauthorized immigrants by the census and other household surveys. Since unauthorized immigrants may be reluctant to answer census or household survey questions correctly (if at all), most organizations or government agencies using the residual methodology assume an undercount. To correct for the undercount, the estimates of unauthorized immigrants counted are adjusted upward, usually by about 10 percent.⁴⁶ There are several other limitations, including a level of uncertainty when estimating rates of emigration (which the U.S. government does not report), as well as sampling errors in the census and survey data itself. However, even with these limitations, to date, there has not been another widely accepted methodology for estimating the number of unauthorized immigrants in the United States, and both government and non-government entities have used the estimates developed by this methodology for many years.

Flow Estimates

The year-to-year change in the stock of unauthorized immigrants represents net flows in and out of the population—by definition, the change in the unauthorized immigrant population equals the difference between the number of new unauthorized immigrants “flowing” into the country (both between and at ports of entry, as well as those who fall out of lawful status or overstay) and the number “flowing” out of the population (through voluntary emigration, adjustment to lawful status, removal by DHS, or death). In this sense, the change in the number of unauthorized immigrants is a holistic measure of the success of U.S. immigration enforcement. However, overall changes in the stock of unauthorized immigrants cannot be used to evaluate the success of particular types of enforcement efforts. Some types of enforcement primarily seek to prevent or deter inflows (e.g., border security), some primarily seek to increase outflows (e.g., interior removals), and some seek to do both (e.g., employment verification).

Measuring Entries through Specific Channels

Because the total stock of unauthorized immigrants can only speak to the overall success of immigration enforcement, measures specific to inflow (entry) and outflow channels are necessary to assess (1) the success of particular immigration enforcement strategies, and (2) what combination of strategies would most effectively reduce the overall stock of unauthorized immigrants. The following subsections describe channel-specific measures, attempts to combine overall and channel-specific measures into a unified account of stocks and flows, and some of the challenges that inhibit these efforts.

Inflow between Ports of Entry (unauthorized border-crossers)

The key outcome measure for enforcement between ports of entry is the number of successful illegal entries. However, because successful illegal entries are by definition undetected, the number of successful entries must be estimated indirectly from other available data. Specifically, both the government and external researchers have used other directly measured data to estimate the probability of apprehension (i.e., the chance that an unlawful entrant will be apprehended). If the probability of apprehension is accurately estimated, it can be combined with the number of apprehensions (which is directly measured) to estimate the total number of successful entrants. For example, if the probability of apprehension is 50 percent and there are 500,000 apprehensions in a year, one can estimate that another 500,000 people successfully entered illegally.

In addition to its usefulness for estimating the total number of illegal entries, the probability of apprehension itself is sometimes of interest to stakeholders and the public, because it essentially measures Border Patrol's success at stopping would-be border-crossers. Beginning in FY 2014, the government began reporting the effectiveness rate as a performance measure, which is similar to the probability of apprehension but also includes people who Border Patrol "turns back" and does not apprehend (see below). This is the same measure of border control that was proposed in the Senate's June 2013 bill. Although the probability of apprehension does not directly measure the outcome in question—the number of successful illegal entries between ports of entry—it is a reasonable indicator of Border Patrol's ability to minimize illegal entry.

Three main methodologies have been developed to estimate the probability of apprehension: analysis of known-flow data

and analysis of migrant surveys. This subsection describes each of these methodologies, its associated challenges, and some potential avenues to overcome those challenges. Following the discussion of each measure, the section compares probability of apprehension estimates with the potential number of successful crossings they imply.

Recidivism Rate

Because the Border Patrol now takes fingerprints from every migrant it apprehends, it is possible to determine how many people were apprehended more than once during a given time period. The recidivism rate, which was reported as a performance measure by INS in the late 1990s and has recently been adopted again by DHS, is the percentage of unauthorized border-crossers who were caught more than once during the same fiscal year.⁴⁷ The logic of the recidivism rate as a measure of border control is that more effective enforcement should cause more people who are caught once to give up and cease trying to enter.

Interpretation of this measure is complicated by the fact that recidivism rates are determined not only by the rate at which immigrants are deterred from trying to cross, but also by the probability of apprehension. For example, a falling recidivism rate could mean that border enforcement is successfully discouraging people from crossing the border, but it could also mean that the apprehension rate has fallen (i.e., that Border Patrol is catching a lower percentage of the people who try to cross). Similarly, a rising recidivism rate could indicate that deterrence is down (i.e., that people who get caught turn right around and try again), or it could indicate that the apprehension rate has increased. Therefore, when the recidivism rate changes, it is not clear whether this is due to change in one variable, the other variable, or both. Appendix B lays out this issue in greater detail.

This limitation of the recidivism rate becomes more significant as enforcement intensifies. Intensified enforcement should cause both the rate at which crossers are deterred and the probability of apprehension to rise. These changes offset each other in the determination of the recidivism rate, which makes it possible that the recidivism rate would not change even in a situation where intensified enforcement produces significant success. This is a critical limitation. Because the recidivism rate is estimated using apprehension data, overcoming this limitation requires combining the recidivism rate with an independent estimate of either deterrence or the probability of apprehension—i.e., one that is not based on apprehension data. The secondary estimate allows statisticians to isolate, or control for, the effect that one factor has on the recidivism rate. In turn, this makes it possible to determine why the recidivism rate changed. For example, migrant surveys have been used to estimate the deterrence rate. This secondary estimate of deterrence can be used as a control, permitting researchers to isolate the separate influences that deterrence and the probability of apprehension exercise on the recidivism rate.⁴⁸

This was not a very important issue prior to the recent enforcement buildup, when available evidence suggested that the rate of at-the-border deterrence was quite low.⁴⁹ However, deterrence has likely increased substantially over the past decade since DHS has instituted a “high-consequence enforcement” strategy that seeks to increase deterrence by applying greater consequences to people who are apprehended. In the past, most people caught at the border were “voluntarily returned,” meaning that they were sent back without consequences. Today, DHS formally “removes” as many border-crossers as its resources allow, which involves detaining them and sending them back through a formal deportation process that carries immigration and/or criminal consequences.⁵⁰ Because the application of greater consequences occurred alongside

efforts to make border-crossing more difficult (e.g., the doubling of border patrol agents since 2005), the rate of border deterrence has probably risen substantially, making the recidivism rate’s limitations potentially more important.

Another important challenge to the recidivism rate concerns the composition of border-crossers. If border deterrence is low, more “casual crossers”—i.e., those not as strongly motivated to successfully enter the United States—will attempt to enter. These casual crossers will invest less effort in their crossing attempt and therefore may be less likely to succeed (e.g., a determined crosser might save money for years to hire a smuggler, but a casual crosser might just try to walk across). As border enforcement becomes more effective at deterring people, casual crossers are likely to be the first people to stop trying. Since casual crossers may be more likely to get caught, a drop in the number of casual crossers will tend to drag down the apprehension rate. One would expect the apprehension rate to increase as border security becomes more effective, but a reduction in the number of casual crossers could limit the extent of this expected increase, or even outweigh it entirely.

Analysis of Known-Flow Data: The Effectiveness Rate

Border Patrol routinely collects known-flow data along the border, which contain three key categories: (1) apprehensions, which are arrests of those attempting illegal entries; (2) “turn-backs,” or instances where Border Patrol observes people giving up on their entry attempt and returning to Mexico; and (3) “got-aways,” which are estimates of those who successfully evade the Border Patrol and enter illegally.

Since the 1990s, Border Patrol has used known-flow data to calculate the effectiveness rate in order to analyze its enforcement operations. This ratio equals the number of apprehensions plus turn-backs divided by the number of apprehensions, turn-backs, and got-aways—in other words, it is the percentage of people who did not “get away.” The

ratio can be interpreted as the degree to which Border Patrol enforcement operations resulted in the prevention of illegal entry.

Table 3 presents effectiveness rates based on publicly available known-flow data for FY 2006 to FY 2011 and FY 2014. Aggregate figures for FY 2006 to FY 2011 should be interpreted with caution, as Border Patrol first issued guidance intended to standardize collection and reporting practices across sectors in September 2012.⁵¹ However, the rate also improved in eight of the nine border patrol sectors over this period, supporting the idea that the overall effectiveness rate improved. Given potential changes in reporting practices and the lack of sector-specific data for FY 2014, it is unclear whether the difference between FY 2011 and FY 2014's effectiveness rates is significant.

In calculating the effectiveness rate, there are several limitations that must be acknowledged. Border Patrol knows the number of apprehensions with certainty, but must estimate the number of got-aways and turn-backs using data from a variety of sources. Estimates of got-aways are based on direct visual observation by agents or cameras, physical evidence of movement (collection of which is known as "sign-cutting"), and information from local residents believed to be credible. The estimate of got-aways will necessarily fail to include some percentage of those who successfully enter and are completely undetected. Expanded border surveillance technology, including the deployment of drones, and external review and evaluation both of the data and the methods used to evaluate them has the potential to make known-flow data more accurate.⁵² In addition, the estimates of turn-backs may include those who initially turn back but later attempt entry unobserved. Since the data on apprehensions represents individuals, but the data on turn-backs and got-aways represent events, an effectiveness rate may not necessarily coincide with the number of individuals successfully crossing.

It is important to distinguish the effectiveness rate from the apprehension rate. Known-flow data can also be used to estimate the apprehension rate, simply by dividing the number of apprehensions by the total number of incidents. Of course, this estimate of the apprehension rate is subject to the same data limitations as the effectiveness rate.

Migrant Survey Analysis

Various organizations, including the Border Patrol, have conducted migrant surveys over the years. Border Patrol asks apprehended individuals various questions about their current and past travel histories. External researchers survey migrants in detention or returned migrants in their home countries. Surveys that ask those who have attempted illegal entry in the past how many times they were apprehended, and whether they ultimately successfully entered or gave up their attempt, can be used to estimate the probability of apprehension and the degree of border deterrence. Calculation of the total number of successful entries from migrant survey data requires identifying a total number of apprehensions that corresponds to the set of trips recorded in the migrant survey (e.g., at a particular crossing area in a given year).

This method also has some challenges. Specifically, there are challenges as to whether the sample in the survey is representative of the overall migrant population. One issue pertains to who is surveyed. Migrant surveys of only those apprehended (such as those in detention or those apprehended by Border Patrol) will not include those who made successful entries. Another issue pertains to the composition of the migrant population. Over time, the population attempting to immigrate into the United States may change in ways that affect the ability of migrant surveys

Table 3: Effectiveness Rates for the Southwest Border Region

U.S. Border Patrol Sector	2006	2007	2008	2009	2010	2011	2014
San Diego	80%	77%	82%	87%	90%	92%	-
El Centro	83%	85%	84%	88%	89%	91%	-
Yuma	64%	79%	88%	92%	95%	94%	-
Tucson	67%	64%	68%	71%	78%	87%	-
El Paso	73%	87%	93%	94%	96%	96%	-
Big Bend	86%	88%	81%	73%	73%	68%	-
Del Rio	63%	69%	72%	82%	86%	86%	-
Laredo	70%	64%	78%	84%	87%	84%	-
Rio Grande Valley	55%	53%	57%	61%	63%	71%	-
Border-wide ^A	69%	70%	73%	76%	79%	84%	79%

Source: FY 2006-2011 calculated from GAO (2012); FY 2014 from DHS (2014).⁵³

A: Prior to FY 2013, data-collection practices were not standardized across sectors.

to measure illegal immigration outcomes. For example, historically, the majority of unauthorized immigrants to the United States were Mexican, and this led to a focus on Mexican migrants. Many of the estimates presented in Figures 5 and 6, for example, are derived from data on illegal trips by Mexican nationals. In the last four years, however, the share of Mexicans in the unauthorized inflow appears to have fallen significantly, and the share of migrants from Central American countries has risen. In fact, recent data indicates that as of 2014, Mexicans are no longer a majority of migrants apprehended at the U.S.-Mexico border.⁵⁴ A very important task for future research is to develop methodologies and data that can be used to

estimate the measures of Table 4 for migrant flows from Central American and other migrant-sending countries. Recidivism analysis should be carried out for these migrants using CBP apprehension record data. Migrant surveys could potentially be carried out in these countries through collaboration with researchers based there.

Other challenges for migrant survey measures relate to the impact of enforcement on the survey population. Intensified enforcement that successfully produces additional deterrence reduces the number of illegal trips and thus the size of the sample of the potential survey population. Intensified enforcement might also increase reluctance to voluntarily participate in a survey.

Probability of Apprehension, Deterrence, and Successful Border-Crossings

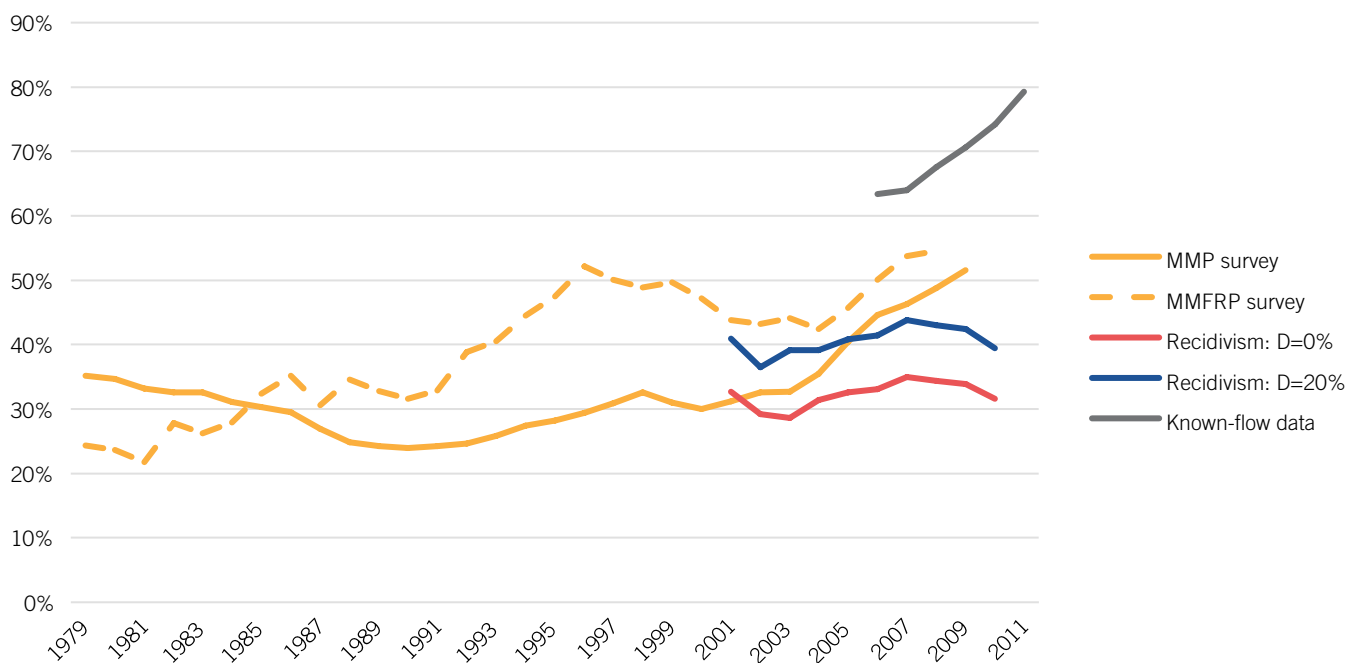
As previously mentioned, all three approaches described above—the recidivism rate, the effectiveness rate, and migrant surveys—can be used to estimate the probability of apprehension and therefore (along with apprehension data) the number of successful illegal entries. Figure 4 shows estimates of the probability of apprehension for the period from 1979 to 2011 using each of these three methods based on: (1) data from two migrant surveys (the Mexican Migration Project and the Mexican Migration Field Research Project), (2) a recidivism analysis that assumes either a 0 or 20 percent rate of at-the-border deterrence (to control for the effect of deterrence on the recidivism rate described above), and (3) Border Patrol known-flow data.⁵⁵

Prior to the 2000s, evidence from migrant surveys and recidivism suggest that the probability of apprehension ranged between 20 and 50 percent. In the 2000s, migrant survey and known-flow data both suggest that the probability of apprehension was rising. Although the estimates based on recidivism analysis do not show such a trend, given that the rate of at-the-border deterrence was probably rising in the late 2000s as apprehended migrants were subjected to increasing consequences, estimates based on recidivism analysis that properly controlled for at-the-border deterrence would likely show a rise in deterrence over time, illustrated by the difference between the “D=0%” line to the “D=20%” line. The estimate of the probability of apprehension based on known-flow data is significantly greater than estimates based on the other approaches, which is not surprising given that known-flow data do not include illegal entries that were completely undetected by Border Patrol.

Figure 5 estimates the number of successful entries by Mexican nationals calculated based on (1) the probabilities of apprehension from Figure 4, and (2) the number of apprehensions recorded by Border Patrol for each of those years.⁵⁶ Figure 5 also includes the estimates of overall inflows from a stock-flow estimate done by Warren (2013).⁵⁷ Prior to the mid-2000s, the level of successful entry implied by the Mexican Migration Project survey-based estimate of the probability of apprehension is too high to be consistent with the levels of the estimated stock of unauthorized resident immigrants shown in Figure 1, suggesting that the estimate of the probability of apprehension derived from this survey’s data is too low. However, all estimates fell significantly in the 2000s, reflecting both a falling number of apprehensions and a rising probability of apprehension.

Figures 4 and 5 demonstrate that it is possible to estimate the number of successful illegal entries. Each of the methodologies have their limitations, but if used consistently over time, they can provide a better picture of border enforcement outcomes than we have now.⁵⁸ Several variances in the current data represented above most likely means that no single method is bound to give an accurate picture. However, some combination of these methods—through an index, for example—may provide a better picture and analysis of trends over time. This strategy is frequently applied in other areas, namely economic and crime indices.

A serious research effort that brings CBP and DHS experts and external researchers together to review these methodologies could make them more consistent with one another or even help to develop an index using multiple methods that is more objective. DHS administrative data from individual apprehension records would further enable external researchers to reconcile inconsistencies and to develop better-quality estimates. DHS’s reluctance to

Figure 4. Probability of Apprehension Estimates: Mexico-U.S. Land Border, Between Ports of Entry

Source: Roberts et al. (2013).

share administrative data on immigration enforcement with external researchers has been noted as a major obstacle to developing better immigration enforcement outcome measures.⁵⁹

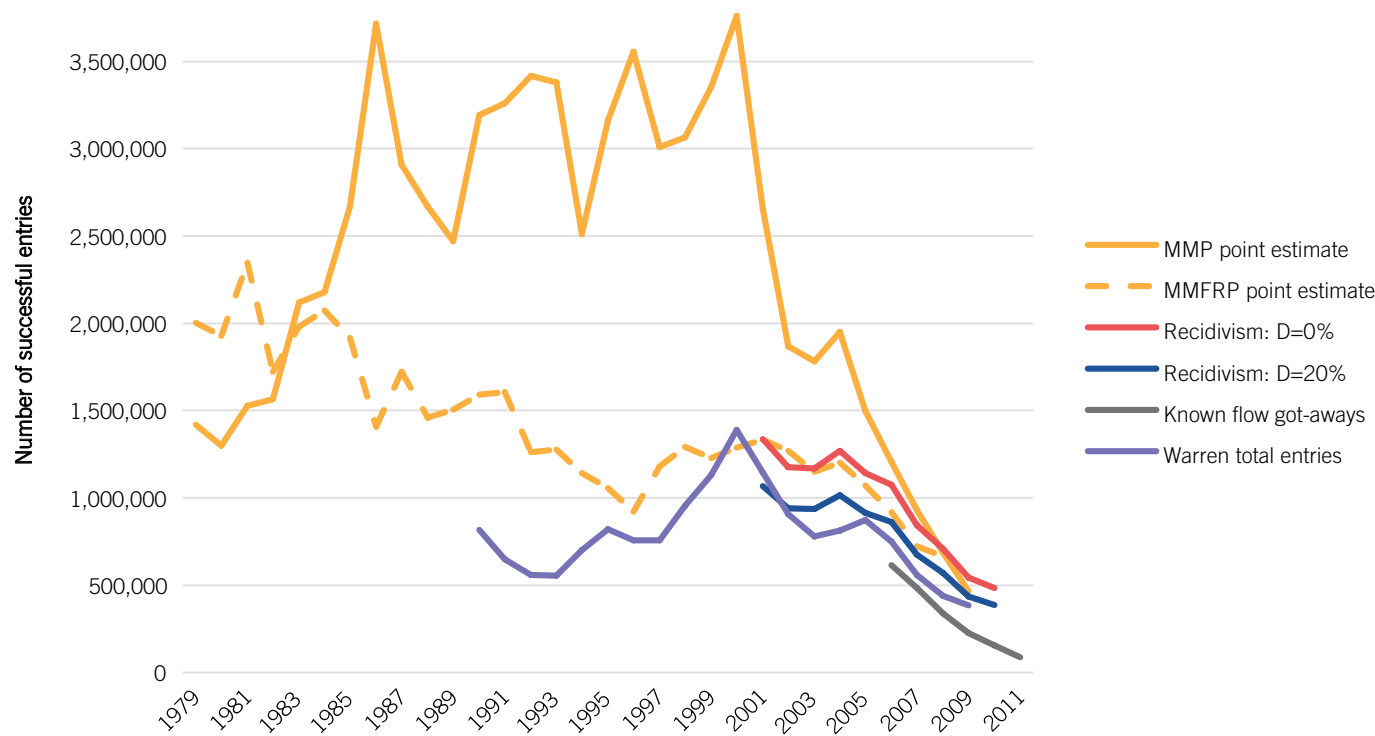
Inflow at Ports of Entry

In addition to the data between ports of entry, any comprehensive set of measures should also include estimates of the number of unauthorized individuals who enter through the ports of entry. Because port-of-entry inspections are conducted in controlled areas, there is generally more data collected in this mode of entry than others. Despite this fact, much more is publicly known

about illegal entries between the ports of entry. Performance measures for unauthorized entries at legal ports of entry would enhance the public's understanding of this oft-overlooked way in which unauthorized immigrants evade law enforcement and enter the country.

A very large number of individuals are inspected at U.S. ports of entry every year. Figure 6 displays data on the total number of inspections of people at all ports from 1972 to 1996 and from 2005 to 2013, and at land ports only from 1992 to 1994 and from 2005 to 2013.⁶⁰ After hitting a peak of roughly 500 million in the early 1990s, the number of inspections at all ports currently is slightly above 350 million per year. Inspections at land ports were 86 percent

Figure 5. Number of Successful Entries by Mexican Nationals Mexico-U.S. Border, Between Ports of Entry



Source: Roberts et al. (2013).

of total inspections from 1992 to 1994, fell to 76 percent in 2005, and fell farther, to 67 percent, in 2013, reflecting the growing weight of air travel in arrivals to the United States.

In addition to the data on the total number of inspections, CBP collects data on the number of aliens who are refused admission. Figure 7 shows the number of aliens who were refused admission to the United States from 1972 to 1996 and from 2005 to 2013, and the refusal-rate measure of aliens denied admission as a percentage of aliens inspected. The number of aliens refused admission

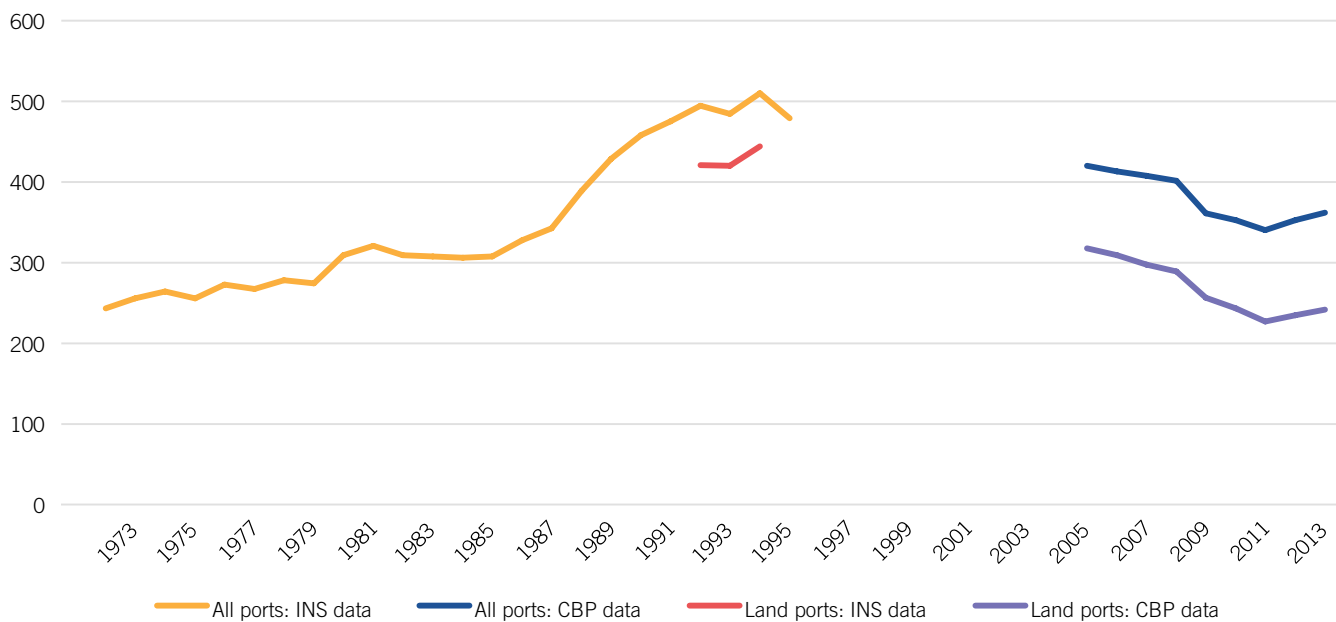
fluctuated between 340,000 and one million from 1972 to 1996, and aliens refused admission as a percentage of total inspections fluctuated between 0.25 and 0.55 percent from 1972 to 1986, but the number of aliens refused admission fell to roughly 200,000 from 2005 to 2013, and the refusal rate fell to 0.13 percent.⁶¹ The very large number of inspections carried out at the ports implies that only a small percentage of them need to be of successful illegal entrants for a significant volume of illegal entries to occur at the ports.

Much more is publicly known about the probability of apprehension and number of illegal entries between the ports of entry than at the ports, even though CBP has authority to inspect any person or vehicle and controls all movement through the ports and has more directly collected data available. While CBP may have estimates that it has developed for internal use of the probability of apprehension at the ports, it has not shared these estimates publicly. For example, CBP conducts randomized secondary inspections (intensive screening) of vehicles at land ports of entry and international passenger arrivals at air ports of entry through its COMPEX program.⁶² A random sample of vehicle or air passengers is selected for intensive inspection, and as long as that sample is truly random, the percentage of

those detected attempting illegal entry in this sample can be applied to the overall traveler flow to get an estimate of successful unauthorized entrants. As noted earlier, DHS reported COMPEX compliance and apprehension rates for air- and land-vehicle passengers from 2005 to 2009. However, no estimates of the number of illegal entries through ports based on COMPEX data have ever been made public by DHS.

Prior to the formation of DHS, the INS sponsored the INTEX program, which was COMPEX's predecessor. The INS did share INTEX data with an external researcher, and Morrel-Samuels (2002) used the data to estimate the number of unauthorized entries at U.S. ports of entry at 3.0-5.5 million

Figure 6. Number of People Inspected at All Ports and at Land Ports (million people inspected)

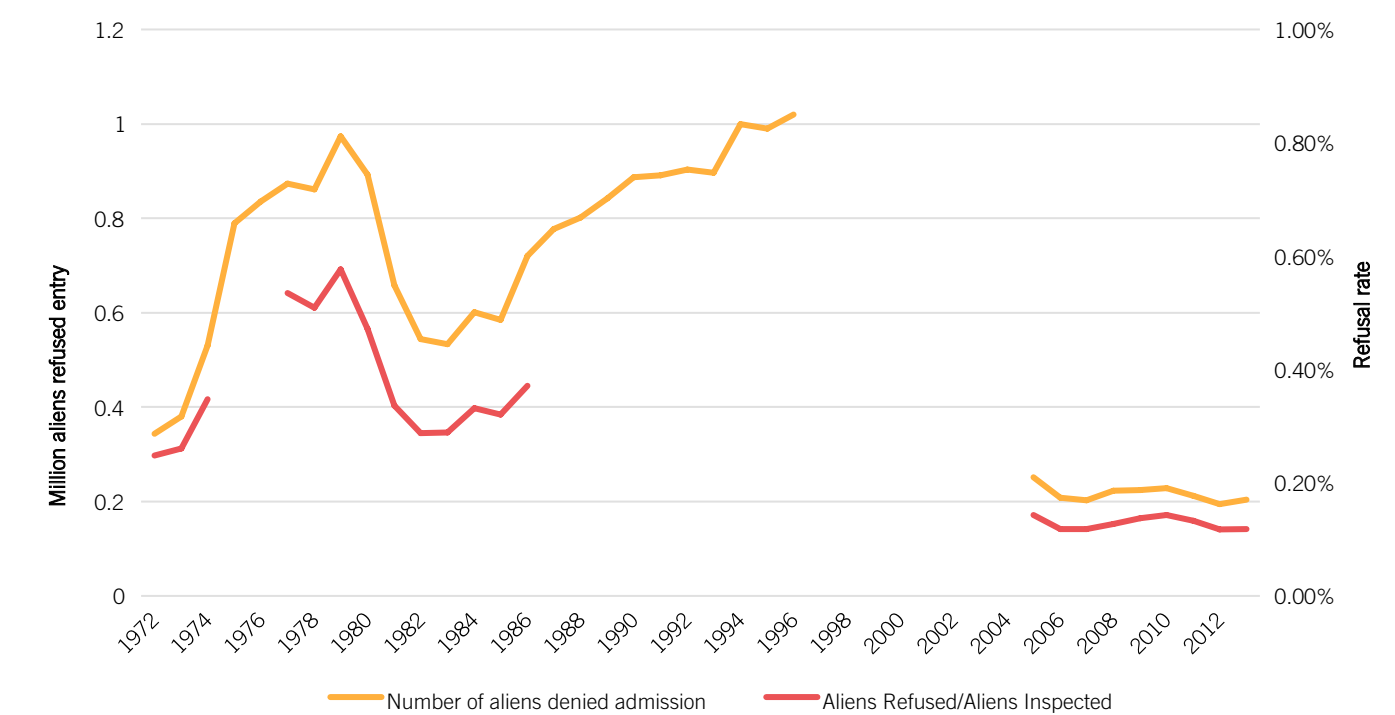


Source: INS data (for both all ports and land ports) are from INS Congressional Budget justifications from 1972 to 1998; CBP data are from GAO (2014).

annually around the year 2000. This is an extraordinarily high level of unauthorized entries and suggests that many unauthorized entrants at ports do not stay in the United States long enough to be captured in the data sources used to make estimates of the stock or year-over-year flow of unauthorized immigrant residents. It also suggests that the quality of these estimates needs to be carefully evaluated. There has been significant progress made with respect to

the collection of data on entries through ports since the early 2000s, given that DHS has required and collected much more comprehensive data on travelers at all ports of entry—land, sea, and air. Therefore, developing quality estimates of these flows should now be possible. In order for future outcome measures of border enforcement to be comprehensive, inclusion of more publicly available port-of-entry data is desirable.

Figure 7. Aliens Refused Entry at Ports and Refusal Rate



Source: Number of aliens denied admission are from INS Congressional Budget justifications from 1972 to 1998 and from the DHS Office of Immigration Statistics reports on non-immigrant admissions from 2005 to 2013 (see, e.g., http://www.dhs.gov/sites/default/files/publications/ois_ni_fr_2013.pdf). Number of aliens inspected are from INS Congressional Budget justifications from 1972 to 1988 and calculated from data provided in DHS Office of Immigration Statistics reports on non-immigrant admissions and GAO (2014) from 2005 to 2013.

Overstays

In addition to unlawful entries at and between the ports, a complete estimate of unauthorized immigration must include individuals who were legally inspected and admitted at ports of entry, but who either remained beyond their authorized time of admission, or otherwise violated the terms of their admission (e.g., by working without authorization or dropping out of school when on a student visa). Even if additional enforcement at the border were successful in deterring or preventing additional unlawful entry, failure to address the overstay population could still result in increases in the overall stock of unauthorized immigrants. Therefore, measurement and public reporting of overstay estimates are important to a comprehensive border enforcement evaluation framework.

Efforts to measure the overstay population began in the late 1980s.⁶³ Robert Warren first measured the stocks and flows of overstays from 1985 to 1988 by matching arrival and departure stubs from the paper I-94 form that all visa travelers to the United States were required to complete.⁶⁴ In 1996, the last year for which he developed estimates, he found that 41 percent of the estimated five million unauthorized population were overstays.⁶⁵ Although some other efforts have been made to estimate the size of the overstay population, the most commonly cited estimates are still based on Warren's 1996 work.⁶⁶

While the U.S. government has not publicly reported an estimate of the overstay population since 1996, DHS has significantly improved its capability to identify overstays with the introduction of the US-VISIT system in 2004. As noted in the Bipartisan Policy Center's (BPC) report in 2014, DHS now collects biographic data on arrivals for almost all travelers as well as land, sea, and air ports, and it collects similar data on departures for all travelers at air and sea ports and land travelers via Canada through a data-exchange agreement.⁶⁷ BPC also noted that, though

biometric data add value for some enforcement purposes, biographic data are adequate for statistical estimates of overstay rates. However, no exit data of any kind are collected at the southern land border. As a result, it is not possible to precisely count the number of overstays; instead, as is the case with all measures of unauthorized immigrant stocks and flows, any performance measure describing the overstay population would be an estimate.

Although the government has not recently published recent overstay estimates, DHS and the State Department are required to consider each country's overstay rate in determining eligibility for the Visa Waiver Program. The methodologies employed in this analysis are not known, but given the increases in data collection that took place over the past decade, it seems feasible that, at minimum, a concerted effort between the government and external researchers could improve upon the estimates that currently exist in the public domain. Accurate estimation seems particularly feasible for countries like China, India, and the Philippines, whose nationals constitute a sizeable share of the unauthorized immigrant population, but whose geography makes those individuals much more likely to enter by air and sea, where complete entry-exit data are already collected.

Among the three primary entry methods for unauthorized immigrants, estimates of the overstay population may face the most methodological hurdles. Nonetheless, better estimates seem possible. Serious efforts to report such measures would represent an important component of any effort to establish outcome measures for immigration enforcement.

Measuring Inflows and Outflows: Stock-Flow Accounting

The three groups of inflows described above—between ports of entry, at ports of entry, and overstays—are the

primary mechanisms for entry into the United States. There are four main channels through which individuals may “flow out of” the unauthorized immigrant population—forcible removal, adjustment to legal status, departure on their own recognizance, or death. Taken together, the stock and flow measures listed in Table 2 and discussed above could be combined into a complete stock-flow accounting of the unauthorized immigrant population. This would break the year-to-year change in the unauthorized immigrant population into the specific ways that unauthorized immigrants entered or exited that population.

Recently, Warren and Warren (2013) took a major step toward the development of a complete stock-flow accounting of the unauthorized immigrant population. The new methodology does not break entries into separate channels, but breaks exits into the four major exit channels (removals, voluntary emigration, adjustment to lawful status, and death). Table 4 displays Warren and Warren’s estimates, which cover the 1990 to 2010 period. These estimates suggest that total entries fell dramatically in the late 2000s. Warren and Warren’s estimates also suggest that exits rose somewhat after 2006, as a result of both increased adjustments in status and removals from the United States.

Warren and Warren’s estimates are the closest that government or independent researchers have come to providing estimates for the stock and flow measures recommended in Table 2 for the immigration enforcement

system. However, as Figure 5 illustrates above, Warren and Warren estimate significantly fewer total entries than the migrant survey and recidivism-based estimates, even though it covers all entry channels and nationalities. This is an important challenge for future research. Any complete stock-flow accounting that depends on estimates calculated through different methodologies must make those estimates consistent with one another before they can be combined.

One reason for the discrepancy may be that the Warren and Warren estimates of inflow include only migrants who stay in the United States for a relatively long period (e.g., at least one year), but the other estimates of inflow also include those staying in the United States for short periods of time.⁶⁸ This issue was raised forcefully in Bean et al. (1990), who distinguished between unauthorized immigrants who commute across the border on a daily or weekly basis, those who enter for seasonal work, and those who settle permanently.⁶⁹ It is well-established that the border enforcement buildups of recent years have shifted the migration balance away from commuters and toward permanent settlement; according to the Pew Research Center, the median length of residence for adults increased from fewer than eight years in 2003 to nearly 13 years in 2013.⁷⁰ In Figure 5, this could explain why the gap between the Warren estimates and the migrant surveys narrows over time. Discrepancies between various estimates of inflows and stock could potentially be reduced through focused research efforts that sought to explain significant inconsistencies.

Table 4: An Integrated Stock-Flow Accounting of Unauthorized Immigrants to the U.S.

	Population on Jan. 1	Net Change	Entries	Exits				
				Total	Voluntarily Emigrated	Adjusted to Lawful Status	Removed by DHS	Died
1990	3,500,000	634,935	815,876	180,941	102,648	37,883	25,369	15,041
1991	4,134,935	451,657	648,602	196,945	115,922	35,290	28,568	17,165
1992	4,586,592	338,841	558,601	219,760	124,179	42,925	33,921	18,735
1993	4,925,433	327,496	556,605	229,109	130,175	44,870	34,023	20,041
1994	5,252,929	467,097	700,030	232,933	138,038	38,392	34,921	21,582
1995	5,720,026	570,626	821,533	250,907	149,624	41,900	35,765	23,618
1996	6,290,652	472,185	755,784	283,599	161,052	55,428	41,426	25,693
1997	6,762,837	447,625	758,703	311,078	170,283	54,319	58,954	27,522
1998	7,210,462	616,056	953,591	337,535	181,664	61,448	64,797	29,626
1999	7,826,518	773,481	1,131,520	358,039	197,808	60,393	65,287	34,551
2000	8,599,999	1,020,484	1,389,322	368,838	197,784	72,621	65,279	33,154
2001	9,620,483	638,197	1,145,813	507,616	223,171	176,169	71,191	37,085
2002	10,258,680	433,518	906,295	472,777	237,468	114,927	80,836	39,546
2003	10,692,198	285,752	779,187	493,435	244,470	119,709	88,033	41,223
2004	10,977,950	338,848	812,516	473,668	246,684	84,288	100,363	42,333
2005	11,316,798	397,498	873,134	475,636	250,187	79,037	102,764	43,648
2006	11,714,296	266,996	749,421	482,425	255,867	64,200	117,171	45,187
2007	11,981,292	27,212	558,276	531,064	257,585	94,064	133,190	46,225
2008	12,008,504	-109,690	439,496	549,186	252,281	100,485	150,079	46,341
2009	11,898,814	-173,804	384,314	558,118	243,319	104,029	164,839	45,931
2010	11,725,010							

Source: Warren and Warren (2013).

Immigration Task Force



Border Patrol safe boat patrols Rio Grande. Photo courtesy of U.S. Customs and Border Protection.

Chapter 4. Measures and Migration Decisions

To develop enforcement policies and measure their success, it is important to understand how those policies and measurements relate to individuals' decisions to illegally migrate to the United States. As described more technically in Appendices B and C, four key factors influence a potential migrant's decision to try to enter the United States illegally:

- The probability of entering successfully, including the number of crossing attempts the migrant expects to make;
- The expected monetary and non-monetary costs of successful entry;
- The expected consequences of unsuccessful entry; and
- The expected benefits if the trip is successful, including the probability of finding work in the United States.

Policies that aim to reduce future flows of unauthorized immigrants ultimately attempt to influence these four factors. The policy levers that influence these four factors aim to achieve two core categories of outcomes: “at-the-border” deterrence and “before-the-border” deterrence. A potential migrant who decides not to leave home in the first place has been deterred before the border. All border and interior enforcement activities contribute to before-the-border deterrence, because all enforcement activities influence one or more of the four factors listed above. However, only some activities influence at-the-border deterrence. For example, consequences for border-crossers create at-the-border deterrence by causing some people who already decided to migrate illegally to change their minds, but they also create before-the-border deterrence by discouraging individuals who are aware of those consequences from attempting to migrate in the first place. By contrast, employment verification has no effect on a migrant's at-the-border experience, but it does reduce the expected benefits of a successful journey (by reducing the

chances of finding a job) and thereby creates before-the-border deterrence.

In this way, a migrant's decision to come to the United States provides important context for the measures described in the previous section. This section describes key considerations for linking the concepts of before- and at-the-border deterrence to policy decisions about measuring immigration enforcement, as well as immigration enforcement writ large.

What is the Optimal Level of Deterrence?

The question of what constitutes a secure border is often front and center in the immigration debate. Different definitions of border security are likely appropriate for different applications, but in the context of immigration reform, it is important to consider what level of border security is needed to deter future unauthorized immigration. Very little research has been done on this important question. However, it is reasonable to think that the relationship between deterrence and enforcement is highly non-linear. At low levels of deterrence, relatively few migrants may judge that the risks of crossing are greater than the benefits of succeeding; at high levels, the border may be so secure that additional security would not change migrants' decisions very much. In between, there may be key thresholds where additional security adds considerable deterrent value, particularly on a per-dollar basis.

The “repeat-trials model” of unauthorized border-crossing is a useful illustration of this principle. Table 5 shows the expected number of crossing attempts given a particular probability of apprehension. If the probability of apprehension equals zero, and the border is thus in effect “open,” the expected number of crossing attempts is one. As the probability of apprehension rises from zero, the expected number of attempts needed to get across the

border rises as well, but quite slowly at first—for example, if the probability of apprehension is 30 percent, most migrants will still make it through on their first try, and the average migrant can expect to need 1.4 trips to make it across the border. The expected number of attempts then begins to rise more rapidly with the probability of apprehension. At a level of 67 percent, three attempts are expected, but at 80 percent, five attempts, and at 90 percent, ten attempts.⁷¹ Appendix B develops the repeat-trials model formally.

This relationship suggests that a “tipping point” exists where little deterrence is created below a certain level of the probability of apprehension, but a great deal of deterrence above a certain level. The threshold value for such a tipping point will depend on the level of consequences imposed on those who are caught, but unless consequences are quite significant for each unsuccessful attempt, the tipping point will likely be a probability of apprehension above 50 percent, and perhaps as high as 70-80 percent.

Table 5

Probability of apprehension	Number of expected trips
0%	1
30%	1.4
50%	2
67%	3
80%	5
90%	10
95%	20

Source: Appendix C.

The existence of a tipping point suggests that border enforcement will have little impact on migrant decisions up to a certain point, but that once enforcement has produced a tipping-point probability of apprehension, extra enforcement will produce little extra deterrence. It should thus be possible to identify an optimal level of deterrence. This result may also apply to other aspects of immigration enforcement—for example, employment verification could reduce the number of potential jobs available to migrants, and depending on the system’s efficacy and comprehensiveness, a critical threshold could be reached where migrants decide that finding a job is too unlikely to be worth the effort of attempting unlawful entry.

More research will be necessary to determine the most cost-effective levels of deterrence at the border, as well as in other aspects of immigration enforcement. However, the repeat-trials model shows that a 100 percent apprehension rate may not be needed to deter a substantial number of crossing attempts; instead, if the goal is to reduce unauthorized immigration, the apprehension rate only needs to reach a threshold that makes it unreasonable for most migrants to try. This principle may also hold in other immigration enforcement contexts, including the probability of finding a job and the probability of being removed from the United States

It should also be noted that the focus on deterrence as a goal or a strategy can have other consequences. For example, the strategies used in the 1990s to deter unlawful crossings at the then-busiest sectors of the U.S.-Mexico border (Operation Gatekeeper in the San Diego sector and Operation Hold the Line in El Paso) resulted in deterring crossing in those sectors but redirecting the crossings to more dangerous areas, most notably the Tucson sector in Arizona, and a corresponding increase in migrant deaths.⁷² Thus, policymakers may also wish to examine other performance measures that can examine the consequences of various enforcement choices on factors other than

unauthorized crossings, such as the level of smuggling violence at the border or the impact of enforcement measures on local communities. While not directly relevant to the goal of reduced unauthorized immigration, these measures could provide a tool for evaluating other unintended effects of specific border strategies.

Measuring Before-the-Border Deterrence

As described above, would-be migrants who have been deterred “before the border” decide not to attempt illegal entry because the cost-benefit calculation does not justify the trip. Although it is not as straightforward as some of the measures described in Table 2, before-the-border deterrence can be measured by using statistical analysis to combine surveys of migrants or would-be migrants with data on key factors that affect their decision. The research in this area is not yet developed enough to be used as a performance measure, but improved estimates of these factors could considerably enhance our understanding of immigration enforcement’s effects on migrant decisions.

To estimate the level of before-the-border deterrence, data are needed on migrants in a source country who actually make the trip to the border as well as those who ultimately do not migrate. However, because there are many other factors influencing the decision to migrate, in order to be useful, the deterrence impact of various immigration enforcement policies must be separated from other variables, such as economic or security factors in the originating country. This can be done through multivariate statistical analysis. For example, Gathmann (2008) uses data from the Mexican Migration Project survey to evaluate the impact of enforcement and economic variables on the individual decision to migrate and finds no evidence of a significant deterrent impact. However, Borger et al. (2012) use data from the Mexican national household survey for

2002 to 2010, which identifies household members who do and do not migrate. They estimated the impact of border enforcement, economic conditions in the United States and in Mexico, and variables capturing the ease of migrating legally on the decision to migrate illegally to the United States, and their preliminary results show that all variables have a significant impact on this decision at the individual level. They also use these results to quantify deterrence at the aggregate level, and they find that the Great Recession, improvements in the Mexican economy, and border enforcement intensification each accounted for roughly one-third of the downturn in illegal immigration of Mexican nationals to the United States since 2003. This is the first rigorous evidence that enforcement can have a deterrent impact and has played a role in the recent inflow downturn, although much less than combined economic factors.⁷³

The research of Gathmann (2008) and Borger et al. (2012) is based on an analytical framework that makes the decision to illegally migrate a function of enforcement programs, economic variables, and all other factors that conceivably influence migration decisions. Under this framework, potential migrants compare the expected benefits and costs of illegal migration and decide to migrate if benefits exceed costs. Appendix C develops this framework in detail and shows that if adequate data are available, it is possible to estimate quantitatively the degree to which border and interior enforcement programs impact the decision to migrate and thus the degree to which they create behind-the-border deterrence. Borger et al. (2012) establish that adequate data is available, at least in the case of Mexico, to measure the deterrent effect of immigration enforcement.⁷⁴ While this research holds promise, because it is based so heavily on migrant surveys, changing composition of migrants (e.g., more from Central America) will require additional studies to provide a more comprehensive picture.

Developing a Holistic Enforcement Model

Measuring before-the-border deterrence is related to a larger endeavor: developing a holistic model of immigration enforcement's effects on unauthorized migration. In order to identify an optimal level of immigration enforcement expenditure, and how that expenditure should be allocated to specific activities and programs, decision-makers would ideally have access to analytical tools that quantify the relationship between enforcement activities and programs and the deterrence impact on potential migrants. Such tools would organize available data and estimates into an integrated model in which inflows and outflows respond to enforcement, economic, demographic, and other factors based on rigorous analytical frameworks and analysis of historical data. In other words, they would combine (1) a model of migration decisions with (2) measures of enforcement inputs to produce (3) projected effects on the flow measures described in Table 1.

There has been some progress on building such a model. Wein et al. (2009) develop a model of illegal inflow on the southwest border that incorporates sub-models of border enforcement, worksite enforcement, and a detention-

and-removal system. They use the model to evaluate the cost-effectiveness of border versus interior enforcement in deterring illegal immigration. Chang et al. (2011) develop the Wein et al. model further and use it to carry out various simulations related to enforcement strategies against illegal migration. Borger et al. (2012) estimate the historical relationship between border enforcement and illegal migration from Mexico, and their approach can be developed to better understand the deterrence impacts of specific enforcement programs and potentially identify optimal enforcement expenditure levels.⁷⁵

Efforts to develop integrated quantitative models of stocks and flows of illegal immigrants is technically challenging, but it is clear that it can be done if analysts with appropriate skills are engaged to do it and provided with the data that they need to carry out the research. Because there are so many factors influencing the decision to immigrate that are outside of the control of U.S. border or immigration policies, additional analysis of this type would improve our understanding of how different enforcement policies can impact migration trends, including whether different plans to reform immigration enforcement can be expected to reduce unauthorized migration.



Immigration Task Force



New metal border fence near San Diego. Photo courtesy of U.S. Customs and Border Protection.

Conclusion

In the 1980s and early 1990s, the U.S. government and researchers based in think tanks and academia worked together to develop core methodologies and needed administrative and survey data to assess key outcomes related to the control of unauthorized immigration. Since then, however, the government has generally failed to report credible and stable measures of immigration enforcement outcomes. Although a great deal of effort was expended on developing performance measure plans in the late 1990s, and the government did briefly report the stock and inflow of unauthorized migrants as measures from 2002 to 2003, these efforts were disrupted by the formation of DHS. As the previous sections show, there is a sufficient body of research and analysis to allow policymakers and legislators to agree on and develop a set of common performance measures for immigration enforcement.

The importance to the current immigration debate of developing and regularly reporting on consistent performance measures for immigration enforcement cannot be overstated. As stakeholders continue to perceive the state of the border differently, there are implications for immigration legislation, border funding, and policy implementation. In recent years, Congress and the administration have argued over appropriate measures of the state of the border, and several bills have been introduced to attempt to require specific border metrics. For example, during the 2013 Senate deliberations over immigration reform legislation, there was debate over the effectiveness of allowing the executive branch agencies to determine the appropriate metrics, and some called for external evaluators to review or “certify” the state of border security.⁷⁶ Had consistent performance measures already been established before this debate, it is possible that stakeholders would have had an easier time agreeing on the current state of border security and establishing performance goals for the future.

BPC’s Immigration Task Force has called for performance measures to be “audited by an independent commission and published periodically for public scrutiny.”⁷⁷ While there are several options for an institution that could produce and evaluate the recommended measures related to illegal immigration enforcement, whether performance measures are accepted and trusted by all stakeholders will ultimately depend greatly on the extent to which they are clearly stated, measured using known and understood methodologies, and reported in a transparent and consistent manner over time. The measures suggested in this paper for immigration enforcement would, if consistently reported based on data that are regularly made available, provide all stakeholders with a clearer understanding of the effectiveness of border and immigration enforcement. As described, these measures would cover overall changes in unauthorized immigration, the specific ways that people enter or exit the unauthorized immigrant population, and the frequency with which unauthorized border-crossers are caught.

In order for these performance measures to be successfully implemented, several challenges must be addressed. First, institutional reluctances to publicly report on enforcement outcomes must be overcome. For example, federal law enforcement agencies are often resistant to measuring stocks and flows that are not directly observable and have historically failed to attach credibility to estimates that have been made by researchers.⁷⁸ Similarly, agencies are reluctant to use measures based on data that are collected outside the government, regardless of the integrity of the research or the sources. However, because of the inherent challenges in estimating a population that actively evades detection, non-governmental research could significantly add to the understanding of the current state of enforcement. Additionally, federal agencies are also concerned that reported measures that do not indicate 100 percent success in enforcement could be interpreted

as failure, although achieving 100 percent enforcement is an unrealistic expectation in any border security effort.* Successfully conveying the strengths and limitations of any enforcement measure could mitigate these concerns.

In addition to these institutional concerns, performance measures should also be resistant to manipulation or political influence. Of critical importance to this effort will be mechanisms that ensure consistent measurement and reporting over time. Historically, metrics have changed frequently, possibly when they are thought to demonstrate negative outcomes. If a common understanding of border and immigration enforcement is to be established, however, measures must remain the same over time; ever-changing measures make it difficult to track trends over time or to identify the effects of changes in enforcement policy. Congress can (and has in the past) mandate specific measures be reported by the agencies. Tying the regular reporting of such measures to appropriations would

ensure consistency. An external agency, such as GAO or a congressionally established independent commission could recommend the initial slate of performance measures and audit the subsequent performance reports. These agencies could compare governmental estimates of performance measures against those developed by researchers or think-tanks for additional verification of the data.

Ultimately, the political process must determine the way in which performance measures are selected, mandated, or audited. However, it is clear that objective, consistently reported outcome measures would help stakeholders understand the success or failure of immigration enforcement policies and would help policymakers assess what policy changes and enforcement goals are most appropriate for the future. These potential benefits make the need for performance measurement incontrovertible—and possibly even a prerequisite for future immigration reform legislation.

* No state has ever prevented all attempted unauthorized entries into its territory. Roberts et al. (2013) review several historical cases, including East Germany during the Cold War, which experienced mass outmigration in the 1950s and attempted to stop it completely by establishing a “kill zone” on its borders and severely punishing those who were caught and not killed. Even under such an extreme approach, in the late 1970s, 5 percent of those trying to cross succeeded.

Immigration Task Force



Processing at Border Patrol station. Photo courtesy of U.S. Customs and Border Protection.

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Immigration Task Force



Photo: Katherine Welles / Shutterstock.com

Appendix A. The Allocation of Federal Law Enforcement Resources

Annual budgetary expenditures are a useful summary measure of the resources used to carry out law enforcement activities. The federal government enforces a wide range of federal laws, including immigration laws but also laws related to foreign trade, interstate commerce, illegal drugs, violent crimes, property crimes, and other areas.⁷⁹ Law enforcement can also be defined as only enforcement of criminal laws or enforcement of all types of laws (including civil laws). Finally, law enforcement can be defined narrowly to include only those enforcement programs that identify and arrest law violators, or broadly to also include the legal system that tries accused violators and the prison system that incarcerates those convicted. Assessing the size of the immigration enforcement system in the context of overall federal law enforcement thus requires making assumptions on what broad types of laws will be included (criminal and/or civil), and what components of the enforcement system (identify/arrest, court system, and/or prison system) will be included.

This evaluation considers only the criminal justice component of the federal law enforcement system, and we will include only programs that identify, arrest, and imprison violators.⁸⁰ The calculations presented in Tables B1 and B2 include the following agencies and break agency expenditures down into immigration- and non-immigration-related components using the following methodologies:⁸¹

- *Immigration and Naturalization Service (INS) of the Department of Justice (DOJ)*: Prior to the establishment of DHS in 2003, this agency housed most immigration enforcement and processing programs of the federal government. One component of the INS processed applications related to legal immigration in the pre-DHS era (including adjudications, naturalizations, and refugee/asylum applications). This component was labeled “Citizenship and Benefits” in the INS budget until 2003, when it became the USCIS agency under DHS. Although this component is not generally considered to be a law enforcement program, it could be treated as such given that it is expected to identify fraudulent applications and deny benefits to ineligible immigrants. In addition, USCIS has the authority, in certain cases, to issue charging documents for removal. To account for this ambiguity, Tables B1 and B2 present separate estimates that include and exclude Citizenship and Benefits/USCIS in law enforcement expenditures.
- *U.S. Customs and Border Protection (CBP) within DHS*: Upon the formation of DHS, CBP took over Border Patrol, the INS programs related to managing ports of entry, and air and marine operations that support immigration and border enforcement. The part of the U.S. Customs agency (then within the Department of Treasury) that handled customs inspections at the border and management of trade was also merged into CBP. Because the CBP budget does not identify expenditures on programs related to customs enforcement specifically, we add the budget of the Customs agency in the pre-DHS era to immigration-related law enforcement. For the post DHS-era, this paper treats CBP’s entire budget as immigration-related law enforcement expenditures. Therefore, we refer to immigration and customs-related law enforcement.⁸²
- *U.S. Immigration and Customs Enforcement (ICE) in DHS*: Upon the formation of DHS, ICE took over programs related to immigration enforcement in the interior at the INS and the U.S. Customs Office of Investigations. We exclude expenditures of the Federal Protective Service, which was a component of ICE from 2003 to 2009 when it was transferred to another part of DHS that is responsible for protecting federal facilities.
- *U.S. Marshals Service of DOJ*: The U.S. Marshals apprehend fugitives and transport federal prisoners. Part of the service’s activities is related to immigration enforcement. From 1994 to 2010, we use the share of suspects arrested for immigration offenses by U.S.

Marshals in total suspects arrested as a proxy for the share of U.S. Marshals expenditures on immigration enforcement. This implicitly assumes that the average cost of arresting a suspect related to immigration offenses equals the average cost for those arrested for other offenses. The immigration-related share rose from 11 percent in 1994 to 46 percent in 2010. No data is available prior to 1994 or after 2010, and we assume that the share equaled 11 percent from 1975 to 1993 and 46 percent from 2011 to 2013.

- *U.S. Bureau of Prisons of DOJ*: The Bureau of Prisons imprisons all who are convicted of a federal crime and sentenced to prison. Part of its activities are related to immigration enforcement. From 1985 to 2010, the share of prisoners at the end of the fiscal year who have been convicted on an immigration-related offense serves as a proxy for the share of the Bureau of Prison's expenditures related to immigration enforcement. This implicitly assumes that the average cost of imprisoning a suspect convicted of an immigration offense equals the average cost for those held for other offenses. The immigration-related share was quite stable, around 3 percent from 1985 to 1995, rose rapidly to 11 percent by 2000, and then rose slightly more to 12 percent by 2010. No data is available prior to 1985 or after 2010, so the analysis assumes that the share equaled 3 percent from 1975 to 1985 and 12 percent from 2011 to 2013.
- *Federal Bureau of Investigations (FBI) of DOJ*: The FBI is charged with investigation of a broad range of federal crimes. The FBI may investigate crimes related to immigration or customs violations on its own or through participation in joint task forces with ICE or other agencies. This analysis assumes that this is a negligible fraction of expenditures and that all FBI expenditures are related to non-immigration/customs enforcement.
- *Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) of DOJ*: The ATF is charged with investigating

and preventing crimes involving the unlawful use, manufacture, and possession of firearms and explosives, arson and bombings, and illegal movement of alcohol and tobacco. The ATF also regulates the sale, possession, and transportation of firearms, ammunition, and explosives in interstate commerce. The ATF may investigate crimes related to immigration or customs violations on its own or through participation in joint task forces with ICE or other agencies. This analysis assumes that this is a negligible fraction of expenditures and that all ATF expenditures are related to non-immigration/customs enforcement.

- *U.S. Secret Service (USSS)*: The USSS was under the U.S. Treasury Department until 2003 and then merged into DHS upon its formation. It is charged with investigating financial crimes and protection of certain current and former American and foreign political leaders. This analysis treats all expenditures by the USSS as non-immigration federal law enforcement.
- *U.S. Coast Guard (USCG)*: The USCG was under the Department of Transportation and then merged into DHS upon its formation in 2003. USCG interdicts migrants attempting illegal entry through the maritime domain. Unlike the other federal agencies whose expenditures are included in this analysis, USCG uses a cost-accounting system that permits it to allocate its expenditures to specific activities and missions. The law enforcement activities for which USCG provides budgetary expenditures include "living marine resources" (protection of U.S. fisheries), drug interdiction, migrant interdiction, and "other law enforcement activities." * Data are available on Internet-accessible sources for total USCG expenditures from 1975 to 2013, and on expenditures broken down by mission for 1989,

* The analysis does not include "Port Waterways and Coastal Security" as a law enforcement mission because USCG does not designate it as such. However, it might be appropriate to treat at least a portion of this mission as law enforcement (if not all of it) for the purposes of this analysis.

1996, and 2004 to 2011. Data are also available on drug interdiction expenditures specifically for 1989 to 1998. We estimate expenditures on all law enforcement missions and migrant interdiction through simple analysis of the shares of these categories in total USCG expenditures in available years.**

- *US-VISIT component of DHS:* US-VISIT was established in DHS to collect biometric data on foreign visitors to the United States. This analysis treats its expenditures as a component of immigration-related law enforcement. In 2013, as part of a congressional appropriations act, US-VISIT was reorganized, and components of it were subsumed within CBP, ICE, and the National Protection and Programs Directorate.

As noted, any quantification of the allocation of federal law enforcement resources across type of offense will inherently be only an approximation to the true allocation. This breakdown of federal law enforcement expenditures aggregates expenditures on customs enforcement with

expenditures on immigration enforcement, as it is not possible to split these two apart in the post-DHS era with available data.

Table B1 in the main text shows BPC estimates of immigration/customs-related law enforcement expenditures and other federal law enforcement expenditures in real dollars between 1975 and 2013. Using real dollars controls for price inflation and is the appropriate measure of agency use of real resources. All budgetary data used are enacted budgetary appropriations. Data for enacted appropriations from 1975 to 2000 were obtained from the Justice Department's archives.⁸³ Data for 2001 to 2013 are from DHS and DOJ annual budget tables.⁸⁴ Real 2013 dollar figures are calculated by deflating nominal dollar figures with the price deflator for federal nondefense consumption and gross investment expenditures. This government price deflator was obtained from the Bureau of Economic Analysis's interactive database of U.S. national income statistics.

** In 1989 and 1996, the share of all law enforcement missions in total USCG expenditures was 39 percent and 33 percent respectively, and the share of migrant interdiction was 6 percent and 8 percent respectively. The 1989 share was unusually high due to a major emphasis on drug interdiction in the late 1980s and early 1990s: the share of drug interdiction fell from 23 percent to 9 percent from 1989 to 1993, and then held close to a stable share of 8 percent from 1994 to 1998. For 1975 to 1988, the calculations assume that the share of all law enforcement missions was 33 percent and that the share of migrant interdiction was 7 percent. For 1990 to 1995, the analysis assumes that the share of all law enforcement missions fell linearly from 39 percent to 33 percent and that the share of migrant interdiction was 7 percent. For 1997 to 2003, the share of all law enforcement missions is assumed to be 33 percent (the share in 1996 was 33 percent, and the average share from 2004 to 2011 was 30 percent), and the share of migrant interdiction was 7 percent (the share in 1996 was 7 percent, and the average share in 2004 to 2011 was 7 percent.) For 2012 to 2013, the analysis assumes that the share of specific missions in total USCG expenditures in 2011 continued to hold.

Immigration Task Force



Undocumented immigrants being repatriated.

Appendix B. The Repeat-Trials Model of Illegal Entry

In order to understand the existing methodologies for estimating inflows of border-crossers, it is important to describe the process of making an unauthorized crossing. An individual makes an initial trip from their home to the border region. Many border-crossers hire a smuggler, either before they begin their trip or after they arrive in the border region. After arriving at the border, they carry out an initial trial, which is an attempt to enter illegally. A crosser faces a chance of being caught by border enforcement authorities, which is termed the probability of apprehension. If the first trial is successful, no apprehension is made. If the first trial is not successful, an apprehension is recorded and the person is potentially subjected to consequences for being caught, such as detention, criminal prosecution, and removal. These people then choose whether or not to make another trial. If they do not try again and leave the border region, then they are considered to have been “deterred at the border.” If they make another trial, they again attempt entry, face a probability of apprehension, and if apprehended and returned, may give up after this second attempt. If a person is never deterred at the border, then this model assumes this process of repeated trials will continue until the person has successfully entered.

This process is known as the repeat-trials model, and it has been the core approach to modeling the process of illegal entry into the United States across land borders.⁸⁵ In its simplest form, this model assumes that a migrant comes to the U.S. border, attempts illegal entry, is either not caught and successfully enters, or is caught and immediately returned to the Mexican side of the border with no consequences, and that all apprehended individuals continue trying to enter until they are successful, so that there is no at-the-border deterrence. Then for a group of migrants who attempt illegal entry and face the same probability of apprehension, it is straightforward to determine the number of apprehensions that will be made of group members. Denote the number of people in the group by F , and the probability of apprehension that each

group member faces by A . Then the number of group members that are apprehended a first time equals $A \cdot F$, the number that are apprehended a second time equals $A \cdot A \cdot F = A^2 F$, the number apprehended a third time equals $A^3 F$, and so on. The total number of apprehensions T is:

$$(1) T = AF + A^2F + A^3F + \dots$$

or

$$(2) T = (A + A^2 + A^3 + \dots) \cdot F$$

or

$$(3) T = \{A/(1-A)\} \cdot F$$

The number of recidivist apprehensions T_v is the sum of all apprehensions after the first one:

$$(4) T_v = A^2F + A^3F + \dots$$

which equals:

$$(5) T_v = \{A/(1-A)\} \cdot A^2F$$

The recidivist ratio, which is the ratio of recidivist apprehensions to total apprehensions, thus equals:

$$(6) T_v/T = [\{A/(1-A)\} \cdot A^2F] / [\{A/(1-A)\} \cdot F]$$

or

$$(7) T_v/T = A$$

Thus, the probability of apprehension is equal to the number of recidivist apprehensions to total apprehensions. This is a remarkable result that permits estimating the probability of apprehension using only data on the number of apprehensions. As long as there is a method of identifying recidivist apprehensions, this ratio can be calculated. The importance of this result is that previous estimates of the probability of apprehension required an estimation of the

total number of individuals who had attempted crossing, which has been challenging to do accurately.

Thomas Espenshade was the first to apply this approach using data from 1977 to 1988. Because fingerprints were not taken by Border Patrol until 2000, the data that Espenshade used was based on apprehension records that included information on whether the person was recognized by agents as having been caught previously: the data that he used was based on Border Patrol agents recognizing the individuals as “repeaters” who had recently been caught in the same area.⁸⁶ Starting in 2000, Border Patrol has taken the fingerprints of everyone who is apprehended, and this biometric information is currently used to identify recidivist apprehensions. Chang (2006) uses this apprehension data to estimate the probability of apprehension. (This study has not yet been made available to the public by DHS.)

Fundamental Limitations of the Recidivist Ratio and the Recidivism Rate

One limitation in the previous analysis is that it does not account for those who are deterred at the border from crossing after a first attempt. If an individual is apprehended, they might decide to cease attempting to cross the border illegally between ports of entry. However, it is possible to account for this impact. The rate at which those attempting illegal entry give up after being apprehended on any particular attempt can be called the rate of at-the-border deterrence. Let this rate be denoted by D . In the previous section, D was assumed equal to zero. If this rate does not equal zero, then it is straightforward to show that the recidivist ratio equals:

$$(8) T_v/T = A \cdot \{1-D\}$$

Equation 8 reveals a fundamental limitation of the recidivist ratio and how changes in it can be interpreted. Both A and D are presumably influenced by the intensity of

border enforcement. We abstractly characterize the level of enforcement activity with the variable e . Then A and D are functions of e such that they increase with e : $A(e)$ and $D(e)$, with dA/de and $dD/de > 0$. (A and D are also bounded by 0 and 1, given that they are probabilities.) We can therefore write Equation 8 as:

$$(9) T_v/T = A(e) \cdot \{1-D(e)\}$$

As enforcement e rises, it should cause A and D to rise. However, $\{1-D(e)\}$ will fall, and change in the ratio T_v/T will clearly understate the true impact of increased enforcement. In fact, it is possible that $D(e)$ rises so much that T_v/T does not change. If such change in D is not taken into account and controlled for, the recidivist ratio could potentially show no change in $A(e)$ even though enforcement has been successful in increasing both A and D .

It is straightforward to show that the recidivism rate that is now reported by DHS as a performance measure also equals the product in Equation 9. The number of people who are caught at least once equals AF . The number of people who are caught more than once equals $\{1-D\}A^2F$. The ratio of those caught more than once to those caught at least once equals $A \cdot \{1-D\}$.

Equation 9 reveals why DHS's use of either the recidivist ratio or the recidivism rate as a performance measure that is intended to capture an increase in the rate of at-the-border deterrence D is problematic. A fall in either is interpreted as reflecting a rise in D and thus a fall in $1-D$. However, this assumes that the probability of apprehension A is not changing.

It is useful to express Equation 9 in terms of a relationship between percentage changes and elasticity. It is straightforward to show mathematically that:

$$(10) R_E = A_E - \{D/(1-D)\} \cdot D_E$$

where R_E , A_E , and D_E are the elasticity of R (the recidivist

ratio), A and D respectively with respect to enforcement intensity: if enforcement increases by 1 percent, then R_E , A_E , and D_E give the resulting percentage increase in R , A , and D respectively.

Equation 10 shows that if D is close to zero, so that the degree to which discouragement at the border takes place is quite low, then change in the recidivist ratio T_V/T will mostly reflect change in the probability of apprehension A . This will be true even if the elasticity D_E is significant, because $(D/(1-D))$ will be close to zero. However, the higher D is, the more sensitive the recidivist ratio becomes to change in D due to change in enforcement, and the recidivist ratio reflects change in the probability of apprehension.⁸⁷ All else equal, as enforcement intensity increases to a point where D begins to rise significantly, the recidivist measure R becomes less and less useful as a proxy for A , or for evaluating the impacts of enforcement.

The issue of whether D matters is ultimately empirical and depends on the level of D and the shape of the $D(e)$ function. If D is close to zero, then Equation 9 shows that the recidivist ratio gives a very good approximation of the true probability of apprehension. The higher D is, the poorer this approximation becomes. If D is low over a broad range of enforcement intensity levels and only starts to rise significantly at very high levels of enforcement, then the recidivist ratio will be a good approximation over that broad range of enforcement levels. Academic analysts first began trying to estimate A and D on the basis of survey data in the early 1990s, and these analysts have generally regarded that the value of D is low (10 percent or less). A key question is whether D has risen significantly since the mid-2000s.

Resolving the Fundamental Limitation

At a deeper level, the basic problem is that there are two equations yet three unknown variables. The underlying equations that are used to derive the relationship expressed in Equation 8 are:

$$(11) T = [1/(1-A(1-D))] * AF$$

and

$$(12) T_V = [(1/(1-A(1-D)))-1] * AF$$

where F is the total number of individual illegal crossers attempting to enter. The three unknown variables are A , D , and F . It is not possible to estimate values of three unknown variables using only two equations. Additional information is required to permit estimation of these unknowns.

One possibility is to obtain estimates of D that come from migrant surveys. Another possibility would be getting information on the total number of crossing attempts made. If we assume that we had a sensor network that perfectly counted the total number of attempted crossings made by distinct individuals, then the three unknowns could be determined. Say that the sensor network recorded a unique “hit” for every successful and unsuccessful crossing attempt for the population F . These attempts include all initial attempts, including those who get across successfully and those who experience their first apprehension, and all subsequent recidivist attempts, both successful and unsuccessful. Then it is straightforward to show mathematically that the total number of sensor hits S equals:

$$(13) S = [1/(1-A(1-D))] * F$$

Equations 11 and 13 can be combined to yield the value of the probability of apprehension A :

$$(14) T/S = A$$

The flow size F and probability D can then be derived using the equations and the estimated value of A . The sensor system that produces an S value that perfectly reflects the actual number of crossing attempts can be termed an ideal sensor system. Such an ideal would be difficult to realize in practice, so that recorded values of S would be subject to uncertainty.



Immigration Task Force



Remote surveillance camera tower. Photo courtesy of U.S. Customs and Border Protection.

Appendix C. An Integrated Model of Immigration Enforcement and Deterrence

The Net Benefits of Illegal Migration and Border Enforcement

The repeat-trials model was developed to establish a framework in which data on apprehensions can be used to estimate the probability of apprehension. It has not been incorporated into a broader model of migrant decision-making that is based on comparison of the costs and benefits of illegal migration. However, it is straightforward to develop a cost-benefit analysis that incorporates the repeat-trial nature of the border-crossing process.

Denoting a potential migrant who is making the decision whether or not to illegally migrate to the United States with the superscript i , the following variables are defined as:

A^i is the probability of apprehension that individual i perceives that they face on attempted illegal entry into the United States;

B^i is the monetized value of the expected benefits of achieving successful entry for individual i . This could include the net increase in labor income resulting from migration (the difference in wage earned in the United States versus Mexico), the monetized value of access to improved public goods (e.g., education, safety, health care), and/or any other benefit resulting from migration to the United States⁸⁸;

P^i is the fee that must be paid to a smuggler if the migrant hires a smuggler;

C^i is the monetized value of other costs associated with making one trip, such as physical hardship and risk of criminal victimization, the opportunity cost of the time spent making the journey, and any other relevant cost;

Q^i is the monetized value of the cost of consequences after being caught on an attempt.

For each attempt, expected benefits are $(1-A^i)*B^i$. Expected costs depend on the nature of the smuggling fee that is paid. If the smuggler receives a fee for each attempt made, expected costs per attempt are $P^i+C^i+A^i*Q^i$, and expected net benefits per attempt are $(1-A^i)*B^i-P^i-C^i-A^i*Q^i$. If, however, the smuggler receives a fee and is required to achieve successful entry for that fee regardless of how many attempts must be made, then the fee becomes the equivalent of a fixed cost for a complete trip.

Smuggling Fee Per Attempt

We consider first the case in which a smuggling fee must be paid for each attempt. In the first instance, we assume that at-the-border deterrence equals zero, so that if a person is caught, they are subjected to consequences, returned to their home country, and they then try to enter illegally again. (At-the-border deterrence will be further considered below.)

If the migrant keeps attempting to cross until achieving a successful entry, and dropping the migrant identifier i for simplicity, then total expected net benefits are:

$$(1) \{(1-A)B-P-C-AQ\} + [A\{(1-A)B-P-C-AQ\}] + [A^2\{(1-A)B-P-C-AQ\}] + [A^3\{(1-A)B-P-C-AQ\}] + \dots$$

The first term of this equation says that someone attempting an initial unauthorized entry pays $P+C$ with certainty, is caught with probability A , and experiences expected consequences AQ , and is not caught with probability $(1-A)$ and experiences expected benefits $(1-A)B$. The second term of Equation 1 says that if the person is caught on the first attempt, they try a second time, again pay $P+C$, and again are caught with probability A and experience consequences AQ or are not caught with probability $(1-A)$ and experience benefits $(1-A)B$. The third term says that if they are caught on the second attempt, they try a third time, and so on.

Equation 15 can be re-written as:

$$(2) \{(1-A)B+A*(1-A)B+A^2(1-A)B+A^3(1-A)B+\dots\} - \{(P+C)+A(P+C)+A^2(P+C)+A^3(P+C)+\dots\} - \{AQ+A^2Q+A^3Q+\dots\}$$

or:

$$(3) \{1+A+A^2+A^3+\dots\}(1-A)B - \{1+A+A^2+A^3+\dots\}(P+C) - \{1+A+A^2+A^3+\dots\}AQ$$

Using the fact that $1+A+A^2+A^3+\dots$ equals $1/(1-A)$, and reintroducing the migrant identifier i , this can be simplified to:

$$(4) \{1/(1-A^i)\} * \{(1-A^i)B^i - P^i - C^i - A^iQ^i\}$$

or:

$$(5) B^i - \{1/(1-A^i)\} * (P^iC^i + A^iQ^i)$$

or:

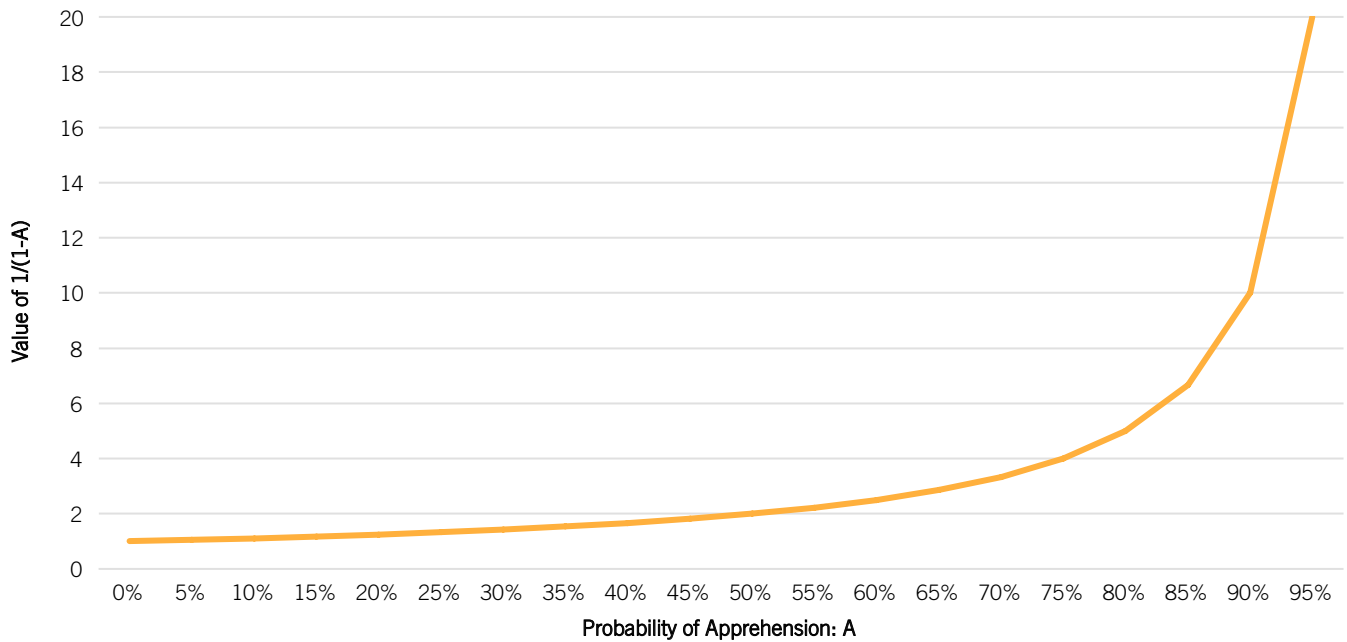
$$(6) B^i - T^i * (P^iC^i + A^iQ^i)$$

where T^i equals $1/(1-A^i)$.

Equation 6 is of fundamental importance. T^i is the number of trips that migrant i expects to have to make in order to successfully enter given a particular level of the probability of apprehension.⁸⁹ The expected number of trips rises in a highly non-linear fashion with the probability of apprehension. A direct implication of this is that the net

benefits of illegal migration fall with the probability of apprehension in a highly non-linear fashion. Figure 1 below shows how the expected number of trips changes with the probability of apprehension. When there is no chance of being caught, so that the border is for all material purposes completely open to illegal entry, A equals 0, and T equals 1, so that the migrant expects to pay $P+C+AQ$, or $P+C$ (because A equals 0). As the chance of being caught rises but is still at relatively low values, the expected number of trips T rises above 1, but very slowly. When the chance of being caught is 50 percent, the expected number of trips equals 2, so that the migrant expects to pay $2(P+C)+Q$: the migrant expects to be caught once, incur consequence Q once, and pay the per-trip fee $P+C$ twice. However, as A rises above 50 percent, the more rapidly the expected number of trips rises with it. When A is 80 percent, the migrant expects to have to make 5 trips, be caught 4 times, and incur the cost $5(P+C)+4Q$. When A rises to 90 percent, the expected number of trips doubles to 10, and expected costs rise to $10(P+C)+9Q$. When A rises to 95 percent, the expected number of trips doubles again to 20. At such high probabilities of apprehension, unless the consequences of being apprehended are close to zero, the border is effectively “sealed,” as the expected cost of attempting entry is so high that very few will undertake it.⁹⁰

Figure 1. The Nonlinear Relationship Between the Probability of Apprehension A and the Expected Number of Trips



Smuggling Fee Per Trip

In the case where a smuggler is paid to achieve a successful entry regardless of the number of attempts, the smuggling fee becomes a fixed cost, and Equation 1 becomes:

$$(7) \{(1-A)B-C-AQ\} + [A^* \{(1-A)B-C-AQ\}] + [A^{2*} \{(1-A)B-C-AQ\}] + [A^{3*} \{(1-A)B-C-AQ\}] + \dots - P$$

and Equation 6 becomes:

$$(8) B^i - T^*(C^i + A^i Q^i) - P^i$$

This may seem to diminish the role that the smuggling fee plays in reducing the net benefits of illegal migration.

However, this is not the case. Denote the per-attempt smuggling fee as P^{PA} , and the per-trip smuggling fee as P^{PT} . In a competitive smuggling industry with risk-neutral smugglers, the following outcome will hold in market equilibrium:

$$(9) P^{PT} = T^* P^{PA}$$

so that the per-trip smuggling fee rises directly with the number of expected trips N_T .

Equation 6 and Figure 1 have a number of important implications for understanding historical developments related to border enforcement and its outcomes.

Enforcement and Outcomes: Mexican Nationals. Prior to the late 2000s, Q was effectively equal to zero for almost all Mexican nationals who were caught, and the available evidence suggests that the probability of apprehension was typically around 30 percent. Given the large increase in wage that the typical Mexican economic migrant could expect to get through migrating to the United States, the benefits of illegal migration B significantly exceeded the cost of illegal migration, T^*C . The border intensification efforts of the 1990s did apparently increase C , as the monetary and non-monetary costs associated with attempting illegal entry rose significantly in this decade.⁹¹ However, there is no evidence that the probability of apprehension rose. Given the size of the gap between benefits and costs and the continued low level of A , the rise in C was not likely to create significantly higher deterrence. In the late 2000s, another significant enforcement buildup took place, and available evidence suggests that it has led to more significant impacts than the buildup of the 1990s. First, available evidence suggests that the probability of apprehension rose significantly and may now significantly exceed 50 percent. Second, positive consequences began to be imposed on those caught, so that the level of Q rose, and the number of those apprehended who are subjected to consequences also rose. Both of these developments have caused a significant rise in the expected cost of illegal entry $T^*(C+AQ)$, which has resulted in a fall in net benefits and the creation of significant behind-the-border deterrence.⁹²

Enforcement and Outcomes: Non-Mexican Nationals. Prior to 2006, the enforcement regime was even more generous to non-Mexican nationals. In addition to Q being effectively equal to zero, non-Mexican nationals who were caught were subjected to the policy of catch-and-release: they were given a date to appear at a U.S. immigration court and released into the interior of the United States. Few of those released subsequently appeared at their court hearings, and few of those who did appear and who were ordered to

leave the United States ever left or were removed. In the context of the repeat-trials model, this meant that for non-Mexican nationals who were caught, there was no repeat trial: being caught once ensured successful entry into the United States, so that the expected cost of illegal migration was C .⁹³ Apprehension data suggests that in 2004, a surge in the flow of non-Mexican nationals across the southern border began. The reasons why this surge began when it did have never been adequately explained. However, the surge did prompt DHS in 2006 to authorize expedited removal for non-Mexican nationals: those who were caught were held at detention centers and flown back to their home countries relatively quickly.⁹⁴ In the context of Equation 20, this policy change is reflected in a change in the expected cost of illegal migration from C to $T^*(C+AQ)$, where Q is the monetized value of cost associated with being held in a detention center and flown back home. If A equaled roughly one-third (33 percent) for these migrants, then T equaled roughly 1.5. Given that smuggling fees are significantly higher for non-Mexican nationals than Mexican nationals and typically equal \$5,000 to \$8,000, and that other components of C are also arguably higher for non-Mexican nationals, an increase in expected costs of 50 percent represented a significant increase.⁹⁵ Subsequent to the end of catch-and-release, by 2007, the flow of non-Mexican nationals, as suggested by the number of apprehensions, fell back to a level only slightly higher than pre-surge levels.

At-the-Border Deterrence

At first glance, it might seem obvious that if the probability of apprehension A and/or level of consequences Q rise, then the level of at-the-border deterrence increases. If A rises, then it becomes harder to enter, and a person is more likely to give up after being caught one or more times. If the consequences of being caught are significant, then a person is less likely to want to run the risk of experiencing them again after being caught.

However, the existence of at-the-border deterrence relies on migrants having inadequate information and/or being irrational in their behavior. If migrants have a good idea of what A is, then they understand how many expected number of attempts will be required to achieve successful entry. It is not even necessary for migrants to know what A is and be able to think through the repeat-trials model. All that is necessary is that migrants have heard about the experiences that other crossers have had when they have attempted illegal entry. They will hear about experiences that will be consistent with the current value of A : if A is low, they will hear that most crossers had to try only once to succeed, and if A is high, they will hear that many crossers had to try multiple times to succeed. The same is true for consequences Q : migrants will have knowledge about the consequences that are being imposed by hearing about the experiences of others who have been subjected to them. If a rational and reasonably well-informed migrant decides to come to the border and attempt illegal entry, they will thus understand what the expected number of trips required to achieve illegal entry T and associated expected cost $T^*(P+C+AQ)$ are. This means that if A and Q are high, and migrants know this, those who decide to attempt crossing will not give up if the frequency with which they are caught and the consequences that they are subjected to is consistent with their understanding of A and Q . It is only those migrants who had unrealistic expectations concerning A and/or Q who will give up after being caught.

Unless migrants are poorly informed or somehow systematically irrational, the key margin for producing deterrence of illegal migration is thus behind-the-border deterrence, not at-the-border deterrence. Informed migrants will come to the border knowing what the expected number of trips is and will be prepared to pay the costs associated with the expected number of trips. For example, this was the argument made by the Obama administration during the surge in Central American children and families

during the summer of 2014. The administration argued for detention, rapid processing, and removal for those not eligible for some form of admission or relief from removal in order to “send a message” to those who would come later. The administration also took out radio and newspaper advertising in those countries to improve the understanding about the potential migrants of the expected consequences of apprehension. These efforts were aimed at increasing behind-the-border deterrence.

It is important to note that consequence programs that incarcerate those who are caught do by definition produce at-the-border deterrence for these migrants during their period of incarceration, because these migrants are physically unable to attempt entry again.⁹⁶ It is also important to note that at-the-border deterrence can be produced by unexpected events happening during the crossing, such as personal injury that prevents future entry attempts. Intensified enforcement may lead to a higher rate of such unexpected events happening.

The available evidence on the impact of consequence programs evaluate recidivism rates for those who are put through a consequence program, which is the rate at which they are subsequently caught again. The base recidivism rate is for those who are put through “voluntary return” and thus not subjected to a consequence. If the recidivism rate for those put through a consequence program is lower than this base rate, it suggests that the program is having a deterrence impact, as fewer decide to attempt entry again. Recidivism rates for consequence programs employed on the southern border that are calculated by DHS are presented for 2010 and 2011 in Rosenblum (2013), and program rates are generally below the base rate, with the difference being larger for programs that impose more severe consequences. No information is provided on how these rates are calculated, and external researchers have not been provided access to the individual apprehension records that are used to construct these rates. The

methodology used to calculate these rates does need to be verified. Using recidivism rates to evaluate the impact of consequence programs may suffer from another problem—one that might be difficult to control for empirically: the probability of apprehension may change after a person is caught and subjected to a consequence, as they may invest more money and effort into not being caught on a subsequent attempt.

Net Expected Benefits, Overall Illegal Inflow, and Deterrence

The net expected benefits of migrating illegally to the United States are evaluated at the individual or family level. A given individual in a source country will perceive values for the variables that determine net expected benefits as given by Equation 6:

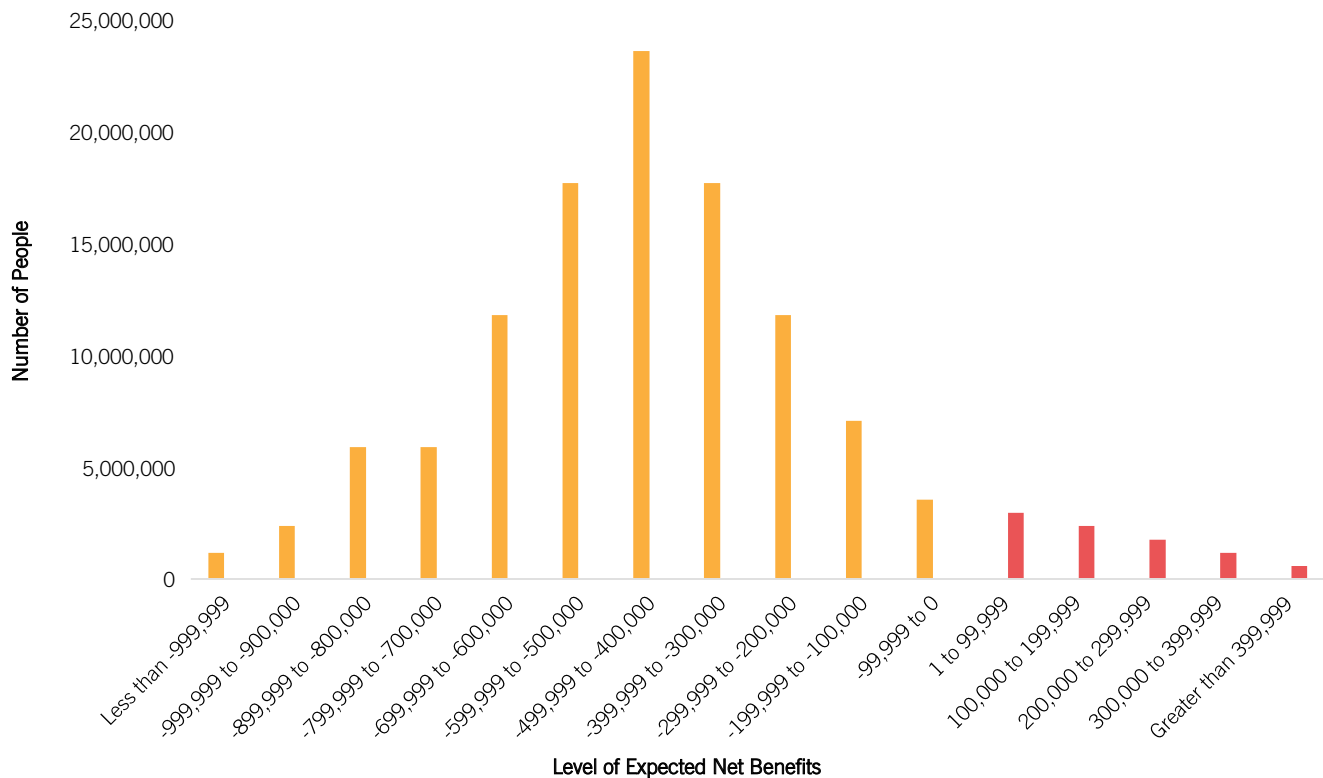
$$(10) B^i = T^*(P^i + C^i + A^iQ^i)$$

For a given source-country population, each individual will have a value of perceived net benefits associated with migrating illegally. For the population as a whole, there will be a distribution of the population across levels of expected net benefits. A hypothetical example of such a distribution is illustrated in Figure 2. A natural assumption to make is that a person will migrate illegally if expected net benefits exceed zero. The individuals in this population who will migrate illegally are those in the red bars, and the total number of illegal inflow from this source country is the sum of these individuals.

Enforcement creates deterrence by causing the perceived values of A^i , P^i , and/or Q^i to rise. This causes the distribution in Figure 2 to shift to the left, and a group of people perceive expected net benefits to go from positive to negative. This group would have migrated before the change but does not after the change, and gross inflow falls. Changes in economic factors in the source and destination country will also affect perceived benefits B and cause the distribution to shift.

In the case of Mexico, after the mid-2000s, the net-benefit distribution across the Mexican population shifted to the left due to the U.S. recession and improvements in the Mexican economy, which reduced values of perceived benefits B^i , and also to the border enforcement buildup, which increased values of $T^*(P^i + C^i + A^iQ^i)$. Identifying the individual contributions of these changes to the fall in illegal immigration from Mexico to the United States requires extensive data availability and the use of sophisticated statistical techniques. Borger et al. (2012) have carried out preliminary research that accomplishes this. Their research potentially forms the basis for comprehensive analysis of why the unauthorized flow from Mexico has changed historically. This research also estimates key parameters that can be used for projecting future unauthorized flows from Mexico given projected developments in the U.S. and Mexican economy, enforcement activities, and legal immigration policies. Theoretically, the same parameters would apply for other immigration source countries, such as those in Central America; however, the availability of data, given the relatively recent phenomenon of mass migration from those countries to the United States, will be a limitation.

Figure 2. Hypothetical Distribution of Source-Country Population Across Levels of Expected Net Benefits of Illegal Migration



The demographic and socioeconomic characteristics of Mexican nationals who perceive positive net benefits of migrating illegally to the United States will differ systematically from those who do not perceive positive net benefits. The ENOE Mexican household survey in conjunction with data from migrant surveys can be used to determine illegal migration rates from distinct Mexican demographic groups. Denoting the migration rate for group j in time period t as $R_{j,t}$ and the total population size of group j as $N_{j,t}$, total illegal flow from group j is:

$$(10) F_{j,t} = R_{j,t} * N_{j,t}$$

To project total illegal flow from a particular group, a projected illegal migration rate can be multiplied by a projection of the group's population size. To estimate the latter, projections of the population size of key demographic groups can be obtained from the United Nations, which prepares projections through 2100 and breaks projected population down by age and gender. This will likely need to be broken down further into urban and rural groups.⁹⁷

The migration rate for a particular group will be a function of economic conditions, enforcement activities, and other

relevant activities. The analysis of expected net benefits suggests that enforcement will impact it through the apprehension rate A , consequences Q , smuggling fee P , and other costs C :

$$(11) R^{j,t} = R^{j,t}(E_s^{j,t}, E_d^{j,t}, A^{j,t}, P^{j,t}, Q^{j,t}, C^{j,t}, Z^{j,t})$$

where $E_s^{j,t}$ are economic variables in the source country (e.g., Mexico) of relevance to group j , $E_d^{j,t}$ are economic variables in the destination country (the United States) of relevance to group j , $A^{j,t}$ is the apprehension rate typically faced by group j , $Q^{j,t}$ is the level of consequences typically faced by group j , $P^{j,t}$ is the typical smuggling fee paid by group j , $C^{j,t}$ is the typical level of other costs incurred by group j , and $Z^{j,t}$ are other variables influencing the costs and benefits of illegal migration rate for group j that can be empirically measured.

A complete structural model of illegal migration will be more complex than Equation 11.⁹⁸ A structural model should incorporate a model of the smuggling market: the smuggling fee P is determined as an equilibrium outcome in the market for smuggling services, and a model of this market will describe both supply and demand behavior in that market. Gathmann (2008) develops such a model of the market for smuggling services. The entry route that migrants in group j typically use will influence other costs C . The levels of A and Q will influence both P and C .

Rather than develop and estimate a complete structural model, Borger et al. (2012) estimate a version of Equation 11:

$$(12) D^{i,t} = D(E_s^{i,t}, E_d^{i,t}, G^{i,t}, I^{i,t}, Z^{i,t})$$

where $D^{i,t}$ is an indicator of whether individual i migrates from Mexico at time t , at the level of the individual, $G^{i,t}$ is a variable indicating the intensity of border enforcement that the individual is likely to encounter on their trip, and $I^{i,t}$ is an index indicating how likely an individual who has decided to emigrate is doing so illegally. Their approach can be modified to analyze illegal emigration rates across demographic groups, or, alternatively, their results at the level of the individual can be converted into a group rate R . Borger et al. also determine the border enforcement intensity index G as a function of the hours of border patrol agent activity only.⁹⁹ However, it is straightforward to include other inputs into enforcement detection and interdiction efforts into the analysis of the impact of enforcement on the decision to migrate in the context of Equation 12.

Bringing Other Factors into the Framework

The decision to migrate is a function of other variables, including, for example, enforcement programs in the interior of the United States, risks associated with criminal activity during the cross-border trip, and the ease of migrating legally. Any factor potentially influencing the decision to migrate can be brought into this analytical framework if empirical data on it is available. Ideally, the factor should vary in how it affects different migrant groups or individual migrants, as this variation can most effectively reveal the impact of the factor on potential migrant decisions.

Immigration Task Force



Border Patrol agents detain immigrants in Arizona.

Endnotes

1. Warren, Robert, and John Robert Warren (2013). "Unauthorized Immigration to the United States: Annual Estimates and Components of Change, by State, 1990 to 2010," *International Migration Review* 47(2): 296-329.
2. This is DHS's officially adopted goal 3.1 for mission 3, which is to enforce and administer U.S. immigration laws. See Department of Homeland Security, *The 2014 Quadrennial Homeland Security Review*, p.77. Available at: <http://www.dhs.gov/sites/default/files/publications/qhsr/2014-QHSR.pdf>.
3. For example, CBP inspects all import shipments of goods into the United States. ICE investigates violations of U.S. trade laws and movement of contraband across U.S. borders, among other federal laws.
4. Meissner et al. (2013) comprehensively review the components of the immigration enforcement system and identify six key pillars that achieve the basic goal of preventing unlawful immigration: border enforcement, visa controls and travel screening, information and interoperability of data systems, workplace enforcement, the intersection of the criminal justice system and immigration enforcement, and detention and removal of noncitizens. See <http://www.ice.gov/287g/> for more on 287(g); and see http://www.ice.gov/secure_communities/ for Secure Communities.
5. There are many good histories of the development of the U.S. immigration system and immigration policies. See, for example, Cannato (2009) and Zolberg (2006). For a shorter review that goes into detail on immigration from Mexico, see Chapter 2 of Carriquiry and Majmundar (2012).
6. See Calavita (1992) for a detailed history of the Bracero guest-worker program.
7. For a history of IRCA and its implementation, see Bean et al. (1989).
8. The shift in crossing locations is evident in apprehensions data. The share of Border Patrol apprehensions in the San Diego sector in all apprehensions on the southwest border fell from 44 percent from 1986 to 1995 and to 15 percent from 1996 to 2005, and the share of the El Paso sector fell from 18 percent to 9 percent, whereas the share of the Tucson sector rose from 8 percent to 32 percent. The shares of the El Centro, Yuma, and Del Rio sectors also rose. (Calculated using Border Patrol apprehension data. Available at: <http://www.cbp.gov/sites/default/files/documents/U.S.%20Border%20Patrol%20Fiscal%20Year%20Apprehension%20Statistics%201960-2013.pdf>.)
9. See MPI (2013) for a detailed review of how immigration enforcement programs changed in this period.
10. Since the creation of DHS, there are not separate appropriations or budget lines for immigration enforcement and customs enforcement. However, as noted above, border enforcement efforts for non-immigration purposes can also have impacts on immigration enforcement, and DHS officials at CBP and ICE are responsible for enforcing both sets of laws simultaneously. Therefore, for the purposes of this paper, the combined budgets are used.
11. The lower value excludes expenditures on legal immigration processing, and the upper value includes them. Legal immigration processing is not classified as an area of federal law enforcement, but it does contribute to immigration enforcement. See Appendix A for further discussion.
12. Other major federal law enforcement agencies include the Federal Bureau of Investigations, Drug Enforcement Agency, U.S. Marshals Service, Bureau of Prisons, Federal Detention system, and U.S. Secret Service. See Box 1 and Appendix A for details.
13. See Table 3 in Whitley et al. (2014). As noted in endnote 2, immigration enforcement personnel may also perform non immigration enforcement functions.
14. These administrative data are now maintained in electronic databases that can be accessed by government officials and used for analysis and research. However, the databases are generally not linked together, which means integrated histories specific to individuals that summarize all contacts with immigration and border-crossing authorities cannot be constructed.
15. For example, separate reporting of the total number of inspections at ports of entry of aliens versus citizens ceased in 1986.
16. See the chapter by Edmonston, Passel, and Bean in Bean et al. (1990) for a detailed review of the history of estimates to measure the unauthorized population.
17. The project, known as the "Program for Research on Immigration Policy," was co-led by the RAND Corporation and the Urban Institute and produced publications from 1988 to 1998. Bean et al. (1990) contains these studies.
18. See GAO (1993). The report concluded that estimates of the resident unauthorized immigrant population were significantly more reliable than estimates of inflow. The report recommended that the INS coordinate with the Bureau of the Census to improve coverage of the foreign-born population of the United States in its household survey and to ask more migration-related questions in the survey, improve collection of departure (exit) information from non-immigrant visitors to the United States, regularly estimate the number of visitors who overstay their visas by long terms, and improve estimates of attempted illegal entry attempts.
19. See GAO (1997). The report concluded that DOJ lacked a formal plan to evaluate the effectiveness of their strategy to deter illegal entry across the southwest border. Although INS was building a list of indicators that could help evaluate the strategy's effectiveness, it had "no formal evaluation plan to systematically evaluate the effectiveness of the ... strategy," adding that "key aspects of a formal evaluation plan, such as what data will be collected, by whom, and how the overall effectiveness of the strategy will be evaluated" had not been identified.
20. Performance plans for DOJ that include measures for the INS are posted to the DOJ website for the years 1999 to 2003: see <http://www.justice.gov/archive/parp.html>. Plans for 1997 and 1998 were included in the congressional budget justifications for the INS and are available in hard copy at the USCIS library in Washington, DC.
21. Referred to as the "Inspections Travelers Examination (INTEX) rate."
22. Measures related to interior enforcement for the most part simply converted what had been reported as work flow in the pre-GPRA era into performance measures. Examples of measures related to interior investigations included the number of ongoing and completed investigations, number of smuggling organizations identified and prosecutions completed, and the number of defendants convicted. Measures related to detention and removal included the average number of detention beds available, and the number of detentions and removals carried out (broken down by criminal and non-criminal removals). Measures related to worksite enforcement included the number of worksite visits, the number of unauthorized workers and non-compliant employers identified, and the number of removals of unauthorized workers.
23. For example, the 1999 performance plan added crime rates in regions on the southwest border as a measure. Reducing the level of violent and property crimes in the border region is not a mission of border enforcement, yet this was adopted early on as a performance measure and continues to appear in discussions of how to assess DHS performance.
24. See <http://www.justice.gov/archive/ag/annualreports/pr2002/Section05.htm>, Section 5.1A.
25. See <http://www.justice.gov/archive/ag/annualreports/pr2002/Section05.htm>, Section 5.1B.
26. See <http://www.justice.gov/archive/ag/annualreports/pr2002/Section05.htm>, Section 5.2A.
27. See http://www.dhs.gov/xlibrary/assets/CFO_PerformanceAccountabilityReport_2005.pdf, p.169. GAO (2011) provides a detailed review of the "miles under operational control" measure.

28. The COMPLEX rates are the modern version of the INTEX rates that the INS had begun to develop in 1999 (see note 19).
29. See <http://www.ciponline.org/research/html/border-patrol-strategic-muddle>. Former DHS Secretary Janet Napolitano noted in testimony before the Senate Homeland Security Committee on May 3, 2011, that the Border Conditions Index would “comprehensively measure security along the southwestern border and the quality of life in the region.”
30. DHS also issues public reports that provide detailed statistics on alien removals. See, for example, <http://www.ice.gov/statistics>.
31. See Roberts et al. (2010): <https://www.dhs.gov/xlibrary/assets/statistics/publications/ois-smuggling-wp.pdf>.
32. See <http://www.azcentral.com/news/politics/articles/20130715border-security-poor-analysis.html> for a discussion of this study, which was authored by Dr. Joseph Chang of the Homeland Security Institute.
33. See GAO (2012).
34. The recidivism rate (the “percent of people apprehended multiple times along the Southwest Border”) became a performance measure in FY 2013; see DHS, *FY 2013-2015 Annual Performance Report*. Available at: <https://www.dhs.gov/sites/default/files/publications/MGMT/DHS-FY-2013-FY-2015-APR.pdf>. The effectiveness rate (“rate of interdiction effectiveness along the southwest border between ports of entry”) became a performance measure in FY 2014; see DHS, *FY 2014 Agency Financial Report*. Available at: https://www.dhs.gov/sites/default/files/publications/OFCO/dhs_agency_financial_report_fy2014.pdf. For FY 2014, DHS also retired the number of southwest border apprehensions as a performance measure.
35. These measures include the mismatch error rate of the E-Verify program; the percent of H1-B and religious worker site visits that result in a potential finding of fraud; the number of employers audited, sanctioned, or arrested for violating immigration-related employment laws; the number of convicted criminal aliens removed per year; and the average length of stay in detention of all convicted criminal aliens prior to removal from the United States (see DHS, *FY 2013 Annual Performance Report*, *supra* note 33.)
36. Total federal spending on goods and services (consumption expenditures and gross investment) equaled \$1,232 billion in 2013 (Bureau of Economic Analysis). See Table 3.9.5 available at the Bureau of Economic Analysis’s website: http://www.bea.gov/table/index_nipa.cfm.
37. An increase in Border Patrol apprehensions could indicate that more unauthorized immigrants are attempting to come to the United States, but it could also indicate that Border Patrol has gotten better at catching them. Similarly, a decrease in apprehensions could mean that border security is successfully deterring unauthorized immigration, but it could also mean that unauthorized immigrants have gotten better at evading Border Patrol. By contrast, the total number of illegal entries directly measures the goal in question.
38. See Goal 2.1 on p.77 of <http://www.dhs.gov/quadrennial-homeland-security-review-qhsr>.
39. In addition to performance measures that align to agency missions and goals, congressional legislation has also established specific requirements on reporting with respect to illegal immigration. In 1989, Congress enacted into law the requirement that a report be prepared every three years that includes a “reasonable estimate of the number of aliens who entered the United States during the (preceding three-year) period without visas or who became deportable during the period.” (See <http://www.law.cornell.edu/uscode/text/8/1364>.) In 1998, Congress enacted into law the requirement that a report be submitted annually that provides estimates of the number of non-immigrant aliens who overstayed their visa by country and visa type (see <http://www.law.cornell.edu/uscode/text/8/1376>).
40. National immigration-related poll results for the period from 2001 to the present are comprehensively summarized at <http://www.pollingreport.com/immigration.htm>. A June 2013 United Technologies/National Journal Congressional Connection poll found that 7 percent believe that U.S. borders are “highly secure,” 41 percent “somewhat secure,” 28 percent “not too secure,” and 22 percent “not at all secure.” A May 2013 NBC News/Wall Street Journal poll found that 1 percent of the public believe that the U.S. border with Mexico is “highly secure,” 17 percent “mostly secure,” 38 percent “mostly not secure,” and 25 percent “totally not secure.” Fox News polls conducted in August 2006, May 2010, and April 2013 found that 77 percent, 76 percent, and 60 percent of the public believed that the current level of border security is “not strict enough,” respectively, and 15 percent, 18 percent, and 32 percent believed it is “about right.” A May 2013 Pew Research Center poll found that 53 percent of the public believe that the U.S. government could do “a lot more” to reduce illegal immigration at U.S. borders, 30 percent “somewhat more,” 8 percent “not much more,” and 5 percent “nothing more.” Polls conducted since 2001 asking a similar question on whether the government should do more on border security found similar results.
41. A June 2013 Pew Research Center/*USA Today* poll found that 55 percent of the public believe that the level of the number of immigrants entering illegally in 2013 was higher than ten years prior, 27 percent about the same, and 15 percent lower. A June 2010 Fox News/Opinion Dynamics poll found that 26 percent of the public believed that U.S. borders were “less secure” than in 2005, 19 percent “more secure,” and 47 percent “about as secure.” See <http://www.pollingreport.com/immigration.htm>.
42. See Theodore H. Poister, “Performance Measurement: Monitoring Program Outcomes,” in Wholey et al. (2010) for a review of best practices in performance measurement of public-program outcomes.
43. The measures are not yet reliable and consistent over time, as efforts are being made to standardize the methodologies used to collect data on “got-aways” and “turn-backs” across U.S. Border Patrol sectors.
44. See DHS Memorandum “Strengthening Departmental Unity of Effort.” Available at: <http://www.hlswatch.com/wp-content/uploads/2014/04/DHSUnityOfEffort.pdf>.
45. Beginning in 2010, questions about foreign-born origin were removed from the U.S. Census.
46. DHS’s Office of Immigration Statistics assumes that unauthorized immigrants are undercounted by 10 percent in the household survey that it uses (the American Community Survey). See http://www.dhs.gov/sites/default/files/publications/ois_ill_pe_2012_2.pdf. This undercount rate ultimately derives from a study of accuracy of the 2000 Census in counting the foreign-born population in Los Angeles (see Enrico Marcelli, “2000 Census Coverage of Foreign-born Mexicans in Los Angeles County: Implications for Demographic Analysis,” presented at the 2000 Annual Meeting of the Population Association of America, Atlanta, GA). The Pew Hispanic Center makes undercount adjustments for specific groups of the unauthorized population based on age, sex, country of birth, and year of arrival, and it uses a range of undercount rates of 8 to 13 percent for the 2000 to 2009 period and 5 to 7 percent for 2010 to 2012. (Evidence suggests that coverage of the unauthorized and foreign-born populations have improved over time: see pp. 50-52 in http://www.pewhispanic.org/files/2014/11/2014-11-18_unauthorized-immigration.pdf for detailed discussion.)
47. DHS’s performance report does not make clear any details of the methodology used to calculate the recidivist ratio. Presumably, it considers apprehensions of the same individual only within a restricted time period; for example, over a three-month span or in a year.
48. See Roberts et al. (2013) for a discussion of this approach.

49. Migrant surveys suggest that the at-the-border deterrence rate was between 1 to 10 percent prior to the late 2000s, but that it has increased significantly in recent years: see Roberts et al. (2013) for detailed review of the evidence.
50. The recidivism rate has plummeted sharply during the four years following the implementation of the high-consequence enforcement strategy. However, there other factors that should be considered, including the economic downturn that impacted overall apprehensions and the increase in non-Mexicans apprehended at the southwest border. See <http://bipartisanpolicy.org/blog/performance-measures-suggest-border-strategy-may-be-working/>.
51. See GAO (2012).
52. Drones have been used to conduct surveillance that has yielded estimates of interdiction rates. Data collected by Predator drones using the VADER radar system in late 2012 suggested an interdiction rate of illegal border-crossers of roughly 50 percent in parts of the Tucson sector. However, there are significant limitations on using drone information to estimate interdiction rates. See <http://cironline.org/reports/new-drone-radar-reveals-border-patrol-gotaways-high-numbers-4344>.
53. See GAO (2012) and DHS (2014), "U.S. Department of Homeland Security Agency Financial Report," FY 2014. Available at: https://www.dhs.gov/sites/default/files/publications/OCFO/dhs_agency_financial_report_fy2014.pdf.
54. See, for example, Bipartisan Policy Center, "New immigration enforcement data: for the first time in history, most border-crossers are not Mexican." Available at: <http://bipartisanpolicy.org/blog/new-immigration-enforcement-data-first-time-history-most-border-crossers-are-not/>.
55. See Roberts et al. (2013) for details on these estimates.
56. Mexican data is presented since the estimates are based in part on Mexican survey data. As mentioned above, to construct a model representing all border-crossers, similar data would need to be collected for other nationalities of immigrants, most importantly those from Central America.
57. See Warren and Warren (2013).
58. In addition to methodological limitations, it is also important to note that the probabilities of apprehension and gross inflow levels derived from migrant survey data, and recidivism analysis are for Mexican nationals only, so that inflow levels depicted in Figure 6 for these methodologies are only for Mexican nationals. Because known-flow data on got-aways cannot be distinguished by nationality, the number of successful entries derived from this data include all nationalities.
59. See Carriquiry and Majmudar (2012) and Roberts et al. (2013).
60. The INS ceased reporting inspection counts in any publicly available document in the mid-1990s. DHS has never reported total inspection counts in any publicly available document, although the Office of Immigration Statistics has reported inspections of aliens and of aliens refused entry since 2005. GAO (2014) provides data on inspections at land, air, and sea borders for 2005 to 2013, although these are not broken down by inspections of aliens and non-aliens.
61. Before 2003, the INS—and since 2003, its successor, CBP—has had data available to allow reporting on inspection counts separated by citizens and aliens and the number of aliens refused admission at all individual ports of entry since the 1950s. However, this data is not reported in either annual reports to the public or budget justifications to Congress.
62. See <http://www.cbp.gov/travel/cbp-search-authority/random-exams>.
63. See Roberts et al. (2013), pp. 32-34, for a more detailed review of attempts to estimate the overstay population.
64. See Chapter 3 by Warren in Bean et al. (1990).
65. See Warren (1997).
66. Pew Hispanic Center (2006) made a range of assumptions on overstay rates and updated Warren's 1996 estimates to 2005, but their estimate is intrinsically based on Warren's 1996 estimate. Warren has recently provided partial estimates of trends in the overstay population from 2000 to 2009 and concluded that the share of the overstay population in the total unauthorized population has fallen significantly. See <http://cmsny.org/wp-content/uploads/Warren-Blog-on-Overstays-4.1.13.pdf>.
67. See Bipartisan Policy Center (2014) for a comprehensive review of these improvements.
68. This explanation is suggested by the 2002 Morrel-Samuels's estimate that illegal entries at U.S. land ports were three to 5.5 million annually around the year 2000. The unauthorized *resident* immigrant population was estimated to have been growing by a few hundred thousand a year at that time. The discrepancy between these estimates can be explained by very large inflows of those staying for short time periods (*non-resident* visitors). It could also be explained by very large outflows of unauthorized immigrant residents from the United States.
69. See discussion on pp. 22-23 in Chapter 1 by Edmonston, Passel, and Bean in Bean et al. (1990).
70. Pew Research Center (2014), "As Growth Stalls, Unauthorized Immigrant Population Becomes More Settled." Available at: <http://www.pewhispanic.org/2014/09/03/as-growth-stalls-unauthorized-immigrant-population-becomes-more-settled/ph-2014-09-03-immigration-02/>.
71. See Appendix C for a mathematical derivation of this relationship. This non-linear relationship has not been noticed in previous studies. Kleiman and Kilmer (2009) derive a tipping-point relationship between enforcement and deterrence based on how enforcement resources are prioritized to different types of violators.
72. See, for example, Congressional Research Service (2009), "Border Security: Barriers Along the U.S. International Border." Available at: <https://www.fas.org/sgp/crs/homesecc/RL33659.pdf>.
73. Gathmann (2008) and Borger et al. (2013) came to quite different conclusions on the deterrent impact of border enforcement because they evaluated different time periods, used different survey sources, and used different statistical analysis methodologies related to identification of the impact of enforcement.
74. Borger et al. use data from the Mexican national household survey, the EMIF migrant survey, U.S. Border Patrol apprehension records and staffing deployments at the sector level, and economic indicators for the two countries.
75. See Appendix C for the development of a relevant analytical framework.
76. See, for example, Fox News (2013), "Border apprehensions wildly exaggerated in formula behind Senate bill, say critics." Available at: <http://www.foxnews.com/us/2013/06/05/border-apprehensions-wildly-exaggerated-in-formula-behind-senate-bill-say/>. See also House Committee on Homeland Security (2013), "Summary of H.R. 1417, the Border Security Results Act of 2013." Available at: <http://homeland.house.gov/sites/homeland.house.gov/files/documents/07-13-HR-1417-Summary-3.pdf>. See also The New York Times (2013), "Immigration Amendments Reflect Concern About Border Security." Available at: <http://www.nytimes.com/2013/06/13/us/politics/immigration-amendments-reflect-concern-about-border-security.html>.
77. Bipartisan Policy Center, "Room for Consensus: A Statement by BPC's Immigration Task Force," August 2013, Washington, DC. Available at: <http://bipartisanpolicy.org/library/room-consensus-statement-bpcs-immigration-task-force/>.
78. Whitley (2012) reviews the challenge of measuring unobservable events with respect to federal law enforcement missions and provides several examples of how these events can be measured.
79. See Whitley et al. (2014) for a review of federal law enforcement.

80. Although enforcement of immigration law is primarily a civil law process, the apparatus for doing so, including its size and scope, is directly comparable to the federal criminal enforcement system, including apprehension (arrest), charging, detention, prosecution, court, and sentencing.
81. Many other agencies and offices carry out law enforcement functions, but their budget expenditures and staff sizes are generally very small in comparison with the major agencies included in this analysis. Including these smaller agencies would make little material difference to the results.
82. The Federal Air Marshals (FAM) program, which deploys law enforcement agents to air flights and is non-immigration-related, was part of the Customs agency in the pre-DHS era. After DHS was formed, this program was moved into the Transportation Security Agency. To maintain consistency between the pre- and post-DHS eras, FAM expenditures should ideally be subtracted from the Customs budget, but data is not available to do this. However, the size of the FAM budget prior to the formation of DHS was very small (\$44 million in 2001, which was 0.2 percent of the Customs budget), and leaving it in Customs yields trivial results.
83. Department of Justice, "Budget Trend Data: 1975 through the President's 2003 Request to the Congress." Available at: http://www.justice.gov/archive/jmd/1975_2002/btd02tocpg.htm.
84. DOJ documents are available at: <http://www.justice.gov/about/budget-and-performance>. DHS budget documents are available at: <http://www.dhs.gov/dhs-budget>.
85. The repeat-trials model was first applied to illegal border-crossing by Thomas Espenshade, "Undocumented Migration to the United States: Evidence from a Repeated Trials Model," in: Chapter 5, Bean et al. (1990). Espenshade estimated the probability of apprehension monthly for the period from 1977 to 1988 and found that it ranged between 25 and 40 percent with an average value of 32 percent.
86. Ibid.
87. As D approaches 1, the recidivist measure becomes useless, because the number of recidivist apprehensions goes to zero: if D equals 1, no one tries to cross again after their first apprehension.
88. It is also important to note that the monetized value of opportunity costs related to migration, in addition to the wage that could be earned in the migrant's home country, should be included in B as negative elements. This would include the monetized value of the preference for living in one's home country, the monetized value of having to live away from one's family, and any other relevant opportunity cost.
89. The repeat-trials model is mathematically known as a Bernoulli process with a chance of success equal to 1-A, where success in this context means achieving a successful entry. The mean number of trials required to achieve one success in a Bernoulli process is $1/(1-A)$.
90. One example of a modern border that came close to being "sealed" is the East German-West German border during the Cold War era. To keep their own citizens from leaving without authorization, the East German government deployed a very high number of border patrol guards and imposed severe consequences on those who were detected. In the face of these measures, the probability of apprehension equaled 95 percent. See Roberts et al. (2013, online appendix) for further discussion.
91. Smuggler fees rose, and migrants shifted to using more difficult and dangerous entry routes.
92. Expected benefits from migration B also changed in the late 2000s due to the U.S. recession and developments in the Mexican economy. Recent research has shown that it is possible to isolate the impact of enforcement factors from the impact of economic factors on the decision to migrate illegally.
93. This does raise the question of why a non-Mexican national would have tried to evade detection by enforcement authorities during this time period. One explanation is that there were potential costs associated with being formally recorded in the U.S. justice system as having attempted illegal entry. However, during the mid-2000s, many Central American immigrants did indeed present themselves to enforcement authorities. See e.g., Gaynor, Tim, "Non-Mexican Immigrants Swamp Texas Border City," Reuters, May 30, 2005. Available at: <http://www.freerepublic.com/focus/f-news/1413431/posts>.
94. For a generalized explanation of the issue, see Nuñez-Neto, Blas et al., "Border Security: Apprehensions of 'Other Than Mexican' Aliens," Congressional Research Service (Washington, DC), September 22, 2005. Available at: <http://trac.syr.edu/immigration/library/P1.pdf>.
95. Other components of C were arguably higher for non-Mexican nationals because they had to make longer overland journeys that exposed them to greater risks and hardships.
96. Analysis of U.S. Border Patrol consequence programs that is based on recidivism rates should take incarceration periods into account when developing recidivism rates.
97. U.N. projections of source-country population also incorporate a baseline forecast of emigration from and immigration into the source country. It may be necessary to develop an alternative population forecast that takes into account the projection of illegal outflows developed through Equation 12. This would require developing projections of all migration-related flows for the source country.
98. Equation 11 is what economists refer to as a "reduced form" result that is derived from a structural model.
99. G is based on the hours of border patrol agent activity in the geographic area that the migrant is likely to attempt entry through.

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BIPARTISAN POLICY CENTER

1225 Eye Street NW, Suite 1000
Washington, DC 20005
(202) 204-2400

WWW.BIPARTISANPOLICY.ORG