Illegal Migration from Mexico to the United States

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Abstract. In this paper, I selectively review recent literature on illegal migration from Mexico to the United States. I begin by discussing methods for estimating stocks and flows of illegal migrants. While there is uncertainty about the size of the unauthorized population, new data sources make it possible to examine the composition of legal and illegal populations and the time-series covariates of illegal labor flows. I then consider the supply of and demand for illegal migrants. Wage differentials between the United States and Mexico are hardly a new phenomenon, yet illegal migration from Mexico did not reach high levels until recently. An increase in the relative size of Mexico's working-age population, greater volatility in U.S.-Mexico relative wages, and changes in U.S. immigration policies are all candidate explanations for increasing labor flows from Mexico. Finally, I consider policies that regulate the cross-border flow of illegal migrants. While U.S. laws mandate that authorities prevent illegal entry and punish firms that hire unauthorized immigrants, these laws are imperfectly enforced. Lax enforcement may reflect political pressure by employers and other interests that favor open borders.

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1. Introduction

There is increasing interest by academics and policymakers in Mexican migration to the United States. Mexico is the most important source country for U.S. immigration, accounting for 34% of total immigrant arrivals since 1990. In 2004, the 10.5 million Mexican immigrants living in the United States were 31% of the U.S. foreign-born population and equivalent to 10% of the total population of Mexico (see Figure 1).[1] The United States has not experienced a concentrated immigration wave of this magnitude since the influxes from Germany and Ireland in the mid 19th century.[2] For Mexico, the continuing population outflow is unprecedented.[3] In both countries, the cross-border flow of labor appears to have affected the structure of wages, the intra-national distribution of population, and the pattern of industrial specialization.

Beyond its scale, the distinguishing feature of Mexican immigration is that most new arrivals enter the United States illegally. In 2004, there were an estimated 5.9 million unauthorized Mexican immigrants in the United States, among a total unauthorized population of 10.3 million (Passel, 2005). Thus, 56% of Mexican immigrants appear to lack permission to be in the country, compared to 17% of all other immigrants. Large-scale illegal immigration in the United States is a relatively new phenomenon. It has provoked political debate about whether to provide public services to illegal immigrants, grant them status as legal residents, or militarize U.S. borders to prevent further illegal inflows. In Mexico, migration abroad has helped ease the country's adjustment to rapid growth in its working-age population and to macroeconomic shocks, though not without disrupting the families and communities whose members have moved to the United States.

There is an emerging body of economic research on illegal migration from Mexico to the United States. This literature has been made possible by the recent availability of data sources on the cross-border movements of legal and illegal Mexican migrants. Also prompting attention is the realization that, with unauthorized entrants accounting for over half of Mexican immigrants and over three tenths of all U.S. immigrants, any discussion of international migration in the United States or Mexico ends up confronting the issue of illegality either explicitly or implicitly.

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[1] Figure 1 reports the total number of Mexican immigrants in the United States (legal and illegal) as a share of Mexico's population, the total U.S. population, and the foreign-born U.S. population.

[2] Over the period 1841 to 1860, Ireland accounted for 39% of U.S. immigration and over the period 1841 to 1890, Germany accounted for 30% of U.S. immigration (U.S. Department of Homeland Security, 2004).

[3] The one episode that approaches the current outflow is the Mexican Revolution (1911-1920). Between 1911 and 1925, 680,000 legal immigrants from Mexico (or 5% of Mexico's 1910 population) entered the United States (and were joined by a large number of illegal immigrants). By the late 1920s, many of these individuals had returned to Mexico. See Cardoso (1980) and Alanis (1999).

Much of the initial research on unauthorized labor flows was done by non-economists.[4] The principal themes of this body of work resemble those in the economics literature on internal migration in developing countries (see Lucas, 1997; Rapoport and Docquier, 2003). Early waves of illegal migration from Mexico appear to have originated in rural areas of the country (Cornelius, 1992; Durand, Massey and Zenteno, 2001), involved households financing the migration of one or more members in return for remittances from the migrants (Durand, 1996; Durand et al, 1996), and depended on family and community networks that helped migrants enter and find employment in the United States (Massey et al., 1994; Massey and Espinosa, 1997).

Yet, internal migration and illegal international migration differ in important respects. While policy barriers that restrict within-country regional labor flows are rare, countries actively regulate the inflow of labor from abroad. The United States determines the level of legal immigration through quotas on entry visas, which change infrequently over time.[5] The country implicitly sets the level of illegal immigration through selecting the intensity with which it enforces borders against illegal entry. Key issues for the study of illegal migration are how countries choose their border regulation policies and how prospective migrants respond to these policies.

There is a large literature on U.S. immigration, which tends to focus on the labor-market consequences of immigrant inflows and the economic performance of immigrants.[6] This body of work examines, among other questions, whether immigration reduces wages for U.S. native workers, whether immigrants make relatively greater use of means-tested entitlement programs, and whether earnings, education, fertility, or other outcomes for immigrants converge to native levels over time.

Largely taken for granted in the U.S. literature is *why* foreign residents migrate to the United States. One obvious reason is that U.S. real wages far exceed those in many other countries. Large wage differentials, coupled with binding and slowly changing quotas on U.S. legal immigration, create queues to enter the United States. Given extended delays in clearing such queues, annual variation in the level of legal immigration appears to be more or less insensitive to contemporaneous annual

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[4] For reviews of this literature, see Massey et al. (1994) and Espenshade (1995).

[5] The current U.S. immigration quota system was established by the Hart-Cellar Act of 1965 and amended by the Immigration Act of 1990. The 1990 law set a flexible cap for U.S. legal admissions at 675,000 individuals of which 480,000 are to be family-based, 140,000 are to be employment-based, and 55,000 are to be "diversity immigrants." Immediate relatives of U.S. citizens are not subject to immigration quotas.

[6] For surveys of this literature, see Smith and Edmonston (1997) and Borjas (1999a, 1999b) and for recent work in the area see Borjas (2003) and Card (2005). For analysis of these issues in the context of Mexican immigration, see Smith (2003), Trejo (2003), Blau and Kahn (2005), Borjas and Katz (2005), Card and Lewis (2005), and Duncan and Trejo (2005). There is a smaller literature on the consequences of emigration for Mexico. See Mishra (2005) and Hanson (2005a).

fluctuations in U.S. or foreign economies. Perhaps as a result, the quantity of literature on the consequences of U.S. legal immigration vastly exceeds that on its causes.[7]

With illegal immigration, the determinants of migrant flows and the high-frequency variation of these flows have attracted more attention. Geographic proximity allows unauthorized migrants from Mexico to move to the United States relatively quickly. The existence of well-established migration networks enables U.S. employers to communicate changes in their demand for labor to prospective migrants in Mexico. Migrants use these same networks to find jobs and housing in the United States. Shocks to either the Mexico or U.S. economies may be transmitted into changes in cross-border labor flows with relatively short time lags, making illegal migration potentially quite responsive to changes in binational business-cycle conditions.

Another feature that distinguishes legal and illegal migrant flows is their composition. While legal migrants face entry costs associated with queues in obtaining visas, illegal migrants face costs associated with evading immigration authorities. Once in the receiving country, the risk of detection may make some employers unwilling to hire illegal migrants, limiting their occupational prospects and reducing the returns to skill they perceive. Variation in migration costs and in receiving-country wage profiles between legal and illegal migration suggest the characteristics of illegal migrants may differ from those of legal migrants. Observed changes in the composition of U.S. immigrants, which has received much attention in research on consequences of U.S. immigration, could be partly a by-product of the rising share of unauthorized entrants in immigrant inflows. For Mexico, the composition of migrant outflows matters not just for the labor-market effects of emigration but also for the ties that migrants retain with the country. Illegal migrants appear to be more likely than legal migrants to send remittances to family members in Mexico. Rising illegal migration from Mexico may be partly responsible for the recent surge in remittances in the country, which rose from 0.1% of GDP in 1990 to 2.2% of GDP in 2004 and now generate more foreign exchange in the country than tourism or foreign direct investment (IADB, 2005).

In this paper, I selectively review recent literature on illegal migration from Mexico to the United States. In section 2, I discuss methods for estimating stocks and flows of illegal migrants. While there is uncertainty about the size of the unauthorized population, new data sources make it possible to examine the composition of legal and illegal populations and the time-series covariates of illegal labor flows. In section 3, I consider the supply of and demand for illegal migrants. Wage differentials between the United States and Mexico are hardly a new phenomenon, yet illegal migration from Mexico did not reach high levels until recently. An increase in the relative size of Mexico's working-age population, greater volatility in U.S.-Mexico relative wages, and

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[7] Exceptions include Hatton and Williamson (2004) and Mayda (2004), who examine the correlates of international migration flows. In research on internal migration, there is considerable work on the incentive to migrate. See Greenwood (1997) and Lucas (1997) for reviews of the literature.

changes in U.S. immigration policies are all candidate explanations for increasing labor flows from Mexico. In section 4, I consider policies that regulate the cross-border flow of illegal migrants. While U.S. laws mandate that authorities prevent illegal entry and punish firms that hire unauthorized immigrants, these laws are imperfectly enforced. Lax enforcement may reflect political pressure by employers and other interests that favor open borders. In section 5, I discuss directions for further research.

My goal in this paper is not to conduct an exhaustive survey of work on illegal migration but rather to highlight major findings in the literature, assess the state of important debates, and identify unresolved issues, with an eye toward advancing questions to help guide future work. As much of the literature is empirical, I will focus on this strand of research, with occasional forays into theory. One topic I will not discuss at much length is the economic consequences of illegal migration, in part because literature on the consequences of immigration has been subject to several recent surveys (see note 6) and in part because there is little research on the specific aspects of these consequences that are attributable to illegal immigration.

Though my focus is on the United States and Mexico, insights from the literature are relevant for other regions, as well. Unauthorized migration has become a global phenomenon. In the last two decades, there have been sizable flows of illegal migrants from North Africa and Eastern Europe to Western Europe, from Indonesia to elsewhere in Southeast Asia, and from neighboring countries to South Africa. The U.S.-Mexico experience may be instructive for these and other cases regarding how to measure unauthorized migration, estimate the causes and consequences of migration flows, and gauge the potential impacts of policy interventions.

2. Stocks and Flows of Illegal Migrants

Illegal immigrants account for a large and growing fraction of the U.S. foreign-born population.[8] One may imagine that, as part of the underground economy, unauthorized migrants are not easily subject to measurement. However, there is now abundant evidence that illegal immigrants are represented in official household surveys, including the U.S. Census of Population and Housing and the U.S. Current Population Survey. Given known levels of U.S. legal immigration, the number of foreign-born individuals enumerated in these sources is far too large for them all to be legal.

The most common method to estimate the number of illegal immigrants is to take the difference between the measured immigrant population and the sum of past legal immigrant inflows. Estimates using this residual approach suggest that stocks of illegal immigrants have risen sharply over time. However, there is considerable variability in

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[8] This also appears to be the case in Western Europe (Boeri, Hanson, and McCormick, 2002).

the estimates, associated with differing assumptions about the magnitude of errors in enumerating legal and illegal immigrants in official data sources.

Knowing the overall share of immigrants who are unauthorized is not the same as knowing which specific immigrants in a given data source are unauthorized. Fortunately, there are now several micro-level surveys that provide information on individual migration status. Either by design or default, migrants from Mexico account for a large fraction of those represented in these data sources. While each survey has limitations, their use in conjunction with large public data sets from Mexico and the United States provides considerable detail on the population of legal and illegal migrants from Mexico who are living or have lived in the United States.

A third data source on unauthorized migration is a by-product of U.S. immigration policy. To prevent illegal immigration, the U.S. Border Patrol polices U.S. borders and ports of entry, attempting to apprehend those seeking to enter the country illegally. The Border Patrol compiles high-frequency data on apprehensions and enforcement, the vast majority of which occur along the U.S.-Mexico border. Data on border apprehensions and enforcement allow one to examine how attempts at illegal entry vary with economic conditions in the United States and Mexico and to see which factors are associated with the intensity of U.S. enforcement activities.

2.1 The Residual Foreign-Born Population

In the United States, there are two classes of legal immigrants who appear in official data sources (i.e., are surveyed by the U.S. Census Bureau, the U.S. Bureau of Labor Statistics, or other official entities). One is permanent legal immigrants, who have the right to reside in the country indefinitely. Another is temporary legal immigrants, who have the right to reside in the country for a defined time period, as specified by an entry visa (such as those for students, specific skill classes of workers, diplomats, and family members of temporary legal immigrants).[9] Since government surveys do not screen individuals based on their immigration status, illegal immigrants also appear in official data, to the extent they make themselves available to be surveyed.

The standard method to estimate the number of illegal immigrants is to assume it is equal to the *residual foreign-born population*, which is given by

$$U_t = F_t - \sum_{s=1}^{t} L_s (1 - m_s - e_s) - T_t , \qquad (1)$$

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[9] The Census Bureau does not survey individuals on tourist or business visas or other short-term visitors.

where U_t is the unauthorized foreign-born population in year t, F_t is the total foreign-born population in year t, L_s is the number of permanent legal immigrants that entered in year s≤t, m_s is the mortality rate between year s and year t for legal immigrants entering in year s, e_s is the emigration rate between year s and year t for legal immigrants entering in year s, and T_t is temporary legal immigrants present in year t.

Table 1 reports estimates of the unauthorized foreign-born population by the U.S. Bureau of the Census (Costanzo et al., 2003), Bean et al. (2001a, 2001b), Passel (2005), and the U.S. Immigration and Naturalization Service (2001).[10] In the most recent projection, Passel (2005) estimates that between 2002 and 2004 the illegal immigrant population rose from 9.3 to 10.3 million, for an average annual net inflow of 500,000 migrants, with 57% of these individuals coming from Mexico. This compares to an average annual net illegal inflow during the 1990-to-2000 period of 581,000 migrants (with 58% of net new immigrants coming from Mexico), based on U.S. Census Bureau estimates (Costanzo et al., 2001), and 350,000 migrants (with 79% coming from Mexico), based on INS (2001) estimates.

Obviously, there are a host of assumptions involved in estimating (1). One must assign mortality and emigration rates to each entry cohort and determine the fraction of temporary immigrants admitted in previous years that are still in the country. In practice, most discrepancies evident in Table 1 appear unrelated to differences in these assumptions. Of greater importance are assumptions about measurement error in F_t.

To simplify matters, I re-express equation (1) in contemporaneous values as $F_t = L_t + U_t$, where L_t is the total legal foreign-born population in year t. The U.S. Census Bureau (and other entities that conduct household surveys) tends to undercount the total population (with undercount rates for low-income households, which would include many Mexican immigrants, believed to be relatively high), in which case the measured foreign-born population, $\widetilde{F}_t$, is less than the actual foreign-born population, F_t. The total legal-immigrant population, L_t, in contrast, appears to be measured with greater accuracy, since immigration authorities have records on how many entry visas they award. Suppose the legal-immigrant population that is enumerated in the census is,

$$\widetilde{L}_t = L_t(1 - \lambda_t) + \varepsilon_t^L , \qquad (2)$$

where λ_t is the fraction of legal immigrants that go uncounted, and the unauthorized-immigrant population enumerated in the census is,

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[10] See Bean at al. (1998) for a survey of the literature on estimating illegal immigrant populations.

$$\tilde{U}_t = U_t(1 - \mu_t) + \varepsilon_t^U , \qquad\qquad (3)$$

where μ_t is the fraction of unauthorized immigrants that go uncounted and ε_t^L and ε_t^U are mean zero iid errors. $\tilde{L}_t$ and $\tilde{U}_t$ are not observed individually but are observed in terms of their sum, $\tilde{F}_t$. While the U.S. Census Bureau estimates that it undercounts the Hispanic population by 5%, Bean et al. (2001b) put the undercount rate for legal Mexican immigrants at 2% to 4%. Similarly, while the U.S. Census Bureau estimates that it undercounts the illegal immigrant population by 15%, the INS assumes an undercount of 10%, and Bean et al. (2001) use undercount rates of 15% to 25%. It is primarily these differences in assumptions that account for variation in the estimates in Table 1.

Assumptions about undercount rates are based on comparisons of the enumerated population with the population measured in post-enumeration surveys conducted in specific localities. This requires one to assume that under-enumeration in these localities is representative of the total U.S. population (see Bean et al. 1998). The U.S. Census Bureau justifies its undercount assumptions based on results from its own post-enumeration surveys, from which standard errors for population estimates are derived (Costanzo et al., 2001). The INS (2001) justifies a 10% undercount rate based on a case study of Mexican immigrants in Los Angeles County. Bean et al. (2001a, 2001b) justify their range of undercount rates based on results in Van Hook and Bean (1998).

Given observed values of $\tilde{F}_t$ and L_t and assumed values for λ_t or μ_t, which I indicate by a tilde, the estimated value of the illegal-immigrant population in year t can be approximated as

$$\hat{U}_t = \frac{\tilde{F}_t - L_t(1 - \tilde{\lambda}_t)}{1 - \tilde{\mu}_t} . \qquad\qquad (4)$$

If true undercount rates fall over time and we fail to account for this, estimates of the illegal-migration population will be biased upwards ($\hat{U}_t > U_t$).[11] Consider values for $\widetilde{F}_t$ and L_t in 1996 and 2001 in Bean et al. (2001a, 2001b). If we change the assumption for the 1996-2001 period from a constant illegal undercount rate of 25% (which is at the upper end of the Bean et al. rates) to a reduction in the illegal undercount rate from 25% to 15% (to the lower end of the Bean et al. rates),[12] the estimated annual illegal net inflow from Mexico would fall by 112,000 migrants (from 432,000 to 320,000), which is 30% of the average annual estimated illegal inflow over the period. Since different authors tend to use different post-enumeration surveys as the basis for selecting undercount rates, there is little consensus in the literature about what has happened to the undercount of illegal immigrants over time, other than it exhibiting a downward trend.

In Table 1, the span of estimates for the illegal-immigrant population in the United States is wide. Between 1990 and 2004, the estimated average annual net inflow of unauthorized immigrants ranges from 350,000 to 580,000 individuals, with 55% to 80% of these individuals coming from Mexico. Missing in the literature are attempts to gauge how the validity of different assumptions about undercount rates vary across time. The post-enumeration surveys (typically conducted by or on behalf of the U.S. Census Bureau or BLS) that are the basis for the undercount assumptions are carried out in a small number of communities around the time of the main survey. Since samples for post-enumeration surveys differ across survey periods, there is little basis for making time-series comparisons in undercount rates. Until large-scale public surveys ask about individual migration status directly, estimating the size of the illegal-immigrant population will remain a speculative enterprise.

2.2 Churning in Legal and Illegal Immigrant Populations

Estimates of the stock of illegal immigrants give little indication of how long unauthorized migrants are likely to remain without a legal resident visa. Each year, there appears to be a large flow of individuals from the pool of illegal migrants to the pool of permanent legal immigrants. Many immigrants who obtain visas for legal permanent residence (green cards) are at the time they obtain their visas residing in the United States illegally. Figure 2 shows the number of Mexican immigrants awarded legal permanent

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[11] Ignoring interactions in undercount rates, $U_t - \hat{U}_t \approx \dfrac{\mu_t - \widetilde{\mu}_t}{(1-\mu_t)(1-\widetilde{\mu}_t)} \left[\widetilde{F}_t - (\widetilde{\lambda}_t - \lambda_t)L_t - \varepsilon_t^L - \varepsilon_t^U \right]$.

When the assumed undercount rate for illegal immigrants is low, this expression will be negative (there will be upward bias in the estimated number of illegal immigrants). This effect will be exaggerated if the assumed undercount rate for legal immigrants is also low.

[12] In this exercise, I assume the undercount rate for legal migrants is held constant at 2%.

residence and the fraction of these individuals who are *adjusting status*. Over the period 1992-2002, status adjusters accounted for 56% of new legal permanent immigrants from Mexico. Some of those adjusting their visa status are temporary legal immigrants who have succeeded in obtaining permanent entry visas. However, for Mexican immigrants, the majority of those adjusting status to permanent legal residence appear to have been living in the United States as illegal immigrants (DHS, 2004).

Further evidence of churning in the population of legal and illegal immigrants is available in the New Immigrant Survey (NIS), which in its pilot form includes a random sample of 1,134 immigrants who received U.S. legal permanent resident visas in 1996 (Jasso, Massey, Rosenzweig, and Smith, 2000). Based on the NIS data, Massey and Malone (2002) find that 54% of Mexican nationals who obtained a green card in 1996 reported having entered the United States illegally at an earlier date in time, either by crossing the U.S. border (41%) or overstaying a temporary entry visa (13%). Overall, 21% of U.S. green-card recipients in 1996 reported having crossed the U.S. border illegally and 11% reported having overstayed a temporary entry visa.

Transitions from illegal to legal residence status indicate that many individuals queuing for U.S. green cards choose to do so as illegal immigrants, rather than waiting out the process as residents of their home countries. Between 1992 and 2004, 90% of Mexican immigrants who obtained U.S. green cards qualified under family-reunification provisions of U.S. immigration law. Since 1965, the United States has granted unrestricted legal entry to the immediate relatives of U.S. citizens and restricted legal entry, subject to annual immigration quotas, to more distant relatives of U.S. citizens and relatives of U.S. permanent legal residents. Most applicants take several years or more to clear the queue for a green card.[13] While the United States periodically attempts to limit the granting of green cards to those applicants who either have valid temporary entry visas or are residing abroad, the sheer volume of applications has made this provision difficult to enforce (Vaughan, 2003). Consequently, the U.S. government routinely grants green cards to individuals who currently are residing in the country illegally. Massey and Malone (2002) report that prior illegality is more common among those who receive green cards under family-based immigration provisions than under employment-based immigration provisions. The latter category requires sponsorship by a U.S. employer and applies mostly to highly skilled individuals.

Churning in the illegal immigrant population suggests some unauthorized migrants may view their visa status as mutable. In making the decision to migrate to the United States, individuals in Mexico who have relatives that are U.S. legal residents may

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[13] Though immediate relatives of U.S. citizens are not subject to immigration quotas, to obtain a green card they still must screened by immigration authorities, a process that can take as long as two years. The screening process is more protracted for individuals who meet the qualifications for a green card but whose preference category is subject to immigration quotas (e.g., more distant relatives of U.S. citizens and relatives of U.S. legal residents) and can take five years or more (Martin, 2005).

internalize the prospect of obtaining a U.S. green card in the future. They may consider being an illegal immigrant as simply an intermediate step in becoming a legal permanent resident. The possibility of transitioning from illegal to legal status may blur differences in the expectations and behavior of legal and illegal migrants.

A second means by which prospective migrants might expect to obtain a U.S. green card is through a future amnesty for illegal aliens. In 1986, the U.S. Immigration Reform and Control Act (IRCA) awarded permanent legal residence visas to illegal immigrants who could demonstrate either (i) continuous U.S. residence since 1982, or (ii) 60 days of employment in U.S. agriculture since 1985. Over the next eight years, 1.6 million illegal immigrants received green cards under the first provision and 1.1 million illegal agricultural workers received green cards under the second provision, with Mexican nationals accounting for 2 million of the 2.7 million IRCA legalizations (INS, 1996). While there is political opposition in the United States to another amnesty, there have been numerous recent legislative proposals to legalize at least some unauthorized migrants (Hanson, 2005). The prospect of a future amnesty is another factor that helps diminish distinctions between legal and illegal migrants.

2.3 Composition of the Legal and Illegal Immigrant Populations

A longstanding conception of Mexico-to-U.S. migration is that it is driven by the needs and rhythms of agriculture. According to this view, most migrants from Mexico are from the countryside, come to the United States to work as farm laborers during peak agricultural months, and return to their families in Mexico for the winter off-season. Migrants would tend to be male, rural in origin, relatively uneducated, and residing in the United States on an itinerant basis. While there is little doubt that at one time this view of Mexican migration was accurate, the Mexican immigrant population in the United States has since become more heterogeneous and more permanent.

Large-scale emigration from Mexico began in the early 20th century. Railroad construction in the late 1800s linked interior Mexico to the U.S. border, giving U.S. employers improved access to Mexican labor (Cardoso, 1980). In the early 1900's, Texas farmers began to recruit laborers in Mexico. They followed the main rail line into the country, which ran southwest through agricultural states in Mexico's central and western regions. Early migrants from Mexico came primarily from nine Mexican states in this area (Durand, Massey, and Zenteno, 2001).[14] Migration expanded further in the 1940s, after the U.S. Congress enacted the Bracero Program (1942-1964), which allowed U.S. employers to bring in workers from Mexico (and the Caribbean) to fulfill short-term labor contracts (of less than a year in length). At the end of their contracts, workers were required to return to their home countries. The vast majority of *braceros* worked on U.S.

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[14] These nine states are Aguascalientes, Colima, Durango, Guanajuato, Jalisco, Michoacán, Nayarit, San Luis Potosí, and Zacatecas. During the period 1944 to 1964, this group of states accounted for 55% of migration from Mexico to the United States (Durand, Massey, and Zenteno, 2001).

farms (Calavita, 1992). At its peak, from 1954 to 1960, 300,000 to 450,000 migrant workers from Mexico entered the United States annually. The end of the Bracero Program marked the beginning of large-scale illegal immigration from Mexico.[15]

After working in the United States, many braceros returned to Mexico where they assisted later generations in migrating abroad. They helped establish informal networks through which earlier migrants help new migrants enter the United States, find housing in U.S. cities, and obtain jobs with U.S. employers. Networks are often embedded in relationships involving family, kin, or community of birth, which gives them a regional component. Partly as a result, there is strong historical persistence in migration rates to the United States across Mexican regions. Figure 3 plots emigration rates in the 1950s against those in the 1990s across Mexico's 32 states. Data for the 1950s are from Woodruff and Zenteno (2001), who calculate the fraction of each Mexican state's population that migrated to the United States between 1955 and 1959 under the U.S. Bracero Program. Data for the 1990s, taken from the 2000 Mexico Census of Population and Housing, report the fraction of households in a state having a member migrate to the United States between 1995 and 2000. The correlation between state migration rates in the 1995-2000 and the 1955-59 periods is 0.73. Figure 4 shows that most high-migration states are located in central Mexico, which is neither close to the United States nor home to Mexico's poorest households. States on the U.S.-Mexico border tend to have low emigration rates, as do states in low-income southern Mexico.

Perhaps as a result of migration networks, current generations of Mexican immigrants in the United States tend to live near individuals from their home regions in Mexico. For instance, Munshi (2003) finds that immigrants from the state of Jalisco are much more likely to live in Los Angeles or San Diego than immigrants from the state of Guanajuato, who prefer Chicago or Dallas. Migrants reinforce networks by creating home-town associations that help members of their communities in Mexico make the transition to living north of the border. Of 218 home-town associations formed by Mexican immigrants enumerated in a 2002 survey of such organizations in southern California, 87% were associated with one of the nine west-central states that dominated migration to the United States under the Bracero Program (Cano, 2004).

While migration networks are a consistent feature of cross-border labor flows, the composition of these flows is not. Since the 1960s, Mexico has urbanized, become a more educated nation, and incorporated women into the labor force in greater numbers. Cornelius (1992) and Cornelius and Marcelli (2001) suggest these changes have shifted the composition of Mexican migrants in the United States from sojourners, who follow the harvest season through the rural United States and then return to Mexico at the end of the year, to settlers, who have a permanent presence in U.S. communities. Resisting this notion, Durand, Massey, and Zenteno (2001) suggest instead that migration to the United

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[15] On illegal immigration and guest-worker programs, see Epstein, Hillman, and Weiss (1999).

States remains dominated by men from traditionally agricultural states in Western Mexico. While migrants have become better educated and more urban, they retain strong ties to Mexico, returning often and tending to avoid permanent U.S. settlement.

Until recently, it would have been difficult to muster much more than case-study evidence to evaluate these claims. There are now several data sources on migrants from Mexico that give details on an individual's migration status.[16] Perhaps the best known and most utilized source is the Mexican Migration Project (MMP).[17] The MMP is a household survey conducted in winter months (when seasonal migrants tend to return to Mexico) in 1982 and over the period 1987 to 1997 in several dozen rural communities in western Mexico, chosen for having high rates of migration to the United States (Massey et al., 1994; Durand et al., 1996). In each community and in each year, the MMP surveyed a random sample of several hundred households, collecting information on past migration behavior of each household member.[18] An advantage of the MMP is that it allows one to construct retrospective migration histories on a reasonably large sample of individuals.[19] Among male household heads, 23% report having migrated to the United States within three years of being surveyed (during the period 1984 to 1996). Of those reporting having migrated over the period 1970 to 1990, 89% state that on their first trip to the United States they entered without documents (McKenzie and Rapoport, 2004).

The MMP is subject to several potential problems associated with how migrants and communities are selected into the sample. Since communities included in the MMP are chosen on the basis of being rural and having residents with high migration propensities, they are unlikely to be representative of Mexico as a whole (McKenzie and Rapoport, 2004). Within communities, the households surveyed are those with at least one member remaining in Mexico, thus excluding households that have migrated to the United States in their entirety. And, within households, the migrants surveyed directly are those who have returned to Mexico, for at least part of the year. There are no direct observations on individuals residing in the United States.

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[16] A similar source is the National Survey of Demographic Dynamics (ENADID), conducted by the government of Mexico in 1992 and 1997. The ENADID asks households in Mexico whether any of its members have ever worked in or looked for work in the United States (and the year in which this occurred). In the 1997 ENADID, 9% of individuals report having been to the United States and 21% of households report having a member in the United States, up from 8% and 17% in 1992. As with the MMP, the ENADID only includes households with at least one member remaining in Mexico. See Durand, Massey, and Zenteno (2001) and McKenzie and Rapoport (2004) for work using the ENADID and Cornelius and Marcelli (2001) and Durand, Massey and Zenteno (2001) for discussions of other surveys.

[17] Recent papers using the MMP include Massey and Espinosa (1997), Reyes (1997), Munshi (2003), Gathmann (2004), Orrenius and Zavodny (2004), and McKenzie and Rapoport (2004).

[18] Different households are surveyed in different years, such that the MMP is a repeated cross-sections of households and not a true panel.

[19] On measurement error in retrospective data, see Beckett et al. (2001) and Smith and Thomas (2003).

One way to evaluate the issue of sample selection in the MMP is to compare individuals in the survey with individuals in Mexico's Census of Population and Housing and with Mexican immigrants in the U.S. Census of Population and Housing. Table 2 gives summary statistics for working-age adults in the 1990 U.S. and Mexico censuses and in the 1989, 1990, and 1991 MMP surveys. I consider three MMP subsamples: (a) all respondents, (b) those who report residing in the United States but who are present in Mexico at the time of the MMP survey (seasonal migrants), and (c) those in the United States at the time of the MMP survey (permanent migrants), whose responses are provided by other members of their household in Mexico.

While Mexican immigrants in the United States (census immigrants) and MMP permanent migrants have relatively similar characteristics, they differ considerably from MMP seasonal migrants. Males account for 65% of MMP seasonal migrants, but only 56% of census immigrants and MMP permanent immigrants. And, while age profiles are similar among the three groups, educational attainment is not. Males with nine or more years of schooling account for 52% of census immigrants and 48% of MMP permanent migrants, but only 31% of MMP seasonal migrants. Employment patterns also differ across groups. Among males, 16% of census immigrants and 9% of MMP permanent migrants work in agriculture, compared to 31% of MMP seasonal migrants. Seasonal migrants also appear to be less established in the United States. For males, 55% of MMP seasonal migrants have spent more than five years in the United States, compared to 71% census immigrants and 63% of MMP permanent migrants. For each of these comparisons, results are similar for females.

Over time, Mexican immigrants have shifted out of agriculture as a main industry of U.S. employment. Using data from the U.S. census, Card and Lewis (2005) show that between 1990 and 2000 among recent Mexican immigrants (0-5 years in the United States) the share working in agriculture fell from 23% to 15% for men and from 13% to 7% for women. Among men, construction accounted for the largest growth in employment shares, while among women retail trade showed the largest increase.

Other surveys of illegal immigrants from Mexico also suggest their characteristics are more similar to permanent migrants (whether in the U.S. census or the MMP) than seasonal migrants. The Legalized Persons Survey (LPS) covered illegal immigrants who were granted permanent legal residence in the United States under the amnesty provision of IRCA (eligibility for which required proof of U.S. residence from 1982 forward). The LPS consisted of an initial survey in 1989 and a follow-up survey in 1992 of immigrants qualifying for legalization.[20] Among working-age adults in the LPS, shown in Table 2, 57% of Mexican immigrants are male, 37% had nine or more years of schooling, and 12% worked in agriculture.

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[20] The initial survey was of 6,193 respondents, of whom 5,691 had received amnesty by 1992 (with most of the rest awaiting decision). Of those granted amnesty, 82% were located for the follow-up interview. The LPS sample excluded those granted amnesty under the Special Agricultural Worker provision of IRCA.

In sum, data sources that include illegal immigrants are almost by definition subject to sample-selection problems. Official sources, such as the population census, are likely to undersample illegal immigrants, given their tendency to undercount low-income households. Surveys that specifically target illegal immigrants, such as the MMP or the LPS, explicitly select respondents on the basis of observed characteristics (e.g., residence in a high-migration community, eligibility for an amnesty). Yet, despite conflicting selection criteria, available data sources paint a consistent picture of Mexican immigrants in the United States, suggesting they include a high proportion of women, are overwhelmingly employed outside agriculture, have high education levels (relative to non-migrants in Mexico), and have established a long-term U.S. presence.

One data source that is inconsistent with this conclusion is the MMP sample of seasonal migrants – individuals who reside in the United States but return to Mexico in the winter months. Since MMP seasonal migrants are selected on the basis of having returned to Mexico, it is hardly surprising that they fit the profile of itinerant migrant laborers. Relative to other samples of legal and illegal immigrants, MMP seasonal migrants are disproportionately male, uneducated, and agricultural. While much of the literature based on the MMP uses the information on seasonal migrants to examine Mexico-to-U.S. migration, this sample appears unrepresentative of Mexican immigrants in the United States. When examining results using the MMP one should be mindful that they may apply only to seasonal migrants who return to Mexico with high frequency and not to the general population of Mexican migrants.

2.4 Attempted Illegal Immigration

The majority of unauthorized immigrants from Mexico enter the United States by crossing the U.S.-Mexico border illegally.[21] The U.S. government devotes vast resources to policing U.S. borders, airports, and ports of entry. Between 1980 and 2004, real expenditure on border enforcement increased by over six times and in 2005 will equal $2.2 billion (Hanson, 2005b). U.S. border-enforcement activities provide a glimpse into the high-frequency properties of illegal immigration. The first line of defense against unauthorized entry is the U.S. Border Patrol. Border Patrol officers on "linewatch" duty patrol the border, maintain electronic surveillance of major crossing points along the border, and staff traffic checkpoints along major highways near the border. Figure 5 shows annual Border Patrol officer hours devoted to linewatch duty from 1964 to 2003. Officer hours increased dramatically in the 1990s, rising from 2.5 million in 1994 to 9.8 million in 2001. This increase was due primarily to stepped up enforcement efforts at urban crossing points in California and Texas.

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[21] A second strategy, less common among Mexican immigrants but more common among those from other countries, is to enter the United States on a temporary visa and then remain in the country after it expires.

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Concurrent with increased enforcement, apprehensions of those attempting illegal entry have increased, rising from 280,000 a year during the 1970s to 930,000 a year during the 1990s. Individuals apprehended by Border Patrol officers on linewatch duty are typically captured while trying to enter the United States or just after entering the country. Linewatch apprehensions are thus correlated with the contemporaneous level of attempted illegal immigration.[22] However, apprehensions are likely to be a poor indicator of the actual level of illegal inflows (Espenshade, 1995). Within a single month, one individual may be apprehended multiple times. Those apprehended who agree to be deported voluntarily are not processed by the U.S. justice system. For Mexican nationals, voluntary deportation often involves little more than a bus ride across the border, leaving them in position to attempt illegal entry again in the near future.[23, 24]

To gauge how apprehensions might be related to illegal immigration, consider the level of apprehensions as a function of the average probability of apprehension and the number of attempts at illegal entry. Extending Ethier's (1986) model, let

$$A_t = P(H_t, M_t)M_t,$$ (5)

where A_t is the level of apprehensions, M_t is the number of attempts at illegal entry, and $P(H_t, M_t)$ is the average probability an individual is apprehended on any given attempt to cross the border. The apprehensions probability is a function of H_t, the intensity with which authorities police the border, and the number of entry attempts. Greater enforcement is likely to raise the apprehension probability, making $P(\cdot)$ increasing in H_t. For a given level of enforcement, more total attempts are likely to reduce the probability any single attempt results in capture (since enforcement resources are spread more thinly across those attempting entry), making $P(\cdot)$ decreasing in M_t.[25]

Suppose $P(H_t, M_t) = cH_t^{\alpha_1}M_t^{-\alpha_2}$, where c, α_1, and α_2 are positive constants, in which case log apprehensions can be expressed as

$$\ln A_t = \alpha_0 + \alpha_1 \ln H_t + (1 - \alpha_2)\ln M_t$$ (6)

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[22] Individuals apprehended in the U.S. interior, in contrast, could have crossed the border at a much earlier date, making interior apprehensions less strongly correlated with current attempts at illegal entry.

[23] Between 1990 and 2003, 95% of those the Border Patrol apprehended agreed to depart voluntarily.

[24] A further issue is that the majority of those attempting illegal entry do not appear to be apprehended on any given attempt. Using MMP data, Massey and Singer (1995) find that for trips to the United States in the 1970s and 1980s the average probability of apprehension was 35%.

[25] For earlier work using apprehensions data, see Bean, et al. (1990) and Borjas, Freeman, and Lang (1991).

Hanson and Spilimbergo (1999) use monthly data over the period 1968-1996 to estimate equation (6), modeling attempted illegal entry as a reduced-form function of real wages in Mexico, real wages in the United States, other indicators of economic conditions in the two countries, a time trend and monthly dummy variables.[26] With an estimate of α_1, we can solve for a function that is an affine transformation of $\ln M_t$, given by,

$$\alpha_0 + (1 - \alpha_2) \ln M_t = \ln A_t - \alpha_1 \ln H_t \qquad (7)$$

The expression on the right of (7) will positively covary with $\ln M_t$ as long as $\alpha_2 < 1$. Approximated attempts at illegal entry in (7) do not give an estimate of the level of illegal immigration. However, they may indicate the variation across time and the magnitude of log changes in attempted illegal entry.

Figure 6 shows estimates of (7), based on instrumental-variables estimates of equation (6) (see note 26). Approximated attempts at illegal entry rise from the 1960s to the mid 1980s, are stable from the mid 1980s to the mid 1990s, and then decline somewhat in 2000 and 2001. Part of the 2001 decline may reflect a change in border-crossing activity after the events of September 11th in the United States. In late 2001, the U.S. Border Patrol increased its vigilance at border crossings, which may have dissuaded some migrants from crossing as frequently as they had in the past.[27]

The trend in Figure 6 is roughly consistent with Table 1 and results from previous estimates of the U.S. unauthorized population. Illegal immigration appears to have risen steadily after the end of the Bracero Program in 1965 and has been relatively stable at high levels for the past two decades.[28] I will return to data on border apprehensions and enforcement when evaluating factors that affect the level of illegal immigration and the political economy of U.S. policy on illegal immigration.

2.5 Summary

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[26] To deal with the possible correlation between enforcement and unobserved shocks to apprehensions, Hanson and Spilimbergo (1999) instrument for enforcement using U.S. government spending on national defense and indicators for whether there is an upcoming U.S. presidential, congressional, or border-state gubernatorial election. Border enforcement tends to follow a political cycle, dropping during election years (Hanson, Robertson, and Spilimbergo, 2001). The reported coefficient estimate for α_1 is the long-run elasticity of apprehensions with respect to enforcement.

[27] See Mary Jordan, "Mexicans Caught at Border in Falling Numbers," *Washington Post*, May 24, 2002.

[28] One limitation of this exercise is that I assume border-crossing technology and border-apprehensions technology have been stable over time. There is anecdotal evidence that both may have changed considerably, especially since September, 2001. However, Hanson and Spilimbergo (1999) find no evidence of a structural break in the apprehensions function for the 1968 to 1996 period.

Currently, no data source gives precise estimates of the size of the U.S. illegal-immigrant population over medium or long time spans. Government data-gathering agencies have been wary of asking questions about an individual's immigration status, perhaps out of fear of dissuading illegal migrants from participating in surveys. The result is gaps in our knowledge about unauthorized migrants, which the literature has been able to partially fill in through other data sources.

The perspective that emerges from the data that are available is that Mexico-to-U.S. illegal migration increased in the 1970s and 1980s and averaged around 200,000 to 300,000 net unauthorized entries per year in the 1990s and early 2000s. The population of illegal immigrants from Mexico in the United States includes a substantial fraction of women, is predominantly employed in non-agricultural jobs, and has schooling levels that are comparable to or higher than non-migrating individuals in Mexico. Though many migrants maintain ties with family members in their origin communities, a majority appear to have settled in the United States on a medium or long-term basis.

3. The Supply of and Demand for Mexican Immigrants

Beginning with Sjaastad (1962), economists have viewed migration as an investment decision. An individual migrates if the expected discounted difference in the stream of income between the new and old location exceeds moving costs. The incentive to migrate will vary across individuals according to differences in their expectations of future earnings, discount rates, and perceived cost of migrating. The cost of unauthorized migration includes transport to the border, the physical risks and monetary charges incurred in crossing the border illegally, the psychic penalty from leaving one's friends and family behind, and the time and monetary expense of settling in another country. To uncover sources of variation in the demand for and the supply of illegal migrants, recent work estimates the sensitivity of migrant outflows from Mexico to variation in U.S. and Mexican wages, border-crossing costs, and access to migration networks.

Also beginning with Sjaastad, economists tend to model the migration decision as irreversible (Greenwood, 1997; Lucas, 1997). In many contexts, this assumption may be reasonable. U.S. legal immigrants, if they wish to keep their green cards valid, must make the United States their permanent residence.[29] Those migrating to the United States legally would thus tend to be individuals expecting to stay in the country for an extended period of time. In the context of illegal migration from Mexico, individuals may operate on shorter time horizons. The substantial round-trip migration documented by the Mexican Migration Project indicates that for at least some Mexican nationals the cost of moving back and forth across the border is sufficiently low to warrant making the trip annually.

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[29] A green-card holder may lose U.S. permanent resident status by taking permanent residence abroad, remaining abroad without obtaining a re-entry visa, or by filing a foreign tax return as a non-immigrant. Once a legal immigrant becomes U.S. citizens, he or she is free to enter and leave the country at will.

Of interest to both Mexico and the United States is not just the volume of migrant flows but their composition. Widening differences in earnings between immigrants and natives in the United States is cited as evidence that recent U.S. immigrants are negatively selected in terms of skill (Borjas, 1999a). Following this line of thought, one might expect negative selection to be especially strong among illegal immigrants. Recent work examines migrant selection by comparing the characteristics of Mexican immigrants in the United States with those of non-migrating individuals in Mexico.

3.1 The Incentive to Migrate from Mexico to the United States

A long line of research applies the general framework in Sjaastad (1962) to examine the sensitivity of migration flows to the observed costs and benefits of migrating. For prospective illegal migrants in Mexico, the costs include the four components identified above and the benefits include gains in real income associated with moving from low-wage Mexico to the high-wage United States.

First, consider the components of illegal migration costs. Of these, transport costs to the border are likely to be small and psychic costs difficult to evaluate. Border-crossing costs and settlement costs are in principle measurable, though it is only the former that has been subject to much in the way of formal research. To avoid capture by the U.S. Border Patrol, migrants often purchase the services of a smuggler, known as a *coyote*.[30] Coyotes offer a range of services, from simply guiding migrants across the border to more complete packages that include transport to an interior U.S. city, such as Houston, Los Angeles, or Phoenix.[31] The MMP is one of the few data sources that asks migrants from Mexico about their border-crossing behavior. Using MMP data, Orrenius (2001) documents that during the period 1978 to 1996 69% of migrants reported hiring a coyote, as shown in Figure 7.[32] During this period, the average price paid for coyote services varied between \$385 and \$715 (in 2000 dollars). Since 2001, when the Border Patrol became more vigilant in monitoring U.S. border crossing points, coyote prices have risen. Based on a 2005 survey of return migrants in rural areas of two Mexican states (that are also in the MMP), Cornelius and

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[30] Coyotes also help migrants navigate unfamiliar terrain. Recent changes in U.S. enforcement strategy have made it more difficult to cross the border in urban areas, encouraging migrants to enter the United States through the mountainous desert regions of Arizona and Eastern California, where temperature extremes expose migrants to physical risks. Annual deaths of border crossers have increased from an average of 100 during the mid 1990s to 410 during the period 2000-2004 (Cornelius, 2005). With net annual illegal immigration from Mexico since 2000 at approximately 300,000 individuals (see Table 1), there appear to be around 1.4 deaths per 1,000 successful net unauthorized migrants.

[31] For the more expensive, complete package of smuggling services, the coyote typically receives a portion of the fee up front and the remaining portion once the migrant is safely delivered to friends or family members in the United States. See Charlie LeDuff, "The Crossing: A Special Report; A Perilous 4,000 Mile Passage to Work," *New York Times*, May 29, 2001, p. 1.

[32] To reduce recall bias, I only show data for years within four of years of an MMP survey.

Lewis (2007) find that between the 1996-1998 and 2002-2004 periods average coyote prices rose by 37% from $1180 to $1680.[33]

One might be concerned that coyote prices based on MMP data are biased downwards. As mentioned in the last section, the MMP surveys households in communities with high rates of migration to the United States. Individuals in these communities may have relatively good access to migration networks, making them less dependent on coyote services or better able to negotiate lower prices from smugglers. Cornelius and Lewis (2007) report that 65% of migrants hiring a smuggler in 2004 used friends or family to find a coyote. Results using the MMP itself are consistent with concerns about bias in observed coyote prices. Gathmann (2004) finds that migrants with family members in the United States are less likely to use coyote services, and, among migrants who do hire a smuggler, those with family members abroad pay lower prices. Yet, even if one accepts the high coyote prices quoted in the press,[34] border-crossing costs since 2001 appear to be no more than $2,000, which is 35% of Mexico's 2003 per capita GDP.

Next, consider the benefits to migration. To calculate the gross return to migration, one would need to account for the expected length of stay in the United States, the expected path of future earnings, and the discount rate applied to these earnings. In the absence of data on these components, much of the research on the decision to migrate takes a reduced-form approach to modeling how the returns to migration affect behavior.[35] Using retrospective data from the MMP, Orrenius and Zavodny (2005) estimate the hazard that young males migrate to the United States as a function of individual and household characteristics and economic conditions in the two countries.[36] In the MMP, most migrants appear to be entering the United States illegally. The migration hazard is non-monotonic in schooling, increasing at low and medium schooling levels (primary and secondary school) and decreasing at higher schooling levels (preparatory school and beyond).[37] The hazard is decreasing in per capita GDP in Mexico and increasing in U.S. average wages. These results suggest that migrants tend to be drawn from the middle of the schooling distribution and that migration is more likely during periods when U.S. income is expanding relative to income in Mexico. The migration hazard is also higher for individuals whose fathers have migrated or whose siblings have migrated. This result could indicate the presence of family

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[33] The increase in prices is based on respondents recollections in 2005 of prices they paid in previous years and thus may be subject to recall bias. In 2005, 90% of respondents in Cornelius' data (all of whom are from the states of Jalisco or Zacatecas) reported using a coyote on their previous trip to the United States.

[34] Recent articles in the popular press give a price range for coyote services of $1,500 $2,000 ("Man Accused of Smuggling Immigrants," *The Oregonian*, September 17, 2005, p. B2; "US Immigration," *The Economist*, May 19, 2005; "Between Here and There," *The Economist*, July 5, 2001; "Illegal Immigration; Border Agents Understand a Complex Issue," *The San Diego Union-Tribune*, May 26, 2005, p. B12).

[35] In earlier work, Taylor (1987) examines migration behavior in a single rural community in Mexico.

[36] See also Stark and Taylor (1989, 1991) and Massey and Espinosa (1997).

[37] McKenzie and Rapoport (2004), who also use MMP data, obtain similar results.

migration networks, or it could indicate the presence of unobserved household characteristics (e.g., unmeasured wealth) that influence migration behavior.

By treating migration as a function of age, education, and other individual characteristics, Orrenius and Zavodny pick up variation across individuals in the incentive to migrate. By also including macroeconomic conditions, they pick up time-series variation in the migration incentive. Yet, since their specification is a reduced form, the coefficient estimates do not allow one to recover the elasticity of migration with respect to wage differentials between the United States and Mexico. Further, since the MMP is restricted to communities with historically high propensities to migrate to the United States, the results may not be informative about how prospective migrants in other regions of Mexico respond to changes in binational economic conditions.

To examine how the gross level of attempted illegal migration responds to changes in U.S.-Mexican wages, Hanson and Spilimbergo (1999) estimate an apprehensions function, similar to that in equation (6). Using monthly data, they regress apprehensions at the U.S.-Mexico border on lagged apprehensions, current and lagged linewatch enforcement hours, the real peso wage for production workers in Mexican industry, real peso and real dollar U.S. wages (measured as the weighted average of wages in U.S. industries that employ recent Mexican immigrants in large numbers), and other controls. They instrument for enforcement using U.S. government spending on national defense and indicators for whether there is an upcoming U.S. presidential, congressional, or border-state gubernatorial election (see note 26). Figure 8 shows a partial regression plot of log apprehensions on log Mexican real average hourly earnings, based on Hanson and Spilimbergo's estimates. Border apprehensions appear to be very responsive to changes in Mexican wages. A 10% decline in Mexican real wages is associated with a 6-8% percent increase in border apprehensions. Moreover, this effect is almost fully realized within three months following a wage change, suggesting that shocks to the Mexican economy are rapidly transmitted to changes in attempted illegal migration.

Over the past three decades, Mexico has experienced wide variation in real income, as periodic devaluations of the peso have lead to bursts of inflation, which have caused incomes to fall sharply. Figure 9, which plots relative per capita GDP in the United States and Mexico, gives evidence of this volatility. During three separate episodes in the last 30 years, Mexico's per capita GDP declined by 5 log points or more (relative to the United States) within the space of three years. Each of these episodes was followed by an increase in border apprehensions. Much of the research on inter-regional migration in the United States and other countries finds that it is labor earnings in the receiving region, and not the sending region, that appear to drive migration flows (Greenwood, 1997). However, this does not appear to be the case in Mexico, where income volatility appears to be a strong push factor for illegal migration.

While apprehensions are the only available high-frequency measure of gross attempts at illegal migration, these data have important limitations. Since individual migrants may be apprehended multiple times in a given time period, the number of apprehensions may far exceed the gross number of migrants (Espenshade, 1995). Controlling for border enforcement addresses this problem, but only if one has valid instruments for enforcement (since enforcement is likely to be endogenous to shocks to attempted illegal migration) and if the impact of enforcement on apprehensions (controlling for the incentive to migrate) is stable over time (see notes 26 and 28).

3.2 U.S.-Mexico Wage Differences

The reduced-form results of Orrenius and Zavodny (2005) and Hanson and Spilimbergo (1999) suggest that illegal migration flows are highly responsive to changes in the return to migration. However, these results give no indication of the magnitude of the returns themselves. As a crude approximation of the short-run gross return to migration, I examine differences in hourly wages for men in Mexico and Mexican immigrant men in the United States in 2000. I ask how long a migrant from Mexico would have to work in the United States in order to recoup border-crossing costs, as approximated by the price of coyote services. I focus on males, since, as Table 2 shows, there are large differences in labor-force participation rates between women in Mexico and Mexican immigrant women in the United States, which complicates comparing female wage outcomes across national borders. By limiting the analysis to current wage differences and a single component of migration costs, this exercise falls well short of a complete cost-benefit accounting of the migration decision. Still, given large back and forth flows of labor across the U.S.-Mexico border, the current U.S.-Mexico wage differential is likely to be the relevant gross return to migration for at least some prospective migrants.

Table 3a reports average hourly earnings by age and schooling categories for males in Mexico (based on the 2000 Mexico Census of Population and Housing) and for immigrant males from Mexico in the United States (based on the 2000 U.S. Census of Population and Housing).[38] To increase the share of illegal immigrants among Mexican immigrant men, I limit the sample to very recent immigrants (individuals residing in the United States for 0-3 years). To adjust for cost of living differences between the countries, I scale up Mexican hourly wages to achieve purchasing power parity with the United States, using the 2000 PPP adjustment factor for Mexico in the Penn World Tables.[39]

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[38] For Mexico, average hourly wages are calculated as monthly labor income/(4.5*hours worked last week); for the U.S., average hourly wages are calculated as annual labor income/(weeks worked last year*usual hours worked per week). For Mexico, I need to assume individuals work all weeks of a month, which could bias wage estimates downwards. To avoid measurement error associated with implausibly low wage values or with top coding of earnings, I drop the largest and smallest 0.5% of wage values.

[39] In 2000, Mexico's PPP-adjusted price level was 61% of the U.S. price level.

Not surprisingly, wages are substantially higher among Mexican immigrants in the United States than among residents of Mexico. For 23-27 year-old males the PPP-adjusted hourly wage differential varies from $7.01 for those with 0-4 years of schooling to $5.76 for those with 13-15 years of schooling and to $7.82 for those with 16 or more years of schooling. Given that migration propensities vary widely across regions of Mexico, one might think that the average hourly wage for the country as a whole may not be the relevant alternative wage for most prospective migrants. Table 3b reports wage differentials between the United and States and high-migration states in Mexico, defined to be states with above-average emigration rates in 2000.[40]   U.S.-Mexico wage differentials for high-migration states are similar to those for Mexico as a whole.

In Table 3b, the log binational wage difference declines with schooling, which is in line with empirical research that has suggested estimated returns to schooling are higher in Mexico. In the 1990s in the United States, an additional year of schooling is associated with an increase in wages for Mexican immigrant men of 2.5 to 3.2 log points (Borjas, 1996; Trejo, 1997; Grogger and Trejo, 2002).   In 1990s in Mexico, in contrast, an additional year of schooling is associated with an increase in wages for men of 7.6 to 9.7 log points (Chiquiar, 2003).[41]   Returns to experience also appear to be higher for Mexican residents than for Mexican immigrants. Higher returns to education in Mexico are consistent with the country having a low relative supply of skilled labor compared to the United States. Higher average wages in the United States (within schooling groups) are consistent with the country having a higher relative level of TFP and higher relative supplies of physical capital.

In 2000, a 23-27 year-old recent Mexican migrant with 5 to 8 years of schooling (the category just below the national mean level of schooling for Mexico) would recoup border-crossing costs of $2,000 in 313 hours, or 7.8 weeks based on a 40-hour work week. The speed with which migrants would seem to recover border-crossing costs suggests that other costs to migration (including psychic costs and financing costs associated with credit constraints) are large. In a simple static model, the equilibrium wage differential between two countries is fixed by migration costs. To reconcile persistent U.S.-Mexico wage differences with small border-crossing costs, there would need to be positive unobserved migration costs (otherwise migration flows would be larger) and heterogeneity across individuals in these costs (otherwise migration flows would be lumpier, with either everyone or no one in a skill group willing to migrate).

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[40] These states are Aguascalientes, Colima, Durango, Guanajuato, Guerrero, Hidalgo, Jalisco, Michoacan, Morelos, Nayarit, Oaxaca, San Luis Potosi, and Zacatecas.

[41] On the returns to education in Mexico, see also Cragg and Epelbaum (1996) and Ariola and Juhn (2003). If unobserved ability and schooling are correlated, estimates of returns to schooling may be biased. Also, self-selection into the labor force or into migration may introduce further biases.

There are reasons to be skeptical about how well the observed U.S.-Mexico wage differential captures the incentive to migrate. This differential reflects the binational difference in returns to both observed and unobserved characteristics. If migrants are positively selected in terms of unobserved skill, observed wage differences will tend to overstate true wage differences. In the next section, we address the issue of which types of individuals in Mexico select into migration.

Another issue is that, since average wages for Mexican immigrants in the United States are a composite of wages for legal and illegal immigrants, they may overstate wages an illegal immigrant would expect to earn. Kossoudji and Cobb-Clark (2001) use the Legalized Persons Survey (LPS) to compare wages for illegal immigrants before and after they obtained green cards under the amnesty provision of the 1986 Immigration Reform and Control Act. Between 1989 and 1992, average hourly earnings for newly legalized immigrant men (64% of whom were Mexican nationals) rose by 6 log points relative to earnings for Latino men in the NLSY, controlling for observable characteristics. Also, prior to legalization, illegal-immigrant men had relatively slow wage growth. Not surprisingly, illegal status is associated with lower wages and less opportunity for occupational advancement (Koussoudji and Cobb-Clark, 1996 and 2000).[42]

What is surprising, perhaps, is that the estimated wage premium for legalization is so small. One might expect that being confined to the underground economy would substantially limit workers' employment prospects. Once legalized, they would enjoy strong wage growth. By this reasoning, a 6-log-point gain over three years is unimpressive. One possibility is that the three years covered by the LPS is not long enough for individuals to realize the wage benefits associated with gaining legal status. Legalization may open up new opportunities to move between occupations or between regions, which migrants need more time to exploit. Another possibility is that Koussoudji and Cobb-Clark's estimate is biased downwards. Their control group includes legal and illegal immigrants from Latin America, as well as second and later generation Latin American immigrants. Suppose illegal immigrants are more negatively selected in terms of unobserved skill than legal immigrants (where overall legal immigrants may be positively or negatively selected in terms of skill). In an economy where the return to skill is rising (as in the United States during the 1990s), stronger negative selection of illegal immigrants in terms of unobserved skill would tend to make their unobserved wage growth relatively small and lead one to underestimate the wage premium due to legalization.

The differential in U.S. and Mexican wages in Table 3b may also miss important sources of variation across individuals in the incentive to migrate. For instance, average wages for Mexican immigrants in the United States may hide heterogeneity in expectations about U.S. wages among prospective migrants. Individuals with previous U.S. labor-market

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[42] Rivera-Batiz (1999), who also uses the LPS, estimates larger wage differences between legal and illegal immigrants. For other work on the wage consequences of IRCA, see Bansak and Raphael (2001).

experience or who speak English well might have relatively strong wage expectations due to the ease with which they expect to find a U.S. job or the high productivity they anticipate having on the job. Though not specific to Mexico, Bleakley and Chin (2004) find that, for immigrants from non-English-speaking countries that arrived in the United States as children, wages are higher for those with stronger English-language skills.[43]

Another source of heterogeneity in wage expectations among prospective migrants is variation in access to migration networks. Individuals with friends or family that have migrated abroad may have better information about how to find a job in the United States. Munshi (2003), using data from the MMP, finds that Mexican migrants in the United States are more likely to be employed and more likely to be employed in a (higher-paying) nonagricultural job the larger is the U.S. population of residents from their origin community in Mexico.[44] He instruments for the time-varying size of the U.S. population from a migrant's origin community in Mexico using lagged rainfall in the migrant's origin community (which presumably affects the marginal productivity of labor in Mexican agriculture and so the incentive to migrate abroad). His results suggest that having a larger network improves a migrant's ability to assimilate economically in the United States. Migration networks appear to be organized around families. Among nonagricultural (agricultural) workers, 78% (74%) received assistance in finding a U.S. job, and among this group 47% (43%) received help from a relative and 47% (43%) received help from a friend or *paisano* (someone from their home region in Mexico). The small remaining fraction of those receiving assistance relied on an employer, labor contractor or other source.

Even accounting for heterogeneity in wage expectations among migrants, the volume of Mexico-to-U.S. migration is smaller than one might expect. U.S.-Mexico real wage differentials are large today and have been large for over a century (Massey, Durand, and Zenteno, 2001). The emerging literature on migration networks suggests that networks arise in response to hidden migration costs associated with finding employment and getting settled abroad. Carrington et al. (1996) develop a model of regional labor movements in which migration networks lead migrant flows to be sluggish initially, when the migrant population is small, and then to accelerate over time, as migration costs endogenously fall in response to past migration. Imperfect credit markets, which we discuss in the next section, are another explanation for sluggish migration.

3.3 The Selection of Migrants from Mexico

In an important body of work, Borjas (1987, 1991) argues that who migrates to the United States from a particular country will depend on that country's wage distribution. In a country with high returns to skill and high wage dispersion, as in

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[43] Bleakley and Chin (2004) instrument for English-language ability using immigrant age at arrival, exploiting the fact that younger children appear to learn new languages more easily than older children.

[44] For other work on migration networks in Mexico, see Winters, de Janvry, and Sadoulet (2001).

Mexico, there will be negative selection of migrants. Those with the greatest incentive to migrate to the United States will be individuals with below-average skill levels in their home countries. In support of this idea, Borjas (1987, 1995) finds that as sources for U.S. immigration have shifted from Europe to Latin America and Asia, the economic performance of new immigrants has deteriorated. Relative to earlier cohorts, recent immigrants earn lower wages compared to natives at time of arrival and take longer for their earnings to converge to native levels. These findings counter an earlier belief that immigrants tend to have high potential for earnings growth (Chiswick, 1978).

A simple test of the negative selection hypothesis is to compare the observable skills of migrants from Mexico with individuals in Mexico who choose not to migrate abroad. While selection on observables does not necessarily reflect selection on unobservables, one might expect individuals' observable and unobservable skills to be positively correlated. Table 4 shows educational attainment for Mexican immigrants in the United States and for residents of Mexico in 2000, based on census data from the two countries. To help isolate the population of illegal immigrants, the table shows results separately for very recent immigrants (0-3 years in the United States) and for longer-term immigrants (4+ years in the United States). Section 2 suggests a relatively high fraction of very recent immigrants are likely to be illegal immigrants. To control for age, I limit the sample to 28-37 year olds, which in Table 2 is the age cohort with the highest likelihood of migrating abroad. For comparison, the table also describes educational outcomes for the full sample of working-age residents of Mexico and immigrants from Mexico in the United States.

It is well known that Mexican immigrants in the United States are much less educated than U.S. natives (Borjas and Katz, 2005). However, Mexican immigrants, whether recent or longer term, compare favorably when we examine residents of Mexico. In 2000, 65% of male residents of Mexico had 9 or fewer years of schooling, compared to 54% of recent immigrants and 51% of longer-term immigrants. Beyond 9 years of education, Mexican immigrants outperform Mexican residents in every category except college graduates. Relative to male residents of Mexico, recent Mexican immigrant men are more likely to have 10-15 years of education (40% versus 23%) and less likely to have 16 plus years of education (5% versus 12%). A similar pattern holds for men in 1990 and for women in either year. It appears that in Mexico individuals with moderate to high education levels have the highest likelihood of migrating abroad, which is inconsistent with negative selection of migrants in terms of observable skills.

Other data on Mexican migration are also inconsistent with negative selection. Using historical data from U.S. and Mexico population censuses, Feliciano (2001) finds that average schooling of Mexican immigrants has been higher than for residents of Mexico since at least 1940. Based on MMP data, in which the vast majority of individuals who migrate to the United States do so illegally (at least on their first attempt), Orrenius and Zavodny (2005) estimate that the probability a young adult male

migrates to the United States increases as schooling rises from low levels to levels around the national mean (eight years) and then declines as schooling rises to levels above the national mean. McKenzie and Rapoport (2004) obtain similar results, also using the MMP.[45] These findings are similar to literature on internal migration in Botswana, India, the Philippines, and other developing countries, in which there appears to be an inverted U-shaped relationship between rural household income and the likelihood that a household finances urban migration for one or more of its members (Lucas, 1997).

Chiquiar and Hanson (2005) develop a more formal approach to evaluate the selection of Mexican immigrants in terms of observables. Let the observed density of wages for individuals working in Mexico be

$$g(w \mid i = MX) = \int f^{MX}(w \mid x) h(x \mid i = MX) dx , \qquad (8)$$

and the observed density of wages for Mexicans working in the United States be

$$g(w \mid i = US) = \int f^{US}(w \mid x) h(x \mid i = US) dx , \qquad (9)$$

where $f^i(w \mid x)$ is the density of wages w in country i, conditional on a set of observed characteristics x, and $h(x \mid i)$ is the density of observed characteristics in i. Consider the density of wages that would prevail for Mexican immigrants in the United States if they were paid according to the price of skills in Mexico:

$$g^{MX}_{US}(w) = \int f^{MX}(w \mid x) h(x \mid i = US) dx . \qquad (10)$$

DiNardo, Fortin, and Lemieux (1996) show that, under the assumption that the distribution of unobservables (conditional on the distribution of observables) is the same in the two countries, a counterfactual density as in (10) can be written as

$$g^{MX}_{US}(w) = \int \theta f^{MX}(w \mid x) h(x \mid i = MX) dx , \qquad (11)$$

where

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[45] On migrant selection in Mexico, see also Ibarraran and Lubotsky (2005).

$$\theta = \frac{h(x \mid i = US)}{h(x \mid i = MX)} = \frac{Pr(i = US \mid x)}{Pr(i = MX \mid x)} \frac{Pr(i = MX)}{Pr(i = US)} . \quad^{46} \qquad (12)$$

Thus, the counterfactual density in (11) can be estimated by taking the observed density for wage earners in Mexico and re-weighting it to reflect characteristics of Mexican immigrant workers in the United States. The weight in (12) can be estimated parametrically by running a logit on the probability of a Mexico-born adult being in the United States, conditional on observed characteristics, using a sample that combines Mexican immigrants and Mexican residents.

By comparing actual and counterfactual wage densities, we can nonparametrically summarize the nature of migrant selection in Mexico. Consider the difference between the actual wage density for residents of Mexico and the counterfactual wage density that would obtain were Mexican immigrants paid according to skill prices in Mexico:

$$g_{US}^{MX}(w) - g^{MX}(w) = \int [\theta^M - 1] f^{MX}(w \mid x) h(x \mid i = MX) dx . \qquad (13)$$

If there is negative selection of migrants in terms of observable skills, the difference in (13) would show positive mass in the lower part of the wage distribution – indicating migrants are over-represented among Mexico-born individuals with below-average skills – and negative mass in the upper part – indicating migrants are under-represented among the Mexico-born with above-average skills. In contrast, with positive selection there would be negative mass for low wages and positive mass for high wages.

Figure 10 shows estimates of the density difference in (13) for men and women in 1990 and 2000, based on results in Chiquiar and Hanson (2005). The sample is working-age adults (21 to 65 years of age) who either reside in Mexico or are very recent Mexican immigrants in the United States. Immigrants are individuals 21 years or older at time of U.S. entry and who have been in the U.S. for 3 years or less. (Again, very recent immigrants are likely to include a relatively high fraction of illegal immigrants.) The logit regression used to estimate the weights in (12) has as regressors dummy variables for age, schooling, and marital status, and interactions of these variables.

Consistent with Table 4, it is *not* the lowest-wage individuals who exhibit a stronger tendency to migrate to the United States. In either year, for Mexican immigrant males there is greater mass in the middle of the wage density and less mass in either tail,

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[46] Chiquiar and Hanson (2005) show how to derive a weighting function similar to (12) that controls for differences in labor-force participation among workers in the two countries. To simplify the exposition, I leave out the analytics behind this extension. The results in Figure 10 control for differences in labor-force participation between Mexico and the United States.

when compared with the actual wage density of Mexico residents. The immigrant-resident density difference is close to zero in the left tail to just below zero, positive for middle wage values, and again close to zero in the right tail. This suggests that immigrant males are drawn disproportionately from the middle of Mexico's wage distribution, rather than from the bottom half. Low-wage and high-wage individuals appear to be relatively less likely to migrate to the United States. These counterfactual wage densities support intermediate selection of immigrant men in terms of observable skills. The results for females contain even less support for negative selection. The immigrant-resident density difference is negative for low wage values, strongly positive for upper-middle wage values, and zero for high wage values. For women, there appears to be moderate positive selection of immigrants.

Table 4 and Figure 10 do not explicitly separate legal and illegal Mexican immigrants, leaving it unclear how the two groups compare in terms of skill. What does theory suggest about the self-selection of legal versus illegal migrants? Consider a simple extension of Borjas (1991), who adapts the Roy (1951) model.[47] Let individuals from Mexico, indexed by 0, choose whether or not to migrate to the United States, indexed by 1, where migration is a one-time decision (or, equivalently, a one-period decision). Residents of Mexico face a wage equation given by

$$\ln(w_0) = \mu_0 + \delta_0 s \,, \tag{15}$$

where for Mexico w_0 is the wage, μ_0 is the base wage, s is the level of schooling, and δ_0 is the return to schooling. If the population of Mexicans were to migrate *legally* to the U.S., they would face the wage equation

$$\ln(w_1^L) = \mu_1^L + \delta_1^L s \,, \tag{16}$$

while if they were to migrate *illegally* they would face wage equation,

$$\ln(w_1^I) = \mu_1^I + \delta_1^I s \,. \tag{17}$$

where w_1^i is the wage, μ_1^i is the base wage, and δ_1^i is the return to skill for Mexican migrants with status i. Higher levels of TFP and larger relative supplies of capital in the

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[47] For expositional simplicity, I consider a non-stochastic version of Borjas (1991), in which there is no unobserved component of skill. The extension to a stochastic setting is straightforward.

United States suggest the base wage is lower in Mexico ($\mu_1^i > \mu_0$, for i=I,L); higher U.S. relative supplies of human capital suggest that the return to schooling is higher in Mexico ($\delta_1^i < \delta_0$, for i=I,L). Table 3 supports both assumptions. Kossoudji and Cobb-Clark (2001) find that in the United States the base wage and the return to schooling are higher for legal than for illegal immigrants, which suggests $\mu_1^L \geq \mu_1^I$ and $\delta_1^L \geq \delta_1^I$.

Migrant selection also depends on the structure and financing of migration costs. Consider a setup similar to Borjas (1987), in which the migration cost for migration status i, C^i, expressed in time-equivalent units, $\pi^i = C^i / w_0$, is assumed to be constant across individuals. Combining equations (15)-(17), a resident of Mexico will be willing to migrate to the United States under migration status i if

$$\ln(w_1^i) - \ln(w_0 + C^i) \approx \ln(w_1^i) - \ln(w_0) - \pi^i > 0 . \qquad (18)$$

Suppose that migrants finance migration costs by borrowing and that to secure a loan of amount C^i a migrant must have collateral of amount γC^i, $\gamma > 0$. Collateral requirements may reflect imperfect credit markets, which place initial wealth restrictions on which agents are capable of migrating abroad, as in Rapoport (2002), McKenzie and Rapoport (2004), and Orrenius and Zavodny (2005).[48]

To capture the relationship between credit constraints and skill, suppose that individual wealth in Mexico, Y_0, is a linear function of skill, such that

$$Y_0 = \rho_0 + \sigma_0 s . \qquad (19)$$

Low-skill individuals will be unable to finance migration because they have insufficient collateral to secure a loan. The lowest skill level for migration strategy i to be feasible is

$$\underline{s}_i = \frac{\gamma C^i - \rho_0}{\sigma_0} ,. \qquad (20)$$

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[48] I limit the analysis to partial equilibrium. Rapoport (2002) develops a general-equilibrium model of credit constraints and migration, based on the occupation-choice model in Banerjee and Newman (2003).

which is higher the larger are migration costs. Whether the least skilled legal migrant is more or less skilled than the least skilled illegal migrants depends on the relative magnitude of legal and illegal migration costs. In Cornelius and Lewis (2007), recent border-crossing costs for illegal migrants range from $1200 to $1700 (in 2000 dollars). The current costs of legal migration include fees paid to the U.S. government to process a visa application, which range from $700 and $1000 for family-sponsored immigration visas, and the expense of hiring a lawyer or immigration specialist to handle the application process, which typically ranges from $400 to $1000.[49] Ignoring the time costs involved in crossing the border illegally or in completing the bureaucratic steps needed to obtain a green card, entry costs for legal migrants from Mexico appear roughly similar in value to those for illegal migrants, in which case $\underline{s}_I$ and $\underline{s}_L$ would also be similar.

Based on (18), high-skill individuals will choose not to migrate because higher returns to skill in Mexico make it more attract to stay at home. The highest skill level for which migration strategy i is attractive is

$$\bar{s}_i = \frac{\mu_1^i - \mu_0 - C^i}{\delta_0 - \delta_1^i} \, , \qquad\qquad (21)$$

which is higher the larger the U.S.-Mexico difference in the base wage and the smaller the U.S.-Mexico difference in the return to skill. Thus, larger differences in the return to skill between countries make negative selection of migrants in terms of skill more pronounced. I assume parameter values are such that $\bar{s}_i > \underline{s}_i$ for i=I,L, which yields positive levels of both legal and illegal migration. As long as the lower support for the distribution of skill is less than $\min(\underline{s}_L, \underline{s}_I)$ and the upper support of the distribution of skill is greater than $\max(\underline{s}_L, \underline{s}_I)$, both legal and illegal migrants will tend to be drawn from individuals with intermediate skill levels. If legal and illegal migration costs are similar, Kossoudji and Cobb-Clark's (2001) results on base wages and returns to skill for legal and illegal migrants would suggest that $\bar{s}_L \geq \bar{s}_I$, or that the highest skilled legal migrants are at least as skilled as the highest skilled illegal migrants.

The simple theoretical model together with available empirical evidence suggests that legal migrants would be more positively selected than illegal migrants in terms of

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[49] On fees for immigration visas, see http://uscis.gov/ and http://www.usavisanow.com/.

skill. However, this outcome implicitly depends on all prospective migrants in Mexico having an equal probability of being eligible for a U.S. legal immigration visa. There is no reason to expect this to be the case. If more-skilled individuals are more (less) likely to have family members who are U.S. citizens or U.S. legal permanent residents, they will be more (less) able to obtain a U.S. green card, in which case there would be stronger (weaker) positive selection of legal migrants relative to illegal migrants. Also, the discussion ignores dynamic considerations, in which individuals may migrate illegally today in expectation of obtaining a U.S. green card in the future. As of yet, there is little empirical research on which types of households in Mexico appear to have better access to legal channels of obtaining a U.S. green card.

Combining (20) and (21), it is clear that as migration costs rise both legal and illegal migrants become more positively selected in terms of skill (i.e., the interval $(\underline{s}_i, \bar{s}_i)$, for i=I,L, shifts to the right). In the MMP, Orrenius and Zavodny (2005) find that as the level of U.S. border enforcement rises (U.S. linewatch enforcement hours increase) the probability a young adult male migrates to the United States falls, with the effect being stronger for individuals with lower schooling levels. This suggests that higher migration costs disproportionately select lower-skilled individuals out of the migrant pool. Similarly, McKenzie and Rapoport (2004) find that in MMP communities with stronger U.S.-migration networks the inverted-U-shaped relationship between migration and schooling is weaker. As migration costs fall (access to migration networks improves) positive selection of migrants becomes less pronounced.

There is abundant evidence that Mexican immigrants in the United States are disproportionately drawn from the middle of the distribution of observable skills in Mexico. While there are no data that explicitly differentiate between the selection pattern of legal and illegal migrants, there is intermediate selection among migrants in the MMP, in which a very high fraction of migrants are illegal. Intermediate selection is consistent with migrants facing credit constraints in financing the cost of migration, such that low-skill, low-income individuals are disproportionately selected out of the migrant pool. Other factors that could contribute to intermediate selection include higher discount rates greater risk aversion, or higher psychic migration costs among low-skilled, low-income individuals, such that these individuals are less willing to migrate to the United State for any given binational wage differential. Credit constraints or some other factor is needed to reconcile the facts that (a) the incentive to migrate appears to be strongest for individuals with low schooling (as seen in Table 3), and (b) individuals with low schooling have a relatively low probability of migrating abroad (as seen in Table 4).

3.4 Migration and the Supply of Labor in Mexico and the United States

As we have seen, the literature on labor flows from Mexico to the United States focuses primarily on the correlation between migration and U.S.-Mexico earnings

differences. There is little work on the underlying causes on these wage differences or whether migration is related to variation in these causal factors. The work that perhaps most closely addresses these issues is Robertson (2000), who examines the correlation between U.S. and Mexican wages over time. Using synthetic cohorts constructed from household data in the two countries over 1987-1997, he regresses the quarterly change in Mexican wages for a given age-education-region cell on quarterly changes in U.S. wages for the same age-education cell and on the lagged difference in U.S. and Mexican wages for the cell. A shock that raises U.S. wages by 10% is associated with an increase in wages in Mexican interior cities by 1.8% and wages in Mexican border cities by 2.5%.[50] Positive comovements in U.S. and Mexican wages are consistent with the two countries' labor markets being at least partially integrated. Migration flows are one factor that may contribute to labor-market integration, as are cross-border trade and investment flows.

To examine further the determinants of labor flows from Mexico to the United States, consider a simple two-country model in which the aggregate production function for Mexico (indexed by 0) at time t is given by

$$Q_{0t} = A_{0t} \left[K_{0t}^{\upsilon} + \left(\sum_{h} L_{0ht}^{\kappa} \frac{1}{j} \right)^{\frac{\upsilon}{\kappa}} \right]^{\frac{1}{\upsilon}} , \qquad (22)$$

where A_{0t} is total factor productivity, K_{0t} is the supply of capital, L_{0ht} is the supply of labor of skill type h, $\upsilon \leq 1$ determines the elasticity of substitution between capital and labor ($\nu = 1 - 1/\sigma_{KL}$), and $\kappa \leq 1$ determines the elasticity of substitution between labor skill types ($\kappa = 1 - 1/\sigma_{hh'}$, all $h \neq h'$). Equating the wage to the marginal product of labor,

$$\ln w_{0ht} = (1 - \nu) \ln Q_{0t} + (\upsilon - \kappa) \ln L_{0t} + (\kappa - 1) \ln L_{0ht} + \ln p_{0t} , \qquad (23)$$

where L_{0t} is the labor aggregate in (22) and p_{0t} is the price of Mexico's output. The aggregate production function for the United States (indexed by 1) has an analogous structure, with the added dimension that labor skill type h, L_{1ht}, is an aggregate of the employment of native and immigrant workers, who are imperfect substitutes, such that

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[50] Robertson (2000) also finds that wage changes in Mexico are negatively correlated with the lagged U.S.-Mexico wage difference, which suggests that over time wages in the two economies tend to converge. The estimated convergence rates are very rapid, with equilibrium U.S.-Mexico wage differentials being reached within one to two quarters. Rapid convergence seems at odds with rising levels of trade, investment, and migration between the two countries, which suggests that integration of U.S. and Mexican markets is incomplete and that wage convergence between the two countries is more gradual.

$$L_{1ht} = \left(\overline{L}_{1ht}^{\eta} + I_{ht}^{\eta} \right)^{\frac{1}{\eta}} , \qquad (24)$$

where $\overline{L}_{1ht}$ is the supply of native-born U.S. labor of skill type h, I_{ht} is the supply of immigrant labor of skill type h, and $\eta \le 1$ determines the elasticity of substitution between native and foreign labor ($\eta = 1 - 1/\sigma_{LI}$) The marginal product of immigrant labor in the United States (assumed to be the same for legal and illegal immigrants) is

$$\ln w_{Iht} = (1-\upsilon) \ln Q_{1t} + (\upsilon - \kappa) \ln L_{1t} + (\kappa - \eta) \ln L_{1ht} + (\eta - 1) \ln I_{ht} + \ln p_{1t} , \quad (25)$$

where L_{1t} is the U.S. labor aggregate and p_{1t} is the price of U.S. output.

If migration equalizes wages between the United States and Mexico, then

$$\ln w_{0ht} - \ln P_{0t} = \ln w_{Iht} - \ln P_{1t} - \ln c_{ht} , \qquad (26)$$

where P_{kt} is the consumer price index in country k (expressed in terms of a common currency) and $c_{ht} = 1 - C_{ht}/(w_{Iht}/P_{1ht})$ is the migration cost for labor type h expressed as a markup over the wage rate. C_{ht} may be a function of U.S. border enforcement, or, if migration networks exist, of the existing U.S. stock of immigrants from Mexico.

Using (23)-(26) to solve for the level of immigration of skill type h,

$$\ln I_{ht} = \frac{1}{1-\eta} \left[(\nu - 1) \ln \frac{Q_{0t}}{Q_{1t}} + (\kappa - \nu) \ln \frac{L_{0t}}{L_{1t}} + (\eta - \kappa) \ln \frac{L_{0ht}}{L_{1ht}} - \ln \frac{p_{0t}}{p_{1t}} + \ln \frac{P_{0t}}{P_{1t}} - \ln c_{ht} \right] .$$
$$(27)$$

Immigration of skill type h workers from Mexico is (a) decreasing in Mexico-U.S. relative GDP (which, in turn, is decreasing in Mexico-U.S. relative TFP and the Mexico-U.S. relative supply of capital), (b) increasing in the Mexico-U.S. relative labor aggregate (as long as different labor skill types are more substitutable than are aggregate labor and capital, such that $\kappa - \nu \ge 0$), (c) increasing in the Mexico-U.S. relative supply of skill type h (as long as immigrant and native workers of the same skill type are more substitutable than are labor of different skill types, such that $\eta - \kappa \ge 0$), (d) decreasing in the Mexico-U.S. terms of trade, (e) increasing in the Mexico-U.S. relative cost of living, and (f) decreasing in migration costs. All else equal, immigration rises when Mexico has slower

productivity growth, slower capital accumulation, faster labor-force growth, or negative terms-of-trade shifts relative to the United States.

What is the relative contribution of the variables on the right of (27) to the increase in Mexican migration to the United States? Unfortunately, existing literature offers few answers to such a question. For a preliminary take on the data, Figure 11 plots Mexico-U.S. relative real GDP per worker, the Mexico-U.S. terms of trade, and the Mexico-U.S. real exchange rate over the 1960-to-2000 period (based on the Penn World Tables). Relative real GDP per worker is a crude proxy for a term that combines the first, second, fourth, and fifth terms in (27) (i.e., all terms *except* the relative supply of labor for skill type h and migration costs). Relative income declines in the 1980s and is flat in the 1990s. Slow growth in Mexico's GDP and rapid growth in Mexico's labor force have combined to make the U.S.-Mexico gap in income per worker larger in 2000 than it was in 1980. Changes in the terms of trade appear to have mattered little for relative income changes. Over the last two decades, the Mexico-U.S. terms of trade have been stable, consistent with the two countries exporting similar types of manufactured goods.[51]

Changes in aggregate income may understate the contribution of binational income differences to Mexico-U.S. migration. Relative average aggregate income may hide variation in income across sectors or regions in Mexico that affect migrant outflows. For instance, negative income shocks to Mexican agriculture or to Mexico's high-migration states would likely increase migration abroad, even if positive income shocks to other sectors or regions helped smooth income at the national level. Also, the relative variability of income may affect migration, independent of changes in relative mean income. As movements in Mexico's relative price level in Figure 11 indicate, Mexico's economy has recently been subject to a high degree of price volatility.

To characterize changes in relative labor supplies in Mexico and the United States, Figure 12 shows the relative size of the working-age population in the two countries over the period 1970 to 2000. I take the population of Mexican nationals to be the sum of individuals born in Mexico residing in either Mexico or the United States, which I then divide into age cohorts by gender. To examine a population of U.S. natives who are likely to be substitutable in production with Mexican labor, I restrict U.S. age and gender cohorts to be individuals with a high-school education or less.

Over the 1980-to-1990 and 1990-to-2000 periods, there is a dramatic increase in the supply of young Mexican nationals relative to the supply of young less-educated U.S. natives. In 1980, Mexico's supply of 20-29 year olds was just over half the size of the

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[51] Terms-of-trade changes in the Penn World Tables may understate true terms-of-trade changes. Within industries, Mexico and the United States tend to specialize at different ends of the production chain, with the United States focused more on capital-intensive component production and Mexico focused more on labor-intensive product assembly. Such within-industry specialization may not be adequately reflected in conventional measures of the terms of trade, which fail to account for the fragmentation of production.

U.S. population of less-educated 20-29 year olds. By 2000, Mexico's supply was larger than the U.S. supply. The change in relative supply occurred in part because a large cohort of young Mexicans entered the labor force in the 1980s and 1990s and in part because more U.S. natives now continue their education beyond high school. The increase in relative labor supply is especially strong among women, for whom skill upgrading in the United States has been most pronounced (Katz and Autor, 1999).

As further evidence of the contribution of relative labor-supply changes to Mexico-U.S. migration, Figure 13 plots the stock of Mexican immigrants in the United States against the Mexico-U.S. relative supply of labor by gender and age cohort over the 1970-to-2000 period (where I use five-year age cohorts to increase the sample size). I restrict U.S. natives to be either those with a high-school education or less or those with less than a high-school education, which roughly approximates a plot of $\ln(I_{ht})$ against $\ln(L_{0ht}/L_{1ht})$ in (27).[52] Across cohorts and time, there is a strong positive correlation between Mexico-U.S. migration and the relative supply of Mexican labor. Figure 13 gives suggestive evidence that increases in the relative supply of Mexican labor contribute to migration abroad, presumably by pushing down Mexican wages.

Surprisingly, the determinants of wage differences between the United States and Mexico and their link to Mexico-U.S. migration flows are largely unexplored topics. A cursory glance at the data suggests that a combination of slow growth in Mexico's economy and rapid growth in Mexico's labor force have contributed to rising labor outflows in recent years. However, many details about this story are unknown. In the last two decades, Mexico has undertaken major economic reforms, which may have changed the distribution of factor rewards or the distribution of regional incomes in a manner that increased the incentive to emigrate.[53] The migration function in (27) suggests the link between relative factor supplies and migrant flows depends on the substitutability of Mexican and U.S. labor, which we know little about (Borjas, 2003).[54] And, while there is considerable micro-level evidence that migration networks affect individual migration decisions, there are few estimates of the impact of these networks on aggregate labor flows. Thus, the literature provides little guidance for thinking about

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[52] To keep this approximation as literal as possible, I define the supply of Mexican labor to be residents of Mexico and the supply of U.S. labor to be the sum of Mexican immigrants in the United States and less-educated U.S. natives (where both variables are measured by age and gender cohort).

[53] These reforms include a liberalization of foreign trade and investment (unilaterally over the period 1985 to 1989 and trilaterally with Canada and the United States under the North American Free Trade Agreement in 1994), the privatization of state-run enterprises and the deregulation of industry (in the late 1980s and early 1990s), and changes in the land-tenure system (in the early 1990s, which privatized land previously held by rural cooperatives). Aguayo (2005) finds that in the 1990s individuals from communities more exposed land reform were more likely to migrate internally in Mexico.

[54] Cortes (2005) and Ottaviano and Peri (2005) provide recent evidence that in the United States low-skilled native and foreign labor are less than perfect substitutes.

how GDP growth, population growth, skill upgrading, or other shocks to national economies affect aggregate labor flows from Mexico to the United States.

3.5 Summary

Differences in earnings between the United States and Mexico are one factor that contributes to Mexico-to-U.S. migration. Consistent with previous migration research in many other contexts, labor outflows from Mexico increase when U.S.-Mexico income or wage differences increase. Illegal migration flows, measured either using survey data on migrant-sending communities in Mexico or apprehensions at the U.S.-Mexico border, are quite responsive to relative income changes. Access to migration networks also appears to facilitate cross-border labor flows.

The literature has made little progress in identifying how the underlying determinants U.S.-Mexico wage differences affect binational migration. Another unresolved issue is why, given large income differences between the United States and Mexico and small observed costs in crossing the border illegally, migration flows are not larger. There appear to be unobserved sources of migration costs (or heterogeneity in the perceived benefits of migrating abroad) that are important enough to impede many individuals from leaving Mexico. These unobserved costs appear to be especially large for less-educated individuals, who have relatively low migration propensities despite having relatively large apparent returns to migration.

4. Policies to Control Illegal Immigration

Many government policies play a role in determining the level of illegal immigration. Some policies, including the enforcement of international borders and the monitoring of hiring practices by employers, affect illegal immigration directly. By changing the intensity with which they enforce borders or monitor employers, authorities effectively regulate the inflow of illegal immigrants from abroad. In the United States, enforcement policies are under the control of federal government agencies and can be changed frequently, even on a day-to-day basis. Other policies, including quotas for permanent or temporary legal immigration, the rights of immigrants to draw on public assistance, and minimum-wage requirements, affect illegal inflows indirectly through their impact on the expected reward from unauthorized migration. In the United States, these and other such indirect policies are set by Congress and tend to change slowly over time, which has made their impact on illegal immigration difficult to gauge.

In this section, I examine U.S. policies to control illegal immigration. I focus on enforcement policies, as these have been the subject of most academic research. Theoretical literature considers the incentives of countries to restrict illegal immigration and the political economy of impediments to labor inflows from abroad; empirical

literature examines the impact of enforcement policies on migrant flows. There is little work on policies that restrict labor outflows, as such policies do not exist in Mexico and are uncommon except in highly authoritarian regimes.

4.1 U.S. Border and Interior Enforcement Policies

There is considerable academic and policy interest in the economic impact of U.S. actions to prevent illegal immigration. The increase in the stock of illegal immigrants in the United States, evident in Table 1, indicates that U.S. enforcement efforts have not succeeded in stopping illegal entry from Mexico or other countries. The concomitant increase in U.S. resources devoted to enforcement, seen in Figure 5, suggests that the lack of success is not for want of effort.

In political science and sociology literature, rising illegal immigration tends to be interpreted as a result of policy failure (Andreas, 2000; Massey, Durand, and Malone, 2003; Cornelius, Tsuda, Martin, and Hollifield, 2004; Cornelius and Lewis, 2007). Due to political constraints, the United States has focused on border enforcement, rather than monitoring U.S. employers, which appears ill-suited to curtail unauthorized entry in a country that shares a 2,000-mile long land border with a poor neighbor. Further, the United States has chosen to concentrate enforcement resources in border cities, leaving less populated corridors largely unpoliced through which illegal immigrants continue to enter the country in large numbers. Are U.S. enforcement policies ineffective? And, if so, why have U.S. immigration authorities chosen these policies? I deal with research on the first question in this section and on the second question in the next.

Each year, the U.S. Congress appropriates funds to the Department of Homeland Security (DHS) for enforcement of U.S. borders, which falls under U.S. Customs and Border Protection, and for enforcement of immigration laws in the U.S. interior, which falls under U.S. Immigration and Customs Enforcement. (Prior to 2002, both border and interior enforcement belonged to the now-defunct Immigration and Naturalization Service(INS) in the U.S. Department of Justice.)

The U.S. Border Patrol, the primary agency responsible for border enforcement, is part of U.S. Customs and Border Protection. Border Patrol officers may be deployed to linewatch duty, in which they attempt to apprehend unauthorized immigrants at the U.S.-Mexico border; to entry points along the U.S.-Mexico and U.S.-Canada borders, at which they monitor pedestrian and vehicular traffic entering the United States; or to traffic checkpoints along major highways inland from border crossings, at which they conduct inspections. Some of these activities (linewatch duty) are more oriented toward preventing illegal immigration, while others (traffic checks) are more oriented toward preventing the smuggling of contraband. The broad scope of Border Patrol activities suggests that DHS officials (and INS officials before them) have sufficient discretion in allocating resources to allow them to vary the intensity with which they enforce borders

against illegal immigration. Discretion creates an opportunity for political pressure to influence enforcement activities over short time horizons (as well as through the more-protracted congressional appropriations process).

The detection of illegal immigrants in the U.S. interior falls under U.S. Immigration and Customs Enforcement (ICE). The activities of ICE agents (and of INS agents before the creation of DHS) include attempts to apprehend illegal immigrants at U.S. worksites, investigations of international smuggling operations, and prosecutions and deportations of non-citizens who have been convicted of a felony in the United States. As with the Border Patrol, DHS officials have discretion in how ICE agents are deployed, allowing them to vary the intensity of interior enforcement against illegal immigration at the local, regional, and national level.

Boeri, Hanson, and McCormick (2002) document that U.S. immigration authorities apprehend far more illegal immigrants at U.S. borders than in the U.S. interior. Table 5, which shows "deportable aliens" located by U.S. immigration authorities from 1992 to 2004, updates their data. (Deportable aliens include, primarily, apprehended illegal immigrants, and, secondarily, legal immigrants subject to deportation because they have committed a criminal offense.) Over the period, 93% of deportable aliens were located by the Border Patrol, rather than by ICE or INS agents in the U.S. interior. Of those apprehended by the Border Patrol, 97% were Mexican nationals. And, of apprehensions of Mexican illegal aliens, less than 1% occurred at U.S. worksites. The vast majority of Mexican nationals apprehended were "seeking employment," which generally means they were caught trying to cross the U.S.-Mexico border illegally.

Apprehensions of illegal immigrants are a policy output. How might one measure inputs into enforcement policy? For border enforcement, the primary inputs are officer hours the Border Patrol spends policing the border and capital expenditure on enforcement infrastructure. In Figure 5, between 1990 and 2003 officer hours devoted to border enforcement increased by 3.8 times, from 2.5 million to 9.5 million. For interior enforcement, measures of policy inputs are more difficult to obtain. Those that are available suggest immigration authorities devote a relatively small share of their resources to the U.S. interior. Between 1999 and 2003, the number of man hours ICE agents devoted to worksite inspections declined from 480,000 (or 9% of total INS agent hours) to 180,000 hours (or 4% of total ICE agent hours) (GAO, 2005). Thus, in 2003 U.S. immigration authorities devoted 53 times as many officer hours to linewatch enforcement as to worksite enforcement. One consequence of low worksite enforcement is that few U.S. employers who hire illegal immigrants are detected or prosecuted. The number of U.S. employers paying fines of at least $5,000 for hiring unauthorized workers was only 15 in 1990, which then fell to 12 in 1994 to 2 in 1998 and to 0 in 2004. A

recent U.S. General Accounting Office study concludes, "The worksite enforcement program has been a low priority under both the INS and ICE" (GAO, 2005).[55]

The emphasis of border enforcement over interior enforcement does not appear to be due to illegal immigrants being difficult to locate once they are inside the United States. Several U.S. industries, including agriculture, construction, and restaurants and hotels, appear to employ large numbers of unauthorized workers. The U.S. Department of Labor (2005) reports that over the period 1999 to 2002 54% of the U.S. farm laborers it surveyed were in the United States illegally. At harvest time, in the late summer and early fall, many of these workers are plainly visible at farms in California, Texas, Washington, and elsewhere in the western United States. U.S. immigration authorities simply choose not to conduct large-scale raids on U.S. farms, construction sites, or other places of business where illegal immigrants tend to work.

Beyond concentrating on border enforcement, U.S. immigration authorities target their efforts at specific locations along the border. Figure 14 plots annual hours the U.S. Border Patrol officers spent on linewatch duty by region along the border over the period 1977 to 2003. Officer hours increase sharply in the early 1990s in Texas, in the mid 1990s in Western California (San Diego), and in the late 1990s in Arizona. These increases reflect successive Border Patrol operations near specific U.S. border cities, including El Paso, San Diego, El Centro, and McAllen (Reyes, Johnson, and Van, 2002). Operations involve increased patrols, constructing walls and barricades, and mounting electronic surveillance equipment. Figure 14 also plots apprehensions by U.S. Border Patrol officers on linewatch duty by border region. Following the increase in Border Patrol activities in Western California, apprehensions declined in the region but shortly thereafter increased in nearby Eastern California and Arizona. In response to greater border security in San Diego, which in the 1970s and 1980s was the primary illegal entry point along the border, prospective migrants appear to have shifted their attempts to enter the United States to the more remote desert regions of the California-Mexico and Arizona-Mexico borders. Border Patrol operations have succeeded in reducing illegal border crossings at targeted locations, but not, as the increase in illegal immigration during the 1990s reveals, at other locations along the border.

There is active debate in policy circles about the effectiveness with which U.S. immigration authorities deploy the resources they have available. In their own defense, authorities claim that they are overwhelmed by current levels of attempted illegal immigration (GAO, 2001). Even with the increase in enforcement resources, authorities suggest they have been unable to staunch in the inflow of unauthorized migrants because the number of those attempting to enter the United States illegally has risen too fast. An opposing line of argument is that immigration authorities deploy their enforcement

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[55] Further, since September, 2001, and the shift in government priorities toward preventing terrorist attacks, the majority of time ICE agents spend on worksite enforcement is devoted to monitoring "critical infrastructure sites," such as airports and power plants (GAO, 2005).

resources ineffectively for strategic motives (Cornelius et al., 2004). In response to political pressure from employers and other groups that benefit from illegal immigration, goes the reasoning, U.S. immigration authorities choose not to enforce U.S. laws against hiring illegal immigrants and to deploy the Border Patrol in a manner that allows large numbers of illegal immigrants to enter the country.

Has increased U.S. border enforcement in fact made illegal immigration in the United States more costly?[56] Hanson and Spilimbergo (1999) find that, controlling for the endogeneity of enforcement, border apprehensions increase as border enforcement increases. This finding suggests that expanded enforcement makes crossing the border more difficult (since more of those attempting illegal immigration are being caught at the border), but it does not reveal whether greater difficulty in border crossing deters prospective migrants from attempting to enter the United States illegally.

Gathmann (2004) provides more direct evidence of the consequences of expanded border enforcement for migration. She uses MMP data to examine the correlates of coyote prices paid by migrants from Mexico to the United States and to estimate the impact of coyote prices on migrant demand for smuggler services.[57] The price a migrant pays to a smuggler is higher in years when border enforcement is higher. But the elasticity of coyote prices with respect to enforcement is small, in the range of 0.2 to 0.5. During the sample period, a one-standard-deviation increase in enforcement would have lead to an increase in coyote prices of less than $40; in the mid 1990s average coyote prices were $410. The estimated demand for smuggler services and the individual probability of choosing to migrate to the United States are both quite responsive to changes in coyote prices. However, given the small enforcement elasticity of coyote prices, the observed increase in border enforcement over 1986 to 1998 appeared to reduce the average migration probability among MMP respondents by only 10%.

Gathmann's results, of course, are conditional on the pattern of border enforcement that was realized over the sample period. By increasing enforcement in some border locations but not others, U.S. immigration authorities may have (intentionally or not) mitigated the impact of expanded enforcement on smuggler prices. Gathmann documents that as the United States carried out its 1990s border buildup many migrants shifted from higher-enforcement to lower-enforcement crossing points. We do

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[56] For earlier work on this question, see Espenshade (1994, 1995), Kossoudji (1992), Donato, Durand, and Massey (1992), and Massey and Singer (1995). For other recent work see Angelucci (2003).

[57] In the estimation of coyote prices, Gathmann (2004) instruments for border enforcement using the drug budget of the U.S. Drug Enforcement Agency (DEA). In the estimation of the demand for coyote services, she includes both the smuggler price and the level of border enforcement as regressors, instrumenting for the former with the average U.S. prison term for smugglers (which rises over the sample period) and for the latter again with the DEA drug budget. Under the assumption of normality in the errors, she is able to control for selection into migration (by exploiting MMP data on non-migrants).

not know how coyote prices would respond to a border-wide increase in enforcement as the United States has yet to carry out that experiment.

Another issue is that MMP data may lead one to underestimate the impact of enforcement on smuggler prices. MMP communities have sent migrants to the United States for decades. Many families in these communities have long-term relationships with coyotes. Prices coyotes charge long-term customers may be less responsive to shocks than prices they charge on the smuggling spot market used by migrants in the rest of Mexico. Hence, in the rest of the country attempted illegal migration could more responsive to border enforcement than Gathmann's results suggest.

The United States has undertaken a massive increase in the resources that it devotes to border enforcement. Yet, the apparent impact of this increase has been modest. While expanded border enforcement has reduced attempted illegal entry at what used to be major crossing points in California and Texas border cities, it appears to have had a small effect on deterring illegal immigration overall (measured either in terms of changes in smuggler prices or the average probability a Mexican national migrates to the United States). One possibility is that there are important non-convexities in enforcement such that it only becomes an effective deterrent to illegal entry at high levels of resource commitment. This is perhaps the implicit argument of those calling for further expansion of U.S. enforcement efforts.[58] Another possibility is that U.S. enforcement strategies are ineffective by design, due to the political economy of immigration control.

4.2 The Determination of U.S. Enforcement Policies

In the absence of economic distortions, the optimal immigration policy would be to have open borders. All else equal, immigration raises national income by allowing countries to use fixed factors more productively, making free immigration welfare maximizing. In practice, countries may choose to restrict immigration because existing distortions, such as the existence of social-insurance programs financed by non-lump-sum taxes, make a departure from free immigration the constrained optimum (Scholten and Thum, 1996; Wellisch and Walz, 1998; Razin and Sadka, 1999).[59] Or, governments may choose to restrict immigration because they weight the welfare of different individuals unequally, for whatever reason favoring those opposed to immigration (Foreman-Peck, 1992). For instance, if the median voter is a worker whose wages would be reduced by immigration, politicians may choose to restrict immigration in order to enhance their future electoral prospects (Benhabib, 1996).

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[58] See Steven A. Camarota, "Use Enforcement to Ease Situation," *Arizona Republic*, October 23, 2005.

[59] See Hanson (2005b) and Hanson, Scheve, and Slaughter (2006) for evidence on how the public-finance consequences of immigration affect individual preferences toward immigration in the United States. See Sinn, Flaig, Werding, Munz and Hofmann (2003) and Razin and Sadka (2003) for analysis of the public-finance consequences of immigration in welfare states similar to the European context.

Policies to address illegal immigration enter a country's choice set when legal immigrant admissions are subject to binding restrictions and the enforcement of borders against illegal entry is costly. Enforcement costs may be due to the expense of policing the border or to agency costs associated with giving immigration authorities an incentive to implement laws against unauthorized entry.

Using Becker's (1968) crime-theoretic framework, Either (1986a,b) derives conditions under which border enforcement raises national income. In the absence of migration, wages in a home country exceed wages in a foreign country. Restrictions on legal migration prevent legal labor flows from equalizing international factor prices, creating an incentive for illegal migration. The home country interdicts illegal migrants through costly border enforcement. Let the probability of apprehension, $0 \leq g \leq 1$, be an increasing, convex function of expenditure on enforcement, E, which is financed by taxes on skilled labor. The home-country wage for unskilled natives, w, is then related to the alternative foreign-country wage of illegal labor, w^*, through the equalization of expected wages that results from illegal migration:

$$w^* = g(E)w^* + [1 - g(E)]w - k , \tag{28}$$

where k is the cost of migration (which, distinct from Either (1986a), I suppose is incurred whether or not an individual is apprehended). Consider the impact of an increase in enforcement on the home-foreign wage gap. Totally differentiating (28)

$$\frac{dw}{dE} - \frac{dw^*}{dE} = \frac{1}{1-g}\left[\overset{-}{g'(w - w^*) + k'}_{-}\right]. \tag{29}$$

The expression in (29) is positive, implying greater enforcement increases the home-foreign wage difference, as long as the apprehension probability is increasing in enforcement ($g' \geq 0$), the initial wage gap is positive (absent which there would be no incentive to migrate), and migration costs (e.g., smuggler prices) are weakly increasing in enforcement ($k' \geq 0$). In (29), one can see that changes in enforcement affect the wage for unskilled workers in the home country through three channels: by lowering wages in the foreign country (greater enforcement increases foreign labor supply, lowering the foreign wage), by lowering the probability that those attempting migration succeed in entering the country (greater enforcement means a given level of attempted illegal immigration has a smaller impact on the home-country's labor supply), and by raising the cost of crossing the border (greater enforcement raises coyote prices).

Ethier (1986a) identifies two environments in which interdicting illegal migrants raises national income: the existence of downward wage rigidity in the home-country market for unskilled labor, such that border enforcement lowers unemployment by reducing illegal immigration; and the presence of market power in the home-country demand for foreign labor, such that greater border enforcement lowers the wage the home country has to pay immigrant workers. In the absence of these or other distortions, enforcement is welfare reducing.[60]

One implication of Ethier's work is that for border enforcement to be more than a resource drain on the home country it must affect outcomes in sending and receiving labor markets. We have already seen evidence in Gathmann (2004) that in Mexico higher U.S. border enforcement is associated with modestly higher smuggler prices and modestly lower migrant outflows. Are there measurable impacts of border enforcement in the United States? Hanson, Robertson, and Spilimbergo (2001) examine the effect of border enforcement on wages in U.S. and Mexican border regions. If enforcement impedes illegal immigration, and if illegal immigrants depress wages in the regions in which they settle, then wages in receiving (sending) border regions will tend to rise (fall) after an increase in enforcement. They use quarterly data for 1980 to 1997 on wages in immigrant-labor-intensive industries in U.S. border states and among less-skilled workers in Mexican border cities. For high-immigrant industries (apparel, textiles, food products, furniture) in California and Texas, they find zero correlation between wages and enforcement of the Mexico-U.S. border in that state. They also find no evidence of a positive effect of border enforcement on the wages of workers with low-education levels (high-school dropouts or high-school graduates) in border regions of California or Texas.[61] For Mexico, the impact of U.S. border enforcement appears to be larger. In Tijuana, which is the most active crossing point for illegal immigrants during the sample period, greater U.S. enforcement at the city's border with San Diego is associated with lower wages for less-skilled workers (up to six years of education).

There are two quite different interpretations of Hanson, Robertson, and Spilimbergo's results. One is that that border enforcement deters illegal immigrants, but illegal immigration has a minimal impact on labor markets in U.S. border regions. U.S. border regions may adjust to influxes of illegal immigrants without large changes in wages either through U.S. native workers exiting these regions (Borjas, Freeman, and

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[60] Extending Ethier's analysis, Bond and Chen (1987) introduce international capital mobility, Djajic (1987, 1999) puts migration in a dynamic setting, Bandyopadhyay and Bandyopadhyay (1998) and Gaytán-Fregoso and Lahiri (200) consider interactions of trade policy or foreign aid and illegal migration, and Woodland and Yoshida (2005) examine border enforcement where illegal migrants are risk averse. Another distortion that could potentially justify positive border enforcement is the presence of welfare policies that result in net fiscal subsidies to illegal immigrants (through their use of public schools, emergency health care, and other public services).

[61] Both sets of results hold with or without instrumenting for border enforcement (to control for the INS setting enforcement in response to economic conditions in U.S. or Mexican border areas) using data on U.S. political cycles (see note 26) and entry activity at other U.S. international boundaries (ports and Canadian border crossings).

Katz, 1997) or through border economies shifting towards industries that are relatively intensive in the use of immigrant labor (Card and Lewis, 2005). A second interpretation of their results is that border enforcement has a minimal impact on illegal immigration, consistent with Espenshade (1994) and Massey and Singer (1995). It would still be conceivable that illegal immigration puts downward pressure on wages in U.S. border regions, but, since border enforcement does not impede illegal immigration, there would be zero correlation between enforcement and wages in U.S. border regions. Gathmann's (2004) results suggest border enforcement does affect migration costs. And it is the case that wages in Tijuana decline following increases in border enforcement, even if wages don't change in California or Texas.

The framework in Either (1986a,b) is a normative analysis of border enforcement. Turning to positive questions, how does the U.S. Congress decide on the level of funding for immigration control and how do U.S. immigration authorities allocate budgeted resources between enforcement and other activities for which they are responsible? In the context of trade policy, Grossman and Helpman (1994) develop a framework in which endogenously determined industry campaign contributions affect import tariffs on foreign goods. Facchini and Willmann (2005) extend the Grossman-Helpman model to consider policies on international factor mobility. In their setup, governments restrict factor inflows from abroad through a per-factor unit tax or quota. Facchini and Willmann make two important assumptions about the structure of immigration policy: (i) the receiving-country government captures factor tax revenues or quota rents, which it rebates to citizens, and (ii) individuals are organized according to their factor type and lobby the government on immigration policy. In equilibrium, each factor lobby offers the government campaign contributions to support stronger (weaker) restrictions on inflows of factors for which its members substitute (complement) in production.

Facchini and Willimann's first assumption appears to be counterfactual. In the context of illegal immigration, the U.S. and other governments do not collect payments associated with factor inflows. On the contrary, the government spends resources on enforcement to impede the immigration of labor. Their second assumption has more empirical support. Periodic attempts by the INS or ICE to increase interior enforcement are met with political opposition. For instance, in 2005 the Western Growers Association, a business lobby representing farmers in the western United States, issued a statement complaining that excessive enforcement was preventing farmers in Arizona from hiring sufficient immigrant labor to harvest their winter lettuce crop.[62] In 1998, INS raids of onion fields at harvest time in the state of Georgia prompted the U.S. Attorney General, both Georgia U.S. senators, and three Georgia congressional representatives to

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[62] See Miriam Jordan, "As Border Tightens, Growers See Threat to 'Winter Salad Bowl,'" *The Wall Street Journal*, March 11, 2005, p. 1.

criticize the INS for injuring Georgia farmers.[63] There is also historical evidence of anti-enforcement efforts by business groups.   In the 1940s and 1950s, the district commissioner of the U.S. Border Patrol in El Paso would routinely issue orders to stop apprehending illegal immigrants during the agricultural harvest season (Calavita, 1992). On occasions when the Border Patrol did increase enforcement activities, Texas farmers often complained to their congressional representatives, who pressured the INS (through formal written communication) to be less aggressive.

Lax worksite enforcement by the U.S. government is indirect evidence that political factors influence the intensity with which the country enforces against illegal immigration. Hanson and Spilimbergo (2001) search for systematic evidence of such effects. They estimate the sensitivity of border enforcement to relative price changes in industries that use unauthorized immigrant labor intensively (apparel, perishable fruits and vegetables, slaughtered livestock, construction). In theory, higher relative prices for immigrant-intensive industries would increase the returns to lobbying for weaker border enforcement. Controlling for macroeconomic conditions in the United States and Mexico, they find that increases in the relative product price for an immigrant-intensive industry today is associated with a decrease in border enforcement six to ten months in the future. This finding suggests authorities relax enforcement when the demand for undocumented workers increases. Enforcement also rises when overall labor-market conditions in the United States tighten, which suggests that the U.S. government raises enforcement when attempted illegal immigration is expected to be high.

It appears, then, that enforcement softens when the specific sectors that use illegal aliens intensively expand but not when the overall demand for labor is high. This is suggestive of a free-rider problem among special-interest groups, in which sectors that benefit greatly from lower border enforcement, such as apparel and agriculture, lobby politicians on the issue (and lobby more strongly when the gains to higher immigration are greater), while sectors that benefit modestly are less politically active.

4.3 Summary

Restricting unauthorized immigration only makes sense for a country that is subject to distortions that would be exacerbated by illegal labor inflows. By selecting the intensity with which it enforces U.S. borders against unauthorized entry and monitors the employment practices of U.S. business, U.S. immigration authorities implicitly determine the level of illegal immigration.   The United States makes stark choices in its enforcement polices. It heavily polices specific U.S. border cities, maintains a lighter presence in less-populated areas, and weakly enforces U.S. worksites. There has been little research by economists on the political economy of policies specifically related to

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63 See Mark Krikorian, "Lured by Jobs, Illegal Immigrants Risk Death at Border Crossings," *Santa Barbara NewsPress,* April 25, 1999.

illegal immigration. The work that does exist suggests that special interest groups are active in attempting to influence U.S. enforcement practices.

5. Concluding Discussion

In the United States, unauthorized immigration accounts for one-third to one-half of new immigrant inflows. Mexico is by far and away the largest source country for those entering the United State illegally. An emerging body of academic research on illegal migration from Mexico to the United States has made progress on many fronts. Yet, the literature is at an early stage. Heightened policy interest in illegal immigration, both in the United States and Mexico, suggests the many unanswered questions, some of which I now highlight, will receive attention in the time to come.

Available measures of the stock and flow of illegal migrants are imprecise, hampered by the unwillingness of official government agencies to question individuals about their immigration status. With the U.S. population of illegal immigrants now exceeding 10 million individuals, one would expect that, at the very least, U.S. government household surveys would conduct post-enumeration surveys that explicitly ask individuals about their immigration status. This would allow researchers to estimate the stock of illegal immigrants with much more precision. Of greater benefit would be incorporating questions about immigration status directly into the U.S. Census of Population or U.S. Current Population Survey. There is precedent for U.S. government surveys including questions about whether a respondent has a legal immigration visa. For over a decade, the U.S. Department of Labor has conducted surveys of U.S. farm workers in which it explicitly asks whether an individual is in the United States legally or illegally (e.g., U.S. Department of Labor, 2005).

A handful of data sources provide information about illegal immigrants from Mexico in the United States. Immigrants from Mexico, whether legal or illegal, are drawn disproportionately from the middle of the country's schooling distribution. Over time, illegal migrants appear to have become more likely to be female, to work outside of agriculture, and to settle in the United States on a long-term basis. Largely absent in the literature is analysis of the life-cycle behavior of migrants. Many individuals from Mexico first enter the United States as illegal immigrants and over time gain a legal permanent residence visa through sponsorship by a U.S. family member. One would expect that how a prospective migrant responds to changes in U.S. or Mexico economic conditions, or the extent to which a migrant already in the United States assimilates into U.S. society, would depend on whether the individual expects to obtain a U.S. green card in the future. Family sponsorship in the granting of entry visas may thus create a direct link between receiving-country policies on legal immigration and the incentive for illegal immigration. Individuals in Mexico with family members in the United States do appear to be more likely to emigrate. However, we do not know whether this represents the

effect of migration networks, which lower the cost of migration, or prospects for obtaining a green card, which raise the benefit to migration.

Consistent with research in many other contexts, Mexico-to-U.S. migration flows are correlated with changes in relative incomes in the two countries. Attempted illegal immigration appears to be particularly responsive to shocks to the Mexican economy, with surges in apprehensions at the U.S.-Mexico border coming shortly after downturns in Mexico. Yet, given the large magnitude of U.S.-Mexico wage differences and the small apparent cost of crossing the border illegally, the volume of migration flows from Mexico to the United States is surprisingly low. Also, given the high relative return to education in Mexico, it is puzzling that Mexican immigrants exhibit intermediate selection in terms of their observable skills. One would expect less-skilled Mexican immigrants to have the strongest incentive to migrate abroad. Unobserved sources of heterogeneity in migration costs, home bias in consumption, and credit constraints in financing migration are all potential explanations for the volume and composition of Mexican immigration. Research on these issues is just beginning to emerge.

Over the last two decades, the United States has greatly increased the resources it devotes to controlling illegal immigration. The government has, in particular, beefed up enforcement at specific U.S. border cities. While the United States has criminalized the hiring of illegal immigrants, the government devotes few resources to monitoring U.S. worksites for the employment of unauthorized workers. The net effect of changes in enforcement policy (coupled with changes in U.S. and Mexico economic conditions) has been increasing levels of illegal immigration. There is no formal political economy theory of immigration control that would explain why the United States chooses border over interior enforcement.[64] The United States appears to be on the verge of granting an amnesty to at least some of the illegal immigrants residing in the country, which would come two decades after an earlier legalization under the Immigration Reform and Control Act. There is also no formal theory that would explain why a country would choose to enact imperfect and costly enforcement against illegal immigration today and later grant an amnesty to those that entered illegally. Given the importance of illegal immigration for the U.S. labor market and for U.S. public finances, policies to control labor inflows have been the subject of surprisingly little research.

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[64] Ethier (1986a) includes a normative analysis of border versus interior enforcement but takes the government preference to deviate from zero enforcement as given. See Epstein and Weiss (2001) for an extension of this analysis and consideration of an amnesty for illegal immigrants.

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Table 1: Estimates of the U.S. Illegal-Immigrant Population, 1990-2004

		Total Population of Illegal Immigrants in the United States (millions)						
		Costanzo et al. (2003)			Bean et al. (2001a, 2001b)			
	INS	Undercount Rate			Undercount Rate			Passel
Year	(2001)	10%	15%	20%	15%	Median	25%	(2005)
1990	3.500	3.766	4.430	4.707	--	--	--	--
1991	4.025	--	--	--	--	--	--	--
1992	4.204	--	--	--	--	--	--	--
1993	4.492	--	--	--	--	--	--	--
1994	4.750	--	--	--	--	--	--	--
1995	5.146	--	--	--	--	--	--	--
1996	5.581	--	--	--	--	--	--	--
1997	5.862	--	--	--	--	--	--	--
1998	6.098	--	--	--	--	--	--	--
1999	6.488	--	--	--	--	--	--	--
2000	7.000	8.705	10.242	10.882	--	--	--	--
2001	--	--	--	--	5.918	7.751	9.864	--
2002	--	--	--	--	--	--	--	9.300
2003	--	--	--	--	--	--	--	--
2004	--	--	--	--	--	--	--	10.300

		Population of Illegal Immigrants from Mexico in the United States (millions)						
1990	2.040	1.008	--	--	--	--	--	--
1996	--	--	--	--	1.524	2.543	3.706	--
2000	4.808	3.872	--	--	--	--	--	--
2001	--	--	--	--	3.462	4.510	5.765	--
2002	--	--	--	--	--	--	--	5.300
2003	--	--	--	--	--	--	--	--
2004	--	--	--	--	--	--	--	5.900

Notes: Costanzo et al. (2003) report estimates of the total U.S. unauthorized population using three alternative undercount rates for illegal immigrants (10%, 15%, or 20%). The INS (2001) uses a constant undercount rate for illegal immigrants of 10%, as does Passel (2005). The 1996 Bean el al. (2001a) estimates are based on undercount rates of either (a) 15% for illegal immigrants and 3% for legal immigrants, or (b) 25% for illegal immigrants and 5% for legal immigrants. The 2001 Bean et al. (2001b) estimates are based on undercount rates of either (a) 15% for illegal immigrants and 0.5% for all legal immigrants (2% for legal Mexican immigrants), or (b) 25% for illegal immigrants and 2% for all legal immigrants (4% for legal Mexican immigrants). The median estimates for Bean et al. (2001a, 2001b) are for the full set of reported of undercount rates, which vary depending on the year and sample.

Table 2a: Migrant and Non-Migrant Mexican Nationals, Males

		1990 US Census	1990 Mexico Census	Mexico Migration Project, 1989-1991		In US at time of survey	1989 LPS
				In Mexico at time of survey			
				All Respondents	Currently on last migration		
Percent Male		56.2	48.0	48.7	64.7	55.9	57.2
Age	18 to 27	38.5	37.6	34.1	38.4	43.5	33.0
	28 to 37	31.9	25.8	29.7	35.7	35.7	42.5
	38 to 47	17.1	17.4	19.0	18.1	11.7	16.5
	48 to 57	8.2	11.7	10.7	6.7	5.9	5.8
	58 to 67	4.4	7.5	6.4	1.1	3.2	2.3
Males Aged 18 to 47							
Years of	None	9.6	9.2	5.2	3.8	2.1	4.0
Schooling	1 to 4	10.3	17.3	23.4	24.3	15.3	19.7
	5 to 8	28.0	30.1	32.5	41.4	34.3	39.1
	9 to 11	17.2	24.7	18.5	19.4	23.8	18.4
	12 to 15	31.7	11.1	12.9	9.3	19.1	18.3
	16 plus	3.2	7.7	7.5	1.8	5.6	0.5
Live in Urban Area		91.9	74.8	80.6	74.5	89.2	--
In Labor Force		91.0	85.2	95.8	98.6	94.1	95.2
Work in Agriculture		15.5	23.9	28.9	31.2	9.1	11.9
Has Migrated to US		--	--	50.3	100.0	100.0	--
Migrate US Last Year		--	--	2.5	0.1	0.1	--
Years	0 to 5	28.8	--	65.6	45.2	36.9	13.9
in US	6 to 10	23.4	--	14.8	17.3	20.2	19.4
	11 to 20	35.7	--	15.2	28.2	36.3	6.7
	20 plus	12.2	--	4.5	9.3	6.6	59.9
Sample size, 18-67		96,487	196,729	5,370	722	375	1,670
Sample size, 18-47		83,703	158,917	4,448	666	341	1,535

Table 2b: Migrant and Non-Migrant Mexican Nationals, Females

| | | 1990 US Census | 1990 Mexico Census | Mexico Migration Project, 1989-1991 | | | |
| | | | | In Mexico at Time of Survey | | In US at time of survey | 1989 LPS |
				All Respondents	Currently on last migration		
Percent Female		43.8	52.0	51.3	35.3	44.1	42.8
Age	18 to 27	33.0	38.0	35.0	35.5	43.2	31.9
	28 to 37	31.4	26.1	29.3	37.1	33.5	42.0
	38 to 47	18.9	17.0	18.6	21.3	16.6	16.8
	48 to 57	10.4	11.5	10.7	5.6	4.4	6.6
	58 to 67	6.3	7.6	6.5	0.5	2.4	2.7
Females Aged 18 to 47							
Years of	None	8.5	12.7	6.6	3.0	5.1	4.6
Schooling	1 to 4	9.8	18.8	25.9	18.7	13.8	18.7
	5 to 8	28.3	31.4	35.4	56.2	35.5	43.0
	9 to 11	16.2	24.8	16.8	12.4	15.2	17.2
	12 to 15	34.0	8.0	11.9	7.6	28.3	15.9
	16 plus	3.3	4.4	3.5	2.2	2.2	0.6
Live in Urban Area		92.7	75.8	80.6	70.8	88.8	--
In Labor Force		56.7	26.6	28.8	35.7	47.5	61.3
Work in Agriculture		7.9	2.3	2.4	2.2	6.6	4.1
Children Ever Born		2.6	3.3	--	--	--	--
Own Children in HH		1.7	1.6	1.8	1.0	2.2	2.1
Has Migrated to US		--	--	18.6	100.0	100.0	--
Migrate US Last Year		--	--	0.8	0.0	0.0	--
Years in US	0 to 5	26.2	--	58.1	44.3	41.5	10.7
	6 to 10	20.9	--	17.5	17.6	16.5	11.1
	11 to 20	37.3	--	18.7	28.9	29.2	4.7
	20 plus	15.6	--	5.7	9.2	12.7	73.5
Sample size, 18-67		76,518	212,912	5,658	394	296	1,248

| Sample size, 18-47 | 63,278 | 172,458 | 4,688 | 370 | 276 | 1,132 |

Notes: Table 2 gives summary statistics on working-age adults, either 18-47 or 18-67 years old. The samples are residents of Mexico (1990 Mexico Census of Population and Housing); Mexico-born residents of the United States (1990 U.S. Census of Population and Housing); respondents of the 1989-1991 Mexican Migration Project Survey (all respondents, those residing in United States but in Mexico at the time of the survey, or those residing in United States at the time of the survey whose responses were given by household members in Mexico); and illegal immigrants from Mexico in the United States who qualified for amnesty under the U.S. Immigration Reform and Control Act (1989 Legalized Persons Survey). The definition of an urban area is a locality with more than 2,500 inhabitants.

Table 3a: Average Hourly Wages for Mexican Males, 2000

| | Age | Years of Schooling Completed | | | | | |
		4	5 to 8	9 to 11	12	13 to 15	16+
Mexican	18 to 22	7.83	7.60	7.45	8.07	8.76	8.44
Immigrants	23 to 27	8.44	8.19	8.21	9.06	9.53	13.02
in U.S.	28 to 32	8.27	8.56	8.70	9.66	9.56	15.69
	33 to 37	9.46	9.25	9.34	10.07	11.36	16.84
	38 to 42	9.19	9.39	9.33	11.01	12.11	16.26
	43 to 47	9.75	8.90	9.35	10.68	12.80	15.88
	48 to 52	9.57	9.37	9.42	9.31	11.65	17.78
Residents	18 to 22	1.36	1.56	1.76	2.06	2.61	3.91
of Mexico	23 to 27	1.43	1.80	2.10	2.79	3.77	5.20
	28 to 32	1.56	1.93	2.42	3.22	4.80	6.63
	33 to 37	1.65	2.08	2.56	3.45	5.25	7.07
	38 to 42	1.64	2.14	2.88	3.74	5.62	7.42
	43 to 47	1.69	2.30	3.00	4.40	5.86	8.05
	48 to 52	1.66	2.30	3.15	4.21	6.11	8.71

Notes: Table shows average hourly wages in 2000 U.S. dollars for Mexican immigrant males in the United States or male residents of Mexico who report working 20 to 84 hours a week (in either sample, the highest and lowest 0.5% of wage values are excluded). Data for Mexico are a 10% random sample of the 10% microsample of the *XIII Censo General de Poblacion y Vivienda, 2000*; data for the United States are from the 5% U.S. PUMS in 2000. Mexican immigrants are restricted to individuals who have resided in the United States for three years or less. See the text on the calculation of wage values.

Table 3b: Log U.S.-Mexico Hourly Wage Differential, Males in 2000

Age	4	5 to 8	9 to 11	12	13 to 15	16+
	Years of Schooling Completed					

Age	4	5 to 8	9 to 11	12	13 to 15	16+
Log U.S.-Mexico Wage Differential, All Males in Mexico						
18 to 22	1.263	1.098	0.985	0.895	0.750	0.361
	(0.022)	(0.013)	(0.015)	(0.018)	(0.042)	(0.099)
23 to 27	1.281	1.043	0.904	0.746	0.507	0.387
	(0.024)	(0.015)	(0.018)	(0.018)	(0.038)	(0.048)
28 to 32	1.225	1.036	0.821	0.652	0.306	0.357
	(0.029)	(0.018)	(0.024)	(0.023)	(0.047)	(0.052)
33 to 37	1.258	1.025	0.823	0.613	0.339	0.294
	(0.034)	(0.023)	(0.034)	(0.031)	(0.057)	(0.059)
38 to 42	1.287	1.019	0.775	0.575	0.288	0.216
	(0.035)	(0.029)	(0.045)	(0.043)	(0.068)	(0.075)
43 to 47	1.265	0.905	0.708	0.498	0.275	0.118
	(0.040)	(0.037)	(0.063)	(0.063)	(0.103)	(0.116)
48 to 52	1.264	0.987	0.715	0.418	0.164	0.122
	(0.050)	(0.046)	(0.096)	(0.076)	(0.122)	(0.142)

Age	4	5 to 8	9 to 11	12	13 to 15	16+
Log U.S.-Mexico Wage Differential, Males in High-Migration States						
18 to 22	1.188	1.061	0.989	0.912	0.676	0.381
	(0.026)	(0.016)	(0.017)	(0.025)	(0.052)	(0.128)
23 to 27	1.211	1.013	0.895	0.722	0.481	0.425
	(0.027)	(0.017)	(0.019)	(0.024)	(0.050)	(0.052)
28 to 32	1.144	1.011	0.824	0.657	0.361	0.415
	(0.031)	(0.020)	(0.025)	(0.028)	(0.057)	(0.053)
33 to 37	1.151	0.988	0.821	0.652	0.317	0.411
	(0.035)	(0.025)	(0.034)	(0.034)	(0.061)	(0.060)
38 to 42	1.206	0.966	0.792	0.601	0.185	0.291
	(0.036)	(0.030)	(0.044)	(0.046)	(0.070)	(0.073)
43 to 47	1.194	0.867	0.671	0.528	0.237	0.181
	(0.041)	(0.037)	(0.061)	(0.067)	(0.101)	(0.112)
48 to 52	1.193	0.961	0.727	0.292	0.284	0.227
	(0.049)	(0.045)	(0.092)	(0.080)	(0.125)	(0.137)

Notes: Table shows the log difference in average hourly wages (and standard errors) for Mexican immigrant males and male residents of Mexico. The top half of the table includes all regions of Mexico; the bottom half includes only high-migration states. See Table 3a and the text for details.

Table 4: Educational Attainment for the Mexico Born Population, 2000

| | | 21-65 Year Olds | | 28-37 Year Olds | | |
| | | Residents Of Mexico | Mex. Imm. in US | Residents of Mexico | Mex. Immigrants in US | |
					0-3 Yrs	4+ Yrs
Males	0	0.069	0.127	0.036	0.076	0.078
	1-4	0.166	0.080	0.103	0.045	0.043
	5-8	0.270	0.307	0.263	0.303	0.275
Highest	9	0.189	0.087	0.246	0.114	0.116
Grade of	0-9	0.694	0.601	0.648	0.538	0.512
Schooling						
(%)	10-11	0.045	0.055	0.059	0.064	0.067
	12	0.101	0.212	0.129	0.260	0.278
	13-15	0.047	0.083	0.044	0.075	0.098
	10-15	0.193	0.350	0.232	0.399	0.443
	16+	0.113	0.050	0.121	0.062	0.046
N		215,804	80,453	68,206	9,358	15,839
Females	0	0.092	0.133	0.047	0.070	0.078
	1-4	0.179	0.087	0.116	0.041	0.043
	5-8	0.280	0.315	0.278	0.269	0.294
Highest	9	0.174	0.085	0.219	0.112	0.125
Grade of	0-9	0.725	0.620	0.660	0.492	0.540
Schooling						
(%)	10-11	0.040	0.049	0.054	0.056	0.062
	12	0.112	0.204	0.145	0.276	0.253
	13-15	0.042	0.079	0.039	0.083	0.090
	10-15	0.194	0.332	0.238	0.415	0.405
	16+	0.080	0.048	0.103	0.093	0.055
N		235,086	72,967	75,625	6,575	16,173

Notes: The sample is individuals 21-65 or 28-37 years old (in the U.S., excluding group quarters; in Mexico, excluding those not born in the country). Residents of Mexico in 2000 are a 10% random sample of the 10% microsample of the *XIII Censo General de Poblacion y Vivienda, 2000*. Mexican immigrants are from the 2000 5% U.S. PUMS and are restricted to be individuals 21 years or older at time of entry into the country who have been residing in the United States for 0-3 years or 4 or more years. Schooling variables show the percentage of individuals whose high grade completed is that indicated.

Table 5: Illegal Immigrants Located by U.S. Immigration Authorities, 1992-2004

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Total deportable aliens located (millions)	1.258	1.327	1.095	1.395	1.650	1.537	1.679	1.714	1.815	1.387	1.062	1.046	1.241
Share located by ICE/INS Agents	0.047	0.048	0.058	0.050	0.061	0.080	0.074	0.079	0.076	0.087	0.101	0.110	0.065
Share located by Border Patrol	0.953	0.952	0.942	0.950	0.939	0.920	0.926	0.921	0.924	0.913	0.899	0.890	0.935
Of Border Patrol deportable aliens located, share that are:													
Mex. aliens seeking employment	0.888	0.884	0.874	0.895	0.907	0.906	0.899	0.901	0.910	0.875	0.861	0.870	0.860
Mex. aliens at U.S. worksite	0.011	0.010	0.013	0.013	0.008	0.010	0.006	0.003	0.002	0.003	0.005	0.006	0.005
Mex. aliens unspecified	0.076	0.079	0.082	0.069	0.068	0.067	0.073	0.068	0.064	0.089	0.095	0.070	0.070
Other aliens	0.026	0.026	0.031	0.023	0.017	0.018	0.021	0.028	0.024	0.033	0.039	0.053	0.065

Source: U.S. Department of Homeland Security (http://uscis.gov/graphics/shared/statistics/yearbook/index.htm).

Mexican Immigrants in the US

Figure 1

US Legal Immigration from Mexico
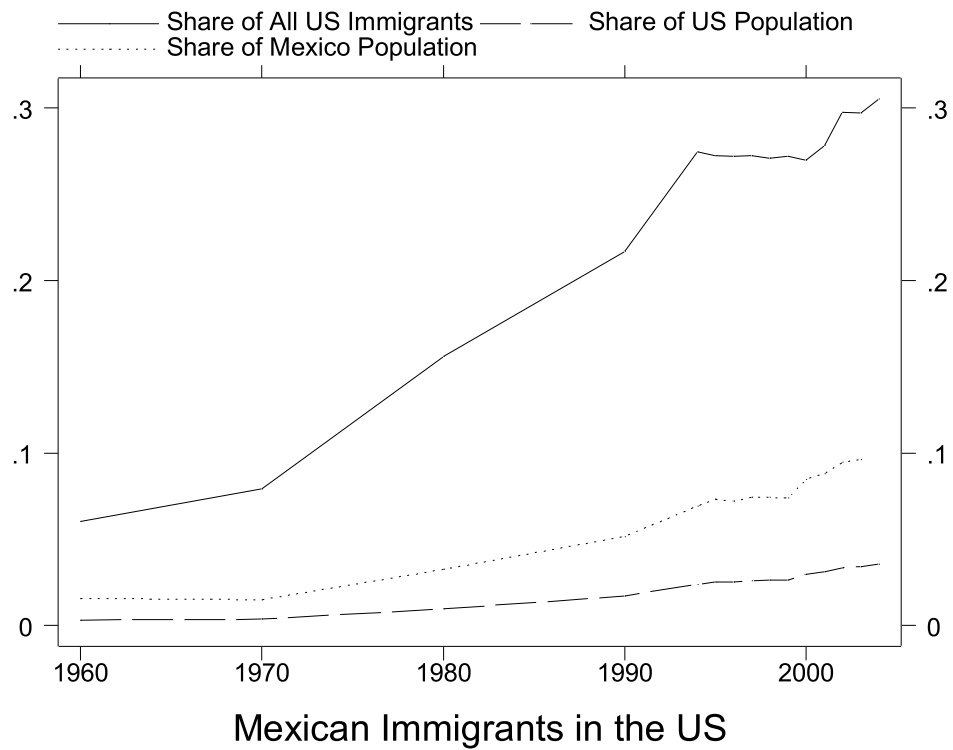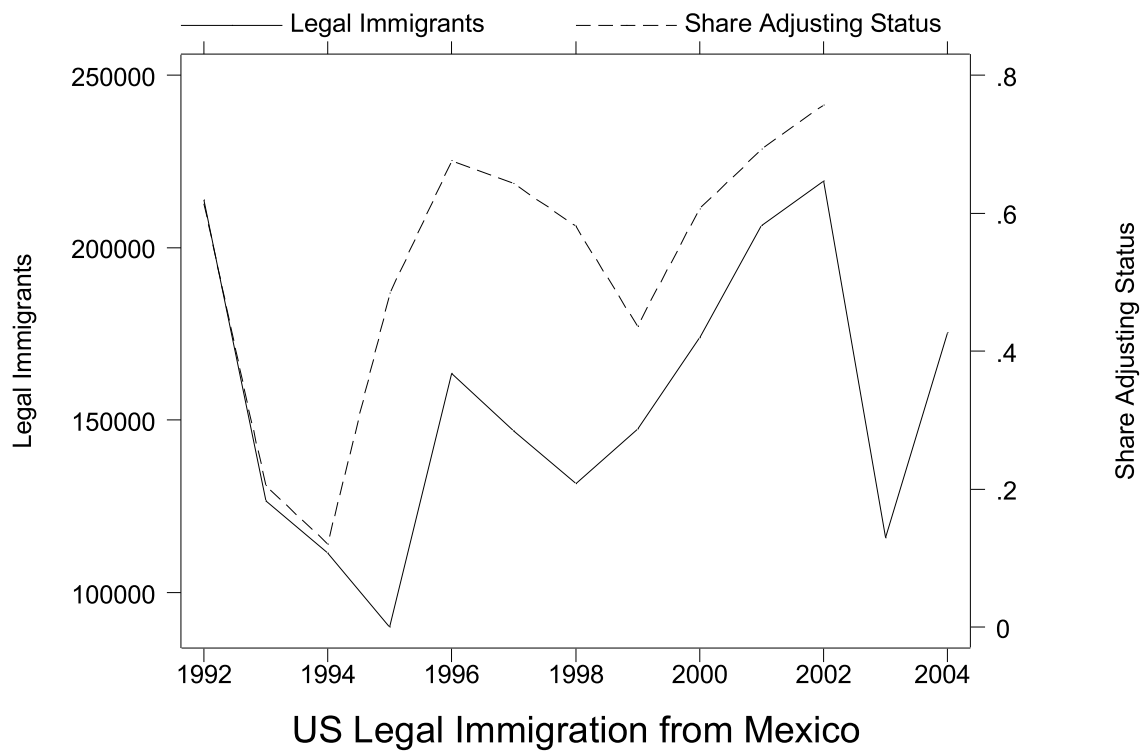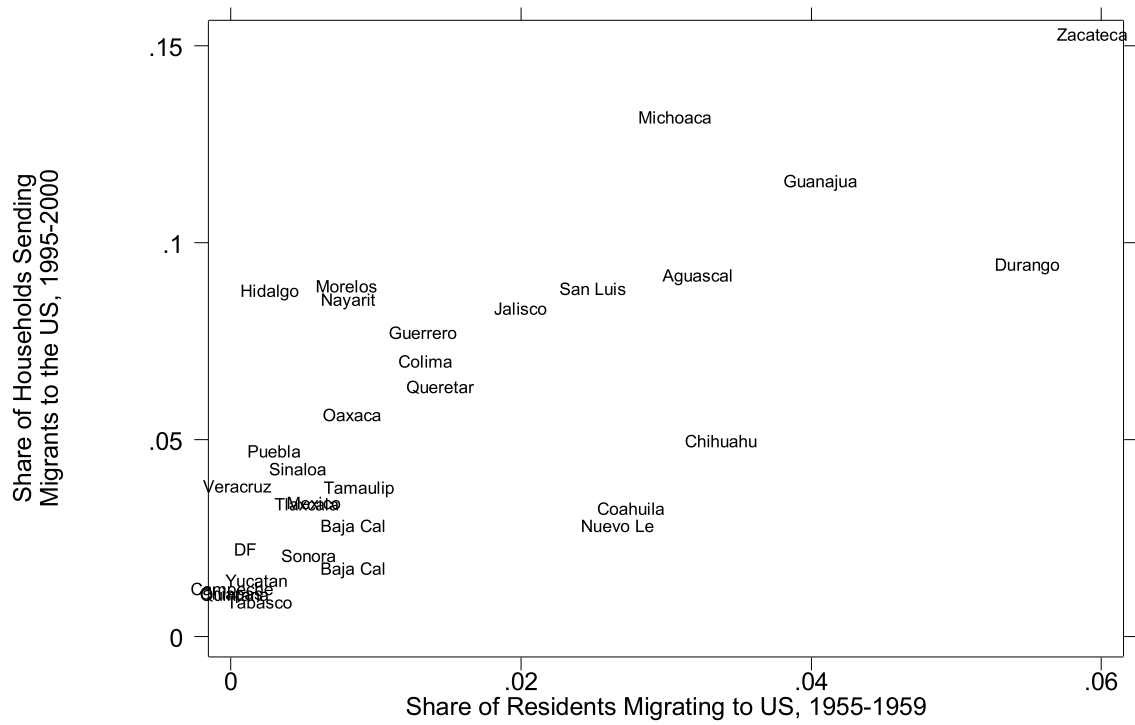
Figure 2

Figure 3: Migration Rates to the U.S. by Mexican States, 1950s and 1990s
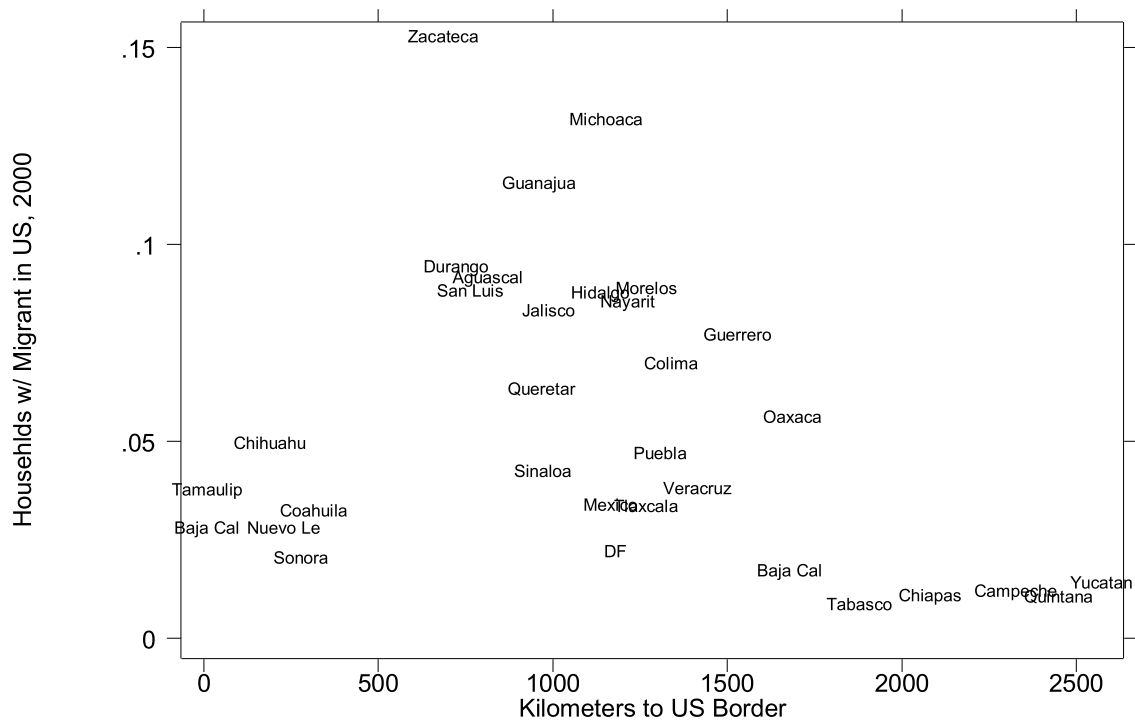
Figure 4: Migration Rates to the U.S. by Mexican State and Distance to the U.S.
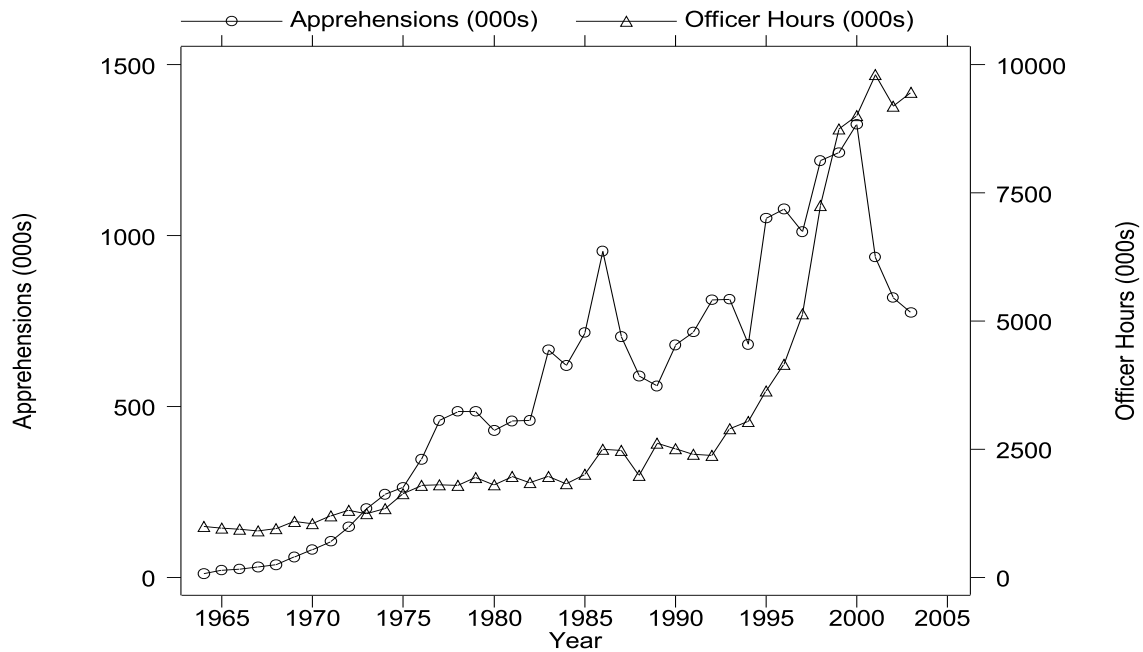
Figure 5: Linewatch Apprehensions and Enforcement by the U.S. Border Patrol
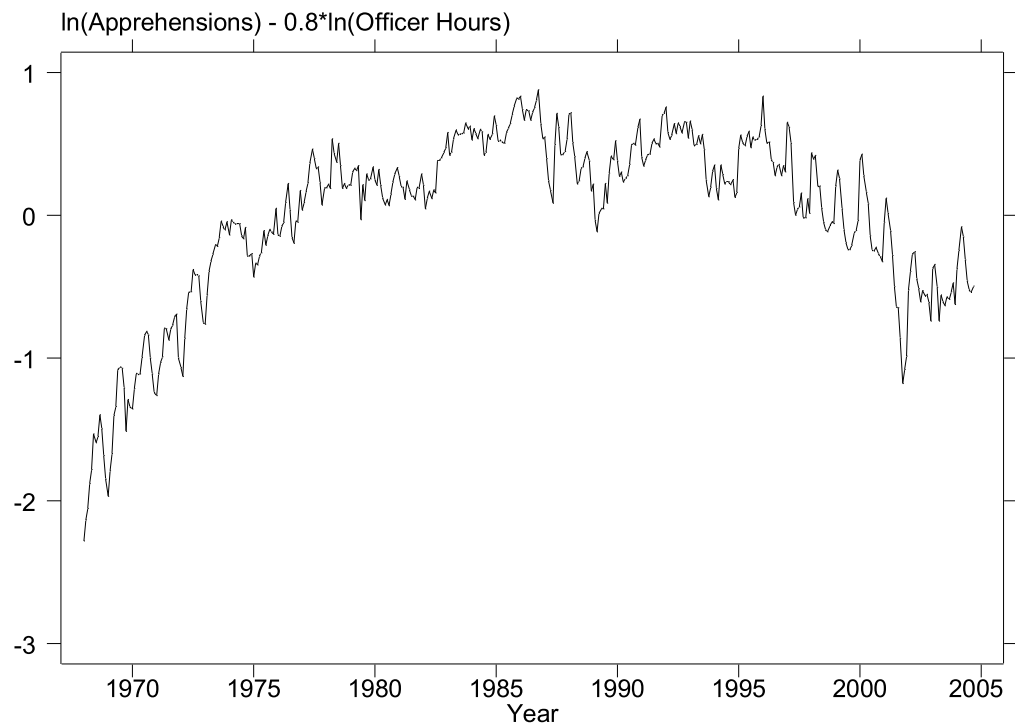
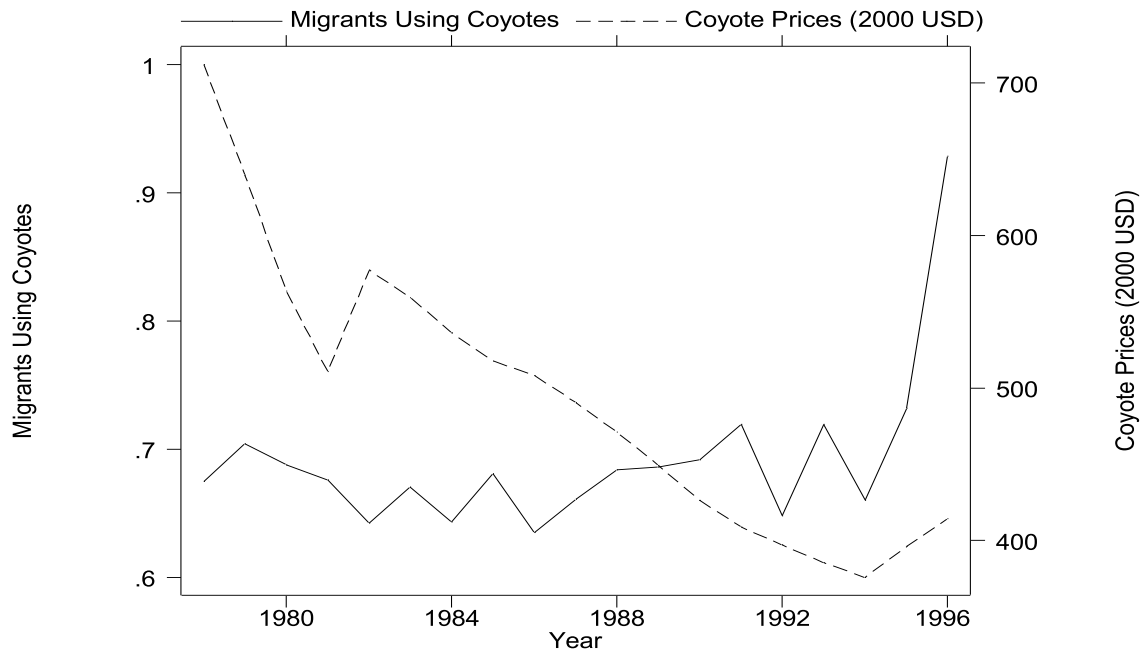**Figure 6: Estimated Attempts at Illegal Entry along the U.S.-Mexico Border**

Figure 7: Use of Smugglers by Migrants in the Mexican Migration Project

Figure 8: Border Apprehensions and Average Wages in Mexico
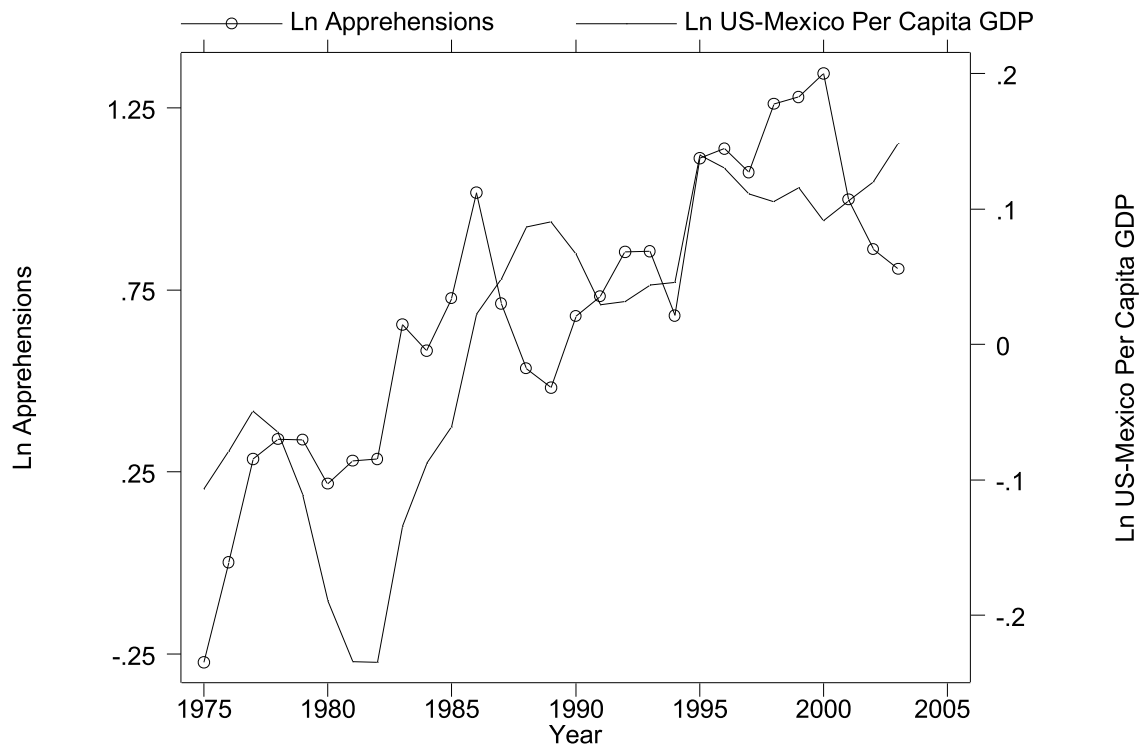
Figure 9: Border Apprehensions and U.S.-Mexico Relative Per Capita Income
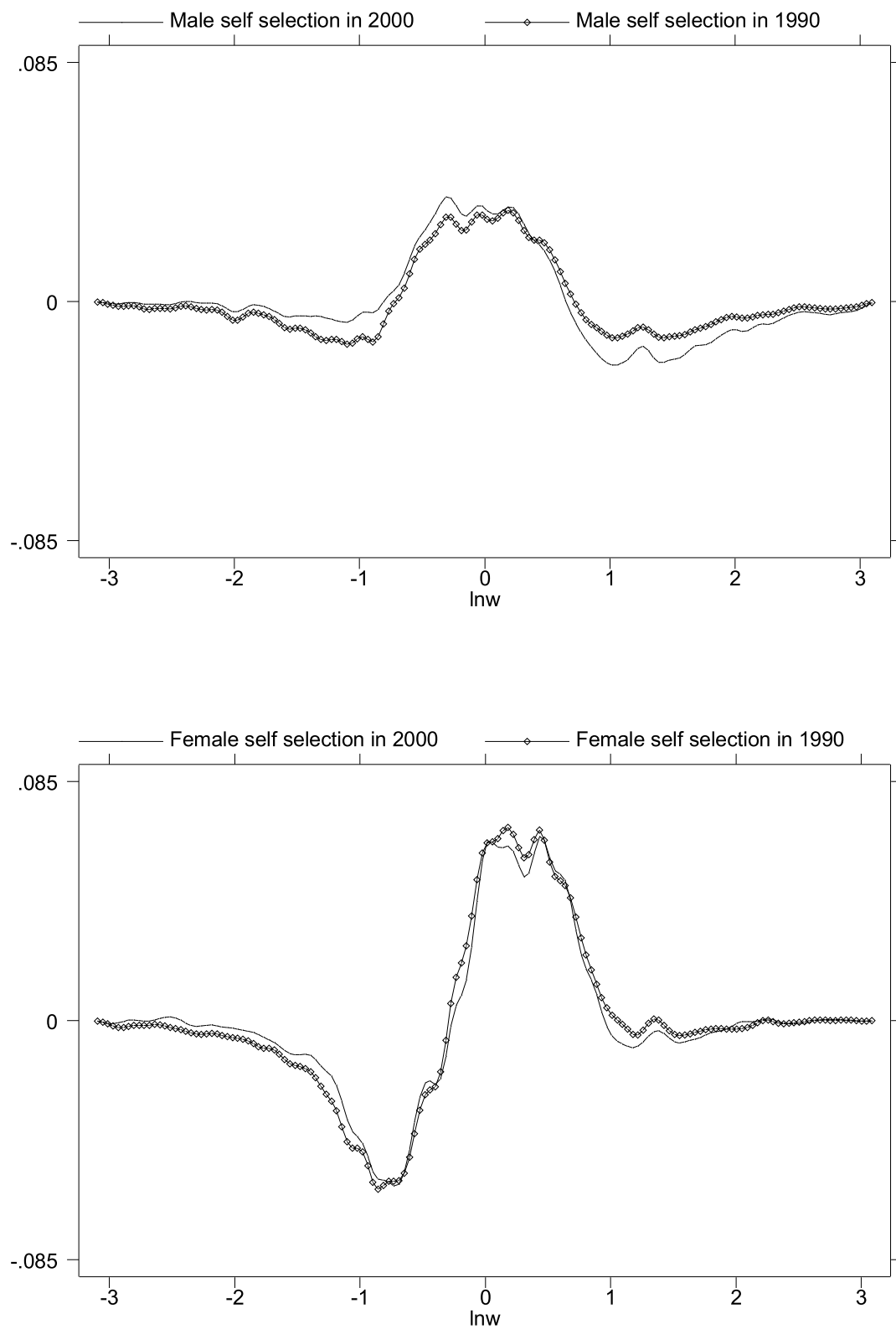
Figure 10: Immigrant (counterfactual) – Resident (actual) Wage Densities, 1990 and 2000

(counterfactual density for Mexican immigrants minus actual density for Mexican residents)
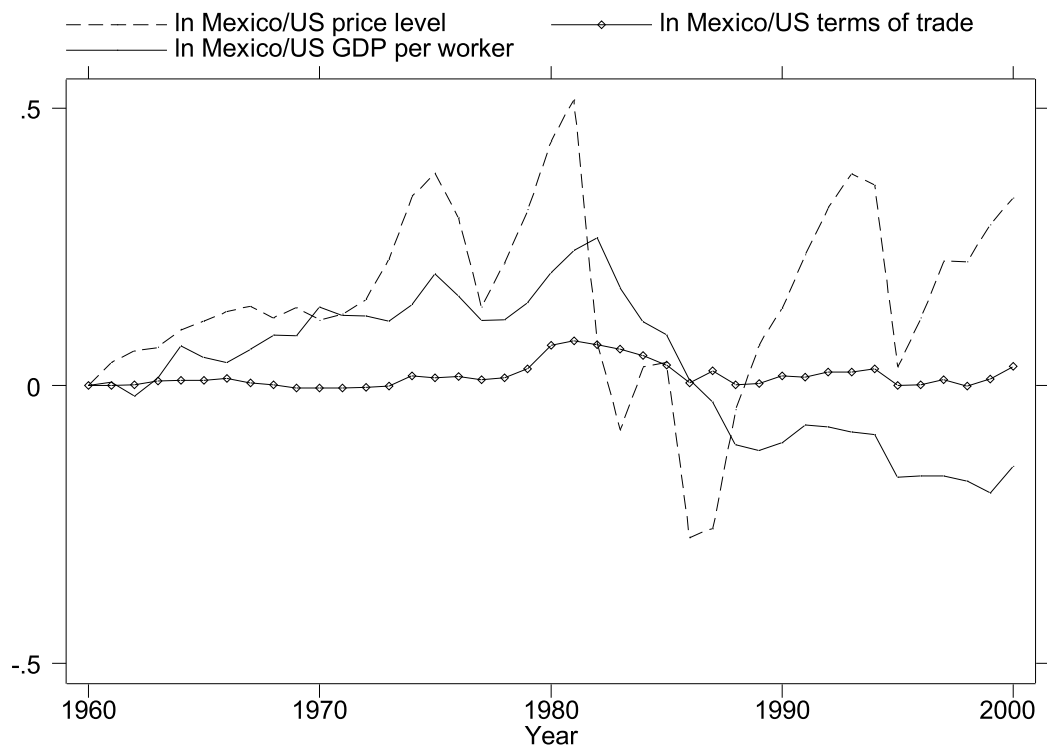
Figure 11: Mexico-U.S. Relative Incomes, Prices, and Terms of Trade
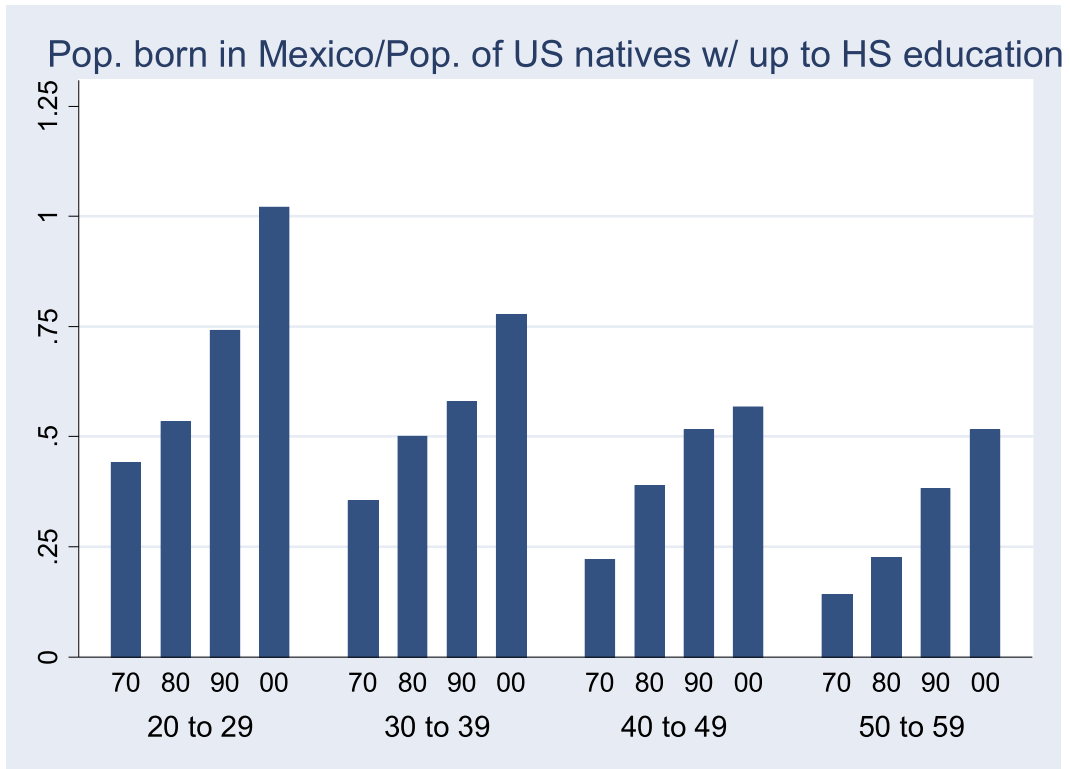
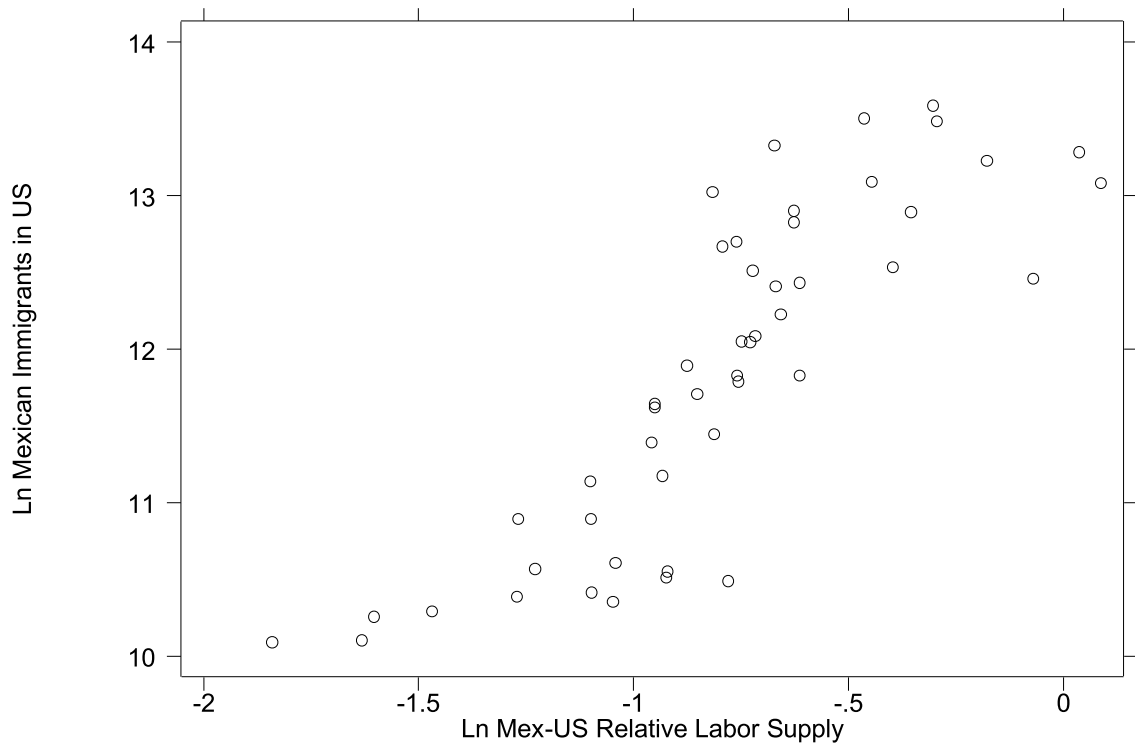**Figure 12a: Mexico-U.S. Relative Male Population, 1970-2000**
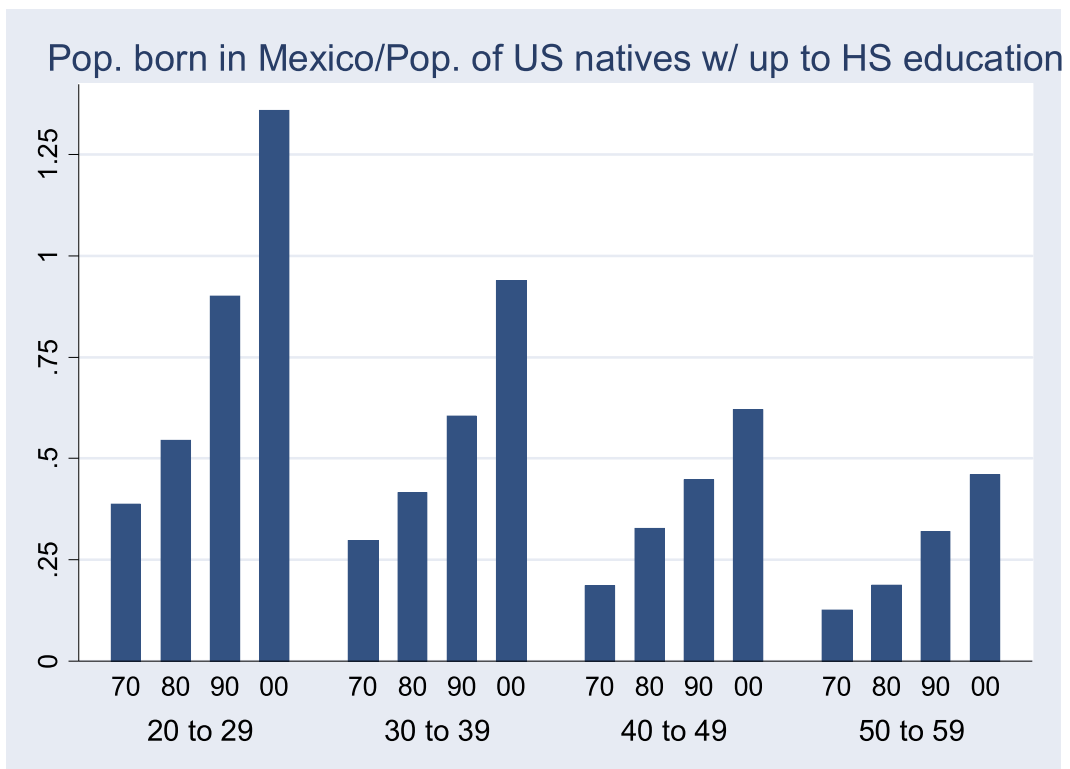
Figure 12b: Mexico-U.S. Relative Female Population, 1970-2000
Figure 13: Mexico-U.S. Relative Labor Supply, 1970-2000
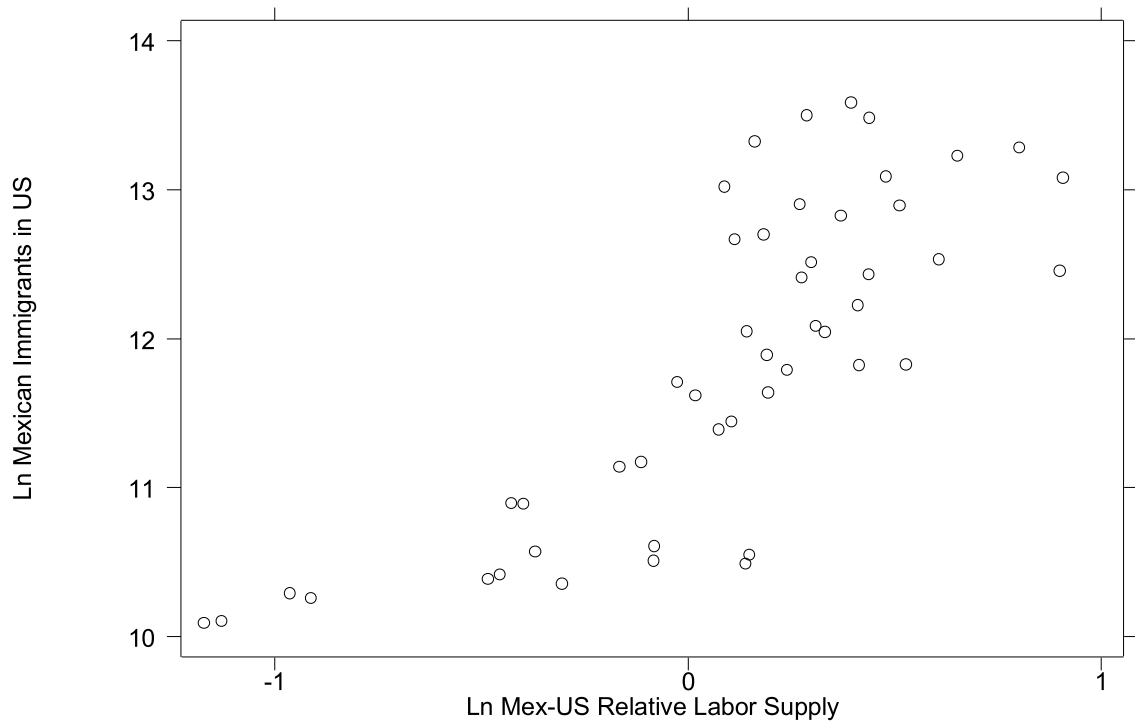
U.S. Native Population with Less than a High School Education

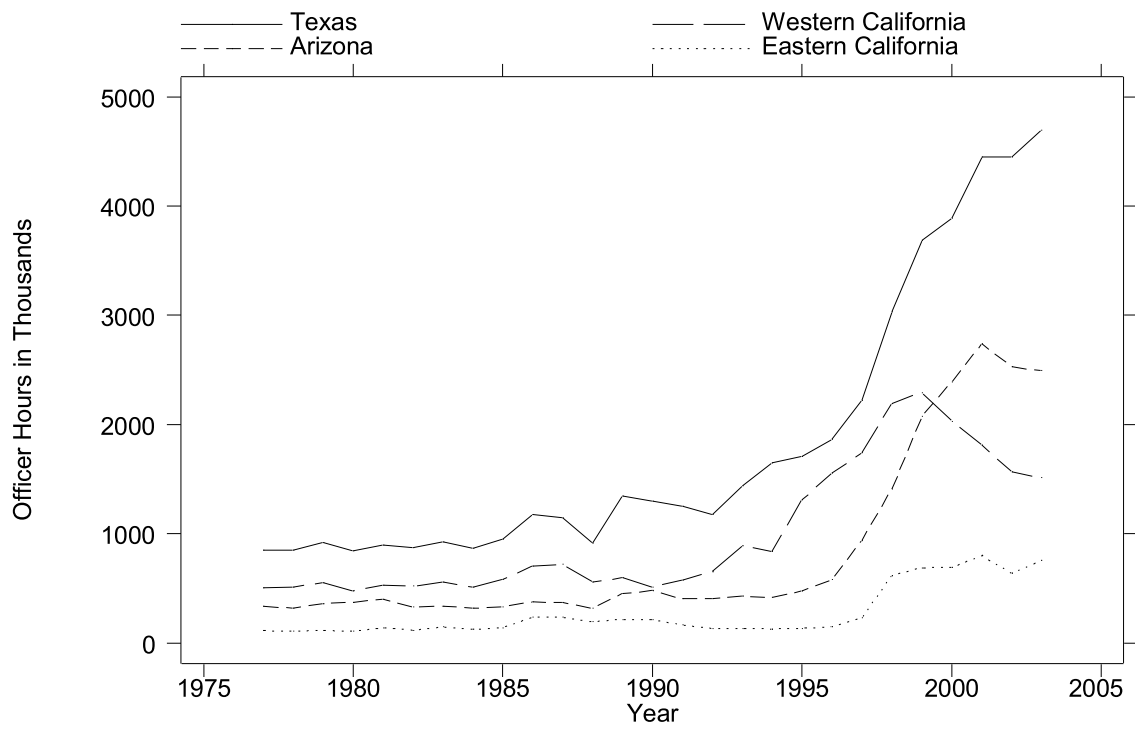**U.S. Native Population with up to and Including a High School Education**

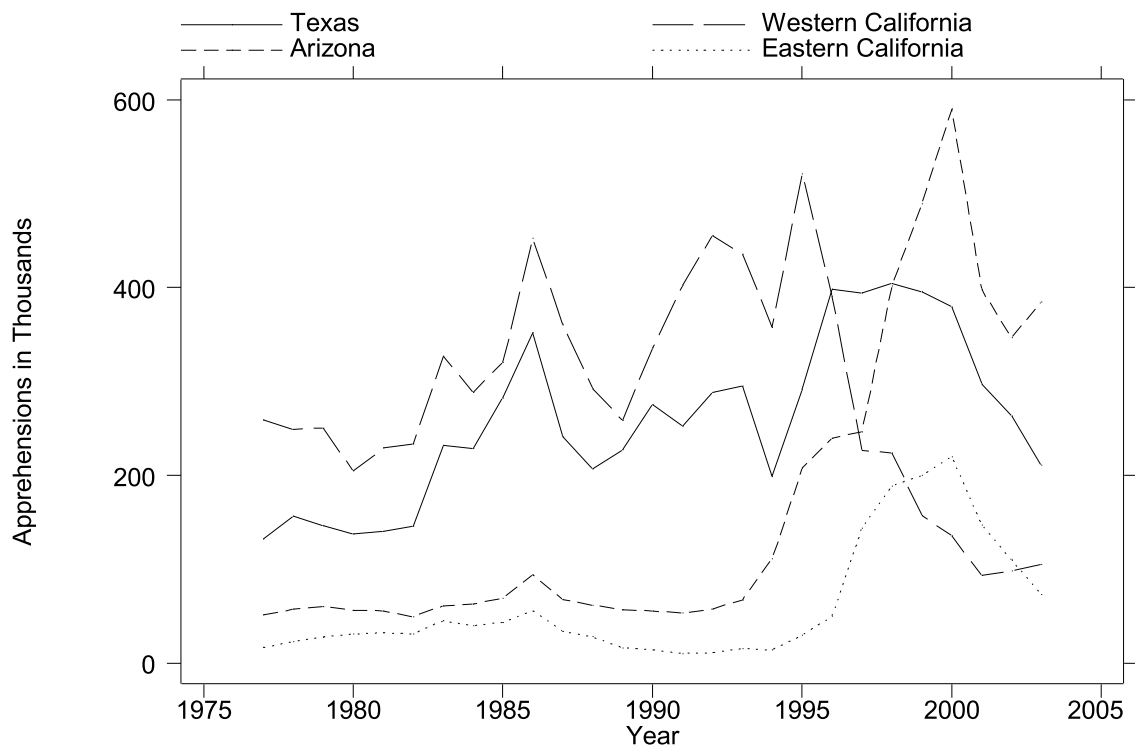**Figure 14a: Linewatch Enforcement by U.S. Border Patrol Region**

Figure 14b: Linewatch Apprehensions by U.S. Border Patrol Region