TI 2017-043/V
Tinbergen Institute Discussion Paper

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December 2, 2016

Abstract

The 1986 US Immigration Reform and Control Act (IRCA) was directed at tackling the problem of growing unauthorized migration through legalization of unauthorized immigrants, increasing border security and sanctioning employers who hired unauthorized immigrants. Our paper investigates how the IRCA affected the migration dynamics of Mexican immigrants focusing on their age of onset of migration and the duration of their first trip. We find that the IRCA had a positive effect in reducing unauthorized migration to the US. Although primarily aiming at unauthorized immigration, the IRCA had substantial effects on legal migration through its legalization program.

Keywords: Immigration policy, migrant behavior

JEL-codes: J61, J68

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1 Introduction

Immigration policies restrict the entrance of persons from other countries. There is a range of these policies from quotas that establish a maximum number of work and residence permits to be issued to foreigners to admission criteria that limit access (Boeri and van Ours, 2013). Admission criteria can be based on a point system in which individual-specific characteristics such as education, experience and language abilities are important. Admission criteria can also be based on family relationships or labor market conditions such as shortage of specific skills. During a large part of the twentieth century U.S. immigration was restricted through quota while over the last decades it was largely determined by family considerations, i.e. entry visas were assigned to those who had family members already in the U.S. (Daniels, 2002). In the second half of the twentieth century, the annual number of immigrants to the U.S. increased from a quarter of million in the 1950s to nearly half a million in the 1970s and close to a million in the 1990s. In the same time period, there was also big change in the source composition with a sharp rise in immigration from Asia and Mexico. In addition to the sharp rise of legal migration to the U.S. there was a big increase in unauthorized immigration, especially from Mexico (Clark et al., 2007).

The Immigration Reform and Control Act (IRCA) of 1986 was the first legislative reform aimed at tackling the growth of unauthorized immigrants. It intended to control and deter illegal immigration to the US through legalization of unauthorized immigrants, increased border security, and sanctions on employers which hired unauthorized immigrants. The law gave a legal status to about 2.7 million unauthorized immigrants in the years following its enactment (Baker, 2010). Despite this effort, the number of illegal migrants residing in the US continued to grow from 3.5 million in 1990 to more than 11 million in 2013 (Baker and Rytina, 2013; Passel et al., 2014).

We evaluate the effects that the IRCA had on the dynamics of Mexican migration. Changes in immigration law can affect the migrant stock in a country through several channels. A policy change may have an effect through both migrant inflow and outflow which in turn depend on the propensity to migrate to the country, the duration of stay, and the average number of trips each immigrant makes. Our study aims to investigate

the overall effect of the IRCA on a Mexican-born individual. We distinguish between the effect on the propensity of taking a first unauthorized trip to the US and the duration of the first stay in the US. In doing so, we attempt to separate the effects of the IRCA on the duration of stay of those migrants who are unauthorized throughout their stay from those who eventually receive legal status, as legalization limits the newly legal migrant's return behavior.[1] We compare the results with those of legal immigrants. To measure the overall effect of the reform we use a timing-of-events approach. In particular, we estimate a multivariate migration rate model which aims to detect a change in the age of initial migration and that of a return following the change in law. In our empirical analysis, we use a survey data of Mexican households provided by the Mexican Migration Project (MMP).

In our analysis we distinguish various groups of immigrants. The *legal* immigrant population of the US consists of two groups of migrants. *Legal residents* are non-citizens allowed to live and work in the country permanently by a permit termed Legal Permanent Resident (LPR). *Naturalized citizens* are foreign-born individuals who became citizens of the US. The non-immigrant population or *temporary migrants* include students, holders of various temporary work permits and their family but does not include short-term visitors for pleasure and business. Lastly, *unauthorized migrants*, also known as illegal immigrants and illegal residents, are foreign-born individuals who reside in the US but are neither legal immigrants, temporary migrants, nor short-term visitors. In our analysis we focus on unauthorized immigrants from Mexico who entered the US without authorizing documents and legal immigrants who hold LPR permits[2].

Our contribution to the literature on immigration policy is fourfold. First, we provide a concise account of unauthorized migrants' behavior after the introduction of the IRCA. We investigate whether there was indeed a one-time effect and assess the effectiveness of the IRCA in reaching its objectives. Second, we specify the contribution of each major component of the IRCA to its outcome. Third, we study the effect of the immigration policy on the age of onset of migration and the duration of the first migration spell using

[1]Immigrants who stay longer than 6 months outside the US risk losing their Legal Permanent Residence permits.

[2]Thus, the legal immigrants in our analysis do not include citizenship holders, as only 0.5% of our migrant sample held citizenship at the time of their first entry, in contrast with the 8% who held LPR permits and 83% who entered unauthorized

hazard rate analysis. We allow for time-varying variables to affect an individual's behavior over time. We also take into account that the behavior of an individual may change as the individual gets older or as the trip progresses. Finally, in comparison to previous studies that use samples of males, household heads or young migrants, we analyze a comprehensive dataset that includes both genders, all types of household members, and longer spells. Thus, our dataset represents the Mexican migrant population more closely.

Our paper is structured as follows. In the next section, we give a brief overview of the IRCA and the Mexican immigration to the US. This section also includes a review of the literature assessing the effects of the IRCA on unauthorized immigration in the US. Section 3 describes our data and presents a descriptive analysis of Mexican migrant behavior. Section 4 sets out the empirical model of the age of onset of migration and presents relevant parameter estimates. Section 5 discusses the set-up of the model to analyze the duration of the first trip and presents related parameter estimates. Section 6 offers an analysis on the major components of the IRCA. Section 7 presents a sensitivity analysis and simulation results to indicate how the IRCA affected the age of onset of migration and the duration of the first trip to the US. The last section concludes.

2 Immigration Reform and Control Act

Under the legalization program of the IRCA 3.0 million illegal immigrants applied for legal residence and 2.7 million of them eventually received a permanent resident status (Baker, 2010). Of these, 1.1 million received LPR as a special agricultural worker. The legalized migrants represented the majority of the 3-5 million illegal immigrants present in the country at the time (Rytina, 2002). Illegal immigrants who demonstrated eligibility to legal residence under the law were not subject to deportation and were allowed to work upon enactment of the law. The application window lasted for 12 months starting in May 1987. Eligible migrants received a legal temporary residence permit and 1.5 years later were able to apply for LPR permits. Thus 95 percent of the actual receipt of residence permits happened during the period of 1989 to 1991 (See Figure 1; Baker (2010)). Those legalized under the IRCA were not subject to the annual quota for granting of LPR permits that generally apply to legal migration. About 70 percent of the applicants

under the IRCA legalization program were immigrants from Mexico.

As a second major component of the IRCA, border enforcement staff were increased by 50 percent. The budget allocated for the Border Patrol increased 82% between 1986 and 1991. However, due to the increase in time allocated to other non-border activities, per-officer time spent on patrolling the border declined significantly resulting in a modest change in the levels of total time spent on border patrol activities (see Figure 2; U.S. General Accounting Office (1992)). In 1994, the number of border enforcement staff as well as the time spent on border patrol activities took a sharp upturn.

Lastly, the IRCA introduced, for the first time in the US, employer sanctions for hiring an unauthorized immigrant, which potentially affected 7 million employers in the US (General Accounting Office, 1987). With the introduction of the IRCA, employers were required to verify and document new recruits' identities and work permits. After a two year public education period, employer sanctions came into full effect in 1988. The Government Accountability Office reported in 1990 that the initial implementation of the IRCA was satisfactory (GAO, 1990). However, due to fear of discrimination against foreign workers, the employers' burden of verification was relatively small and enforcement of the policy fell over the years (see Figure 3; US Congress. Senate. (1996); Cooper and O'Neil (2005).

Due to the many and diverse components of immigration policy it is difficult to determine in advance possible effects of a set of policy changes such as the IRCA. Even when the overall outcome is known, it is hard to disentangle the effect of such a major change as legalization from those of other components which change infrequently as well. Previous studies on the effect of the IRCA use different identification strategies. Orrenius and Zavodny (2003) and White et al. (1990) use time dummies in measuring the effect of the IRCA on apprehension levels to ascertain whether it reduced undocumented migration. Donato et al. (1992) also used annual time dummies to analyze the trend of first and repeat migration and apprehension levels after the IRCA. While White et al. (1990) find that the IRCA reduced apprehension rates in the 2 years after, further analysis reveals that apprehensions fell in the few months after the law but reverted to the pre-IRCA levels after that (Orrenius and Zavodny, 2003). Donato et al. (1992) also agree that the IRCA did not affect the rate of migration to the US and find that it did not change repeat

migration patterns either.

Researchers have studied the effect of the IRCA on other aspects of migration as well. To evaluate the effect of the legalization component, comparison of legalized individual's behavior before and after the IRCA is common as well as comparison of legalized individuals with comparable native population (Amuedo-Dorantes et al., 2007; Amuedo-Dorantes and Bansak, 2011; Kossoudji and Cobb-Clark, 2000). Another strategy to measure the overall effect of the IRCA is to use the change in the legalized population as proxy for the IRCA ((Reyes, 2004; Massey and Espinosa, 1997; Baker, 2015)). Arguing that legalization was the most salient part of the law, Baker (2015) uses the ratio of legalized migrant population in a county to identify the effect of the IRCA on the level of crime.

Several studies on the general migration dynamics of migrants in the US differentiate between individuals whose trip initiates before and after the IRCA (Li, 2016; Quinn, 2014; Reyes, 2001). Their conclusion is mixed. Reyes (2001)[3] and Li (2016)[4] find that the duration of Mexican migrants trip increased for those who moved after the IRCA, while Quinn (2014)[5] find no change. However, this measure excludes the effect of the IRCA on the many migrants whose trip started before the policy but lasted long enough to be affected by it.

3 Data and descriptive analysis

3.1 Mexican Migration Project

Our data are from the Mexican Migration Project (MMP154[6]), an annual survey of Mexican households conducted by a team of researchers based at the University of Guadalajara and Princeton University. The collection of social and economic data on the Mexico-US migration started in 1982 and is freely accessible for research.

Every year the MMP research team chooses 3-5 communities in Mexico non-randomly, with the objective to include communities with positive out-migration to the US and to obtain a representative sample of small villages, towns, mid-size cities as well as metropoli-

[3]for MMP surveys between 1982-1993, all first and last trips
[4]for MMP surveys between 1982-2013, male household heads' last trip
[5]for MMP surveys between 1987 - 2008, male household heads' last trip
[6]The MMP database and codebook are available from mmp.opr.princeton.edu.

tan areas (Durand and Massey, 2004b). The team interviews a random sample of about 200 households in each community. They collect information about each member of the household, both those in Mexico and the US, in addition to socio-economic characteristics of the household. If a household member ever took a migratory trip to the US, the year of the first trip, the number of trips, documentation and duration information on the first and last trips to the US are recorded. Although the researchers interview households mainly in Mexico they also interview a small number (3.1% of individuals in the MMP154 sample) that originate in these communities but are located in the US. The latter represent the sample of permanent settlers in the US.

Since 1982, the MMP survey covered 154 different communities in 24 states out of 32 in Mexico. A great advantage of MMP-data over other sources of migrant data is that it distinguishes between various types of entry - undocumented, as a naturalized citizen, or a permanent resident, with a tourist visa, or a work visa. The survey also notes whether and when an immigrant received legal immigrant status. Despite being non-representative it is argued that the MMP data correctly captures the migration behavior of an average Mexican immigrant[7].

The MMP dataset defines a trip to the US if it is to a residence that involves employment, search for work, or an otherwise 'reasonably stable' residence (Mexican Migration Project and Latin American Migration Project, 2012). A short trip to the US for tourism or family visit purposes is not considered a trip nor is the trip that was cut short at the outset by a border apprehension. Likewise, a short trip to Mexico during a residence in the US is not considered to be a return trip. Due to unidentifiability of the communities in the MMP, we use the municipality and community data supplied by the MMP which

[7]As the survey tends to over-sample communities with significant levels of migration to the US, the data are representative of the communities surveyed but not of the Mexican population or all Mexican immigrants to the US (Durand and Massey, 2004a). Furthermore, those who migrated to the US as a whole family are not covered since the household is not in Mexico to be surveyed. As long term migrants are more likely to have traveled as a whole family, this may bias the MMP sample toward migrants with shorter durations. Durand and Massey (2004a) compared the MMP with the National Survey of Population Dynamics (ENADID) conducted by the Mexican National Institute of Statistics and Geography (INEGI) which is representative of the Mexican population with migration experience to the US. They concluded that, except for community location and size, the main characteristics and US trip duration of MMP migrants and ENADID migrants to the US are consistent. Hanson (2006) compared the MMP with the Mexico's Census of Population and Housing and the Mexican-born migrants in the US Census of Population and Housing concluding that the characteristics of the non-seasonal (permanent) migrants in both samples are similar.

is measured by censuses of 1960, 1970, 1980, 1990, 2000 and 2010. Thus, municipality characteristics in our data take their nearest available values. The documentation that a migrant had at the time of their first main job is defined as the entry documentation and defines whether the first trip in our data is considered unauthorized or legal.

3.2 Descriptive analysis

3.2.1 Age of onset of migration

We take the year in which an individual turned 14 years old as the start of a spell in Mexico[8]. We analyze individuals who had not traveled to the US by age 14 and turned 14 in Mexico in the years from 1976 to 1997, a 10-year band around the IRCA. The spells are observed until an individual takes a first migratory trip to the US or is right censored by the year 1998 or the survey year, whichever comes first. Thus our sample consists of a total of 59,548 potential migrants of whom eventually 7,404 migrated to the US undocumented while 710 became LPR migrants (see Appendix A for details on our data). The observation unit is an individual from Mexico.

As shown in panel A of Table 1, more than half of the sample consists of women. In contrast, only 24% of unauthorized migrants and 40% of legal migrants comprise of women. The median individual in the sample has 9 years of education, while median unauthorized migrants have less education.[9] In the year that an individual turned 14, there were an average of 8 household heads in the US for every 100 households in the community.[10] Furthermore, 71% of males participate in the labor force, and 25% earned more than double the minimum wage. Compared to the median individual in the sample, those from smaller communities with lower level of economic opportunities have higher rates of eventual migration, especially of unauthorized migration. As can be expected, migration rates, especially those of legal migration, are higher in Mexican communities with a larger network in the US. A look at the median spell starting years for eventual

[8]Age 15 is the age around which individuals may decide to embark on a migration trip independently. In the original sample of all migrants less than 1% travel at each age before 12, less than 2% at each of 13 and 14, while more than 3% travel at the age 15, around 5% at 16. More than half of the migrants had traveled before the age of 21, while only 9% had migrated to the US by the age of 14.

[9]Education is measured in years of education and characterizes the migrant at the time of the survey.

[10]The 'migrant community' variable is created using the life history data available for household-head migrants comparing it with the surveyed community.

unauthorized and legal migrants (1983 and 1981 respectively) indicates that the unauthorized migration rate might have increased faster than the legal migration rate.

Figure 4(a) shows the conditional migration rates by age for an individual's first trip to the US. These rates are specified as the probability to migrate at a certain age conditional on not having migrated up to that age. We distinguish between undocumented migration ("unauthorized migration"), migration with an LPR permit ("legal migration") and other types of documents. Clearly, the undocumented migration rate is by far the largest. It increases from about 0.7% at age 15 to about 2% at age 18 to 20 and slowly declines after that. The legal migration rates and other type of migration rates are all below 0.25% per year. Figure 4(b) shows the related survivor rates. By their mid thirties about 20% of the Mexicans in our sample have taken at least one unauthorized trip to the US. The other ways of migration to the US are relatively very small.

Figure 5 illustrates how the IRCA may have affected the age of onset of migration to the US. The top graph shows the unauthorized migration rate by age for individuals who turned 14 before the IRCA and those who turned 14 after the IRCA. When not controlling for migrant characteristics it appears that the unauthorized migration rate fell at ages 15-16 but increased for ages 18-19. The bottom graph of Figure 5 shows that after the IRCA the legal migration rate was substantially lower at most ages.

3.2.2 Duration of the first trip

We analyze first migration trips to the US which started in the years 1976 to 1997. The spells are observed until an individual returns to Mexico or is right censored by the year 1998 or the survey year. We include only first trips due to availability of data. Given that the majority of both unauthorized (61%) and legal migrants (77%) have had only 1 trip until the year they were surveyed and only about 10% had more than 3 trips, we think our analysis captures the migration dynamics of an average Mexican migrant.

Our sample consists of a total of 10,632 unauthorized first trips and 1110 first trips with a LPR permit. Of the unauthorized migrants 12% have eventually received LPR permits including those legalized under the IRCA. In the MMP-data, the duration of the first trip is measured in months. However, months may not be an accurate measure of duration since, due to perhaps recall error in trip duration, the frequency of reported

durations are disproportionately large every 12 months. Thus, we proceed to use discrete duration intervals of return. We round the months to years. As a result, if duration is noted to be t years we assume the true duration falls in the interval of $[12t-6, 12t+6)$ months, with the exception that all durations that lasted less than 18 months are grouped in the first interval.

Panel B of Table 1 provides descriptive statistics about our data. It shows that 61% of unauthorized migrants and 45% of legal migrants have returned to Mexico from their first trip. The median ages at migration are 20 and 21 for unauthorized and legal migrants respectively. Compared to the legal migrants, unauthorized migrants are from smaller communities with smaller shares of community members in the US. The destination for more than half of the migrant sample is California. Taken together, about three quarters of all migrants are headed to the state of California, Illinois, or Texas. About one fifth of both unauthorized and legal migrants work in agriculture[11] The average initial hourly wage of legal migrants is 36% higher than that of unauthorized migrants.

The empirical rates of return from the trip indicate that the trip features strong negative duration dependence. The top graph of Figure 6 shows the empirical (hazard) rates of return from the first trip. Legal migrants have a significantly lower return rate in the first decade after migration compared to that of unauthorized migrants. The bottom graph of Figure 6 shows indeed that the duration of the first legal migration trip to the US is substantially longer than the duration of other types of migration. The median duration of unauthorized and other migration is about 2-3 years while the median duration of the first trip of legal migration is about 12-13 years. A comparison of return rates from first migration trips observed until the IRCA and those starting after the IRCA (Figure 7) indicate that the return rate from an unauthorized trip has declined. The return rate of the legal immigrants however increased.

[11]The occupation variable measures the category of the first main occupation held during the trip.

4 Age of onset of migration

4.1 Statistical model

We model the age of onset of migration using a Mixed Proportional Hazard (MPH) specification. The MPH specification assumes a proportional effect of observed covariates and unobserved individual-specific components. Likewise, the effect of the IRCA is assumed to be multiplicative. We assume that individuals do not migrate before age 15 and we model the duration until first migration as the age of onset minus 14. We focus on unauthorized migration and migration with an LPR document and specify the age of onset of migration in a competing risk model to allow for dependence in an individual's hazard rates of unauthorized and legal migration. We observe spells that started within a 10-year period before and after the IRCA and observe them until 10-year after the IRCA. The dependent variable in the age of onset analysis is the number of years from age 14 until an individual takes his or her first legal or unauthorized migration to the US or is right-censored in 1998, the survey, death, or migration to the US with another type of documentation, for example a tourist visa.

An individual migration rate to destination u (unauthorized) or l (legal) at duration (age) t conditional on time-invariant observed characteristics x, the time-varying policy regime D_t and time-invariant unobserved characteristics v is specified as follows (ignoring a subscript for individual):

$$\theta^j(t|x_t, D_t, v_j) = \lambda_j(t) \exp(x_t\beta_j + \delta_{\text{IRCA},j} D_t + v_j) \qquad \text{for} \quad j = u, l \tag{1}$$

The parameters of main interest are $\delta_{\text{IRCA},j}$ – the effects of the IRCA on unauthorized or legal migration to the US. The specification of the effect of the IRCA assumes that individual hazard rate shifts at the age that is equivalent to the year that the IRCA is effective and not before. For instance, if an individual in Mexico was 19 years of age at the time IRCA was enacted, we allow for a permanent shift in the individual's hazard rate of migration at the age 19. As the IRCA was enacted on Nov 6, 1986 we take the year 1987 as the year the IRCA went into effect. This assumption is not far-fetched as the timing of enactment of a law is difficult to be foreseen by migrants. Although the reform

was discussed by policy-makers for about a decade, the debates around and opposition to the law by legislative authorities created an uncertainty about its implementation[12]. In addition, we assume that the effect of the IRCA is constant over time as we attempt to measure the average effect of the IRCA on the return hazard rate.

The vector of background parameters to be estimated is represented by β_j. The vector of covariates x_t include time-invariant and time-varying variables. Time-invariant variables included are gender and education at the time of the survey[13], migrant cohort represented by birth year minus 1900, and the extent of migrant community in the US. The extent of the migrant community in the US controls for the network effect of migration. It is represented by the share of household heads who were in the US in the sample of all heads of households interviewed from the community[14]. It is measured in the year the spell starts and is time-invariant to ensure exogeneity of the covariate. Dummies for states of birth are included to allow for state-fixed effects not captured by the municipality variables.[15] Time-varying variables are included to control for the home community's socioeconomic characteristics. These are the community population, male labor force participation rate, share of male labor force in manufacturing, and percentage of municipality labor force earning more than double the minimum wage. To control for time-varying labor demand factors, we include 1 period lagged US unemployment rate. Lastly, to control for other US immigration policies that might have affected migration behavior we include 1 period lagged annual number of Mexican's deported from the US. We include deportation as a proxy variable for two other immigration laws followed the IRCA within the observation period. The immigration laws enacted in 1990 and 1996 made deportation procedure of unauthorized migrants easier[16]. As figure 2 shows, deportations of Mexicans remained relatively stable until 1990 after which it increased exponentially. As can be also seen, the IRCA have changed only the line-watch hours at the border, although the latter had also seen strong increase since about 1994. After

[12]Orrenius and Zavodny (2003) reached a similar conclusion that illegal immigrants did not change their behavior in expectation of the IRCA.

[13]We take education as a proxy for unobserved ability of an individual migrant.

[14]Only 14% of our total sample are heads of households, 37% of whom have taken at least one trip to the use within our observation window. The rest of the sample consist of other members of the household.

[15]For 92.4% of the individuals in the main sample, their state of birth and last state of household residence coincide.

[16]The law of 1990 also made changes to the legal admissions quota.

controlling for time trend, personal characteristics, home and destination characteristics, and other immigration policies, we expect that our measure of the average effect of the IRCA is not confounded by other factors that influence migration dynamics.

Duration dependence is specified as a step-function with $\lambda_j(t) = \exp(\Sigma_k \xi_{j,k} I_k(t))$, where k (= 1,..,14) is a subscript for age categories and $I_k(t)$ are time-varying dummy variables that are one in subsequent categories, 13 of which are for individual ages (age 15,...,27) and the last interval is for ages above 28 years. Because we also estimate constant terms, we normalize $\xi_{j,1} = 0$.

The conditional density functions for the completed durations until migration to the US either as an unauthorized or as a legal migrant is

$$f^{ul}\left(t \mid x_t, D_t, v_u, v_l\right) = \left(\left(\theta^u\left(t \mid x_t, D_t, v_u\right) + \theta^l\left(t \mid x_t, D_t, v_l\right)\right)\right.$$
$$\left.\exp(-\int_0^t \left(\left(\theta^u\left(s \mid x_t, D_t, v_u\right) + \theta^l\left(s \mid x_t, D_t, v_l\right)\right)ds\right. \tag{2}$$

We integrate out the unobserved heterogeneity component assuming that they follow a discrete distribution with four points of support and the associated probabilities

$$\Pr(v_u = v_{u,1}, v_l = v_{l,1}) = p_1, \;\; \Pr(v_u = v_{u,1}, v_l = v_{l,2}) = p_2$$
$$\Pr(v_u = v_{u,2}, v_l = v_{l,1}) = p_3, \;\; \Pr(v_u = v_{u,2}, v_l = v_{l,2}) = p_4$$

which are modeled using a multinomial logit specification, $p_h = \frac{\exp(\rho_h)}{\Sigma_h \exp(\rho_h)}$, with $h = 1, 2, 3, 4$ and ρ_4 normalized to zero. Because we estimate constants, we also normalize $v_{u,2}$=$v_{l,2}$=0.

In our competing risk specification we distinguish between three possibilities. The first possibility (indicator r_1) is that an individual migrates to the US unauthorized, in which case we have a completed duration to unauthorized migration and an incomplete duration until legal migration. The second possibility (r_2) is that an individual migrates legally, in which case we have a completed duration to legal migration and an incomplete duration to unauthorized migration. The third possibility (r_3) is that an individual did not migrate to the US so the duration is censored. In that case, we have incomplete durations of unauthorized migration and legal migration.

We define S^{ul}_{ab} as the survivor function of $f^{ul}(t-1|x_t, D_t, v_{u,a}, v_{l,b})$ and $\Delta S^{ul}_{ab} = S^{ul}(t-1|x_t, D_t, v_{u,a}, v_{l,b}) - S^{ul}(t|x_t, D_t, v_{u,a}, v_{l,b})$ for $a = 1, 2$ and $b = 1, 2$. To simplify notation, we denote the hazard rate $\theta^j(t|x, D_t, v_{j,a})$ by θ^j_a for $a = 1, 2$. Then, taking the interval nature into account, the likelihood contribution of an individual's duration in Mexico is specified as follows:

$$
\begin{aligned}
&p_1 \left(r_1 \frac{\theta^u_1}{\theta^u_1 + \theta^l_1} \Delta S^{ul}_{11} + r_2 \frac{\theta^l_1}{\theta^u_1 + \theta^l_1} \Delta S^{ul}_{11} + r_3 S^{ul}_{11} \right) + \\
&p_2 \left(r_1 \frac{\theta^u_1}{\theta^u_1 + \theta^l_2} \Delta S^{ul}_{12} + r_2 \frac{\theta^l_2}{\theta^u_1 + \theta^l_2} \Delta S^{ul}_{12} + r_3 S^{ul}_{12} \right) + \\
&p_3 \left(r_1 \frac{\theta^u_2}{\theta^u_2 + \theta^l_1} \Delta S^{ul}_{21} + r_2 \frac{\theta^l_1}{\theta^u_2 + \theta^l_1} \Delta S^{ul}_{21} + r_3 S^{ul}_{21} \right) + \\
&p_4 \left(r_1 \frac{\theta^u_2}{\theta^u_2 + \theta^l_2} \Delta S^{ul}_{22} + r_2 \frac{\theta^l_2}{\theta^u_2 + \theta^l_2} \Delta S^{ul}_{22} + r_3 S^{ul}_{22} \right)
\end{aligned} \tag{3}
$$

4.2 Parameter estimates

The parameters of equation (3) are estimated using the method of maximum likelihood and reported in Table 2. The first column shows the parameter estimates pertaining to the age of onset of unauthorized migration and the second column shows parameter estimates for the age of onset of legal migration. Unobserved characteristics are assumed to have 2-point support for each migration rate. Preliminary estimations with the assumption of independence between hazard rates show that there are indeed significantly different and, by assumption, two types of individual hazard rates of unauthorized migration - high and low type. Likewise, we could identify two types of legal migration hazard rates that are considerably different from each other. Subsequent estimation allowing for dependence point to a perfect correlation between the two hazard rates indicating not four but two types of potential migrants in Mexico - those who are more likely to migrate with or without documentation and those who are less likely to migrate. The proportion of the latter in the sample is estimated to be 25 percent.

The IRCA appears to have affected legal migration rates more strongly compared to undocumented migration. It decreased the conditional probability of undertaking a legal trip to the US by about 24%. That is, the IRCA has increased the age of onset of legal migration. The IRCA's effect on undocumented migration is a decrease of about 7

percent, although the coefficient is not significant at conventional levels. The estimated effect on undocumented migration could be insignificant because several components of the IRCA have different potential effects on migration. Whereas border control and employer sanctions policies could increase the cost of undocumented entry (Angelucci, 2012; Gathmann, 2008), the legalization component might have acted as a pull factor for future migrants due to the expectation of future legalization or through legalized family members (Massey and Espinosa, 1997). While clearly intended to affect the behavior of current illegal immigrants, a large scale legalization program would also affect the dynamics of legal migration. In particular, the increased availability of permanent resident migrants may have reduced the demand for new immigrant workers, which would reduce legal migration.

Furthermore, we find that education has a non-linear effect on the age of onset of migration. The hazard rate of migration is lower at the low end and at the high end of the educational distribution. Female migrants take their first trip much later, and especially more so in unauthorized migration. Poorer economic opportunities at the home country does indeed seem to trigger migration at an earlier age, especially an undocumented one, as can be seen from the effect of origin community characteristics. The effect of coming from a larger community, a community with a larger male labor force participation rate, a larger share of male labor force in manufacturing, and a larger share of workers earning high wage are all negative and significant on undocumented migration rate. The effect of home community is similar on legal migration rates as well, except that a greater share of workers earning high wages affects the legal migration rate positively, although the effect is small in magnitude. As would be expected, having members of the community in the US decreases the age of onset of first-time migration, with a stronger effect for legal migration rates. This may be because a network in the US lowers migration costs and because it is easier to obtain LPR as family member of a current migrant. Higher unemployment rates in the US increase the age of onset of both undocumented and legal migration. The effect is similar for both migration routes, with about 12% decrease in the hazard of migration for 1% increase in the unemployment rate. The laws enacted in 1990 and 1996 to expedite unauthorized migration deportation does not seem to have affected undocumented migration rates. However, it has decreased the age of onset of

legal migration. There is a positive trend in the rate of undocumented migration. The legal migration age does not exhibit a trend during the observation window. Duration dependence in the hazard rate is positive for legal migration and has an inverted U-shape for unauthorized migration as was shown in Figure 4.

5 Duration of the first trip

5.1 Statistical model

The duration of the first trip of a migrant to the US is measured in years. We specify the return rate at duration τ conditional on observed characteristics $x_{2,t}$ and unobserved characteristics w as

$$\theta^j(\tau|x_{2,t}, D_\tau, L_\tau, w_j) = \gamma_j(\tau)\exp(x_{2,t}\alpha_j + \sigma_{\text{IRCA},j}D_\tau + \sigma_{\text{Legal},u}L_\tau + w_j) \quad \text{for} \quad j = u, l \quad (4)$$

in which j indicates the nature of the first trip in terms of the legal framework: unauthorized or legal. Furthermore, vector $x_{2,t}$ contains in addition to the characteristics in x_t characteristics of the first trip in terms of first main destination (California, Illinois, Texas or other state), type of first main occupation in the US (agricultural, unskilled manufacturing, skilled manufacturing, service or other industry), and the initial wage in the US. The time-varying background variables representing the home community and destination in $x_{t,2}$ are lagged by 1 year. For the time-invariant network variable we take the value observed at the start of the migration trip. The variable D_τ indicates whether a spell interval covers a post-IRCA period, i.e. occurring in or after 1987. By introducing the variable L_τ that indicates whether an unauthorized immigrant obtains a LPR permit during an interval, we allow for a shift in the hazard rate when an illegal immigrant becomes legal during the first trip.[17] This is done to separate the effect of the IRCA on unauthorized immigrants from the effect of legalization. Confounding of newly legalized migrants with other unauthorized migrants will cause a bias in measuring the effect of the IRCA as legalization has a requirement of continued stay in the US which reduces the

[17]Legalized migrants include migrants legalized under the IRCA or the Immigration and Nationality Act.

hazard rate of return. The main parameters of interest are the $\sigma_{\text{IRCA},j}$ that indicate the effect of the IRCA on return migration. For both return hazards we allow for unobserved heterogeneity which is specified as a discrete distribution with two points of support. Based on LR test statistics we choose the model without unobserved heterogeneity for the return hazard from an LPR migration[18].

The conditional density functions for the completed durations of the first trip either as an unauthorized or as a legal migrant is specified for $j = u, l$:

$$g^j(\tau \mid x_{2,t}, D_\tau, L_\tau, w_j) = \theta^j(\tau \mid x_{2,t}, D_\tau, L_\tau, w_j) \exp(-\int_0^\tau \theta^j(s \mid x_{2,t}, D_\tau, L_\tau, w_j))ds \quad (5)$$

We integrate out the unobserved heterogeneity component with points of support $w_{j,1}$ and $w_{j,2}$ and associated probabilities p_j and $1 - p_j$ where $p_j = \exp(\varrho_j)/(1 + \exp(\varrho_j))$. We normalize $w_{j,2} = 0$ and since duration is measured in years, we account for the interval nature of the data in the log-likelihood contribution as before.

5.2 Parameter estimates

The parameter estimates of the effect of the IRCA on the duration of the first migration trip and the effect of legalization of unauthorized migrants are shown in Table 3. These estimates indicate that legalization of an undocumented migrant decreased the hazard rate of return by more than 32%. After accounting for this effect, the IRCA is estimated to increase the hazard rates of return for both undocumented and legal migrants, by about 13% and more than 54%, respectively. Thus, legal migrants return rates have increased significantly after the IRCA. Increased competition in the labor market due to supply of permanent migrants can shorten the duration of stay of temporary migrants in the US. Reyes (2004) reports that legal admissions at the border reduce the duration of both legal and illegal trips possibly due to increased circular migration. Similarly, legal migrants' duration of stay can decrease further if expectation of a future legalization possibility translates into a smaller expected cost of losing one's LPR permit upon return to the home country[19]. Some researchers expect that legalization programs may make the

[18] We set $w_{l,1} = w_{l,2} = 0$

[19] Yet, if an expectation is created for further legalization programs, it could increase the duration of new and current illegal immigrants in the US if they hope to qualify for a legalization program. Under

migrant labor force less mobile or less responsive to labor market conditions (Orrenius and Zavodny, 2012). Our results partially support this idea as legalization prolongs the trip duration for newly legalized migrants. However, this effect is countered by the shortening of the duration of legal trips as legal migrants become more likely to return back home.

As predicted, the results show that there is a negative duration dependence in the return rate from first migration and that there is a stark difference in the return rates for legal migrants between the first year and later years. By the second year of migration, the conditional probabilities of return for both unauthorized and legal migrants drop by more than 50%. As in the case of duration until first migration, the results indicate presence of unobserved heterogeneity in the return rate of undocumented migrants. We identify two types of individuals in the sample, one with a shorter duration and one with a much longer duration. The proportion of the latter in the sample is estimated to be about 21% of undocumented migrants.

We find a trend in the return rate from an unauthorized trip. The return rate from the first unauthorized trip falls by about 1% for each year of arrival. Female unauthorized migrants have a hazard rate of return that is about 54% lower. Age at entry has a nonlinear effect on the hazard rate of unauthorized migrants with an increase at younger ages and decrease at higher ages. Age has no effect on the return rate of legal migrants. Additional education or higher ability decrease the return rate from an unauthorized trip at lower levels but increase it at higher level. However, legal migrants return rates increase linearly with higher education levels.

The same poor economic opportunities that led to an earlier age of migration appear to lead to longer stays on the first trip. However, just as higher share of workers earning more than double the minimum wage increased legal migration rates, it increased their duration as well. Unauthorized migrants to Texas tend to have the highest return rates and those to Illinois (or Chicago) have lowest return rates. The wage level appears to have had a negative effect on the return rate from an unauthorized migration, with 1 US dollar increase in the hourly wage leading to about 3% fall in the hazard rate of return from an unauthorized trips. The parameter estimate for the migrant community variable indicates that presence of members of the home community in the US stimulates higher

the IRCA illegal immigrants had to have lived in the US for at least 5 years to qualify for legalization

rates of return migration. This might result from several factors. Presence of a network reduces initial costs of migration leading to less time in the US to recuperate the cost. Also, as suggested by Lindstrom (1996), due to less cost per trip the presence of a network might encourage circular migration.

6 Decomposition of the IRCA effects

Our study emphasizes the one-time nature of the policy and estimates its effectiveness. In this section we aim to decompose the effects of the IRCA and understand the timing of the effect and which of its components drive the results.

One way to measure the effect of the IRCA components is to include variables indicating how the three major components of the IRCA changed over time in the main analysis replacing our IRCA dummy. However, this has several drawbacks. First, due to both trending and high correlation (in particular deportations and line-watch hours, policies which changed in 1990 and 1986 respectively), it is difficult to disentangle the effect of the time-varying policy variables. The effects of time varying variables and the trend are sensitive to the inclusion of too many time-varying variables. Furthermore, the enactment of the IRCA itself could have affected migrants' behavior over and above its components by giving a strong signal about US policy stance about immigration or by changing expectations of migrants about US policy. Inclusion of only time-varying components of the IRCA would fail to capture this effect. That is, the omission of the unobserved effect would bias the estimation. Lastly, knowing the effects of policy components does not succinctly provide an accurate estimate of the overall effect of the policy.

Thus, we take a step-by-step procedure to the analysis of the effect of the law. In the initial step, we estimate the overall effect of the IRCA controlling for, among others, immigration policies after the IRCA. In the next step, we restrict the effect of all covariates except for the IRCA dummy at its estimated values for a closer view of what factors determine the estimated the IRCA effect.

First, we examine the evolution of the effect of the IRCA over time by estimating the restricted model replacing the IRCA dummy by annual dummy variables. The results for the age of onset of migration are shown in Figure 8. The age of onset of undocumented

migration does not show a significant change after the IRCA. However, we can see that the effects of the IRCA on the age of onset of legal migration have largely been driven by a drop in migration rates in the years 1989-1992. This corresponds to the years that most of the IRCA migrants received permanent residence after a temporary residence period. Then, the age of onset of legal migration increased, but did not reach its base year level in 1978. The results on the return rate are depicted in Figure 9 indicating that the return rate from an undocumented trip increased slightly immediately with the IRCA remaining at the same level thereafter. However, the return from a legal trip peaked in the years 1990 to 1993 mirroring the effect on the age of onset of migration. The comparison of the IRCA components with the annual change in the migration dynamics after the IRCA, suggests that the legalization was a possible driver in the change of behavior in legal migrants.

Next, we examine the effect of the IRCA in terms of its components. We replace the IRCA dummy variable in the restricted model with time-varying variables signifying each major component of the law: (log) annual line-watch hours at the border for the enforcement, (log) annual completed workplace investigation cases for the employer sanctions, and (log) annual number of mexican LPR recipients for the legalization component. As employer sanctions case and LPR admissions are highly correlated[20], we also test the model with various combinations of the components for robustness. The results are presented in Table 4. In columns 1 and 4 of the table, we report the results of the regression where all three component variables are included for the IRCA. The results on the age of onset of migration (Panel A) indicates that, when controlling for all three components, employer sanctions do not have an effect. Increased admission of legal migrants however reduced migration rates by about 5% and 18% respectively for undocumented and legal migration rates at each age. The result on the return rate (Panel B) shows that employer sanctions again have no effect after controlling for line-watch hours and LPR admissions. It shows that when employer sanctions are controlled for, LPR admissions increase the return rate from a legal migration while line-watch hours reduce the return rate.

As employee sanctions cases are all insignificant and the variable is highly correlated with line-watch hours, by way of sensitivity analysis we drop the variable in columns 2

[20]The correlation coefficient is 0.79 for the years 1976-1998.

and 5. Likelihood ratio tests indicate that inclusion of all 3 variables does not improve the overall estimation results compared to models with the inclusion of only LPR admissions and line-watch hours. The results attest that indeed legalization reduces both undocumented and legal migration rates, with a much higher effect on legal migration. It also increases return rates, with larger effects on legal migrants. When employee sanctions are not controlled for, line-watch hours at the border have no effect on migration dynamics of both unauthorized and legal migrants.

Finally, we estimated the full model without restrictions using the LPR admissions variable instead of the IRCA dummy to verify whether our imposed restrictions have affected the result. The outcomes, shown in columns 3 and 6, remain relatively robust to the relaxing of restrictions. A 1% increase in the legal admission rates reduces the age of onset of undocumented migration by 3%. However, the coefficient of the IRCA effect on the return from an undocumented migration becomes insignificant, albeit of similar magnitude. Increased admission of legal migrants reduces legal migration by about 20% and increases return migration by more than 40%. Thus we conclude that legalization was indeed the main driver of the effect that the IRCA had on migration dynamics of Mexicans. Second, border enforcement and employer sanctions levels were not effective in changing migration behavior. This could be due to several factors. Reyes (2007) also found that border enforcement was positively associated with undocumented migration and suggests that for the enforcement to be effective a certain high level is necessary. Massey and Espinosa (1997) posit that preemptive migration might explain ineffective border policy if individuals undertake migration sooner to preempt further increases in border enforcement. Gathmann (2008) found that migrants change their route of entry when border enforcement does not increase evenly in all places. Lastly, we conclude, from the improvements in the log-likelihood in the unrestricted model with LPR admissions compared to the main model with an IRCA dummy variable, that legalizations can be a valid proxy variable for the IRCA.

7 Sensitivity analysis and simulation results

In this section we examine the sensitivity of the results to changes in some of the assumptions underlying our analysis. Tables 5 - 7 show the results of this exercise. We only report the effect of the IRCA as the effects of other determinants hardly change.

7.1 Estimates from sub-samples

So far, we have included both men and women in our sample. However, it might be the case that women tend not to make independent decisions, but rather migrate following their husbands or other male family members (see Reyes, 2001, 2007). For instance, the main results indicate that women take their first trip to the US much later than men under both unauthorized and legal migration routes. They also stay longer on an unauthorized trip. Thus, as it could be that men make the decision to migrate, we separately analyzed male behavior. The results reported in column 1 of Table 5 indicate that indeed the IRCA might have affected them in different ways in their decision to migrate. The effect of the IRCA on the male migration rate, both legal and undocumented, is stronger in magnitude, has the same sign and higher statistical significance. This signals that the effect of the IRCA on women's migration rates were weaker. Male migrants' return rate from the first undocumented migration is of similar magnitude and statistical significance as the main result (column 5 of Table 6). However, their return rate from a legal first trip is statistically not different from zero. This indicates that the IRCA did not affect the return rate of male legal migrants.

Massey and Espinosa (1997) found that having legalized family members greatly increased the odds of an undocumented trip to the US. Thus, unauthorized migration rates may have been affected by the undocumented entry of family members of legalized migrants. To allow for this possibility, we exclude from the sample households with at least one legalized member. The parameter estimates of this robustness check shown in column 2 of Table 5 indicate that our results hold also for the sample whose family members were not legalized. The IRCA has increased the age of onset of migration for both legal and undocumented migrants without family members who were legalized.

We have noted that agricultural workers are overrepresented in the MMP sample

compared to the Mexican migrant population in the US. Workers in agriculture represent 20% of the migrant sample. We check the robustness of our findings in respect to return migration by analyzing a sub-sample which excludes workers in agriculture, but not in other agricultural sectors such as animal husbandry, forestry and fisheries. The effect on return rate from illegal migration does not change very much, while that on legal migrants increases by more than 23 percentage points (column 2 of Table 6). Thus, inclusion of legal immigrant agricultural workers might have dimmed the effect of the IRCA on legal immigrants, with no effect on other processes. Indeed, we observe from the data that 67% of the LPR migrants in agriculture have returned by 1 year after migration compared to 12% of legal migrant in non-agriculture. In addition, we see that 80% of LPR migrants in agriculture have returned to Mexico within 4 years after migration as opposed to 23% for LPR migrants in non-agriculture. In comparison, the difference between the two groups within the unauthorized migrants is not so stark – 78% of unauthorized migrants in agriculture and 50% in non-agriculture return within 4 years.

Next, we take possible anticipation effect of the policy into account as some migrants might have changed their behavior in anticipation of the IRCA. We exclude from the data trips to the US that started in 1986 and 1987. Our results (column 3 of Table 6) show that the main results are robust to our assumption of no anticipation effect of the IRCA. The effects of the IRCA are of same magnitude, sign, and statistical significance for undocumented migrants and stronger for LPR migrants.

Due to the sampling design of the MMP dataset which collects data of about the same number of households in every community, smaller communities could have had a disproportional influence on the estimated effect especially if migration dynamics are different in such communities. In addition, as only up to about 20 permanent migrant households in a community are interviewed in the US, the behavior of circular migrants may have disproportionally dominated the results. To check the robustness of our results with respect to the sampling design, we use a weighted hazard rate model. The weights used for the Mexican sample represent the population of the Mexican communities in the dataset, while the weights used for the US sample represent the size of the total permanent migrants from a Mexican community to the US. Thus, the weighting results in a representative sample of circular and temporary migrants and non-migrants from

the interviewed Mexican communities. For both the migration and return hazard rates, we employ the same background variables as the main models. In the age of onset of migration, we simplify the competing risk model slightly by assuming independence between the two migration routes to allow weighted estimation. We estimate the weighted hazard rate by a complementary log-log model with the same specification of duration dependence (see Jenkins, 1995). The results reported in the last columns of Tables 5 and 6 show that our results are robust to the sampling design. The effect of the IRCA on the age of onset of undocumented migration is of the same magnitude and significance while that of legal migration is stronger and of the same significance level. The effect of the IRCA on return rates are estimated to be stronger and of the same significance level under the weighted measurement.

7.2 Correlation between age of onset and duration of first trip

To account for possible dependency between the propensity to migrate and propensity to return we estimated the effect of the IRCA on the age of onset of migration and return migration simultaneously. The conditional density functions for a completed duration t of a spell in Mexico and subsequent return at duration τ from the first trip either as an unauthorized or as a legal migrant, conditional on observed characteristics x, x_2 and unobserved characteristics v_u, v_l, w_u, w_l is

$$h^{ul}\left(t, \tau \mid x, x_2, D_t, D_\tau, L_\tau, v_u, v_l, w_j\right) = f^{ul}\left(t \mid x, D_t, v_u, v_l\right) g^{j}\left(\tau \mid x_2, D_\tau, L_\tau, w_j\right) \quad (6)$$

for $j = u, l$. The unobserved heterogeneity component is assumed to follow a discrete distribution with eight points of support and the associated probabilities:

$$\begin{array}{ll}
\Pr(v_u = v_{u,1}, v_l = v_{l,1}, w_u = w_{u,1}, w_l = w_{l,1}) = q_1 & \Pr(v_u = v_{u,1}, v_l = v_{l,1}, w_u = w_{u,1}, w_l = w_{l,2}) = q_2 \\
\Pr(v_u = v_{u,1}, v_l = v_{l,1}, w_u = w_{u,2}, w_l = w_{l,1}) = q_3 & \Pr(v_u = v_{u,1}, v_l = v_{l,1}, w_u = w_{u,2}, w_l = w_{l,2}) = q_4 \\
\Pr(v_u = v_{u,2}, v_l = v_{l,2}, w_u = w_{u,1}, w_l = w_{l,1}) = q_5 & \Pr(v_u = v_{u,2}, v_l = v_{l,2}, w_u = w_{u,1}, w_l = w_{l,2}) = q_6 \\
\Pr(v_u = v_{u,2}, v_l = v_{l,2}, w_u = w_{u,2}, w_l = w_{l,1}) = q_7 & \Pr(v_u = v_{u,2}, v_l = v_{l,2}, w_u = w_{u,2}, w_l = w_{l,2}) = q_8
\end{array}$$

The result of this estimation, shown in Table 7, indicate that the age of onset of first migration and subsequent trip duration exhibit dependency. It indicates that the type of individuals with higher propensity of legal and undocumented migration are more likely to return after a short duration of stay if they migrate. This type is estimated to be 66% of all individuals, 7 percentage points higher than what independent hazard rates would predict. In contrast, the type of individuals with lower probability of legal and undocumented migration is associated with lower probability of return if they migrate. This type is estimated to be 13% of all individuals, 8 percentage points higher than what independent processes would predict.

However, the estimates of the effect of the IRCA do not change and are robust to the assumption that the age of onset of migration and subsequent trip duration are independent once actual age at migration has been accounted for.

To sum up, the results of the sensitivity analysis in this section indicate that the estimated effects of the IRCA on onward migration and return rates are robust to changes in several of the main assumptions. In particular, the effect of the IRCA on the age of onset of unauthorized trip and the return rate from both unauthorized as well as legal trips remain unchanged.

7.3 Impact of the IRCA and legalization of unauthorized immigrants

To illustrate the magnitude of the effects of the IRCA and legalization of unauthorized migrants we perform simulations of durations until migration and durations of the first trip based on the characteristics of the median migrant and the parameter estimates of Tables 2 and 3. First, we look at the onward migration rates by the age of 30 for the communities in Mexico (Table 8). Then, we simulate the 3-year return rates for the migrants (Table 9).

As shown in Table 8, the unauthorized onward migration probability by age 30 for a Mexican man with the median characteristics and high migration rate (high-type) decreased by about 2.5 percentage points after the IRCA, from 57.5% to 55%. The migration probability by age 30 of a high-migration type female decreased from 17.7% to

16.6%. Low-type individual's unauthorized migration rates decreased as well. Although their migration rate is considerably lower than that of the high-type it is still higher than that of the high-type legal migrant. For instance, the after-IRCA migration probability by age 30 is 15.9% for an unauthorized trip of a low-type individual while it is 4.7% for a legal trip of a high-type individual. The simulation also shows that the effect of an increase in migrant networks is considerable, as an increase of migration network ratio from 25-th to 75-th percentile leads to about 20 percentage point increase in migration rate of high-type unauthorized migrants and significant increases for the other types of migrants as well. Similarly, the effect of US labor market conditions is considerable for all types of migrants. If the US unemployment rate increases from its 25-th to 75-th percentile, undocumented migration rates fall by about 12 percentage points for the high-type individual and 3 percentage points for the low-type.

The probability of return within 3 years of migration is very high for migrants with the high type of return rate. Median male migrant return is about 54% before the IRCA and increased to 58.5% after. For LPR, the increase is starker - from 8.3% to 13.8%. We can see that female return rate is generally smaller than that of males. The effect of migrant community increase from its 25-th to 75-th percentile is significant as there is much variation in size of migrant community in the US. Previously undocumented legalized migrants' return rate is considerably lower than that of undocumented migrants for both high and low migration type individuals.

8 Concluding remarks

In our study, we measure the effects of an immigration reform, the IRCA, on the migration from Mexico to the US and the return migration from the US to Mexico. Our study contributes to the current literature measuring the overall effect of the policy and identifying the channels through which the policy affected Mexican migration dynamics.

Our results indicate that, once we control for the trend in migration rate, the IRCA had a small effect in reducing unauthorized migration to the US, especially for male migrants. The effect of the IRCA on the age of onset of undocumented migration is negative but not significant. However, when we look closer, we find that the reform decreased the

propensity of males to take an unauthorized trip by about 13% and those with no legalized family members by about 9%. After controlling for the effect of receiving legalization and the trend in return rates, we find that the return rate from an unauthorized trip increased. Thus, the IRCA was effective in reducing the trend in undocumented migration to the US and making undocumented stay shorter. We also find that the IRCA reduced the rate of legal migration as well as the duration of the first legal migration trip. Yet, as the IRCA had greater effect on legal migrants' behavior, the share of undocumented migrants would still have increased after the IRCA. When we consider the increasing trend in undocumented migration and decreasing return migration over the years, the Mexican immigrant stock in the US would certainly have shifted towards a higher proportion of illegal migrants despite the positive effect of the IRCA.

The IRCA as a comprehensive reform has had a substantial effect on immigration. It consisted of different policy measures that intended to control and deter unauthorized migration by increasing the difficulty of illegal entry, and of finding and keeping a job while unauthorized. Evaluation of the outcome indicates that the IRCA affected unauthorized migrants in the US largely through its legalization program. Border enforcement and employer sanctions levels were not effective in reducing migration or encouraging returns. The IRCA appears to have affected legal migration dynamics through its legalization program as well.

References

Amuedo-Dorantes, C. and C. Bansak (2011). The impact of amnesty on labor market outcomes: A panel study using the legalized population survey. *Industrial Relations 50*(3), 443–471.

Amuedo-Dorantes, C., C. Bansak, and S. Raphael (2007). Gender differences in the labor market: Impact of IRCA's amnesty provisions. *American Economic Review 97*(2), 412–416.

Angelucci, M. (2012). U.S. border enforcement and the net flow of Mexican illegal migration. *Economic Development and Cultural Change 60*(2), 311–357.

Baker, B. and N. Rytina (2013). Estimates of the unauthorized immigrant population residing in the United States: January 2012. Technical report, DHS Office of Immigration Statistics.

Baker, B. C. (2010). Naturalization rates among IRCA immigrants: A 2009 update. Technical report, DHS Office of Immigration Statistics.

Baker, S. R. (2015). Effects of immigrant legalization on crime. *American Economic Review 105*(5), 210–213.

Boeri, T. and J. C. van Ours (2013). *The Economics of Imperfect Labor Markets* (2nd ed.). Princeton: Princeton University Press.

Clark, X., T. J. Hatton, and J. G. Williamson (2007). Explaining U.S. immigration, 1971-1998. *Review of Economics and Statistics 89*(2), 359–373.

Cooper, B. and K. O'Neil (2005). Lessons from the Immigration Reform and Control Act of 1986. Technical Report 3, Migration Policy Institute, Task Force on Immigration and America's Future.

Daniels, R. (2002). *Coming to America: A history of immigration and ethnicity in American life* (2nd ed.). New York: Harper Perennial.

Donato, K. M., J. Durand, and D. S. Massey (1992). Stemming the tide? Assessing the deterrent effects of the Immigration Reform and Control Act. *Demography 29*(2), 139–157.

Durand, J. and D. S. Massey (2004a). Appendix: The Mexican Migration Project. In J. Durand and D. S. Massey (Eds.), *Crossing the border: Research from the Mexican Migration Project*, Chapter 16, pp. 321–336. New York:: Russell Sage Foundation.

Durand, J. and D. S. Massey (2004b). What we learned from the Mexican Migration Project. In J. Durand and D. S. Massey (Eds.), *Crossing the border: Research from the Mexican Migration Project*, Chapter 1, pp. 1–16. New York: Russell Sage Foundation.

Gathmann, C. (2008). Effects of enforcement on illegal markets: Evidence from migrant smuggling along the southwestern border. *Journal of Public Economics 92*, 1926–1941.

Hanson, G. H. (2006). Illegal migration from Mexico to the United States. *Journal of Economic Literature 44*, 869–924.

Jenkins, S. P. (1995). Easy Estimation Methods for Discrete-Time Duration Models. *Oxford Bulletin of Economics and Statistics 57*(1), 129–138.

Kossoudji, S. A. and D. A. Cobb-Clark (2000). IRCA's impact on the occupational concentration and mobility of newly-legalized Mexican men. *Journal of Population Economics 13*, 81–98.

Li, S. (2016). The determinants of mexican mmigrant' duration in the united states: family composition, psychic ccost, and human capital. *IZA Journal of Migration 5*(2), 1–28.

Lindstrom, D. P. (1996). Economic opportunity in Mexico and return migration from the United States. *Demography 33*(3), 357–374.

Massey, D. S. and K. E. Espinosa (1997). What's driving Mexico-US migration? A theoretical, empirical, and policy analysis. *American Journal of Sociology 102*(4), 939–999.

Mexican Migration Project and Latin American Migration Project (2012). MMP/LAMP Interviewer's manual.

Orrenius, P. M. and M. Zavodny (2003). Do amnesty programs reduce ondocumented immigration? Evidence from IRCA. *Demography 40*(3), 437–450.

Orrenius, P. M. and M. Zavodny (2012). The economic consequences of amnesty for unauthorized immigrants. *Cato Journal 32*(1), 85–106.

Passel, J. S., D. Cohn, J. M. Krogstad, and A. Gonzalez-Barrera (2014). As growth stalls, unauthorized immigrant population becomes more settled. Technical report, Pew Research Center, Washington, D.C.

Quinn, M. A. (2014). Crossing the border and migration duration. *Contemporary Economic Policy*, 1–19.

Reyes, B. (2001). Immigrant trip duration: The case of immigrants from western Mexico. *International Migration Review 35*(4), 1185–1204.

Reyes, B. (2007). The impact of US immigration policy on Mexican unauthorized immigration. *The University of Chicago Legal Forum 131–154*.

Reyes, B. I. (2004). Changes in trip duration for Mexican immigrants to the United States. *Population Research and Policy Review 23*, 235–257.

Rytina, N. (2002). IRCA Legalization Effects: Lawful Permanent Residence and Naturalization through 2001. INS Office of Policy and Planning.

US Congress. Senate. (1996). Proposals for immigration reform: Hearing before the Subcommittee on Immigration and Refugee Affairs of the Committee on the Judiciary on the impact of immigration on the U.S. and proposals to reform U.S. immigration laws, August 3, 1994.

U.S. General Accounting Office (1990). Immigration reform: Employer sanctions and the question of discrimination. Technical report, General Accounting Office.

U.S. General Accounting Office (1992). Southwest border enforcement affected by mission expansion. Technical report, United States General Accounting Office.

White, M. J., F. D. Bean, and T. J. Espenshade (1990). The U.S. 1986 Immigration Reform and Control Act and undocumented migration to the United States. *Population Research and Policy Review 9*, 93–116.

Appendix A: Information about our data

The original MMP154 dataset contains 162,293 individuals. The following observations were dropped: 284 individuals with unknown migration status, 2769 individuals who are born in the US, as migrants born outside Mexico are classified as immigrants in the US, 252 individuals with unknown birth year, 2 individuals with inconsistent year of birth and age data, 35366 individuals who was not yet 14 by the time of the survey (ie. did not start spell), 23087 individuals who turned 14 before 1964, 207 individuals who passed away before 1964, 543 individuals who passed away after 1964 but before turning 14, 10 individuals who are not alive at the time of the survey and with unknown year of death, 1839 individuals who traveled to the US as children, even though they turned 14 after 1964, 3 individuals with inconsistent duration in the US and year of death, 38 individuals who traveled to the US on a Bracero contract (should be before 1964) or a silva document (letter), 151 individuals who traveled to the US with unknown document status, 594 individuals with unknown years of education, 127 individuals who are born outside Mexico and US, 1128 individuals who are lacking information on origin municipality and network in the US, all individuals from community 130 for lack of information on time-varying characteristics of the community, 60 individuals with inconsistent migration and survey years, and 36238 individuals who either turned age 14 before 1977 or after 1997. Thus we are left with 59,548 observations for the analysis of age of onset of migration.

Of the 14610 individuals who took their first migratory trip to the US undocumented, we omit 51 individuals for whom duration data is not available, 1 individuals with unknown characteristics of municipality (double min. wage), all individuals from community 130 for lack of data on time-varying community variables, 50 individuals with inconsistent duration and survey year, and 3876 individuals who first arrived in the US before 1977 or after 1997. Thus we are left with 10,632 observations for the analysis of duration of first unauthorized trip.

Of the 1462 individuals who took their first migratory trip to the US with an LPR document, we omit 9 individuals with inconsistent duration and survey year, and 343 individuals who first arrived in the US before 1977 or after 1997. Thus we are left with 1,110 observations for the analysis of duration of first legal trip.

Table 1: Descriptive statistics

Panel A: Duration until the first trip	**Undocumented**	**LPR**	**All**
Sample size	7404	710	59548
Spell starting year, median	1983	1981	1985
Female, %	24	40	52
Years of education, median (mean)	6 (7.5)	9 (8.8)	9 (8.5)
Infrastructure and Socioeconomic Indicators in Municipality (at age 14):			
Community population, median	4000	6000	8000
Municipality population, median	26000	38000	37000
Males in LF, mean,	70	71	71
Males in manufacturing, mean	22	23	24
Double min. wage, mean,	20	23	25
Migrant community, mean	12	15	8
Socioeconomic and Policy Indicators in the US (at age 14):			
US unemployment, mean	7.2	7.2	6.8
Deportation of Mexicans, mean	14445	14343	19128
Panel B: Duration of the first trip	**Undocumented**	**LPR**	
Sample size	10632	1110	
of which not censored (returned)	6466 (61%)	497 (45%)	
1 US trip if migrant %	61	77	
Up to 2 US trips if migrant %	80	84	
Up to 3 US trips if migrant %	87	88	
Spell starting year, median	1988	1986	
Unauthorized migrants legalized, %	11.8		
Number legalized	1255		
Age at migration, mean	22	22	
Married at migration, %	39	48	
Infrastructure and Socioeconomic Indicators in Municipality at the beginning of first trip			
Community population, median	4000	7000	
Municipality population, median	27000	42000	
Males in LF, mean	68	69	
Males in manufacturing, mean	24	25	
Double min. wage, mean	24	28	
Migrant community, mean	14	18	
Socioeconomic and Policy Indicators in the US at the beginning of first trip:			
Initial wage, median (mean)	8.4 (9.7)	11.4 (14.1)	
US unemployment, mean	6.6	6.8	
Deportation of Mexicans, mean	19649	17547	
Destination: California %	59	58	
Destination: Illinois %	8	9	
Destination: Texas %	11	13	
Occupation: Agriculture e.o. %	21	18	
Occupation: Unskilled manufacturing %	19	17	
Occupation: Skilled manufacturing %	13	13	
Occupation: Service %	17	11	

Duration until first trip: age of onset minus 14, Years of education as measured at the time of survey, Males in LF: percentage males in municipal labor force, Males in manufacturing: percentage of male labor force in manufacturing, Double min. wage: percentage of workers in municipality who earn more than twice the minimum wage, Migrant community: share of household-heads who were in the US in the year the spell started, US unemployment: US unemployment rate in the year an individual's spell has started, Deportation of Mexicans: Number of deportations of Mexicans from the US in the year an individual's spell has started, Wage: self-reported first US wage (2010 US dollars), Married at migration: marital status at the start of the first US trip (information available for communities 72-154), Agriculture e.o: agriculture, husbandry, forestry, and fishery.

Table 2: Parameter estimates: Age of onset of migration

	Undocumented		**LPR**	
Effect of IRCA	-0.068	(0.053)	-0.240*	(0.130)
Personal characteristics				
Female	-1.481***	(0.030)	-0.767***	(0.082)
Years of education	0.274***	(0.014)	0.484***	(0.050)
Years of education squared	-0.019***	(0.001)	-0.022***	(0.003)
Community characteristics at origin				
Size	-0.089***	(0.010)	-0.078**	(0.031)
Males in LF	-0.011***	(0.002)	0.008	(0.008)
Males in manufacturing	-0.009***	(0.002)	-0.024***	(0.006)
Double min. wage	-0.010***	(0.002)	0.011**	(0.005)
Migrant community	0.054***	(0.002)	0.071***	(0.004)
Immigration policy and unemployment at destination				
US unemployment	-0.111***	(0.014)	-0.125**	(0.043)
Deportation	0.025	(0.045)	-0.475***	(0.117)
Cohort	0.014**	(0.006)	-0.021	(0.013)
Constant	-4.294***	(0.409)	-3.493**	(1.429)
Age dependence				
16	0.571***	(0.061)	0.444**	(0.191)
17	0.959***	(0.059)	0.699***	(0.190)
18 | 18+	1.316***	(0.059)	1.229***	(0.168)
19	1.286***	(0.063)		
20	1.412***	(0.066)		
21	1.324***	(0.072)		
22	1.331***	(0.077)		
23	1.172***	(0.085)		
24	1.195***	(0.092)		
25	1.161***	(0.101)		
26	1.095***	(0.109)		
27	0.930***	(0.120)		
28 +	0.861***	(0.114)		
Unobserved heterogeneity				
ρ_1		-1.091** (0.373)		
v_1	-1.595***	(0.288)	-2.255**	(0.800)
- Log-likelihood = 38548.5				
Observations = 59548				

Standard errors in parentheses; $^{*}p < 0.10$,$^{**}p < 0.5$,$^{***}p < 0.01$.
The table shows estimation results for a competing risk model for two types of entries into the US: undocumented and as an LPR permit holder. Size: (log) community population. All origin community and destination characteristics except for *migrant community* are time-varying variables. Origin state coefficients are not reported. Out of 32 origin states (state of birth) represented in the data, the hazard rate of undocumented migration includes dummies for Aguascalientes, Baja California del Norte, Colima, Chihuahua, Durango, Guanajuato, Guerrero, Hidalgo, Jalisco, Michoacan, Nayarit, Nuevo Leon, Puebla, Queretaro, San Luis Potosi, Tabasco, Tlaxcala, Veracruz, Zacatecas; omitted states are Baja California del Sur, Campeche, Coahuila, Chiapas, Distrito Federal, Mexico, Morelos, Oaxaca, Quintana Roo, Sinaloa, Sonora, Tamaulipas, Yucatan; the hazard rate of legal migration includes dummies for Baja California del Norte, Colima, Chihuahua, Durango, Guanajuato, Guerrero, Jalisco, Michoacan, Nayarit, Nuevo Leon, Queretaro, San Luis Potosi, Veracruz, Zacatecas.

Table 3: Parameter estimates duration of first trip by migrant status

	Undocumented		**LPR**	
Effect of IRCA	0.126**	(0.055)	0.537***	(0.183)
Effect of legalization	-0.320***	(0.110)		
Personal characteristics				
Female	-0.539***	(0.041)	0.064	(0.115)
Years of education	-0.028*	(0.015)	0.054***	(0.014)
Years of education squared	0.002**	(0.001)		
Age at entry	0.088***	(0.019)	0.042	(0.076)
Age squared	-0.001***	(0.000)	-0.001	(0.002)
Married	0.349***	(0.060)	0.215	(0.271)
Community characteristics at origin				
Size	0.089***	(0.011)	0.080**	(0.038)
Males in LF	0.008***	(0.003)	-0.001	(0.011)
Males in manufacturing	-0.002	(0.002)	0.032***	(0.007)
Double min. wage	-0.002	(0.002)	-0.032***	(0.006)
Migrant community	0.026***	(0.002)	0.034***	(0.005)
Destination characteristics				
US unemployment	-0.024*	(0.014)	-0.150***	(0.053)
Deportation	-0.182***	(0.025)	0.138	(0.138)
Initial wage	-0.031***	(0.004)	-0.014	(0.011)
California	0.102**	(0.041)	0.095	(0.133)
Illinois	-0.137**	(0.069)	0.003	(0.249)
Texas	0.327***	(0.057)	-0.543**	(0.242)
Occupation in the US				
Agricultural	0.744***	(0.049)	1.345***	(0.154)
Unskilled manufact.	0.071	(0.046)	0.287*	(0.162)
Skilled manufact.	0.063	(0.053)	0.079	(0.213)
Service	0.274***	(0.048)	0.235	(0.186)
Cohort	-0.010**	(0.005)	0.020	(0.017)
Constant	-0.636	(0.531)	-7.297***	(2.212)
Duration dependence				
Year 2	-0.526***	(0.042)	-0.613***	(0.141)
Year 3 | 3+	-0.774***	(0.057)	-1.100***	(0.131)
Year 4	-0.997***	(0.073)		
Year 5	-1.190***	(0.088)		
Year 6	-1.394***	(0.106)		
Year 7	-1.743***	(0.130)		
Year 8 +	-1.838***	(0.100)		
Unobserved heterogeneity				
ϱ	-1.348***	(0.400)		
w_1	-1.342***	(0.156)		
- Log-likelihood	13720.3		1291.4	
Observations	10632		1110	

Standard errors in parentheses; $^{*}p < 0.10,^{**}p < 0.5,^{***}p < 0.01$.
The table shows estimation results for the hazard rates of return from either an undocumented or a legal migration with an LPR permit. Size: (log) community population. All origin community and destination characteristics except for *migrant community* and initial destination and wage are time-varying variables. Origin state coefficients for Durango, Guanajuato, Jalisco, Queretaro, Veracruz, Yucatan in the hazard rate of return from undocumented migration, and for Michoacan in the hazard rate of return from LPR migration are not reported.

Table 4: Effect of IRCA components

	Undocumented			LPR		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Age of onset of migration:						
LPR admissions	-0.045**	-0.028*	-0.031*	-0.179**	-0.188***	-0.202***
Line-watch hours	-0.183*	-0.097		-0.060	-0.097	
Employee sanction cases	0.009			-0.004		
- Log-likelihood	38541.2	38541.9	38542.4			
Observations	59548	59548	59548			
Panel B. Return rate from first migration:						
LPR admissions	0.036	0.034**	0.014	0.326***	0.429***	0.390***
Line-watch hours	-0.016	-0.015		-0.847**	-0.416	
Employer sanction cases	-0.001			0.052		
- Log-likelihood	13727.8	13727.8	13722.5	1274.7	1275.8	1275.1
Observations	10632	10632	10632	1110	1110	1110
- Log-likelihood	3882.1	3882.4	3878.8	292.9	293.3	286.1
Observations	6325	6325	6325	628	628	628

Standard errors in parentheses; $^{*}p < 0.10$,$^{**}p < 0.5$,$^{***}p < 0.01$.
The table shows coefficients of the (log) annual LPR admission, (log) annual line-watch hours, and (log) concluded workplace investigation cases in the following restricted and unrestricted models. In the restricted models of the age of onset of migration (column 1) and the return rate from first migration (columns 4) the dummy for IRCA effect have been replaced with (log) annual LPR admissions, (log) annual line-watch hours, and (log) concluded workplace investigation cases while the specification of other covariates remain unchanged and their coefficients are restricted to the estimated values in the main model (Tables 2, 3). For columns 2 and 5, the variable for (log) employee sanctions cases is excluded as it does not improve the fit and is insignificant. For columns 3 and 6, unrestricted models were estimated with the same specification as the corresponding main models where only the IRCA dummy was replaced with the (log) annual LPR admissions variable. Panel A shows the results from a competing risk model of the age of onset of migration. Panel B shows the results from separate models of the return rate from an undocumented and legal first migration.

Table 5: Sensitivity analysis of the age of onset of first migration

	Male only	No legalized family	Weighted
	(1)	(2)	(3)
Panel A. Effect on undocumented migration:			
IRCA	-0.128**	-0.094*	-0.052
(s.e.)	(0.060)	(0.055)	(0.087)
- Log-likelihood			233897.4
Observations			504470
Panel B. Effect on LPR migration:			
IRCA	-0.327**	-0.316**	-0.350*
(s.e.)	(0.161)	(0.135)	(0.201)
- Log-likelihood	26382.5	36765.2	39365.2
Observations	28580	58299	497776

Standard errors in parentheses; $^{*}p < 0.10,^{**}p < 0.5,^{***}p < 0.01$. Column 1 analyzes age of onset of migration for male migrants. Column 2 includes in the analysis migrants entering with a visitor's visa as undocumented migrants. Column 3 excludes individuals whose family member was legalized during the observation period. Models in columns 1-3 use same specification and background covariates as the main model. Column 4 shows the results of an analysis using a weighted binary outcome (cloglog) model. The sampling weights are based on the size of the community in the Mexico for the sample interviewed in Mexico. For the sample interviewed in the US, the sampling weights are based on the estimated size of the settled migrant households from each community in the US. The processes do not incorporate unobserved heterogeneity, are estimated separately, but otherwise same in specification. We report only the estimated effect of IRCA on the age of onset for migration outcomes.

Table 6: Sensitivity analysis for the return rate from first migration

	Male only	No agricult. workers	Excl. spells started in 1986, 1987	Weighted
	(1)	(2)	(3)	(4)
Panel A: Effect on the undocumented:				
IRCA	0.152**	0.120**	0.124*	0.203**
(s.e.)	(0.061)	(0.064)	(0.064)	(0.091)
Effect of legalization	-0.388***	-0.329***	-0.415***	-0.656***
(s.e.)	(0.126)	(0.123)	(0.127)	(0.143)
- Log-likelihood	10400.9	11285.2	12065.9	99059.0
Observations	8046	8560	9513	36701
Panel B: Effect on the LPR migrant:				
IRCA	0.133	0.769***	0.768***	0.949***
(s.e.)	(0.242)	(0.214)	(0.224)	(0.280)
- Log-likelihood	761.1	1097.8	1058.3	11318.8
Observations	640	929	950	6866

Standard errors in parentheses; $^{*}p < 0.10,^{**}p < 0.5,^{***}p < 0.01$.
Column 1 analyzes only male migrants. Column 2 excludes sample of migrants who worked in agriculture. Column 3 excludes spells started in 1986 and 1987 to account for anticipation effect of IRCA. Columns 1-3 use the same specification and background variables as the corresponding main model. Column 4 reports the results of an analysis using a weighted binary outcome (cloglog) model. The sampling weights are based on the size of the community in the Mexico for the sample interviewed in Mexico. For the sample interviewed in the US, the sampling weights are based on the estimated size of the settled migrant households from each community in the US. We report only the estimated effect of IRCA on the return rate for different types of migration outcomes.

Table 7: Sensitivity analysis: Joint estimation of the age of onset of migration and the return rate from migration

Panel A. IRCA on the age of onset of migration	
Undocumented	-0.069
LPR	-0.241**
Panel B. IRCA on the return from the first migration	
Undocumented	0.121**
LPR	0.588***
Effect of legalization	-0.328***
- Log-likelihood	53557.0
Observations	63245

Standard errors in parentheses; $^{*}p < 0.10$,$^{**}p < 0.5$,$^{***}p < 0.01$.
Note: The table shows results of joint estimation of the age of onset of migration and subsequent return from migration. We report only the estimated effect of IRCA on the return rate for different types of migration outcomes. The model uses the same specification and background variables as the main model.

Table 8: Predicted migration rate by age 30

	Undocumented		LPR	
Unobserved type (hazard):	High	Low	High	Low
Median individual	57.5	15.9	4.7	0.5
After IRCA	55.0	15.0	3.7	0.4
Female	17.7	3.9	2.2	0.2
After IRCA	16.6	3.6	1.7	0.2
Migrant community = 1.9 (25-th percentile)	51.2	13.5	3.7	0.4
After IRCA	48.8	12.7	2.9	0.3
Migrant community = 11.5 (75-th percentile)	69.8	21.6	7.2	0.8
After IRCA	67.3	20.3	5.7	0.6
US unemployment = 5.6 (25-th percentile)	62.3	18.0	5.4	0.6
After IRCA	59.8	16.9	4.3	0.5
US unemployment = 7.5 (75-th percentile)	54.7	14.8	4.3	0.5
After IRCA	52.2	13.9	3.4	0.4

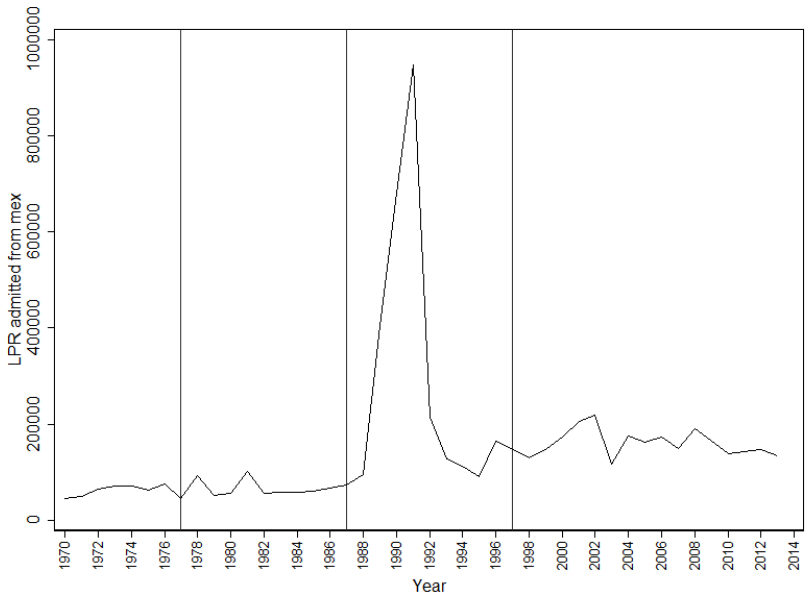
Note: The table shows predicted migration rates by or at age 30 before and after IRCA for a selection of individuals in Mexico. All numbers are in percentages. The median characteristics are taken to be as follows (median of the sample): He is born in 1971, has 9 years of education as of the survey, and comes of age 14 in a community where 5.2 percent of household heads are in the US. He comes from a community of a population of 5000, where men's labor force participation rate is 71%, 24% of male labor force work in manufacturing, and 24% of workers earn above double the minimum wage. During the observation period, the median US unemployment rate was 6.8% and about 18,000 unauthorized mexican migrants were deported in a year. He comes from the state Jalisco. Before and after IRCA estimations assume that the entire spell has taken place either before enactment of IRCA or after.

Table 9: Predicted 3-year return rates

	Undocumented		LPR
Unobserved type (hazard):	High	Low	High
3-year return rates (in percentages):			
Median migrant	53.9	18.3	8.3
After IRCA	58.5	20.5	13.8
Female	36.3	11.1	8.8
After IRCA	40.1	12.5	14.6
Migrant community = 6.5 (25-th percentile)	48.8	16.0	6.9
After IRCA	53.2	18.0	11.5
Migrant community = 20.0 (75-th percentile)	61.2	21.9	10.6
After IRCA	65.8	24.5	17.5
US unemployment = 5.6 (25-th percentile)	54.9	18.8	9.8
After IRCA	59.5	21.0	16.2
US unemployment = 7.5 (75-th percentile)	53.3	18.0	7.5
After IRCA	57.8	20.2	12.5
Legalized in the first year	43.0	13.7	
After IRCA	47.2	15.4	

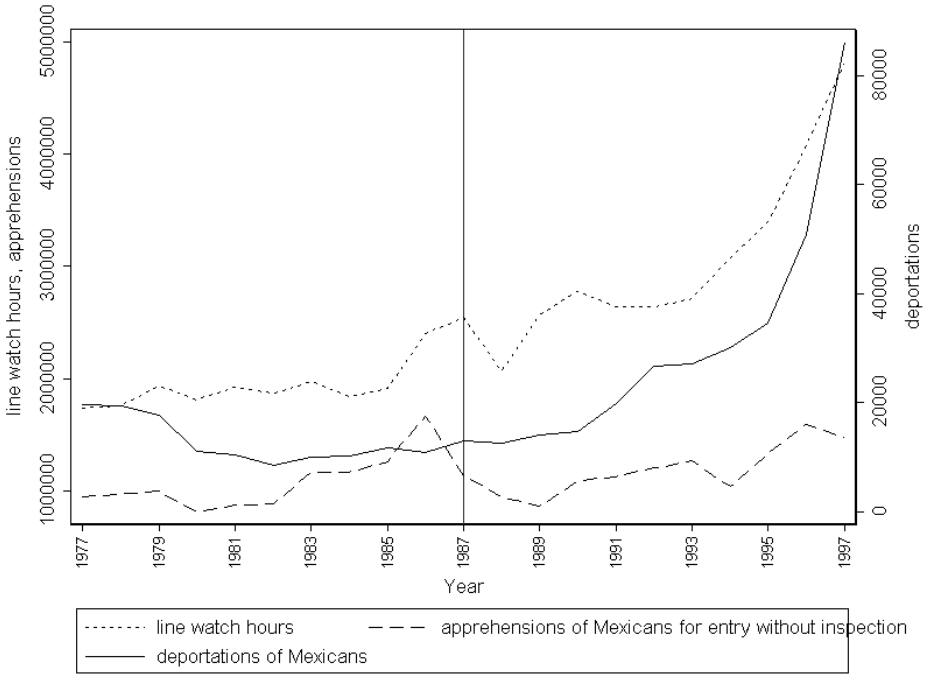
Note: The table shows predicted 3-year return rates from the first trip before and after IRCA for a selection of undocumented and LPR migrants. All numbers are in percentages. The median migrant characteristics are taken to be as follows: He first arrived in the US in 1987 at the age of 20, has 6 years of education as of the survey, comes from a community where 12% of household heads are in the US. He is from a community with a population of 5000, where men's labor force participation rate is 71%, 24% of male labor force work in manufacturing and 24% of workers earn above double the minimum wage. During the observation period, the median US unemployment rate was 6.8% and about 18,000 unauthorized mexican migrants were deported in a year. He comes from the state of Jalisco, migrated to California, has a real wage of 8.5 USD/hr in USD2010, and works in unskilled manufacturing sector. The before and after IRCA estimations assume that the entire trip has taken place either before enactment of IRCA or after.

FIGURE 1: LEGAL RESIDENCE PERMIT HOLDERS ADMITTED ANNUALLY FROM MEXICO.



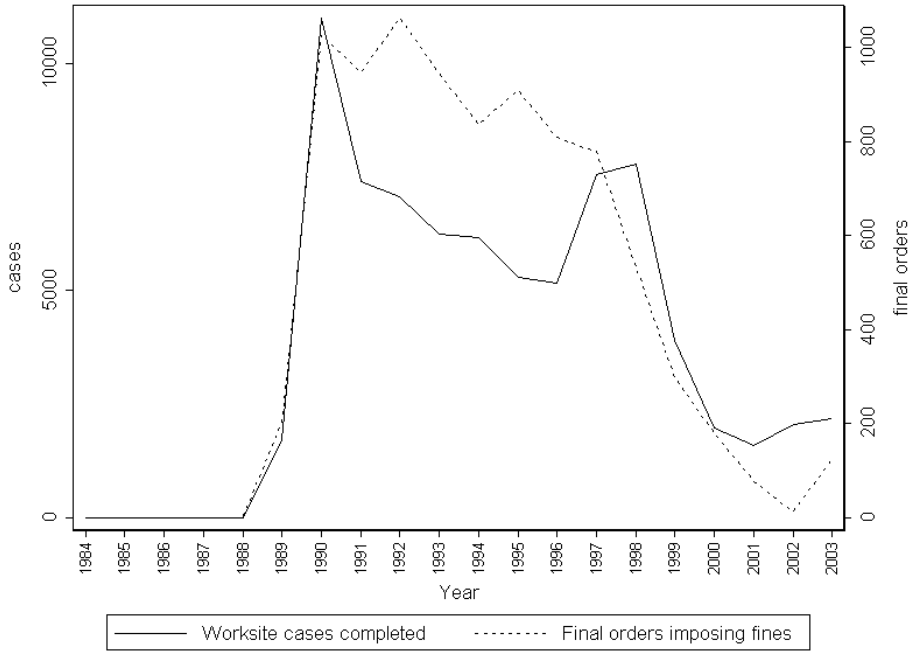
SOURCE: MMP

FIGURE 2: BORDER ENFORCEMENT.



SOURCE: MMP

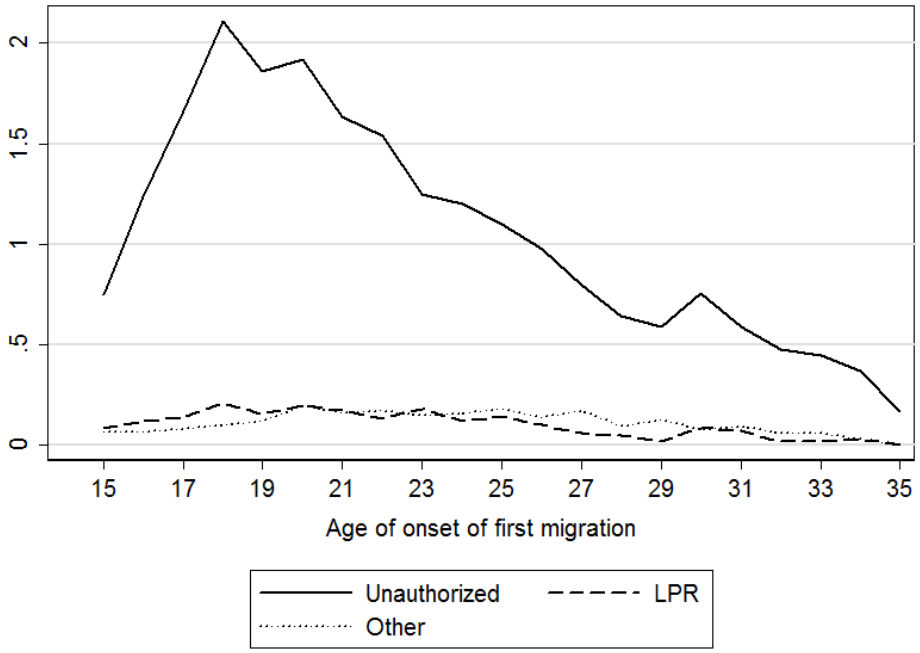
FIGURE 3: EMPLOYER SANCTIONS



SOURCE: AUTHOR'S CALCULATIONS BASED ON 2003 YEARBOOK OF IMMIGRATION STATISTICS (USDHS) AND CIS EMPLOYER SANCTIONS DATABASE.

FIGURE 4: EMPIRICAL MIGRATION AND SURVIVAL RATES FOR AGE OF ONSET OF FIRST MIGRATION

(a) Migration rates (%)



(b) Survival rates (%)

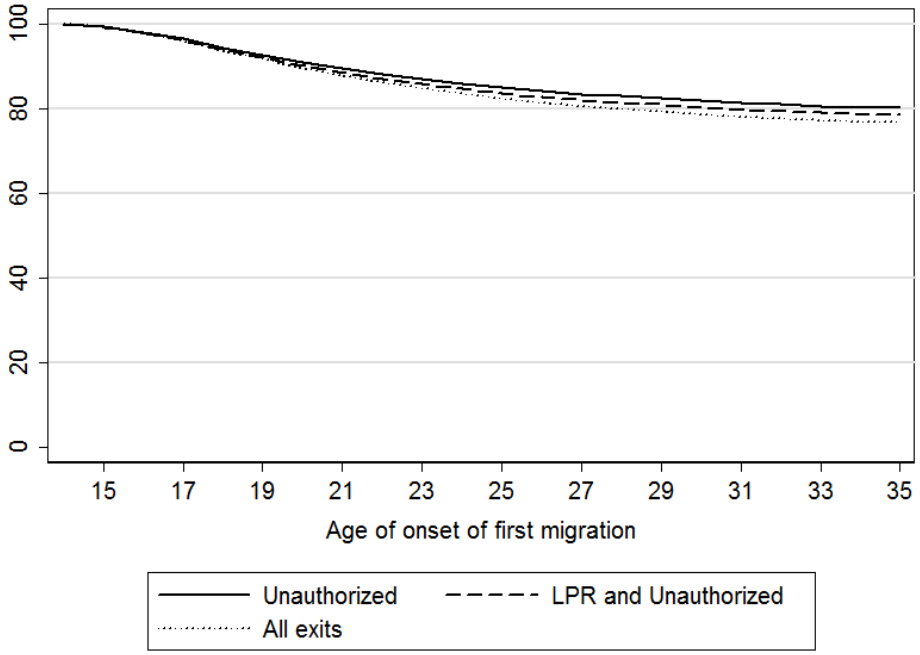
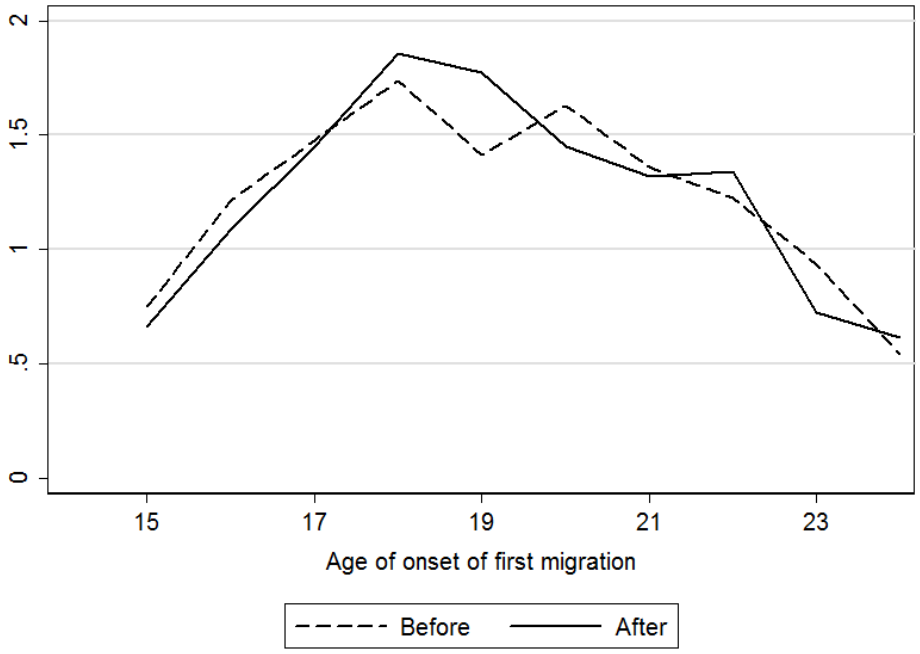


FIGURE 5: COMPARISON OF EMPIRICAL MIGRATION RATES FOR INDIVIDUALS TURNED 14 YEARS OF AGE BEFORE 1987 AND OBSERVED UNTIL 1987 (BEFORE) AND THOSE TURNED 14 IN 1987 OR LATER (AFTER)

(a) Unauthorized migration rates (%)



(b) Legal migration rates (%/year)

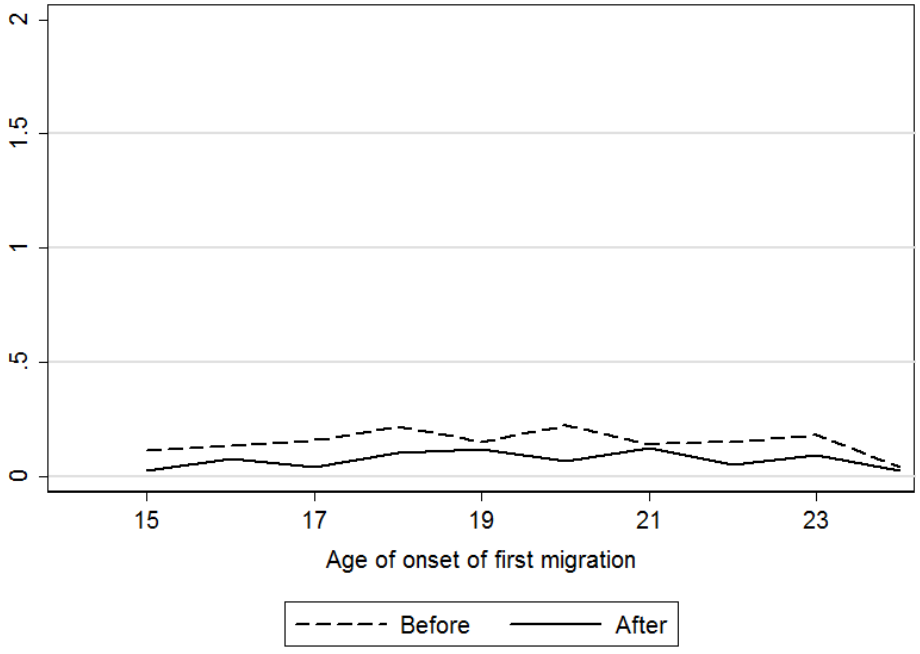
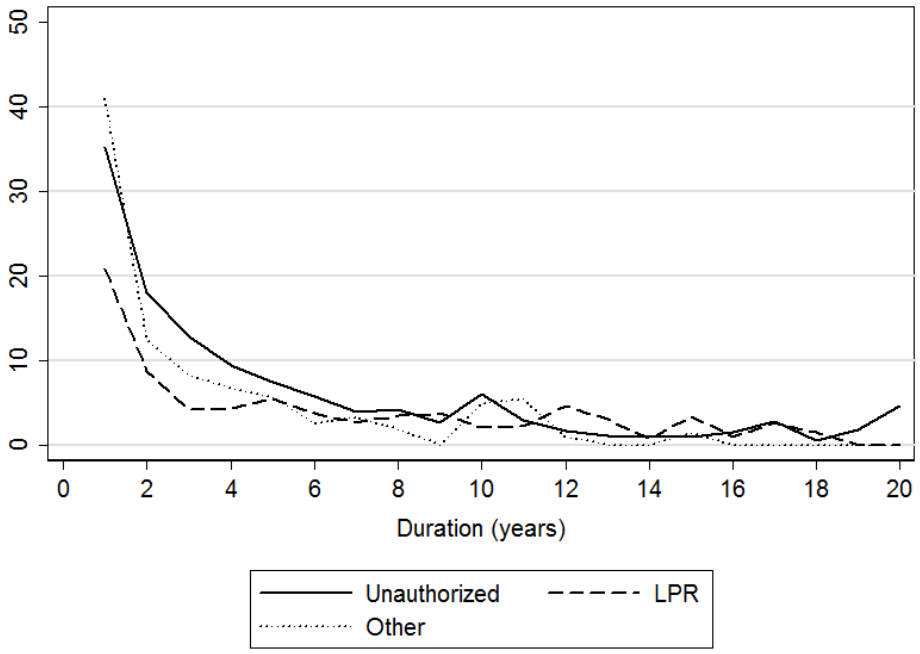


FIGURE 6: EMPIRICAL HAZARD AND SURVIVAL RATES OF RETURN MIGRATION

(a) Return rates (%)



(b) Survival rates (%)

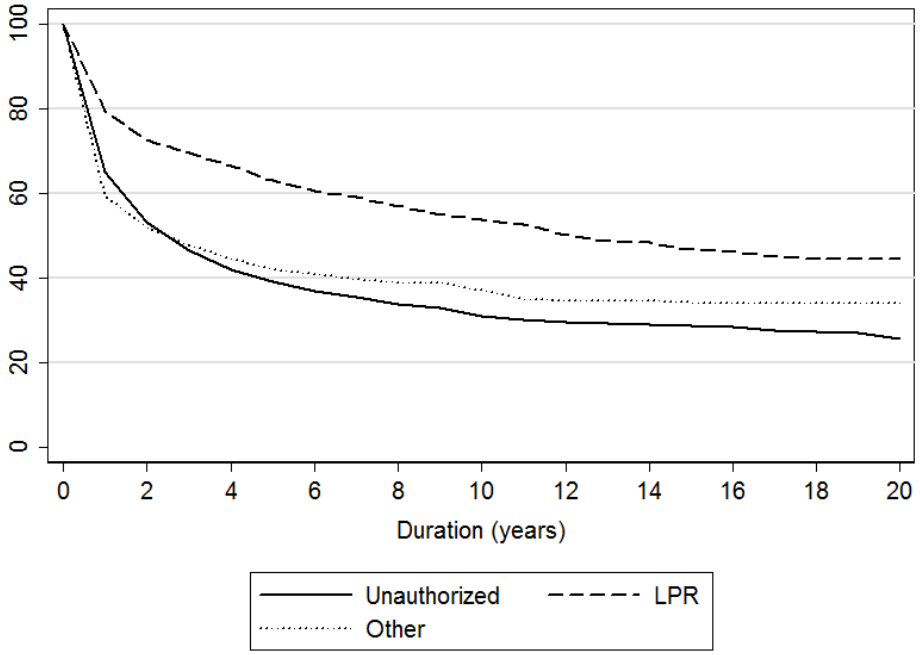
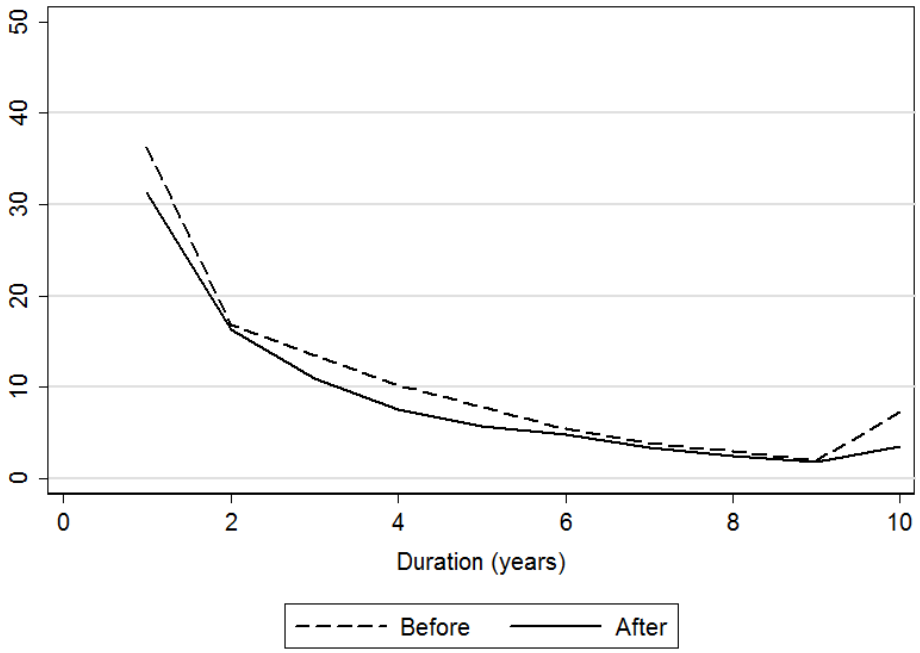


FIGURE 7: COMPARISON OF EMPIRICAL RETURN RATES FROM FIRST MIGRATION FOR TRIPS STARTED BEFORE 1987 AND OBSERVED UNTIL 1987 (BEFORE) AND TRIPS STARTED IN 1987 OR LATER (AFTER)

(a) Return rates from unauthorized migration (%/year)



(b) Return rates from legal migration (%/year)

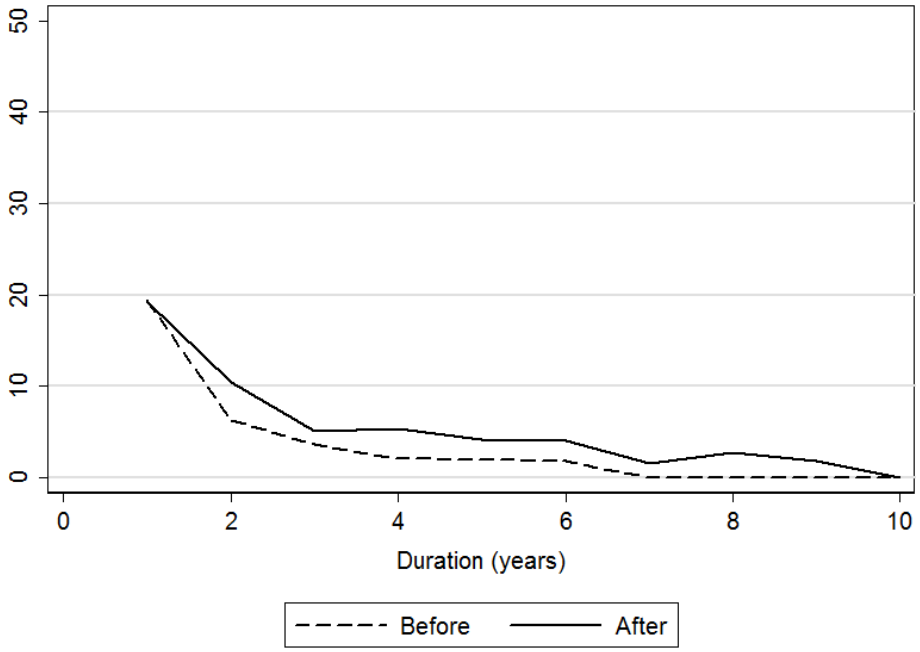
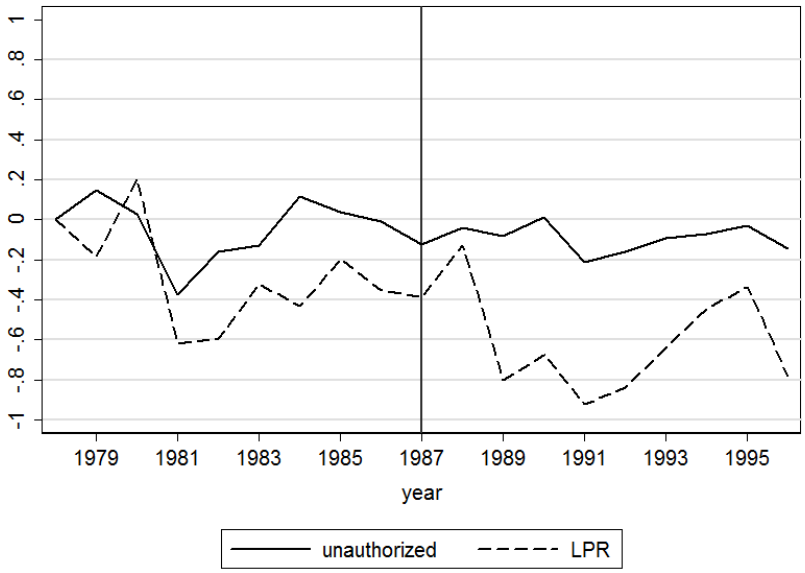
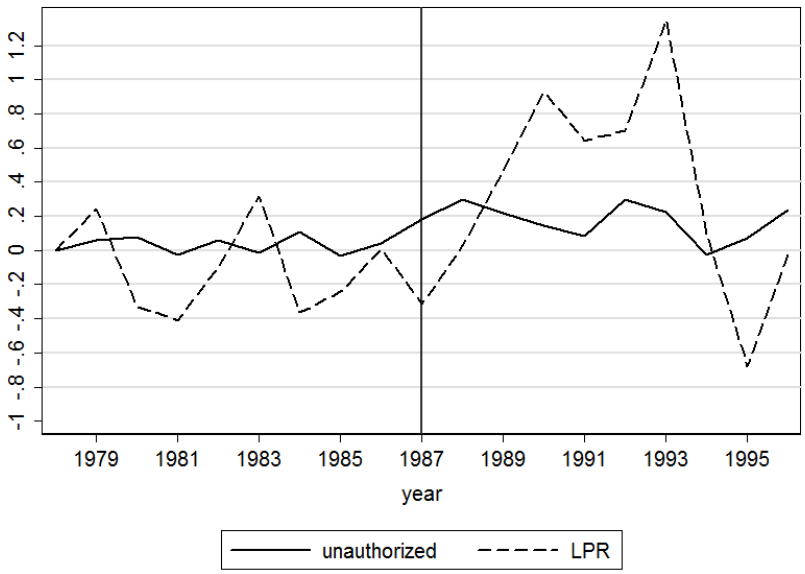


FIGURE 8: ANNUAL SHIFT IN HAZARD RATES, AGE OF ONSET OF ILLEGAL MIGRATION



THE FIGURE SHOWS COEFFICIENTS OF YEARLY DUMMY VARIABLES IN A RESTRICTED MODEL. IN THE RESTRICTED MODEL OF THE AGE OF ONSET OF MIGRATION THE DUMMY FOR THE IRCA EFFECT HAVE BEEN REPLACED WITH YEARLY DUMMY VARIABLES WITH BASE YEAR 1978 WHILE THE SPECIFICATION OF OTHER COVARIATES REMAIN UNCHANGED AND THE COEFFICIENTS ARE RESTRICTED TO THEIR ESTIMATED VALUES IN THE MAIN MODEL (TABLES 2, 3)

FIGURE 9: ANNUAL SHIFT IN HAZARD RATES, DURATION OF FIRST ILLEGAL MIGRATION



THE FIGURE SHOWS COEFFICIENTS OF YEARLY DUMMY VARIABLES IN A RESTRICTED MODEL. IN THE RESTRICTED MODEL OF THE RETURN RATE FROM FIRST MIGRATION THE DUMMY FOR THE IRCA EFFECT HAVE BEEN REPLACED WITH YEARLY DUMMY VARIABLES WITH BASE YEAR 1978 WHILE THE SPECIFICATION OF OTHER COVARIATES REMAIN UNCHANGED AND THE COEFFICIENTS ARE RESTRICTED TO THEIR ESTIMATED VALUES IN THE MAIN MODEL (TABLES 2, 3)