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ABSTRACT

In this paper, I examine changes in labor supply and earnings across regions of Mexico during the 1990s. I focus the analysis on individuals born in states with either high-exposure or low-exposure to emigration, as measured by historical data on state migration to the United States. During the 1990s, rates of external migration and interval migration were higher among individuals born in high-migration states. Consistent with positive selection of emigrants in terms of observable skill, emigration rates appear to be highest among individuals with earnings in the top half of the wage distribution. Controlling for regional differences in observable characteristics and for initial regional differences in earnings, the distribution of male earnings in high-migration states shifted to the right relative to low-migration states. Over the decade, average hourly earnings in high-migration states rose relative to low-migration states by 6-9%.

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1. Introduction

Over the last several decades, migration to the United States has profoundly affected the Mexican economy. The most obvious change has been to Mexico's labor supply. Between 1970 and 2000, the share of the Mexican population (individuals born in Mexico) residing in the United States increased from 1.7% to 8.6% (Figure 1).[1] Emigration rates have been rising steadily over time and are highest for young adults. Between 1990 and 2000, 10.0% of males and 7.7% of females born in Mexico between 1965 and 1974 migrated to the United States, raising the share of this age cohort living in the U.S. to 17.5% for males and 12.6% for females (Table 1).

Not surprisingly, the outmigration of labor appears to have put upward pressure on wages in Mexico. Mishra (2004) estimates that in Mexico over the period 1970-2000 the elasticity of wages with respect to the outflow of migrant labor was 0.4 and that emigration raised average wages in the country by 8.0%. Upward pressure on wages has been strongest for young adults with above-average education levels (those with 9 to 15 years of schooling), who in the 1990s were the individuals most likely to migrate to the United States (Chiquiar and Hanson, 2005). Increased labor flows between Mexico and the United States appear to be one factor contributing to labor-market integration between the two countries. For the 1990s, Robertson (2000) finds that a shock that raises U.S. wages by 10% raises wages in Mexico by 1.8% to 2.5%.

Were the only effect of emigration to raise wages for migrants and for non-migrating workers who substitute for migrant labor, the labor outflow would yield static

[1] In this calculation, the numerator is the population of individuals born in Mexico, as enumerated in the U.S. population census, and the denominator is the sum of this figure and the population of individuals born in Mexico, as enumerated in the Mexican population census. This calculation ignores the small number of individuals born in Mexico who have migrated to third countries.

welfare losses in Mexico. However, an additional consequence of Mexican emigration has been an increase in the return flow of remittances. In 2003, remittances from Mexican immigrants in the United States equaled 2.0% of Mexican GDP (IADB, 2004). These appear to more than offset the loss in GDP due to emigration.[2]

An important aspect of migrant behavior in Mexico is that the propensity to emigrate varies greatly across regions of the country. Due partly to historical accident, central and western Mexico have long had the country's highest labor flows abroad. In Figure 2, which shows the fraction of households that sent migrants to the United States over 1995-2000 by Mexican state, emigration rates are relatively low in states along the U.S. border, sharply higher in states 600-1200 kilometers from the United States, and lowest in distant southern states. Regional variation in migration behavior suggests that the labor-market consequences of migrant outflows may be concentrated in specific areas. If this is true, estimates of the impact of emigration at the national level may understate its impact on the most affected regions. While the importance of specific sending regions in Mexican migration to the United States has long been recognized (Cardoso, 1980), there is relatively little empirical work that assesses the regional economic effects of emigration in Mexico (Durand, Massey, and Zenteno, 2001).

In this paper I examine the regional impacts of emigration on labor supply and labor-market earnings in Mexico. I compare changes in labor-market outcomes across individuals between 1990 and 2000 in two groups of states, states that had high emigration rates in the 1950s and states that had low emigration rates in the 1950s. There

[2] Based on Mishra's (2004) estimates, the emigration loss in Mexico for 2000 would be 0.45% of GDP (0.5 times change in wages due to emigration of 8.0% times loss in labor supply due to emigration of 16.0% times labor share of income of 0.70). In that year, remittances were 1.1% of Mexican GDP. See Borjas (1999a) for estimates of the immigration surplus for the United States.

are two key identifying assumptions in my analysis. One is that labor is sufficiently immobile across Mexican regions for region-specific labor-supply shocks to affect regional earnings differentials. Robertson (2000), Chiquiar (2004), and Hanson (2004) provide evidence of region-specific labor-market shocks having affected Mexico's regional wage structure, which is consistent with some degree of regional labor immobility. The second identifying assumption is that current opportunities to migrate to the United States depend on regional historical migration patterns. One reason this may be the case is that migration networks are regionally organized and historically dependent. Munshi (2003) and Orrenius and Zavodny (2004) are recent contributions to a large literature that finds that in Mexico access to family or community networks helps migrants enter and succeed in the United States.[3]

In the estimation, I use migration rates in the 1950s as a reduced-form determinant of current migration opportunities. Since high emigration in the past could have altered regions in a manner that affects current labor-market conditions, a reduced-form approach is more appropriate than using past migration behavior as an instrument for current migration. To control for internal migration, I use the 1950s emigration rate in an individual's *birth state*, rather than his current state of residence. Historical migration rates in an individual's birth state are thus meant to capture current access to migration networks, and so current opportunities to emigrate, in the Mexican regional labor market in which an individual is located. The persistence in regional differences in migration behavior (Figure 3) is roughly consistent with my identifying assumptions.

[3] An implicit third identifying assumption is that emigration incentives for Mexicans were stronger in the 1990s than in previous decades, which in combination with the second assumption would imply that any negative labor supply shock associated with emigration would be larger in states with a longer history of U.S. migration. Data presented in section 3 are consistent with this assumption.

The challenges to identifying the regional consequences of emigration in Mexico are analogous to those in identifying the regional consequences of immigration in the United States. Many studies have found that across U.S. cities and states immigrant inflows are only weakly negatively correlated with wage changes for U.S. native workers, suggesting that immigration has had little impact on the U.S. wage structure (see LaLonde and Topel, 1997; Smith and Edmonston, 1997; Borjas, 1999; Card; 2001). Borjas, Freeman, and Katz (1997) argue that cross-area wage regressions of this type identify the wage impact of immigration only under restrictive assumptions. The tendency for immigrants to settle in regions with high wage growth makes estimates of the immigration wage impact based on cross-area regressions susceptible to upward bias. The standard practice of using the preceding decade's regional immigrant stock to instrument for current regional immigrant inflows may not be valid if regional labor-market shocks persist over time. Borjas (2003) examines age and education cohorts at the national level and finds larger wage effects from immigration. He estimates that over 1980-2000 the elasticity of U.S. native wages with respect to immigrant inflows was 0.3-0.4 and that immigration contributed to a decrease in U.S. average wages of 3%.

Similar to the cross-area regression approach, I distinguish between Mexican states based on historical migration behavior. However, distinct from this approach I am able to use much longer lags on regional migration rates and to measure historical migration rates in an individual's birth state. These features help address the concerns that (i) regional labor-market shocks may persist for more than a decade, and (ii) an individual's current state of residence may be affected by current regional migration rates. The assumptions underlying my approach are thus perhaps less restrictive than those underlying the standard cross-area approach in literature on U.S. immigration.

An obvious challenge for the estimation is that there may be other, unobserved differences between high and low migration states that may affect current labor-market outcomes. By examining regional differences in changes in outcomes, rather than regional differences in outcome levels, I am able to control for time-invariant region-specific characteristics. Still, there may have been other shocks in the 1990s that had differential effects on regions with high versus low opportunities to migrate to the United States. Candidate shocks include the North American Free Trade Agreement, the privation and deregulation of industry, the reform of Mexico's land-tenure system, and the 1994-1995 peso crisis.[4] The potential for these shocks to contaminate the analysis is an important concern, which I address in discussing qualifications to my results.

In the next section, I document further how migration behavior varies across regions of Mexico and discuss the criterion I use for selecting which Mexican states to include in my sample. In section 3, I describe how changes in labor supply vary across high and low-migration states in Mexico and compare mean earnings and the distribution of earnings in high and low-migration states. In section 4, I use standard parametric techniques and non-parametric techniques developed by DiNardo, Fortin, and Lemieux (1996) and Leibbrandt, Levinsohn, and McCrary (2004) to examine how earnings have changed over time in high and low migration states. By wage of conclusion in section 5, I discuss limitations of the estimation strategy and ideas for extending the analysis.

[4] See Chiquiar (2003) on recent policy changes in Mexico. For work on the labor-market implications of globalization in Mexico, see Cragg and Epelbaum (1996), Feenstra and Hanson (1997), Revenga (1997), Hanson and Harrison (1999), Robertson (2000, 2004), Feliciano (2001), Farris (2003), Ariola and Juhn (2003), Chiquiar (2004), and Hanson (2004).

2. Regional Patterns of Emigration in Mexico

2.1 Data Sources

Data for the analysis come from two Mexican sources. In 1990, I use the 1% microsample of the *XII Censo General de Poblacion y Vivienda, 1990*, and in 2000 I use a 10% random sample of the 10% microsample of the *XIII Censo General de Poblacion y Vivienda, 2000*. Unfortunately, the 1990 census contains no information about household emigration behavior. The 2000 census includes two questions related to emigration: (i) whether anyone from the household migrated to the United States (or another foreign country) in the last five years (and the number, age, and gender of these individuals), and (ii) whether anyone in the household received income in the previous month in the form of remittances from migrants located abroad (and the quantity received). These questions have obvious shortcomings. They provide no indication of the education of migrants, return or round-trip migration, migration before 1995, annual receipts of remittances, or transfers from migrants in kind rather than in cash. Still, the 2000 census is useful in that it is the only nationally representative sample available for Mexico that contains information about migration to the United States.

For data on historical migration patterns, I use estimates of state emigration rates from Woodruff and Zenteno (2001). They calculate the fraction of each Mexican state's population that migrated to the United States over 1955-59 by combining data on Mexican state populations with data on annual U.S. immigration of temporary legal workers from each Mexican state under the U.S. Bracero Program. The Bracero Program, which lasted from 1942 to 1965, allowed U.S. employers to import workers from Mexico (and the Caribbean) to fulfill short-term labor contracts. Most *braceros* worked in agriculture (Calavita, 1992). Woodruff and Zenteno (2001) also provide data on state emigration rates in 1924, which I use in some empirical exercises.

For the analysis of earnings, I focus on men, since their labor-force participation rates are relatively stable over time, rising modestly from 73% in 1990 to 74% in 2000 (and are quite similar in high and low migration states). Labor-force participation rates for women are low and variable over time, rising from 21% in 1990 to 32% in 2000. For women, this creates issues of sample selection associated with who supplies labor outside the home that complicates examining changes in the distribution of earnings.

2.2 Regional Patterns in Mexican Migration to the United States

Large scale migration from Mexico to the United States began in the early 20th century. The construction of railroads in the late 19th century linked interior Mexico to the U.S.-Mexico border, which gave U.S. employers improved access to Mexico labor (Cardoso, 1980). In the early 1900s, growers in Texas began to recruit farm laborers in Mexico. At the time, the population on the Texas-Mexico border was small and dispersed. To find workers, recruiters followed the main rail line into Mexico, which ran southwest through relatively densely populated states in the west-central region of the country. Early migrants came primarily from nine states in this region (Durand, Massey, and Zenteno, 2001).[5] The recruitment efforts of U.S. employers intensified in the 1920s, after the U.S. Congress imposed stringent quotas on U.S. legal immigration, which sharply reduced immigration of low-skilled labor from southern and eastern Europe. Recruitment intensified further in the 1940s, after Congress passed legislation allowing

[5] These nine states are Aguascalientes, Colima, Durango, Guanajuato, Jalisco, Michoacán, Nayarit, San Luis Potosí, and Zacatecas.

large-scale temporary legal immigration from Mexico under the Bracero Program (Calavita, 1992). From the 1920s to the 1960s, the nine west-central states accounted for 44.0% to 56.1% of Mexican migration to the United States (but only 27.1% to 31.5% of Mexico's total population) (Durand, Massey, and Zenteno, 2001).

After working in the United States, many migrants return to Mexico where they often assist later generations in emigrating. Migrants remaining in the United States have created home-town associations that help members of their communities in Mexico make the transition to living north of the border (Cano, 2004). In addition to home-town associations, there appear to be many informal networks through which current migrants help prospective migrants enter the United States, find housing in U.S. cities, and obtain jobs with U.S. employers. These networks are often embedded in relationships involving family, kin, or community of birth, which gives them a strong regional component. Of 218 home-town associations formed by Mexican immigrants enumerated in 2002 survey of such organizations in southern California, 86.6% were associated with one of the nine west-central states (Cano, 2004). Networks appear to be important for migrant outcomes in the receiving country. Munshi (2003) finds that Mexican immigrants in the United States are more likely to be employed the larger is the U.S. population of residents from their home community in Mexico (where he instruments for the size of the home-community population using time-series data on regional rainfall in Mexico). The importance of migrant networks for migration behavior and their strong regional character may help explain regional persistence in migration patterns.

Figure 3 provides graphical evidence of persistence in regional migration behavior. The states that had high migration rates in the 1950s, during the height of the

Bracero Program, continue to be high migration states. The correlation between state emigration rates in the 1995-2000 and the 1955-59 periods is 0.73. The correlation between state migration rates in the 1995-2000 and 1924 periods is 0.48.

As Figure 2 illustrates, high migration states are not those closest to the United States. Nor does income appear to be the sole determinant of emigration. Table 2 reports regressions of state emigration rates in 1995-2000 on income and other state characteristics. In column 1, there is a negative correlation between state emigration rates and state per capita GDP, but the explanatory power of income isn't all that high. In column 2, adding distance to the United States (and distance squared) more than doubles the R-squared of the regression. The relation between emigration and proximity to the U.S. is nonlinear, with emigration initially rising with distance (reflecting low emigration in states on the U.S. border) and then declining with distance (reflecting high emigration for central states and low emigration for distant southern states). In column 3, adding the state emigration rate in 1924 as an independent variable raises the R-squared of the regression from 0.25 to 0.46. However, there appears to be little covariation between the 1995-2000 and 1924 emigration rates that is independent of the 1950s emigration rate. In column 4, once the 1955-59 emigration rate is added the R-squared rises further to 0.67 and the 1924 migration rate becomes statistically insignificant, reflecting the strong historical persistence in state emigration patterns. Columns 5-8 repeat the exercise using the fraction of households in 2000 receiving remittances from migrants abroad as the dependent variable, with similar results.

If states with relatively high emigration rates are also states that are more exposed to other aspects of globalization, then the empirical analysis might confound the effects of emigration with the effects of trade or capital flows. During the 1980s and 1990s, the Mexican government lowered barriers to international trade and foreign investment. Chiquiar (2004) and Hanson (2004) find that since 1985 Mexican states more engaged in international trade have enjoyed faster growth in average income and labor earnings. However, high emigration states do not appear to have benefited disproportionately from trade and investment reform. As expected, trade liberalization has affected states on the U.S.-Mexico border most strongly, and, as Figure 2 shows, border states are not high emigration states. Most high emigration states appear to have relatively low exposure to foreign trade and investment. This is seen in Figures 4 and 5, which plot the fraction of the state population migrating to the United States over 1995-2000 against the share of foreign direct investment in state GDP and the share of imports in state GDP. Table 3 shows that across Mexico states in the 1990s emigration rates are weakly negatively correlated with exposure to trade and foreign investment. It appears high exposure to emigration is not associated with high exposure to globalization. I discuss variation in state exposure to these and other shocks again in Section 5.

2.3 Sample Design

The goal of this paper is to examine the regional labor-market consequences of emigration in Mexico. One approach would be to utilize data on migration to the United States in Mexico's 2000 population census. Using the 2000 data, I could compare labor-market outcomes in households with emigrants to outcomes in households without emigrants. Or, combining the household cross-sections in 1990 and 2000, I could examine the covariation between the 1990-2000 change in household outcomes with the 1995-2000 state emigration rate. The obvious concern with either of these approaches is that household migration behavior is endogenous. The unobserved characteristics of households that affect their earnings and labor supply are also likely to affect whether households send migrants to the United States.

One way to address the endogeneity problem would be to use historical state emigration rates as an instrument for current opportunities to migrate abroad. The discussion in section 2.2 suggests that the 1950s emigration rate in an individual's birth state would be a good indicator of an individual's access to migration networks and so of an individual's relative opportunity to migrate to the United States. Using data from the 2000 census, unreported probit regressions show that the likelihood a household either has sent a migrant to the United States in the last five years or has received remittances from abroad in the last month is strongly positively correlated with the 1955-59 emigration rate in the household head's birth state.[6]

However, historical state emigration rates are unlikely to be a valid instrument for current migration rates. Emigration opportunities in an individual's birth state may have affected an individual's accumulation of human capital, either by influencing the individual's early employment prospects (if local emigration rates affect local wage levels) or the quality of education the individual received as a youth (if remittances or local income levels affect the quality of local schools). Past emigration opportunities are thus likely to affect current labor-market outcomes both directly, through their impact on

[6] Additional controls in this regression are a cubic in age of the household head, dummies for the educational attainment of the household head, the sex of the household head, and dummy variables for the state of residence. Evaluated at mean values for the other regressors, individuals born in high-migration states are 24.3% more likely to have had someone in their household migrate to the United States in the last five years and 21.7% more likely to have received remittances from migrants located abroad in the last month (with both of these effects very precisely estimated).

current emigration opportunities, and indirectly, through their impact on an individual's stock of human capital (which is only partially observed).

Given these concerns, I take a reduced-form approach by comparing changes in cross-section labor-market outcomes, where I categorize individuals according to the emigration rate in their birth state. In so doing, I capture both the direct and indirect effects of historical emigration opportunities on current labor-market outcomes. In presenting the empirical results, I will discuss whether the reduced-form effect of historical emigration rates on labor-market outcomes is likely to under or over-state the effect attributable solely to current emigration opportunities.

My empirical strategy is thus to compare labor-market outcomes in regions that have been more or less exposed to opportunities to migrate to the United States. Table 4 describes the sample of states. I drop the six border states from the sample, since these states have benefited disproportionately from trade and investment liberalization. Most border states had above average emigration rates in the 1950s and including them in the sample could confound the effects of emigration with those of other aspects of globalization. To help isolate the effects of emigration, I limit high-migration states to those with emigration rates in the top three deciles of non-border states and low-migration states to those with emigration rates in the bottom three deciles of non-border states. In 2000, 10.4% of households in the seven high-migration states had sent a migrant to the United States in the previous five years, compared with only 2.1% of households in the seven low-migration states.

With the exception of the Federal District, in which part of Mexico City is located, all the low-migration states are in southern Mexico. Per capita income in the

Federal District is over three times that in the southern low-migration states. And, as Figures 4 and 5 show, the Federal District has much higher exposure to international trade than the southern low-migration states. There is also heterogeneity among high-migration states. Jalisco, in which Guadalajara (the country's second largest city) is located, has high relatively high exposure to international trade. By way of checking the robustness of the results, I will perform the analysis with and without individuals born in the Federal District or Jalisco included in the sample.

3. Preliminary Analysis

3.1 Population Changes in High and Low Migration States

The most direct effect of emigration has been to reduce the relative population of young adults born in high-migration states. Figures 6 and 7 show cohort sizes based on age in 2000 for males and females born in high-migration or low-migration states. In the absence of measurement error, changes in population size are due to either net migration abroad or to death. Cohort sizes decline for all age-sex groups, except 10-19 year olds.[7] Population declines are largest for 20-29 year-old men (men born between 1971 and 1980) from high-migration states, whose number declines by 33.4 log points. In low-migration states, the number of 20-29 year-old men drops by only 9.4 log points, such that the relative decline of the 20-29 year-old male population in high-migration states over 1990-2000 is 24.0 log points. Overall, the population of 20-59 year-old men declines by 9.8 log points in high-migration relative to low-migration states.[8]

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[7] One explanation for the increases in cohort size for 10-19 year olds is greater measurement error in the 1990 census (in which case Figures 7 and 8 may understate reductions in cohort sizes over the decade).

[8] One might imagine that internal migration in Mexico could have partly reversed the change in relative regional labor supplies due to emigration. The large exodus of individuals born in high-migration states might have given individuals from other states an incentive to move in. But data on population by state of

Absolute and relative changes in female cohorts are smaller. The cohort of 20-29 year-old women declines by 16.8 log points in high-migration states and 2.0 log points in low-migration states. Overall, the population of 20-59 year-old women declines by 8.4 log points in high-migration relative to log-migration states.[9] Figure 8 shows that as a result of higher emigration rates for males, the share of men in the population of 20-29 year olds from high-migration states falls from 49% to 45% during the 1990s. In low-migration states the change is more modest, with a drop of 50% to 48%.

It appears men and women born in high-migration states in Mexico have become more likely to migrate abroad. One might also wonder whether they have become more likely to migrate internally. Table 5 reports probit regressions using data from 1990 and 2000 on whether individuals born in high-migration or low-migration states have changed their state of residence since birth. The regressors are (a) a cubic in age, dummy variables for five categories of educational attainment (1-5 years, 6-8 years, 9-11 years, 12-15 years, 16+ years), a dummy variable for marital status, dummy variables for presence of children in the household (ages 0-5, 6-12, 13-18), dummy variables for the state of birth, and a dummy variable for 2000; (b) interactions between the age, education, marital status, and children variables and the year 2000 dummy; (c) interactions between the age, education, marital status, and children variables and a dummy variable for whether the individual was born in a high-migration state; and (d) the interaction between the year 2000 dummy and the dummy for whether an individual was born in a high-migration state. I report results only for this last variable, which captures

residence (rather than state of birth) suggest that this is not the case. During the 1990s, high-migration states experienced the largest net decrease in resident population, followed by low-migration states. Border states had the largest net increase in resident population.

[9] Dropping the Federal District and Jalisco, the relative population of 20-59 year olds in high-migration states declines by 9.4 log points for men and 7.3 log points for women.

the change in the likelihood of having migrated internally over 1990-2000 for individuals born in a high-migration state relative to those born in a low-migration state.

Between 1990 and 2000, men from high-migration states become 3.4% more likely to live in a state different than their birth state, relative to men from low-migration states. Excluding the Federal District and Jalisco the estimate falls to 1.6%. Between 1990 and 2000, women from high-migration states become 4.1% more likely to live in a state different than their birth state, relative to women from low-migration states. Dropping the Federal District and Jalisco the estimate falls to 2.1% (and remains precisely estimated). It appears that during the 1990s individuals from high-migration states have become more likely to migrate either externally or internally.

3.2 Education and Earnings in High and Low Migration States

The educational profile of individuals by birth state varies between high- and low-migration states. Table 6 shows the distribution of schooling by age cohort in 2000 for the sample of Mexican states. For men, average schooling is higher in low-migration states. Among 30-39 year-old men in 2000, 62.6% had completed nine or more years of schooling in low-migration states, versus 47.7% in high-migration states. For women, these figures are 57.5% and 42.7%, respectively. These differences, however, depend on including among low-migration sates the Federal District, which has the most educated work force in the country. Once the Federal District and Jalisco are dropped from the sample, educational attainment is relatively similar in the two groups of states, with 46.9% of men and 40.1% of women in the 30-39 age cohort having completed nine or more years of education in low-migration states and 45.9% of men and 40.6% of women in the 30-39 age cohort doing so in high-migration states.

Despite comparable or higher education levels in low-migration states, wages appear to be higher in high-migration states. Table 7 shows average hourly wages by age and schooling cohort in 1990 and 2000.[10] For the full sample of states, wages are higher in high-migration states for most cohorts in 1990 and for all cohorts in 2000. In 1990, for men with 6-8 years of education, which spans mean schooling levels in either year, average hourly wages are $0.06 to $0.44 higher in high-migration states, depending on the age cohort (based on age in 2000). In 2000, these wage differentials widen to $0.25 to $0.74. Wages in high-migration states increase relative to wages in low-migration states in 15 of the 18 age-schooling cohorts. Dropping the Federal District and Jalisco, wages remain higher in high-migration states in most cohorts for both years.

Figure 9, which shows kernel densities for log average hourly wages, gives another perspective on wages in high and low-migration states. In 1990, wages have lower dispersion and a higher mean in high-migration states when compared to low-migration states. In 2000, these features are more pronounced. Relative to high-migration states, wages in low-migration states show an increase in relative dispersion and in relative mass in the lower tail. In Figure 10, which shows wage densities excluding the Federal District and Jalisco, the relative rightward shift in the wage distribution for high-migration is more evident.

Both in terms of average wages and wage densities, it appears that unconditional wages in high-migration states are higher than those in low-migration states and that this differential increases over the 1990s. This is seen clearly in Figure 11, which shows the

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[10] Average hourly wages are calculated as monthly labor income/(4.5*hours worked last week). I need to assume individuals work all weeks of a month, which could bias wage estimates downwards. To avoid measurement error associated with implausibly low wage values or with top coding of earnings, I restrict the sample to be individuals with hourly wages between $0.05 and $20 in Mexico (in 2000 U.S. dollars). This restriction is nearly identical to dropping the largest and smallest 0.5% of wage values.

double difference in wage densities for high-migration and low-migration states (i.e., the 2000 difference in wage densities for high-migration and low-migration states minus the 1990 difference in wage densities). Relative to low-migration states, over time high-migration states gain mass in the upper half of the wage distribution.

4. Decomposing Changes in Earnings

During the 1990s, the earnings gap appeared to increase between men born in high-migration states and men born in low-migration states. At face value, this change is difficult to interpret. It is possible that the large exodus of individuals from high-migration states may have increased the wages of non-migrating individuals from these states relative to wages for non-migrating individuals from low-migration states. In this case, the national wage changes associated with emigration reported by Mishra (2004) would also be evident at the regional level.

However, other interpretations of the observed wage changes are plausible. Borjas (1987) suggests that in countries with high skill premia and high earnings inequality, such as Mexico, the less-skilled are likely to have the highest propensity to migrate to countries with low skill premia and low earnings inequality, such as the U.S. In Mexico, if low-skill, low-wage individuals are more likely to migrate abroad (migrants are negatively selected in terms of skill), the apparent increase in wages in high-migration states may be due partly to shifts in labor-force composition.

To describe wages changes in high-migration and low-migration states more thoroughly, I apply non-parametric techniques for constructing counterfactual wage densities developed by DiNardo, Fortin, and Lemieux (1996) and Leibbrandt, Levinsohn, and McCrary (2004). In the first exercise, I compare the 1990-2000 change in the distribution of earnings between high-migration and low-migration states, *holding the returns to observable characteristics constant*. By fixing the returns to characteristics but allowing the distribution of characteristics to vary over time and across regions, I isolate how regional differences in the composition of the labor force have changed. This will help reveal whether it is low-wage or high-wage individuals from high-migration states who are more likely to migrate abroad. In the second exercise, I compare the 1990-2000 change in the distribution of earnings between high-migration and low-migration states, *holding the distribution of individual characteristics constant*. By fixing the distribution of characteristics, but allowing the returns to characteristics to vary, I examine whether non-migrating individuals in high-migration states have enjoyed wage gains relative to non-migrating individuals in low-migration states.[11]

It is important to recognize that neither non-parametric exercise I perform amounts to a truly valid counterfactual. This is because emigration is likely to have changed both the distribution of worker characteristics *and* the returns to these characteristics. By looking at each change in isolation, the counterfactual differences in wage densities I construct represent only *partial* decompositions of the change in the wage distribution.[12] Nevertheless, the non-parametric analysis will be helpful for assessing the plausibility of the parametric results.

Following the non-parametric estimation, I consider a parametric regression of differential wage changes in high-migration and low-migration states on differential emigration opportunities (as summarized by historical emigration rates). The parametric

[11] DiNardo, Fortin and Lemieux is not the only approach to non-parametrically decompose changes in wage distributions. See Machado and Mata (2005) (and Autor and Katz, 2004) for an alternative methodology.
[12] A complete decomposition would separate wage changes into components due to changes in returns for given characteristics, changes in characteristics for given returns, and the interaction of changes in returns and changes in characteristics. The non-parametric analysis in effect ignores the third component.

approach will provide an estimate of the differential in wage growth between high-migration and low-migration states that is associated with emigration. There are several reasons why we might be reluctant to assign a causal interpretation to the parametric results, which I discuss in the concluding section.

Finally, the analysis doesn't address changes in the distribution of unobservables. If, holding observed characteristics constant, Mexican emigrants have low (high) unobserved ability relative to non-migrants in Mexico, I would tend to understate the extent to which migrants are negatively (positively) selected in terms of skill.

4.1 Estimating Counterfactual Earnings Densities

Let f(w|x,i,t) be the density of hourly labor earnings, w, conditional on a set of observed characteristics, x, in region i and time t. Define h(x|i,t) as the density of observed characteristics among wage earners in region i and time t. For regions, i=H indicates high-migration states and i=L indicates low-migration states; for time periods, t=00 indicates the year 2000 and t=90 indicates the year 1990. The observed density of labor earnings for individuals in region i at time t is,

$$g(w \mid i,t) = \int f(w \mid x,i,t)h(x \mid i,t)dx$$

Differences in $f(w \mid x,H,t)$ and $f(w \mid x,L,t)$ reflect differences in returns to observables in high and low-migration states; differences in h(x|H,t) and h(x|L,t) reflect differences in the distribution of observables in high and low-migration states. The empirical analysis examines how regional differences in these two sets of densities changed over the 1990s.

In the first exercise, I compare the composition of the labor force across regions. I ask how the difference in earnings densities between high and low-migration states changes over time, holding constant returns to observables such that only the distribution of observables varies across regions and years. The first decomposition I consider is how the wage density differs between high-migration and low-migration states in 1990 for a common set of returns to observable characteristics:

$$\int f(w \mid x, L, 90) h(x \mid H, 90) dx - \int f(w \mid x, L, 90) h(x \mid L, 90) dx . \qquad (1)$$

The density difference in equation (1) evaluates the difference in the earnings distribution in high and low-migration states in 1990, fixing the returns to observables to be that in low-migration states in 1990. This density difference characterizes the initial difference in the distribution of observables between high and low-migration states. Applying DiNardo, Fortin, and Lemieux (DFL), I rewrite (1) as

$$\int [\theta^{L90 \to H90} - 1] f(w \mid x, L, 90) h(x \mid L, 90) dx , \qquad (2)$$

where

$$\theta^{L90 \to H90} = \frac{h(x \mid H, 90)}{h(x \mid L, 90)} . \qquad (3)$$

Equation (2) is simply the observed marginal earnings density in low-migration states in 1990, adjusted by a weighting function. Given an estimate of the weighting function in (3), it would be straightforward to apply a kernel density estimator to equation (2). Following DFL, I estimate the weighting function in (3) by running a logit on the probability a Mexican male is from a low-migration state in 1990 for the sample of Mexican males from high-migration and low-migration states in 1990.

Consider the analogue to equation (2) for 2000. The 2000 difference in the earnings distribution in high and low-migration states that is associated with differences in the distribution of observable characteristics can be written as

$$\int f(w \mid x, L,90) h(x \mid H,00) dx - \int f(w \mid x, L,90) h(x \mid L,00) dx \,. \tag{4}$$

Using weighting functions analogous to (3), I rewrite equation (4) as

$$\int [\theta^{L90 \to H00} - \theta^{L90 \to L00}] f(w \mid x, L,90) h(x \mid L,90) dx \,. \tag{5}$$

Putting (2) together with (5), we have the 1990-to-2000 change in the earnings distribution in high-migration versus low-migration states that is associated with changes in the distribution of observables:

$$\begin{aligned} &\left(\int f(w \mid x, L,90) h(x \mid H,00) dx - \int f(w \mid x, L,90) h(x \mid L,00) dx \right) - \\ &\left(\int f(w \mid x, L,90) h(x \mid H,90) dx - \int f(w \mid x, L,90) h(x \mid L,90) dx \right) = \\ &\int \left\langle \left(\theta^{L90 \to H00} - \theta^{L90 \to L00} \right) - \left(\theta^{L90 \to H90} - 1 \right) \right\rangle f(w \mid x, L,90) h(x \mid L,90) dx \end{aligned} \,. \tag{6}$$

Equation (6) shows the difference in the earnings distribution in high-migration versus low-migration states in 2000, relative to that in 1990, holding the returns to observables constant. Since an individual's birth state is fixed, I can use (6) to evaluate changes in labor-force composition in high-migration versus low-migration states, where I evaluate workers based on their place in the 1990 earnings distribution in low-migration states. To perform this exercise, I estimate a series of logit regressions to construct the weighting functions and then apply the weights to a kernel density estimator to obtain estimates for the densities described by (2), (5), and (6). The first two of these are for a *single difference* in densities and the third is for a *double difference* in densities.

The second exercise I perform is to examine how the returns to observable characteristics have changed in high and low-migration states, holding the distribution of characteristics constant. For 1990 the difference in earnings densities we'd like to see is

$$\int f(w \mid x, H,90) h(x \mid L,90) dx - \int f(w \mid x, L,90) h(x \mid L,90) dx \,. \tag{7}$$

which evaluates the difference in earnings distributions in high and low-migration states in 1990, fixing the marginal density of observables to be that in low-migration states in 1990. Following the logic of DFL, I rewrite equation (7) as

$$\int [\lambda^{L90 \to H90} - 1] f(w \mid x, L,90) h(x \mid L,90) dx \,, \tag{8}$$

where

$$\lambda^{L90 \to H90} = \frac{f(w \mid x, H,90)}{f(w \mid x, L,90)} \,. \tag{9}$$

The corresponding difference in densities for 2000 is

$$\int f(w \mid x, H,00) h(x \mid L,90) dx - \int f(w \mid x, L,00) h(x \mid L,90) dx \,, \tag{10}$$

which evaluates the difference in earnings distribution between high and low-migration states in 2000, again fixing the marginal density of observables to be that in low-migration states in 1990. Using the weights,

$$\lambda^{L90 \to H00} = \frac{f(w \mid x, H,00)}{f(w \mid x, L,90)} \quad \text{and} \quad \lambda^{L90 \to L00} = \frac{f(w \mid x, L,00)}{f(w \mid x, L,90)} \,, \tag{11}$$

I rewrite equation (10) as

$$\int [\lambda^{L90 \to H00} - \lambda^{L90 \to L00}] f(w \mid x, L,90) h(x \mid L,90) dx \,. \tag{12}$$

Putting equations (8) and (12) together,

$$\begin{aligned} &\left(\int f(w \mid x, H,00) h(x \mid L,90) dx - \int f(w \mid x, L,00) h(x \mid L,90) dx\right) - \\ &\left(\int f(w \mid x, H,90) h(x \mid L,90) dx - \int f(w \mid x, L,90) h(x \mid L,90) dx\right) = \\ &\int \left\langle \left(\lambda^{L90 \to H00} - \lambda^{L90 \to L00}\right) - \left(\lambda^{L90 \to H90} - 1\right) \right\rangle f(w \mid x, L,90) h(x \mid L,90) dx \end{aligned} \,. \tag{13}$$

Equation (13) shows the 1990-to-2000 change in earnings distribution in high-migration states relative to low-migration states, holding the distribution of observables constant.

This is the component of the change in relative regional earnings densities associated with changes in relative regional returns to observable characteristics alone.

To estimate the weighting functions in (9) and (11), I use Leibbrandt, Levinsohn, and McCrary's (2004) extension of DFL. As they show, applying Bayes' Axiom yields

$$\lambda^{L90\rightarrow L00} = \frac{f(w \mid x, L, 00)}{f(w \mid x, L, 90)} = \frac{\Pr(t = 00, i = L) \mid w, x)}{1 - \Pr(t = 00, i = L) \mid w, x)} \frac{1 - \Pr(t = 00, i = L) \mid x)}{\Pr(t = 00, i = L) \mid x)}$$

$$\lambda^{L90\rightarrow H00} = \frac{f(w \mid x, H, 00)}{f(w \mid x, L, 90)} = \frac{\Pr(t = 00, i = H) \mid w, x)}{1 - \Pr(t = 00, i = H) \mid w, x)} \frac{1 - \Pr(t = 00, i = H) \mid x)}{\Pr(t = 00, i = H) \mid x)} , \quad (14)$$

$$\lambda^{L90\rightarrow H90} = \frac{f(w \mid x, H, 90)}{f(w \mid x, L, 90)} = \frac{\Pr(t = 90, i = H) \mid w, x)}{1 - \Pr(t = 90, i = H) \mid w, x)} \frac{1 - \Pr(t = 90, i = H) \mid x)}{\Pr(t = 90, i = H) \mid x)}$$

Each weighting function in (14) is the product of odds ratios. In the first weight, the first ratio is the odds an individual is from a low-migration state in 2000 (based on a sample of individuals from low-migration states in 1990 and 2000), conditional on observables, x, and earnings, w; and the second ratio is the (inverse) odds an individual is from a low-migration state in 2000, conditional on just on x. To estimate the odds ratios, I estimate two logit models. In each case, the regressand is a 0-1 variable on the outcome i=L and t=00 (based on a sample of (i=L, t=00) and (i=L, t=90)). For the first logit, the regressors are x and w; for the second, the regressor is x, alone. Other weights can be estimated analogously. After constructing the weights, I estimate (8), (12), and (13).

4.2 A Parametric Approach

To evaluate the association between emigration and earnings parametrically, I pool data on working age men in 1990 and 2000 from high-migration or low-migration states and estimate the following difference-in-difference wage regression,

$$\ln w_{hst} = \alpha_s + X_{hst}(\beta_1 + \beta_2 Y2000_{ht} + \beta_3 High_{hs}) + \phi * Y2000_{ht} * High_{hs} + \varepsilon_{hst} \quad (15)$$

where w is average hourly earnings, X is a vector of observed characteristics, Y2000 is a dummy variable for the year 2000, and High is a dummy variable for whether an individual was born in a high-migration state. The regression includes controls for state-of-birth fixed effects and allows returns to observable characteristics to vary across regions and time. The coefficient, φ, captures the mean differential 1990-to-2000 change in earnings between high and low-migration states.[13]

One important estimation issue is that shocks other than emigration may have had differential impacts on high and low-migration states. I've already discussed the shock associated with NAFTA and other aspects of trade liberalization. Another shock was the peso crisis of 1995. After a bungled devaluation of the peso in 1994, Mexico chose to float its currency, which proceeded to plummet in value relative to the dollar. The ensuing increase in the peso value of dollar-denominated liabilities contributed to a banking collapse and a severe economic contraction. Low-migration states (excluding Mexico City) are modestly less industrialized than high-migration states and so may have been less hurt by the credit crunch. Also, low-migration states tend to have larger tourist industries, which may have benefited from the devaluation. Other shocks in the 1990's included a reform of Mexico's land tenure system in 1992, the privatization of state-owned enterprises, and industry deregulation. The existence of these shocks leaves the

[13] Equation (15) is a standard difference-in-difference specification, which implies I estimate the mean differential in wage growth between high and low-migration states. This approach ignores the possibility that the wage effect of being in a high-migration state may not be uniform throughout the wage distribution. A more elegant approach would be to estimate the regional differential in wage changes non-parametrically, as in the framework derived by Athey and Imbens (2003).

results subject to the caveat that factors other than emigration may have contributed to differential regional changes in earnings. I return to this issue in section 5.

4.3 Empirical Results

The sample for the analysis is the cohort of Mexican men aged 20 to 49 years in 1990 or 30 to 59 years in 2000 who were born in one of the seven high-migration states or one of the seven low-migration states. By restricting the analysis to a single cohort, I limit possible contamination of the sample associated with more-educated younger workers entering the labor force and less-educated older workers exiting the labor force. The dependent variable is log average hourly labor earnings (see note 10).

Figure 12 shows kernel density estimates for the density differences in equations (2) and (5), which characterize the difference in earning distributions between high and low-migration states holding constant the return to observable characteristics. In 1990 and 2000, the density difference has negative mass above the mean and positive mass below the sample mean (where the mean over the entire sample of states is normalized to zero). This implies that in either year there are relatively few men from high-migration states with above-average earnings and relatively many men from high-migration states with below-average earnings. Whatever the source of this initial difference, it becomes modestly more pronounced during the 1990s. Between 1990 and 2000, the density difference loses mass above the mean and gains mass below the mean. Compared to low-migration states, it appears that men with above-average earnings from high-migration states disappear from the sample in larger numbers.

The change in the composition of the labor force is perhaps seen more clearly in Figure 13, which shows the 1990-to-2000 change in the difference in earnings densities between high-migration and low-migration states (for constant returns to observables). This (partial) double difference shows negative mass above the mean and positive mass below the mean, indicating that over time the relative scarcity of high-wage workers has increased in high-migration states relative to low-migration states.

Comparing units on the vertical axes in Figures 11 and 13, it is apparent that the counterfactual double difference in wage densities is small, but it is still informative about the nature of migrant selection on observables. Figure 7 shows that between 1990 and 2000 there was a relatively large loss in the population of working-age men born in high-migration states, which is consistent with individuals from high-migration states having a relatively high propensity to migrate abroad. What Figures 12 and 13 suggest is that the men most likely to migrate abroad are those in the top half of the earnings distribution. This finding is inconsistent with negative selection of emigrants in terms of observable skills and suggests that emigrants exhibit intermediate or positive selection in terms of observable skills. Using data from Mexican and U.S. population censuses, Chiquiar and Hanson (2005) also find evidence against negative selection.[14]

One might also be concerned that including the relatively rich and globalized regions of the Federal District and Jalisco in the sample of birth states affects the results. In Figure 14, I show the double difference in counterfactual wage densities reported in Figure 13 (with returns to observables fixed at those for low-migration states in 1990) for a sample that excludes the two states. Comparing Figures 13 and 14 shows that results are similar with or without these states in the sample. The results are also robust to dropping any one of the other states from the sample.

[14] Results are similar if I evaluate change in earnings densities between high-migration and low-migration states for returns to observables fixed at those for high (rather than low) migration states in 1990.

Over time, it appears that men born in high-migration states are emigrating from Mexico in relatively large numbers and that the emigrants include a disproportionately large number of individuals with relatively high earnings potential. In a simple labor-supply, labor-demand framework, a decrease in the relative supply of more-skilled workers in high-migration states would put upward pressure on relative wages in these states (as long as labor was not perfectly mobile between regions of Mexico). Next, we examine how relative regional returns to observables have changed over time.

Figure 15 shows kernel density estimates for the density differences in (8) and (12), which characterize the difference in earning distributions between high and low-migration states holding constant the distribution of observable characteristics. In 1990 and 2000, the density difference has positive mass above the mean and negative mass below the mean. In either year, returns to observables appear to be higher in high-migration states relative to low-migration states. Although one cannot identify from Figure 15 the source of the initial difference in relative regional earnings, relatively high returns to observables in high-migration states is consistent with the relative scarcity of high-wage workers in high-migration states evident in Figure 12.

Over time, the difference in returns to observables between high and low-migration states appears to have become more pronounced. Figure 15 shows that from 1990 to 2000 the difference in wage densities between high-migration and low-migration states gains mass above the mean and loses mass below the mean. This is seen more clearly in Figure 16, which shows the 1990-to-2000 change in the difference in earnings densities between high-migration and low-migration states, holding constant the distribution of observables. This double difference shows positive mass above the mean and negative mass below the mean, indicating that during the 1990's the wage premium for above-average wage earners increased for men born in high-migration states relative to men born in low-migration states. Though the partial double difference in wage densities is again small (compare to Figure 11),[15] the increase in the relative wage for men born in high-migration states evident in Figure 17 is consistent with the decrease in the relative supply of men born in high-migration states evident in Figure 13. In unreported density estimates, I obtain similar results when I drop men born in the Federal District or Jalisco from the sample.

The non-parametric results suggest there has been an increase in relative wages for men born in high-migration states in Mexico. To evaluate the change in regional relative wages parametrically, Table 8 shows estimation results for equation (15). The dependent variable is log average hourly earnings. The regressors are dummy variables for educational attainment, a quadratic in age, a dummy variable for the year 2000 and its interaction with the age and education variables, a dummy variable for having been born in a high-migration state and its interaction with the age and education variables, dummy variables for birth state, and the interaction of the year 2000 and high-migration dummy variables. This last variable captures the differential change in wage growth in high-migration states relative to low-migration states. Standard errors are adjusted for correlation across observations associated with the same birth state.

Panel (a) of Table 8 shows that during the 1990's the cohort of men born in high-migration states enjoyed labor earnings growth that was 6.3 log points higher than

[15] Since both counterfactual double differences in densities are small, it appears that the interaction between changes in worker characteristics and changes in returns to characteristics accounts for a large portion of the total change in regional relative wages. However, the double differences in wage densities still appear to be informative about the direction of these changes. Relative regional wage changes appear to be larger where relative regional labor-supply changes are larger.

earnings growth for individuals born in low-migration states. These coefficients are precisely estimated. This is consistent with the non-parametric estimates and again suggests that men born in high-migration states enjoyed higher growth in labor earnings than men born in low-migration states. The second two columns of Table 8 show results where the year2000/high-migration interaction is interacted with an indicator for an individual having 9 to 15 years of education (roughly, workers with above mean schooling years but with less than a college education). This term allows relative earnings growth to be larger for more-educated workers. The education interaction term is positive, consistent with Figure 17 (while the variable appears imprecisely estimated the two reported interaction terms are jointly highly statistically significant).[16]

Panel (b) of Table 8 redoes the estimation, dropping observations for the Federal District and Jalisco. Estimated relative wage growth for high-migration states is higher for this sample, with men born in high-migration states enjoying labor earnings growth 8.6 to 8.9 log points higher than for men born in low-migration states. In the second two columns, the interaction between the year2000/high-migration interaction and the dummy variable for secondary education is again positive (and the two interaction terms are again jointly highly statistically significant).

Since emigration rates are highest for individuals in their twenties, one might expect that wage changes between high-migration and low-migration states would have been largest for men who are more educated *and* young. In unreported results, I included additional interactions between the year 2000 dummy, secondary education, and age, but these proved to be imprecisely estimated in most regressions.

[16] Introducing interaction terms for more disaggregated schooling categories yields similar results.

Based on the coefficient estimates, it is possible to construct an elasticity of the relative wage for high-migration and low-migration states with respect to the relative labor supply in high-migration and low-migration states. From Figure 6, the supply of working-age men in high-migration states fell by 9.8 log points relative to the supply of working-age men in the same cohort in low-migration states. This implies a wage elasticity of 0.64. Excluding the Federal District and Jalisco the wage elasticity is 0.91. Either elasticity is larger than the value of 0.4 that Mishra (2004) estimates using data on changes in wages and labor supply for age-schooling cohorts at the national level. Recall, however, that my estimates are reduced form. They include the direct effect of emigration on wages (through changes in the labor supply), and any indirect effect associated with differential labor-demand growth in high-migration states that is associated with historical emigration patterns. Comparing my results to Mishra's suggests that the indirect effects of emigration on regional wages are positive.

5. Discussion

In this paper, I examine how emigration may have affected regional labor supply and regional earnings in Mexico. Mexico has a long history of sending migrants to the United States. Since the early 1900s, emigration rates have varied widely across regions of the country, with individuals from west-central states having the highest propensity to migrate abroad. I exploit regional persistence in emigration behavior by focusing the analysis on individuals born in states with a history of either high-migration or low-migration to the United States, as measured by state emigration rates in the 1950s.

As in earlier decades, during the 1990s individuals born in Mexico's high-migration states appeared to have a relatively high propensity to migrate abroad.

Between 1990 and 2000, the population of 20-59 year-old men born in high-migration states declined by 10 log points relative to similarly aged men born in low-migration states. For women, the corresponding relative regional change in population was 8 log points. The relatively large exodus of individuals from high-migration states is concentrated among individuals with above-average earnings potential. This suggests that in terms of observable skills emigrants are positively selected. Controlling for observables, wages in high-migration states rose relative to low-migration states by 6-9%. This implies an elasticity of wages with respect to the labor supply of 0.7-0.8. This change reflects both the direct effects of emigration on the labor supply and any indirect effects of historical emigration patterns on current regional wage growth.

There are several possible interpretations of these results. One is that emigration raises wages in Mexico, with the effects being most pronounced in states that have well-developed networks for sending migrants to the United States. This interpretation is consistent with the findings in Munshi (2003), Hanson (2004), and Mishra (2004).

However, emigration was by no means the only shock to the Mexican economy during the 1990's. Other shocks may have also contributed to changes in regional relative wages. A large literature documents how NAFTA and other aspects of globalization appear to have increased regional wage differentials in Mexico. It is not clear how globalization interacts with emigration. States more exposed to globalization appear to have lower migration rates to the United States, suggesting that emigration and globalization may be complementary mechanisms for integrating Mexico into the North American labor market. Another important shock was the Mexican peso crisis in 1995. This may have hurt high-migration states more than low-migration states (since high-migration states have larger industrial bases and smaller tourist industries), suggesting my estimates may understate the true effect of emigration on regional wages.

Other policy changes, such as the privatization and deregulation of Mexican industry or the reform of Mexico's land-tenure system, may also have had differential regional impacts. Privatization and deregulation appeared to lower union wage premiums in these sectors (Fairris, 2003). Since more heavily unionized industries are concentrated in Mexico's north and center and relatively absent in Mexico's south (Chiquiar, 2003), we might expect a loss in union power to lower relative wages in Mexico's high-migration states, in which case my results would tend to understate the true effect of emigration. The reform of Mexico's land-tenure system allowed the sale of agricultural land that had previously been held in cooperative ownership. We might expect this change to have raised relative incomes in southern Mexico, which specializes in agriculture. Since low-migration states are concentrated in southern Mexico, this is another reason my results may tend to understate the true effect of emigration.

A brief review of Mexico's other policy reforms during the 1990's does not suggest any obvious reason why they should account for the observed increase in relative earnings in high-migration states. Still, in an environment where multiple shocks have affected Mexico's labor market it is important to be cautious about ascribing shifts in relative regional earnings to any specific event. In the end, we can only say that I find suggestive evidence that emigration has increased relative earnings in Mexican states that have stronger migration networks vis-à-vis the United States.

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Table 1: Share of U.S. Immigrants from Mexico in the Population of Mexico
(percent)

Age Cohort		Males % Residing in U.S.			Females % Residing in U.S.		
Age in 1990	Age in 2000	1990	2000	Change	1990	2000	Change
--	16 to 25	--	11.99	--	--	7.68	--
16 to 25	26 to 35	7.57	17.53	9.96	4.89	12.62	7.73
26 to 35	36 to 45	10.87	15.49	4.62	7.69	11.90	4.21
36 to45	46 to 55	9.18	12.21	3.03	7.47	10.44	2.97
46 to 55	56 to 65	7.00	8.64	1.64	6.44	8.36	1.92
56 to 65	--	5.70	--	--	5.84	--	--

This table shows Mexican immigrants in the U.S. as a percentage of the population of individuals born in Mexico (equal to the sum of the Mexico-born population residing in Mexico and the Mexico-born population residing in the United States) by age and sex categories. The sample is individuals 16-65 years old (in the U.S., excluding those in group quarters; in Mexico, excluding those not born in the country). Residents of Mexico in 1990 are the 1% microsample of the *XII Censo General de Poblacion y Vivienda, 1990*, and in 2000 are a 10% random sample of the 10% microsample of the *XIII Censo General de Poblacion y Vivienda, 2000*. Mexican immigrants are from the 1990 and 2000 5% U.S. Public Use Microsample. Source: Chiquiar and Hanson (2005).

Table 2: Emigration and Characteristics of Mexican States

	Migration to U.S. 1995-2000			
	(1)	(2)	(3)	(4)
Constant	0.231	0.169	0.211	0.175
	(0.085)	(0.085)	(0.098)	(0.077)
Log Per Capita	-0.025	-0.036	-0.03	-0.017
GDP in 1995	(0.011)	(0.011)	(0.011)	(0.009)
Log Distance		0.070	0.006	-0.025
to U.S.		(0.027)	(0.029)	(0.026)
Log Distance		-0.007	0.000	0.003
to U.S.^{2}		(0.003)	(0.003)	(0.003)
Migration Rate			32.813	4.295
1924			(10.210)	(10.210)
Migration Rate				1.919
1955-59				(0.386)
Adjusted R^2	0.116	0.252	0.456	0.667
N	32	32	32	32

The sample is the 31 states of Mexico plus the Federal District. The dependent variable is the average share of households in a state that had sent a migrant to the United States in the 1995-2000 period. Standard errors are in parentheses.

Table 3: Correlation in Measures of Exposures to Globalization across Mexican States

	Maquiladora Value Added/ State GDP	Foreign Direct Investment/ State GDP	Imports/ State GDP	Share of State Population Migrating to US, 1995-2000
Foreign Direct Investment/ State GDP	0.391 (0.027)			
Imports/ State GDP	-0.007 (0.968)	0.571 (0.001)		
Share of State Population Migrating to US, 1995-2000	-0.128 (0.484)	-0.368 (0.038)	-0.253 (0.162)	
Share of State Population Migrating to US, 1955-1959	0.188 (0.303)	-0.123 (0.502)	-0.133 (0.468)	0.725 (0.000)

The sample is the 31 states of Mexico plus the Federal District. Shares of state GDP (maquiladora value added, foreign direct investment, imports) are averages over the period 1993-1999. Correlations are weighted by state share of the national population (averaged over 1990 to 2000). P-values are in parentheses.

Table 4: Ranking Mexican States by Historical Emigration Rates

	State	Migration Rate 1995-2000	Migration Rate 1955-1959	Per Capita GDP 1995	Pop. 2000 ('000s)
High Migration	Aguascalientes	0.090	0.032	1,728	952
	Durango	0.093	0.055	1,329	1,440
	Guanajuato	0.114	0.041	1,062	4,604
	Michoacán	0.130	0.031	901	3,921
	San Luis Potosí	0.087	0.025	1,094	2,362
	Zacatecas	0.151	0.059	878	1,348
	Jalisco	0.082	0.020	1,479	6,272
	Mean	0.104	0.033	1,197	2,986
	Mean w/o Jalisco	0.114	0.038	1,077	2,438
Low Migration	Campeche	0.011	0.000	2,341	680
	Chiapas	0.009	0.000	678	3,877
	Quintana Roo	0.009	0.000	2,437	876
	Tabasco	0.007	0.002	951	1,911
	Veracruz	0.037	0.000	912	6,923
	Yucatán	0.013	0.002	1,159	1,646
	Federal District	0.021	0.001	3,823	8,544
	Mean	0.021	0.001	2,006	3,494
	Mean w/o Fed. Dis.	0.021	0.001	1,030	2,652
Other Non-Border States (12)		0.049	0.007	1,096	2,925
Border States (6)		0.032	0.020	2,054	2,759

This table shows rates of migration to the United States, per capita GDP, and population for Mexican states. Means are weighted by the 2000 population of the subgroup.

Table 5: Probability of Internal Migration

(a) All High-Migration and Low-Migration States

	Moved since Birth	
	Men	Women
	(1)	(2)
Year 2000*High Migration	0.034	0.041
	(0.014)	(0.130)
R	0.068	0.060
N	159,067	174,052

(b) Excluding the Federal District and Jalisco

	Moved since Birth	
	Men	Women
	(3)	(4)
Year 2000*High Migration	0.016	0.021
	(0.010)	(0.007)
R	0.077	0.066
N	107,310	116,864

This table reports results for probit regressions in which the dependent variable equals one if an individual resides in a different state than his/her birth state and zero otherwise. The sample is men and women in Mexico aged 20-49 in 1990 or 30-59 in 2000 born in a high-migration or a low-migration Mexican state. The other regressors are: (a) a cubic in age, dummy variables for five categories of educational attainment (1-5 years, 6-8 years, 9-11 years, 12-15 years, or 16+ years), a dummy variable for marital status, dummy variables for presence of children in the household (ages 0-5, 6-12, or 13-18 years), dummy variables for the state of birth, and a dummy variable for the year 2000; (b) interactions between the age, education, marital status, and children variables and the year 2000 dummy; and (c) interactions between the age, education, marital status, and children variables and a dummy variable for whether the individual was born in a high-migration state. The coefficients show the change in the probability of internal migration associated with an individual being from a high-migration state in 2000 versus that in 1990 (evaluated at mean values for other regressors). Standard errors (corrected for correlation in the errors within birth states) are in parentheses.

Table 6: Schooling by Age Cohort in High-Migration and Low-Migration States, 2000

	State	2000						
	Migration	Age	Years of Schooling					
Sex	Rate	Cohort	0	1-5	6-8	9-11	12-15	16+
Men	Low	30-39	0.042	0.131	0.201	0.262	0.200	0.164
	Low	40-49	0.064	0.192	0.241	0.174	0.145	0.184
	Low	50-59	0.119	0.289	0.240	0.124	0.097	0.132
	High	30-39	0.046	0.200	0.277	0.238	0.135	0.104
	High	40-49	0.084	0.283	0.290	0.142	0.084	0.118
	High	50-59	0.169	0.377	0.236	0.089	0.054	0.074
Excluding	Low	30-39	0.072	0.220	0.238	0.218	0.147	0.104
Federal District	Low	40-49	0.108	0.307	0.253	0.127	0.089	0.116
& Jalisco	Low	50-59	0.182	0.404	0.213	0.075	0.056	0.070
	High	30-39	0.052	0.215	0.274	0.233	0.129	0.097
	High	40-49	0.090	0.292	0.288	0.142	0.082	0.106
	High	50-59	0.174	0.386	0.235	0.089	0.050	0.065
Women	Low	30-39	0.064	0.155	0.205	0.237	0.210	0.128
	Low	40-49	0.105	0.227	0.255	0.162	0.156	0.095
	Low	50-59	0.197	0.278	0.238	0.125	0.113	0.050
	High	30-39	0.052	0.220	0.302	0.217	0.141	0.069
	High	40-49	0.103	0.350	0.292	0.122	0.083	0.050
	High	50-59	0.203	0.407	0.232	0.086	0.054	0.019
Excluding	Low	30-39	0.113	0.261	0.225	0.186	0.131	0.084
Federal District	Low	40-49	0.177	0.353	0.231	0.105	0.076	0.057
& Jalisco	Low	50-59	0.301	0.367	0.195	0.067	0.048	0.022
	High	30-39	0.060	0.236	0.298	0.205	0.135	0.066
	High	40-49	0.113	0.364	0.283	0.116	0.079	0.044
	High	50-59	0.218	0.414	0.216	0.083	0.052	0.017

This table shows the distribution of educational attainment by age cohort for individuals 30-59 years old in 2000 born in high-migration or low-migration Mexican states (based on 1955-1959 emigration rates).

Table 7: Average Hourly Wages by Age and Schooling Cohort, 1990 and 2000

Year	State Migration Rate	2000 Age Cohort	Years of Schooling 0	1-5	6-8	9-11	12-15	16+
1990	Low	30-39	0.92	1.62	1.56	2.14	2.76	4.61
1990	Low	40-49	1.21	1.31	2.56	2.97	4.25	6.30
1990	Low	50-59	1.27	1.83	2.49	3.88	6.10	8.10
1990	High	30-39	1.41	1.77	1.76	2.77	2.80	5.00
1990	High	40-49	1.58	2.87	3.00	3.00	3.67	5.55
1990	High	50-59	1.53	1.93	2.55	3.80	4.76	7.13
2000	Low	30-39	0.61	1.06	1.19	1.50	2.59	5.11
2000	Low	40-49	0.54	0.70	1.31	1.84	3.25	6.19
2000	Low	50-59	0.60	0.85	1.57	1.89	3.56	6.97
2000	High	30-39	1.18	2.63	1.44	2.39	2.72	4.39
2000	High	40-49	1.21	1.22	2.05	2.02	3.51	5.12
2000	High	50-59	0.98	2.56	1.97	2.65	3.69	6.50
			Excluding the Federal District & Jalisco					
1990	Low	30-39	0.83	1.05	1.26	1.96	2.34	3.27
1990	Low	40-49	1.14	1.25	1.71	2.01	3.21	4.22
1990	Low	50-59	1.22	1.60	2.41	3.11	4.86	5.70
1990	High	30-39	1.31	1.74	1.68	1.75	2.80	4.36
1990	High	40-49	1.41	2.96	3.22	3.00	3.44	4.85
1990	High	50-59	1.49	1.64	2.43	3.96	4.47	6.71
2000	Low	30-39	0.56	1.05	1.06	1.23	2.28	3.79
2000	Low	40-49	0.51	0.63	1.11	1.70	2.64	5.54
2000	Low	50-59	0.56	0.79	1.29	1.75	3.20	5.88
2000	High	30-39	1.19	2.98	1.39	2.55	2.58	4.30
2000	High	40-49	1.10	1.11	2.19	1.86	3.13	4.96
2000	High	50-59	0.82	2.47	1.62	2.47	3.54	6.66

This table shows average hourly wages by age and schooling cohort for individuals aged 20-49 in 1990 or 30-59 in 2000 born in a high-migration or a low-migration state. Wage levels are in 2000 U.S. dollars for men with average hourly earnings between $0.05 and $20. See note 10 on how wages are constructed.

Table 8: Regression Results

	All Workers	Workers w/ 20-80 Hour Work Week	All Workers	Workers w/ 20-80 Hour Work Week
	(a) Full Sample of Workers			
Year 2000*High Migration	0.063	0.063	0.045	0.049
	(0.027)	(0.026)	(0.034)	(0.033)
Year 2000*High Migration* 9-15 Years of Education			0.057	0.043
			(0.030)	(0.030)
R	0.308	0.349	0.308	0.349
N	110,837	103,232	110,837	103,232
	(b) Excluding the Federal District and Jalisco			
Year 2000*High Migration	0.089	0.086	0.066	0.066
	(0.032)	(0.032)	(0.042)	(0.042)
Year 2000*High Migration* 9-15 Years of Education			0.084	0.065
			(0.046)	(0.048)
R	0.261	0.302	0.261	0.303
N	71,557	66,152	71,557	66,152

The dependent variable is log average hourly labor earnings. In columns 1 and 3, the sample is males born in a high-migration state or a low-migration state; in columns 2 and 4, the sample includes males who report working 20-80 hours a week. Other regressors (quadratic in age, dummies for year of education, and their interactions with year 2000 dummy and with High Migration dummy; year 2000 dummy variable; state dummy variables) are not shown. Standard errors are in parentheses and are adjusted for correlation across observations within birth states. In panel (a), the sample is working males in all high and low-migration states and time periods; in panel (b), I drop observations for the Federal District and Jalisco from the sample.

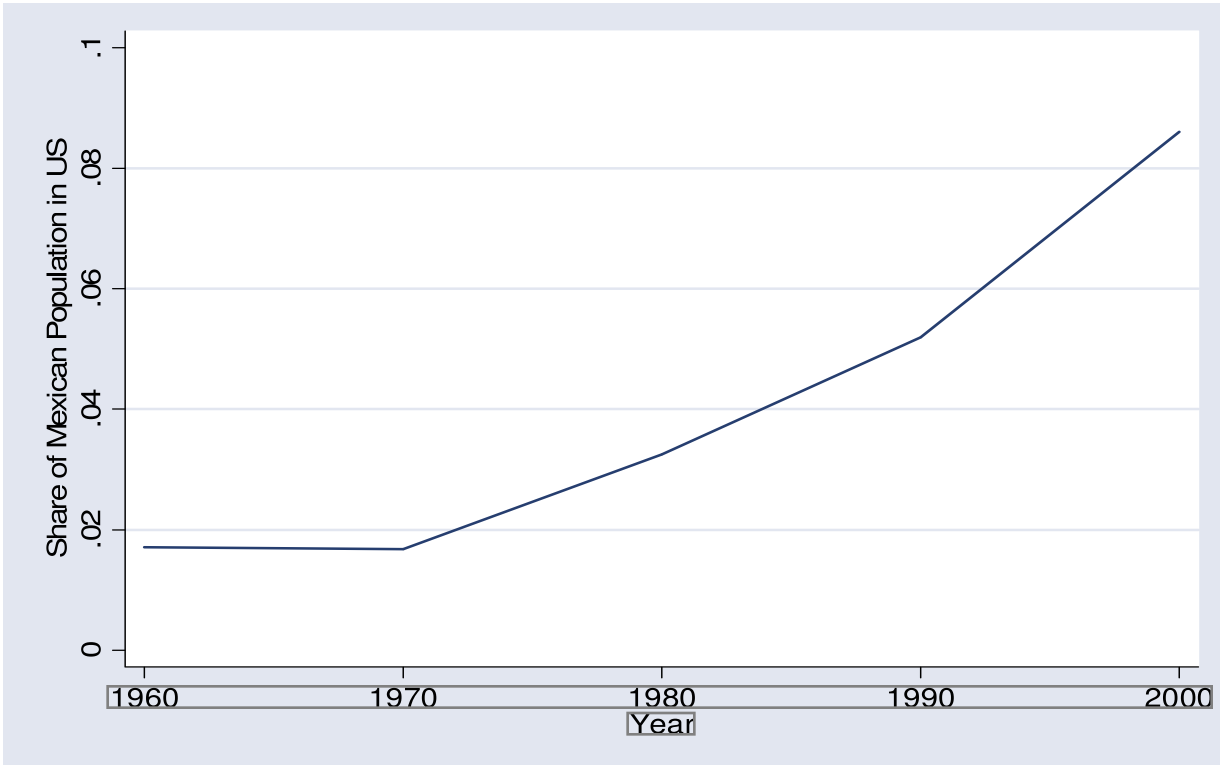


Figure 1: Share of Population Born in Mexico Residing in the U.S.

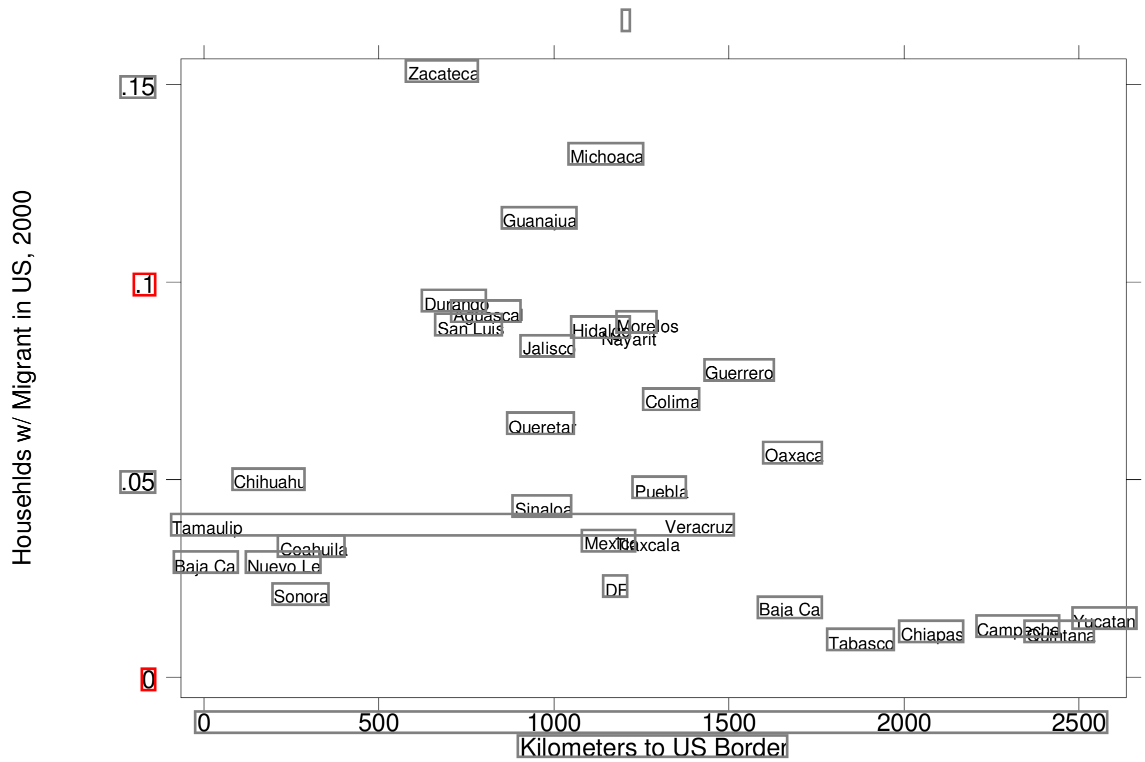


Figure 2: Rate of Migration to the U.S. 1995-2000 by Mexican State

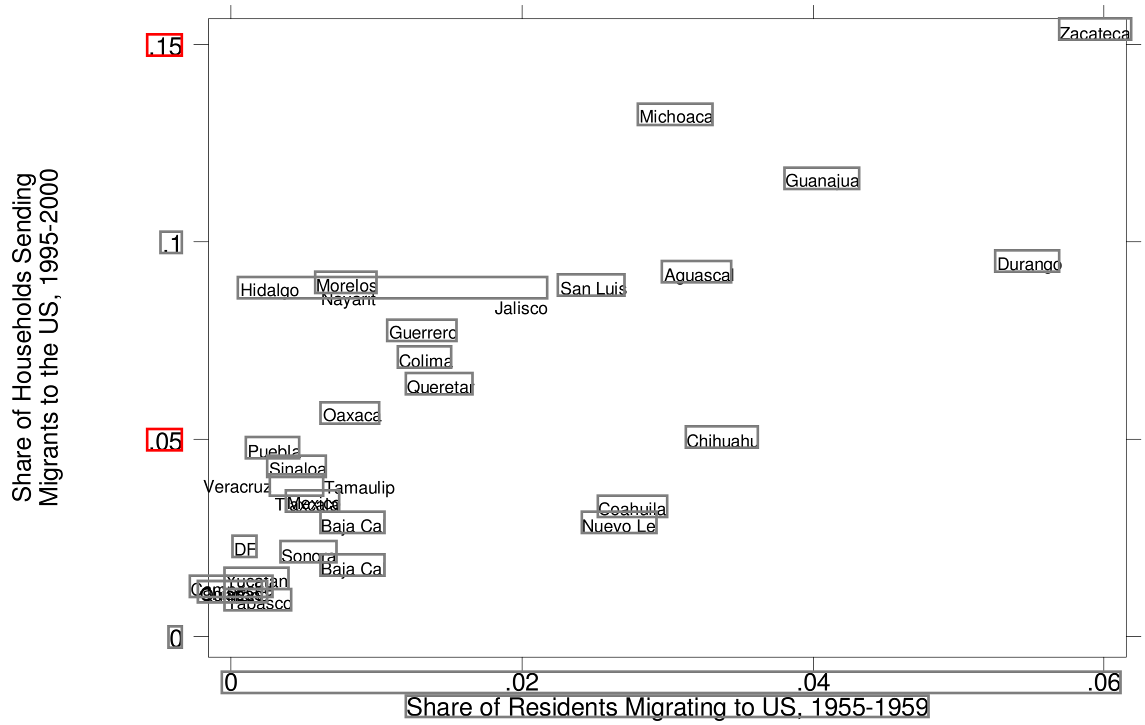


Figure 3: State Rates of Migration to the U.S. in 1990s versus 1950s

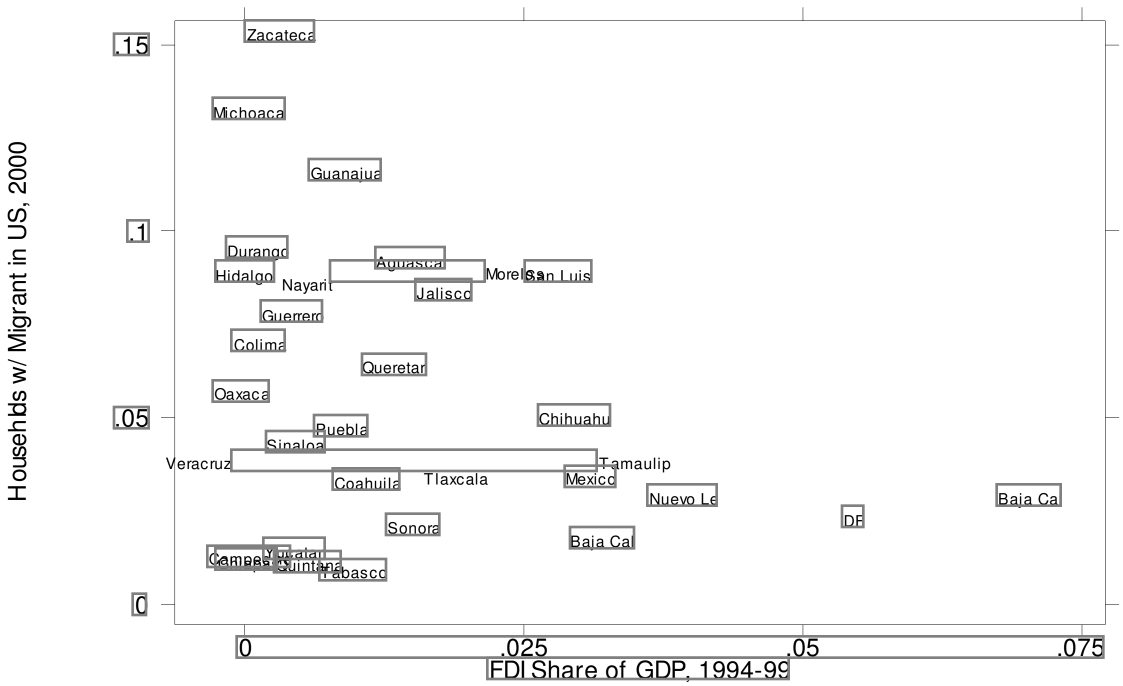


Figure 4: State Exposure to Emigration and Foreign Direct Investment

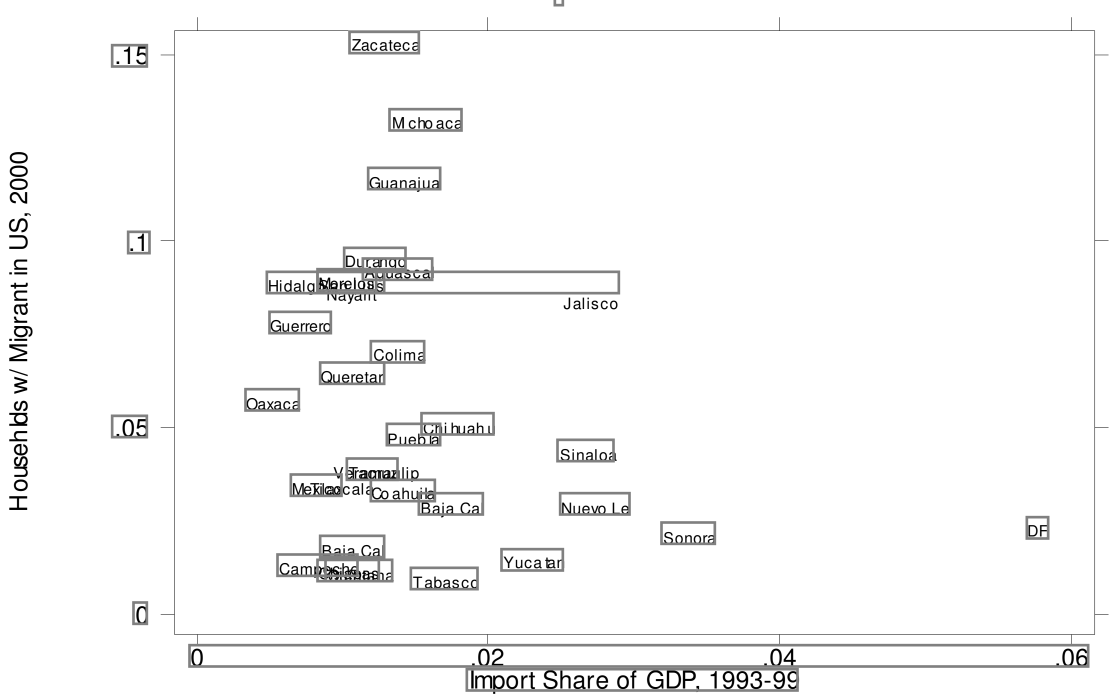
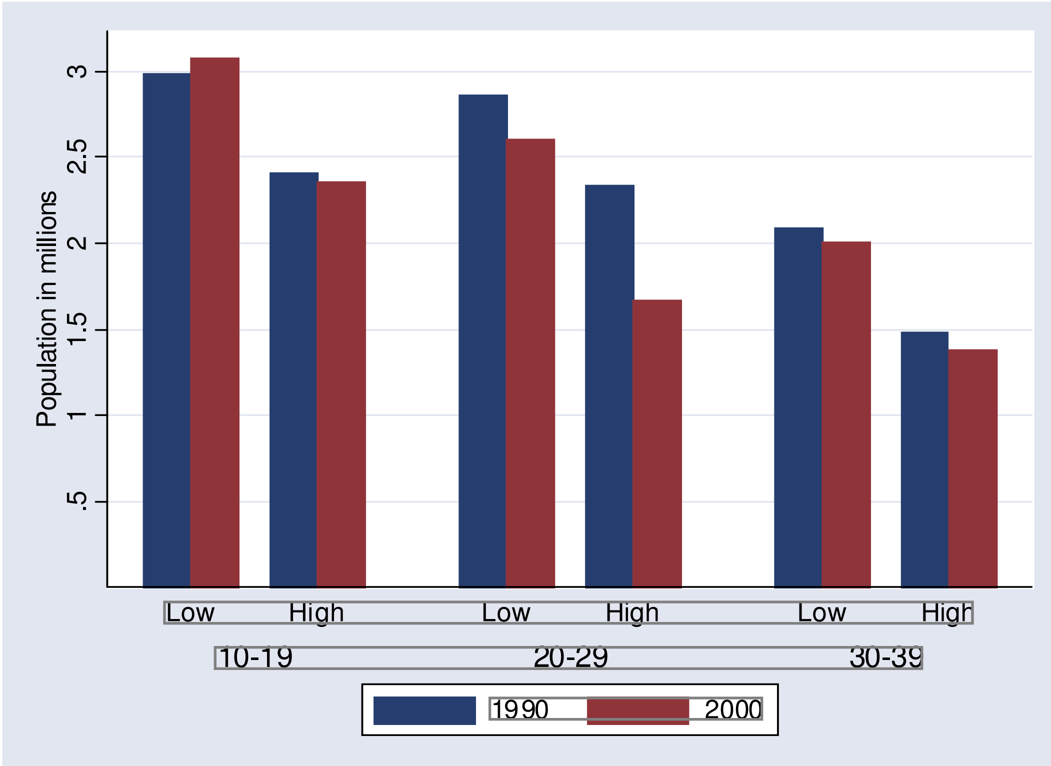


Figure 5: State Exposure to Emigration and International Trade



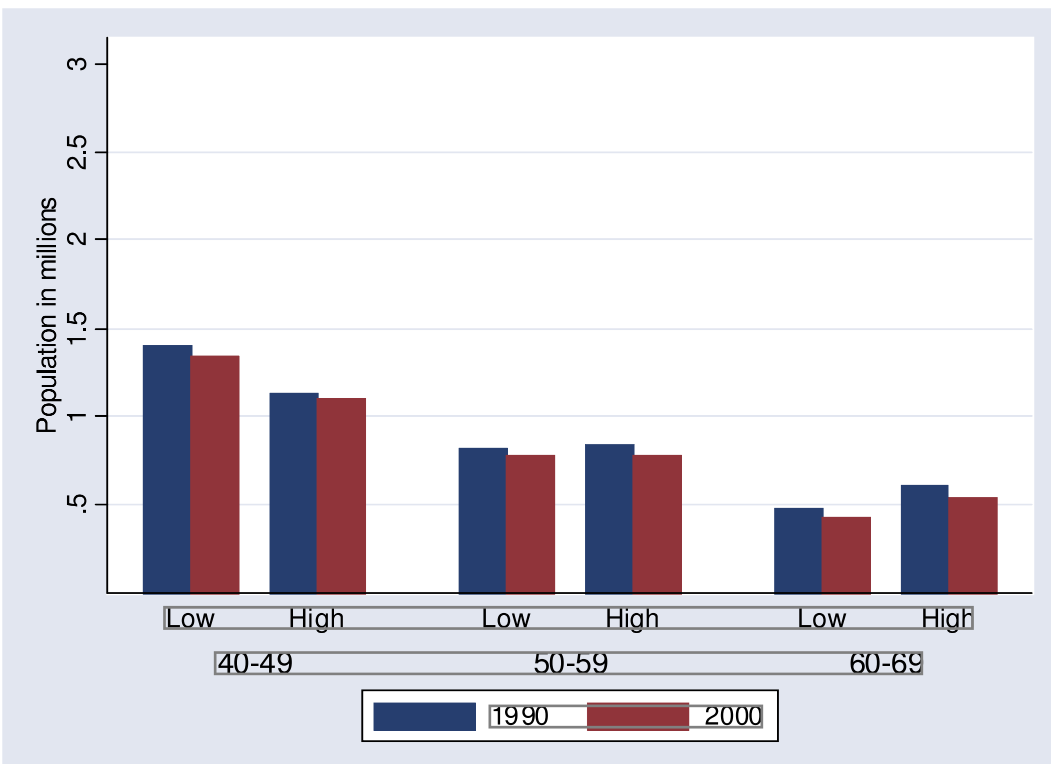
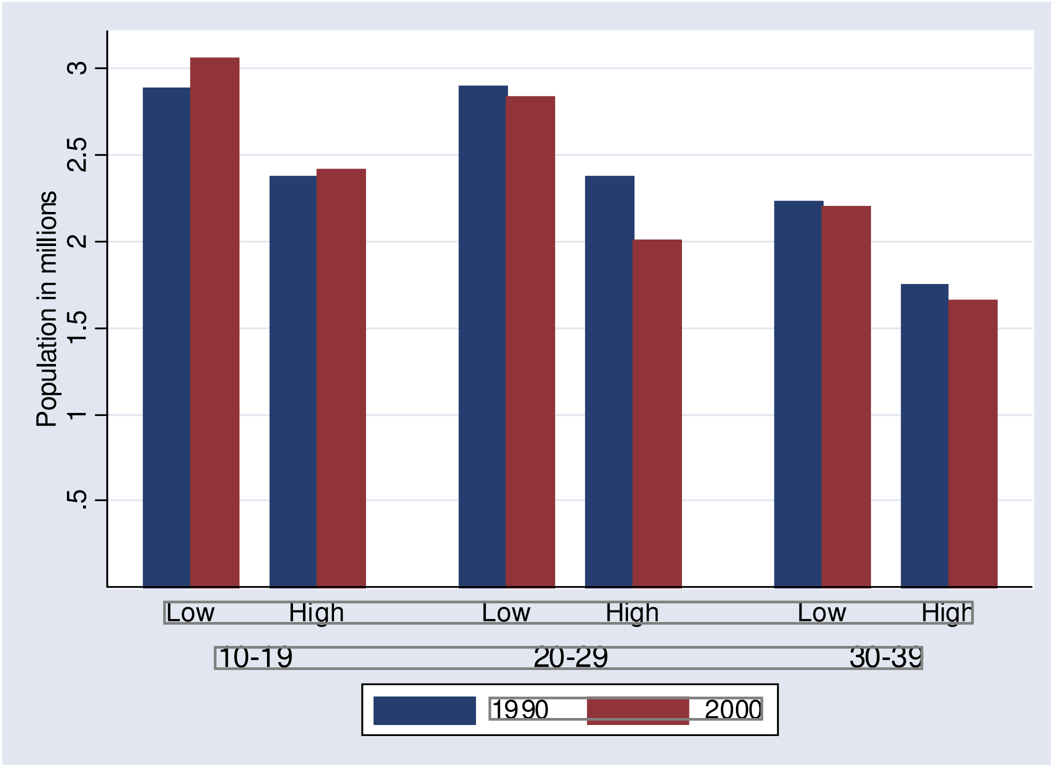


Figure 6:
Cohort Sizes for Men Born in High and Low-Migration States (Based on Age in 2000)



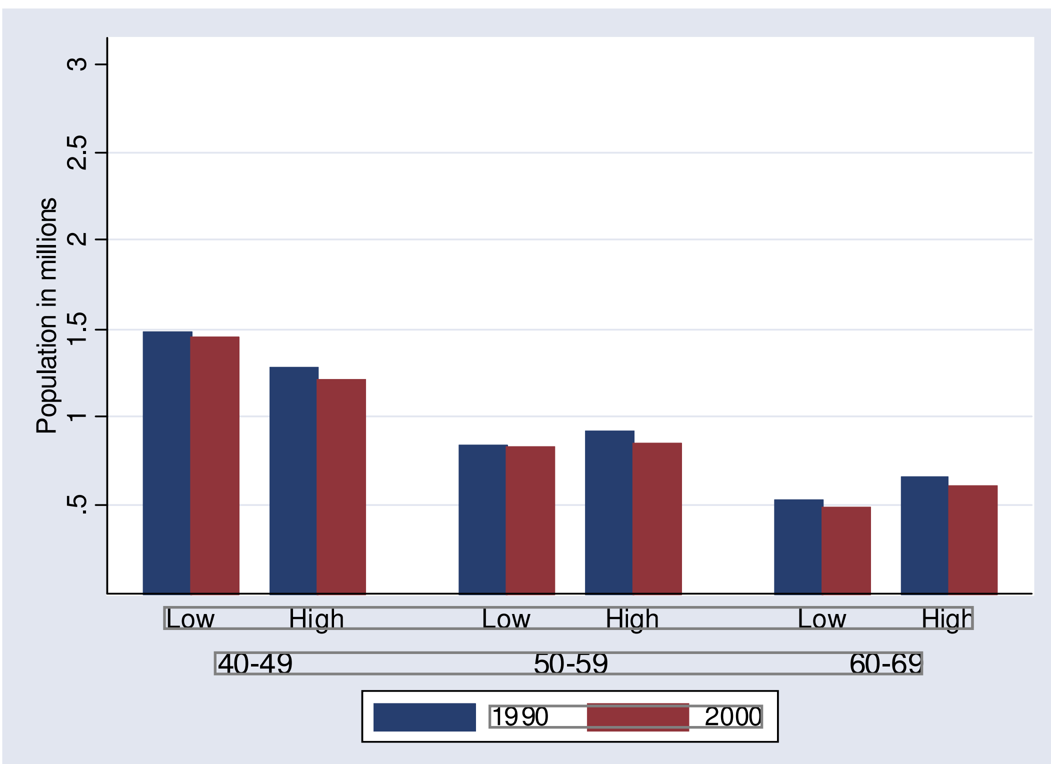


Figure 7:

Cohort Sizes for Women Born in High and Low-Migration States (Based on Age in 2000)

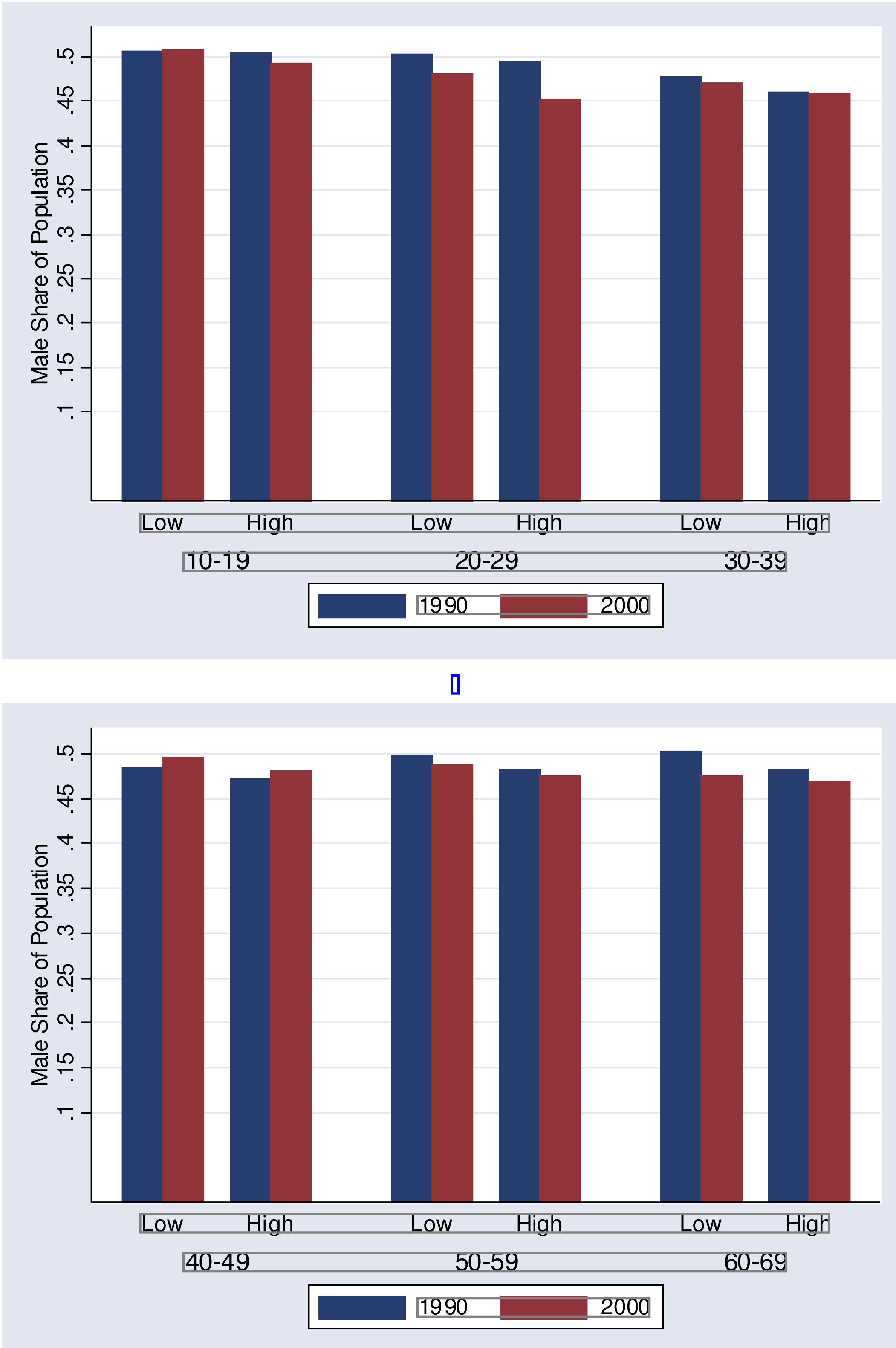
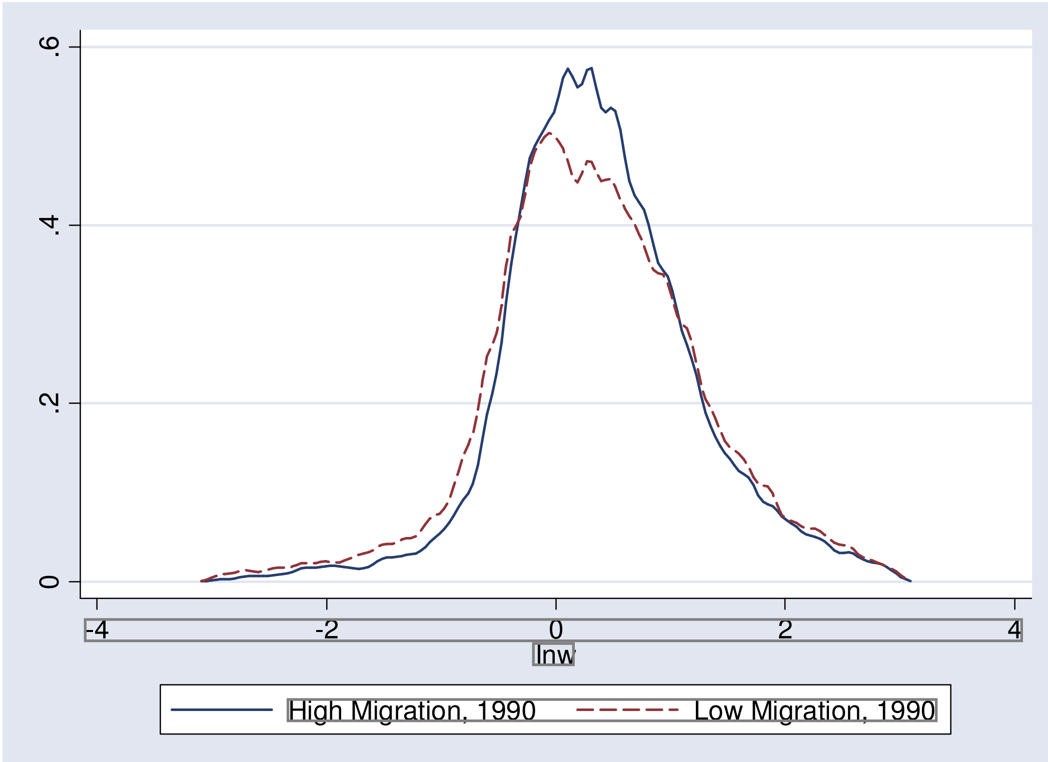


Figure 8:
Share of Men in the Population by Age Cohort in High and Low-Migration States



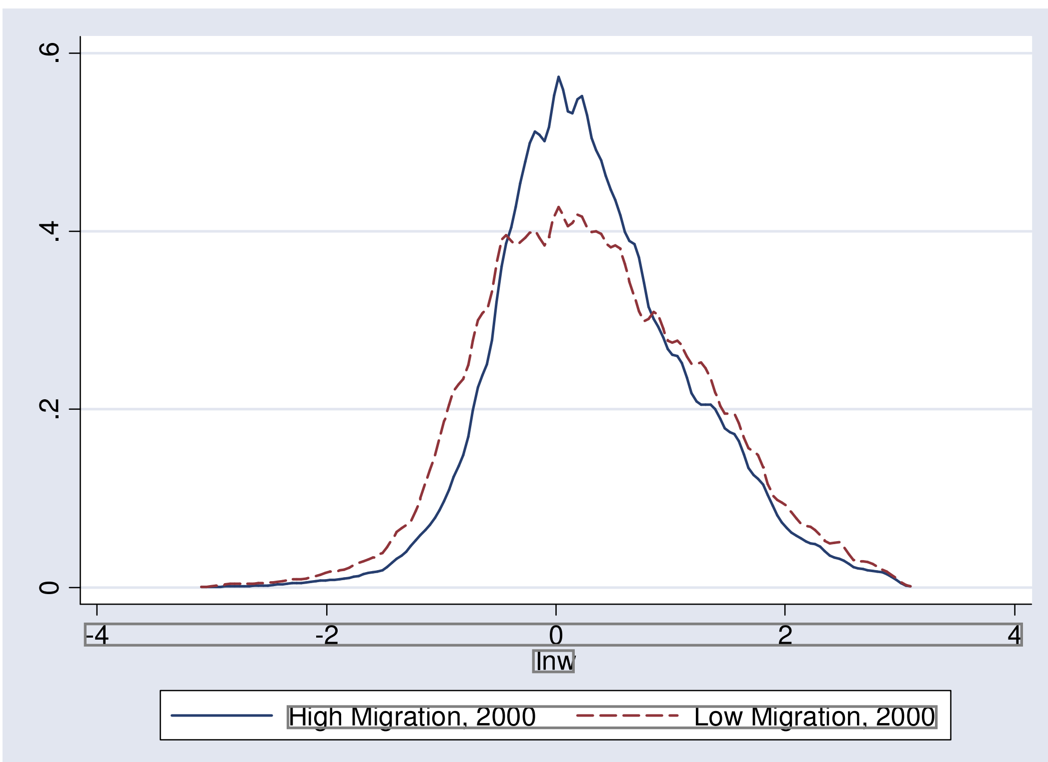
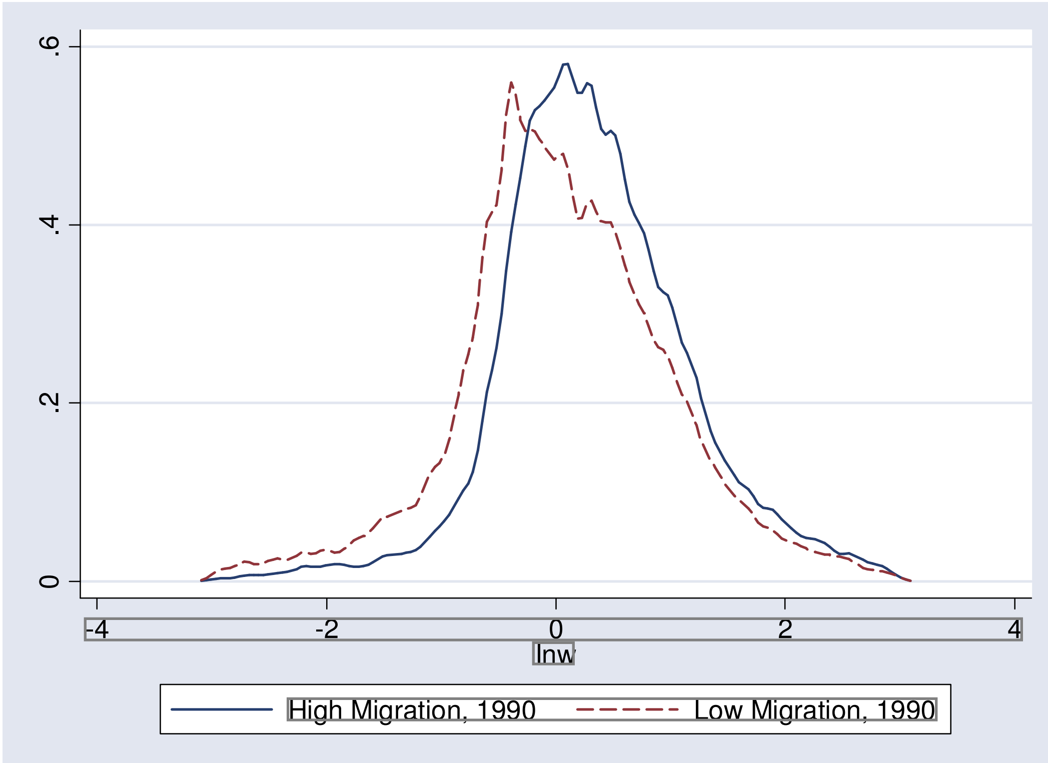


Figure 9: Kernel Densities for Average Log Hourly Wages, 1990 and 2000



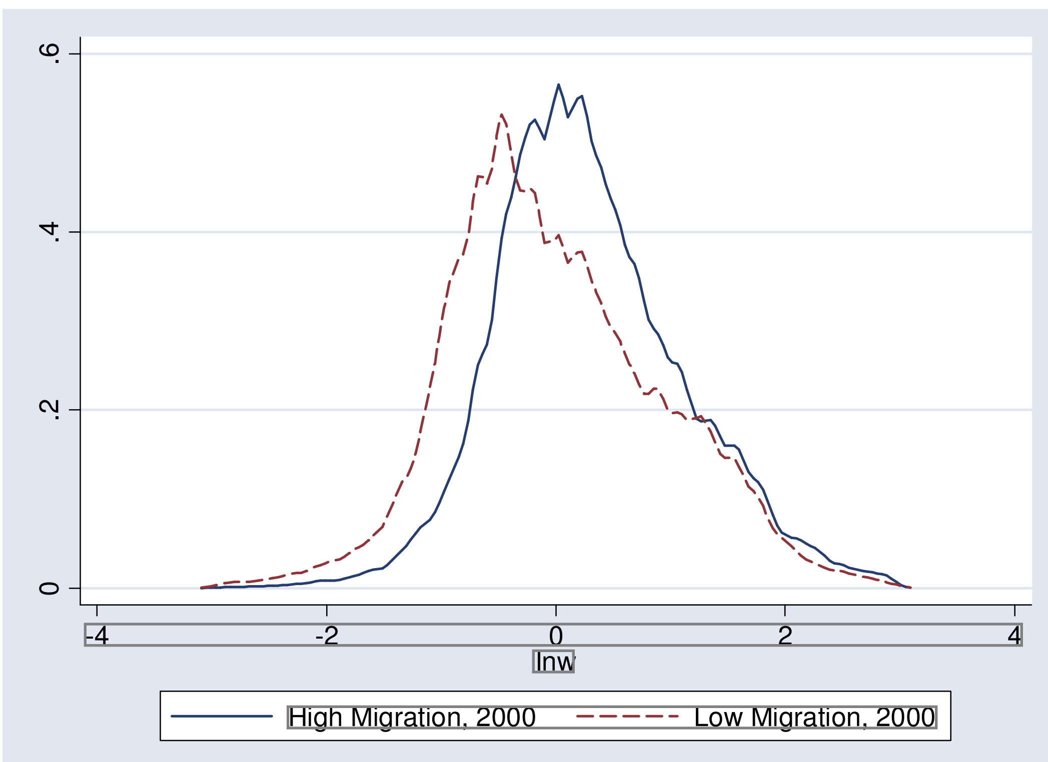
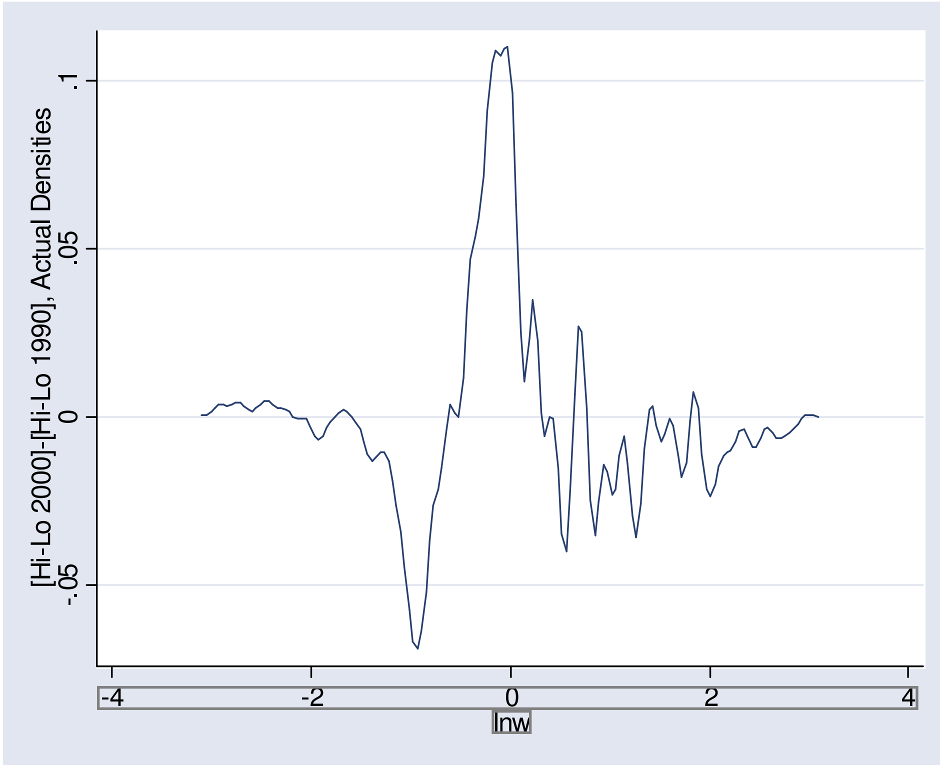
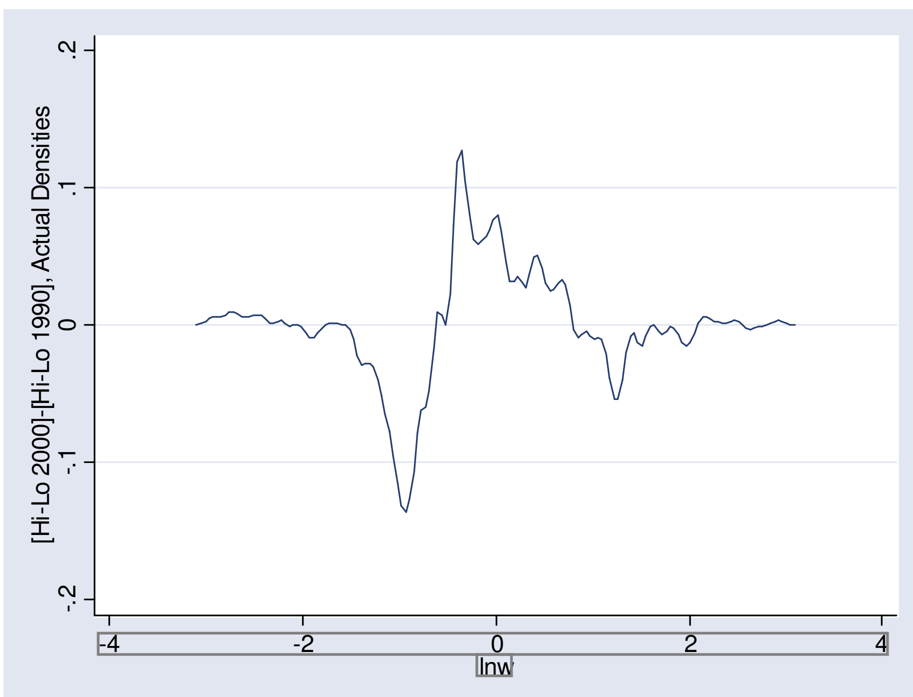


Figure 10: Kernel Densities for Log Wages, Excluding Federal District and Jalisco



(a) Full Sample



(b) Excluding the Federal District and Jalisco

Figure 11: 1990 to 2000 Change in Wage Densities for High-Migration States relative to Low-Migration States

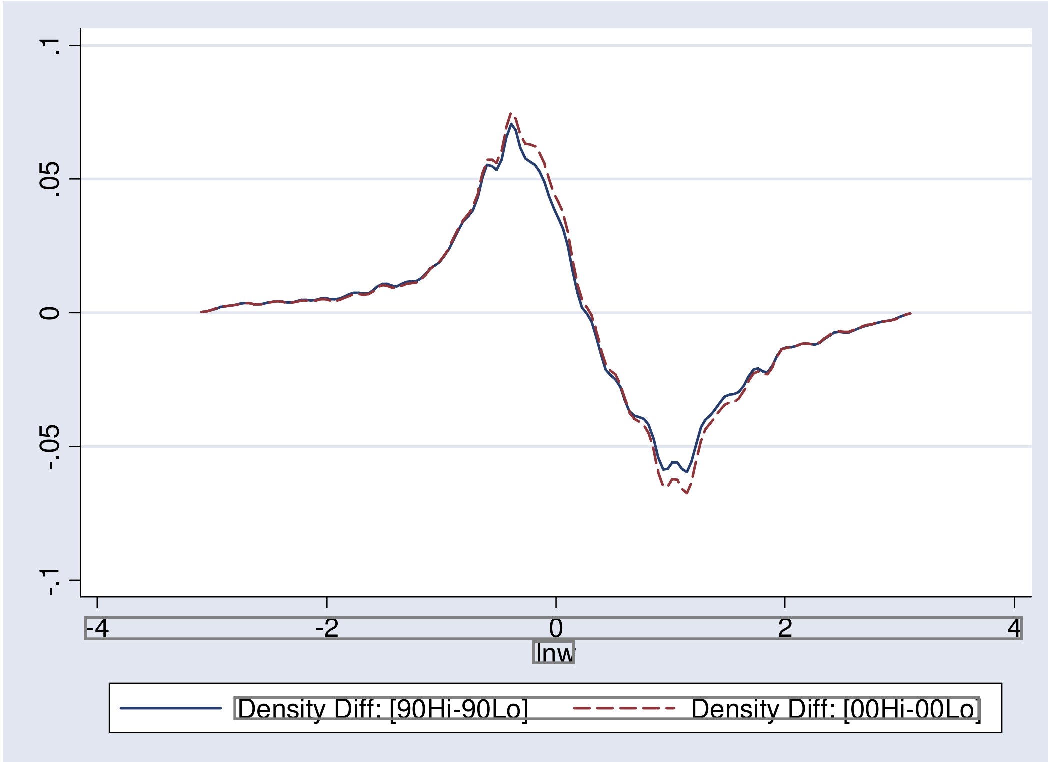


Figure 12: Differences in Counterfactual Wage Densities between High-Migration and Low-Migration States

(with returns to observable characteristics evaluated for low-migration states in 1990)

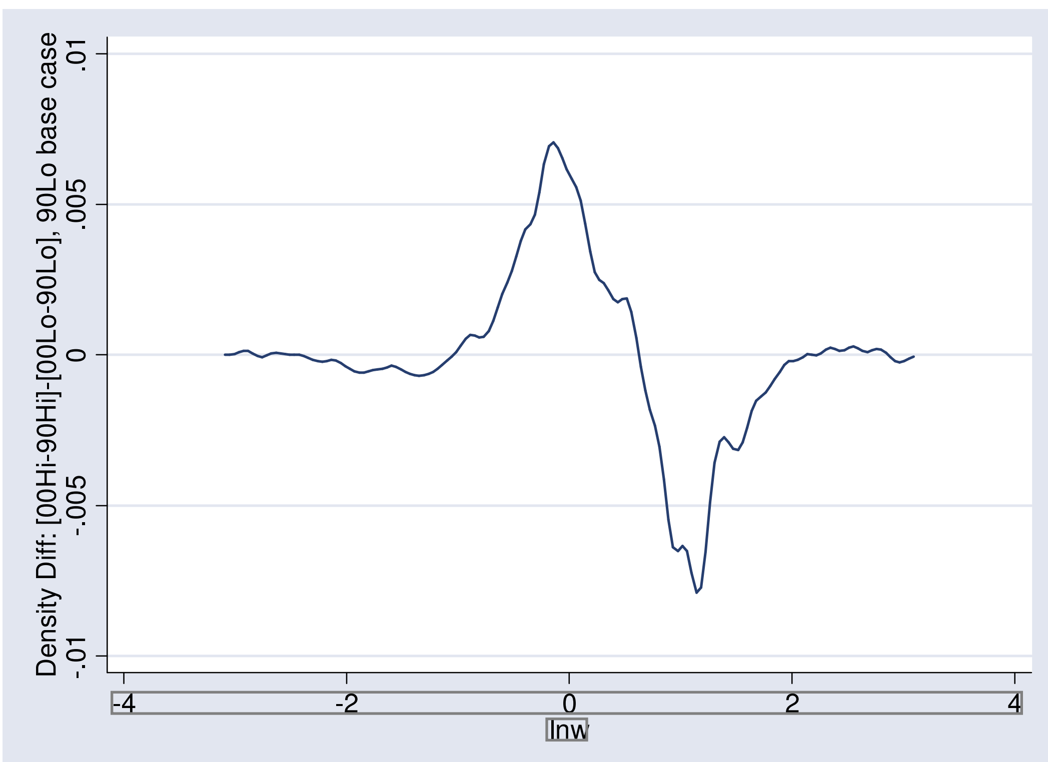


Figure 13: Double Difference in Counterfactual Wage Densities

(with returns to observable characteristics evaluated for low-migration states in 1990)

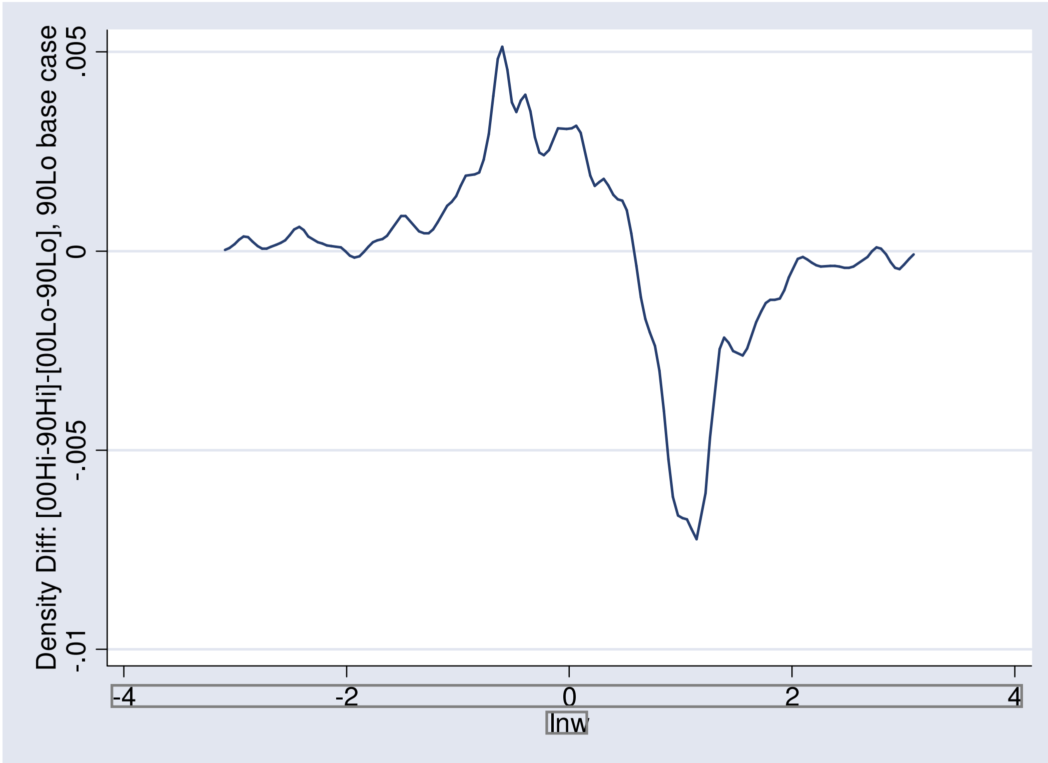


Figure 14: Double Difference in Wage Densities, Excluding Federal District and Jalisco
(with returns to observable characteristics evaluated for low-migration states in 1990)

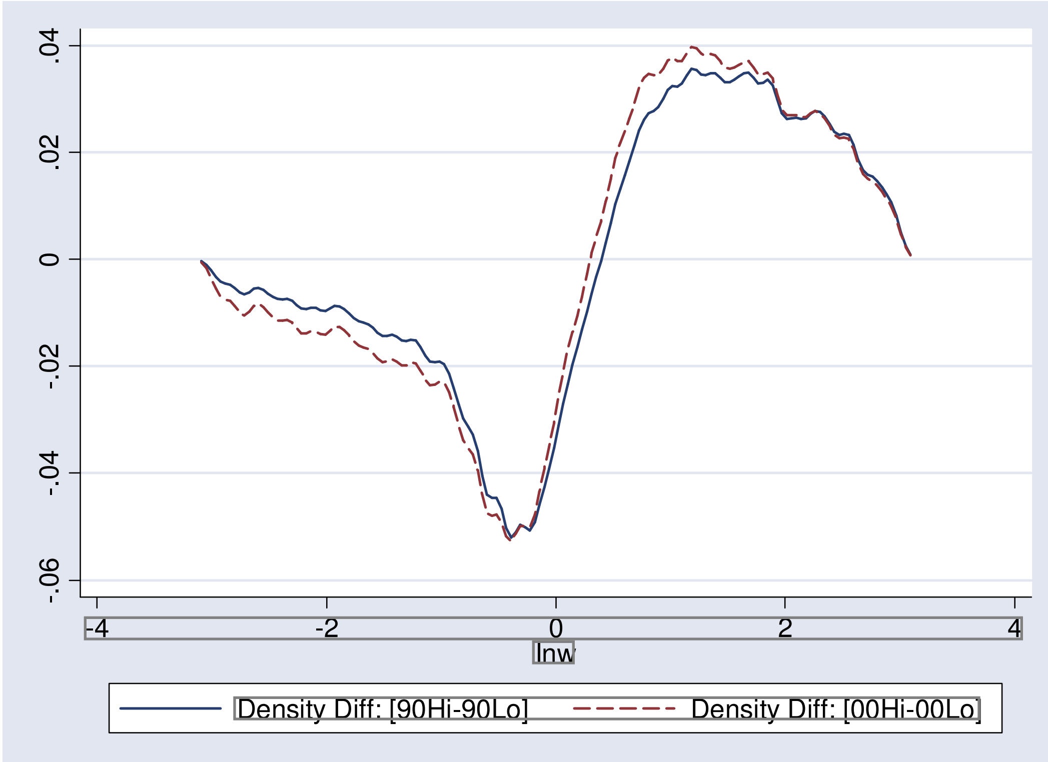


Figure 15: Differences in Counterfactual Wage Densities between High-Migration and Low-Migration States

(with distribution of observable characteristics evaluated for low-migration states in 1990)

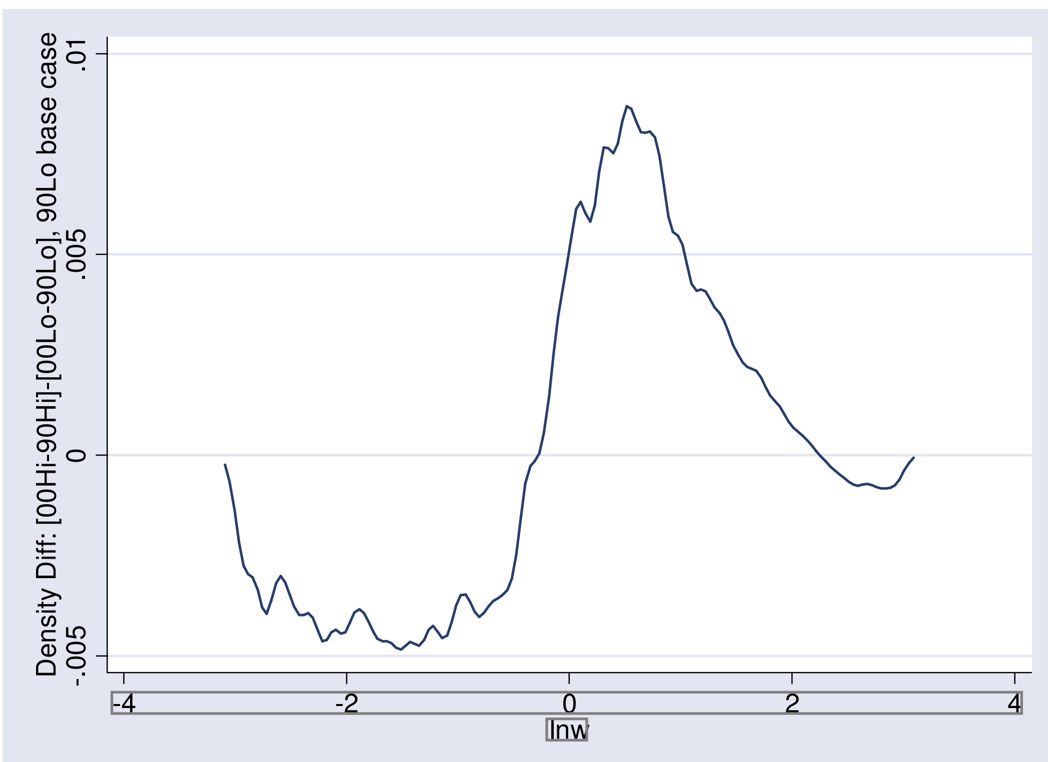


Figure 16: Double Difference in Counterfactual Wage Densities

(with distribution of observable characteristics evaluated for low-migration states in 1990)