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## **Gender Impacts of United States Immigration Policies\***

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The supply of immigrant workers from Mexico is critical to agricultural and non-agricultural sectors in the United States, and approximately half of all Mexican immigrants are females. Mexican immigrants constitute 3.5 percent of the U.S. labor force; however, the employment of both female and male immigrants from Mexico is concentrated in specific sectors. Twenty-five percent are in the service sector while twenty-nine percent are involved in production and transportation occupations (Grieco and Ray, 2004). Mexico-born persons represented an estimated 77 percent of the U.S. farm workforce in 1997-98, according to the National Agricultural Worker Survey (NAWS; U.S. Department of Labor, 2000). Female immigrants typically are employed in positions that have minimal legal status requirements, e.g., domestic services and clerical and agricultural jobs (Kanaiaupuni, 1999).

The United States implemented the 1986 Immigration Reform and Control Act (IRCA) in an effort to curtail the flow of illegal immigration. Reducing Mexico-to-U.S. migration was one of the motivations for the North American Free Trade Agreement (NAFTA). The U.S. Immigration and Naturalization Service (INS) increased enforcement along the United States-Mexico border. Mexico is a focus of all three of these policy measures, because the largest part of the U.S. immigrant labor force originates from Mexican households (U.S. Commission on Immigration Reform, 1997) and the majority of these workers (52 percent) are unauthorized.

Several studies have suggested that IRCA, NAFTA, and border enforcement policies have unintended consequences, increasing rather than reducing the number of Mexican immigrants in the U.S. Their effects on immigration are theoretically ambiguous. Furthermore, the same policy could have differential effects on female and

male immigrants. For example, increases in border control expenditures could discourage male immigrants from returning to Mexico and encourage family reunification in the U.S. However, females are less likely to cross borders illegally, and thus, increases in border controls may deter female immigration (Donato and Patterson, 2004, Orrenius, 2004). An empirical approach is needed to explore policy influences on Mexico-to-U.S. migration.

This paper exploits a unique new data set from a nationwide household survey to econometrically test the effects of IRCA, NAFTA and increased expenditures on enforcement at the U.S.-Mexico border on the gender and sector composition of immigrant labor supply from rural Mexico to the U.S. A dynamic econometric model of migrant labor flows from rural Mexico to the United States between 1980 and 2002 is estimated using retrospective migration life-history data. Recognizing that both migration dynamics and impacts of policy changes may vary by migrants' gender and sector of employment, we estimate separate models for female and male migration to farm and nonfarm jobs.

The paper has five parts. In Part 1 we discuss the historical and current policies that were designed to influence Mexican migration to the United States, elucidating the possible effects that recent policies may have on the gender and sector composition of migration. Part 2 describes the data that we will use to test our empirical model. Our econometric model is presented in Part 3, and the results of the econometric tests are presented and discussed in Part 4. Finally, we conclude with a discussion of results and avenues for future research.

### ***Historical and Present Day Migration Policies***

From 1942 to 1964 over 4.5 million Mexicans temporally worked in the United States in the agricultural sector under the Bracero Program (Durand, Massey, and Paredo, 1999, Donato and Patterson, 2004). The Bracero program was developed in the early 1940s in an effort to ease labor shortages due to World War II for agricultural producers in California and Texas (Cerruitti and Massey, 2004), but was continually reinstated even after the war had ended due to political pressure from growers. The program was finally discontinued in 1964 as labor unions and civil rights groups pressured the government to address the conditions of workers participating in this program (Durand, Massey, and Paredo, 1999, Cerruitti and Massey, 2004).

Even though pressure from labor unions and civil rights groups eventually terminated the program, the number of immigrants that worked in the agricultural sector did not diminish. The United States stopped recruiting workers explicitly for the agricultural sector but did not block the illegal entry of immigrants. Between 1964 and 1980 annual legal entry grew by 76 percent and undocumented entry rose by 42.6 percent (Durrant, internet). The number of arrests rose to almost 1.8 million in 1985, from a level of only 87,000 in 1964 (Cerruitti and Massey, 2004).

### ***Immigration Reform and Control Act***

While the number of arrests and undocumented entry of immigrant workers from Mexico rose, the U.S. experienced high rates of inflation and increases in inequality. Passage by the United States Congress of the Immigration Reform and Control Act (IRCA) in 1986 is viewed by some researchers as a response to economic downturn (Cerruitti and Massey, 2004). IRCA had three main components. First, it imposed sanctions on employers who knowingly hired illegal aliens. These penalties were meant

to discourage the hiring of unauthorized immigrants and reduce migration by dampening the employment expectations of migrants. Second, IRCA provided amnesty to illegal aliens who have lived in the U.S. continually since 1982, if they applied before 1988. This policy, called Legally Authorized Worker (LAW), legalized U.S. migration contacts for households throughout rural Mexico. Third, the Special Agricultural Worker (SAW) program legalized about 1.2 million of the 1.3 million applicants who submitted evidence of having done at least 90 days of farm work in 1985-86 as unauthorized workers. The percentage of SAWs among farm workers peaked at a third in the late 1980s, and has since fallen to about 10 percent. Concurrently with these policies, border enforcement increased along the U.S.-Mexico border to control entry of undocumented Mexican migrants (Durand, Massey, and Paredo, 1999, Cerruitti and Massey, 2004).

While the impacts of IRCA were not directed at Mexicans, its effects were more dramatic for Mexicans than any other nationality. Seventy percent of LAW amnesties and 80 percent of SAW legalizations were given to Mexican workers. Of those apprehended at the border, 95 percent are Mexicans (Cerruitti and Massey, 2004).

Employer sanctions and legalization programs have potentially counteracting effects on future migration. The LAW and SAW programs may have encouraged migration by family members of newly legalized migrants, while sending a signal to rural Mexicans that future amnesty deals might be forthcoming. Border enforcement raised the costs and risks of migrating, but it also disrupted the flow of migrants who typically returned to Mexico when the agricultural season in the U.S. was finished (Cornelius, 1990). All of these policies, therefore, may encourage or discourage migration flows.

The impact of immigration policies by gender has not been a subject of economic research. Nevertheless, the policies described above are likely to have different ramifications for male and female migrants. Agricultural workers in the Bracero program were primarily males and their legalization may encourage family-reunification migration. Cornelius (1990) argues that female migration was positively impacted by IRCA, as wives and children in Mexico crossed the border to reunite with husbands and fathers in the United States. One study estimated that 300,000 persons per year migrated illegally for family reunification, while another found that a family member legalized by IRCA increased the probability of illegal entry by a factor of seven (Durand, Massey, and Paredo, 1999).

Female immigrants typically are employed in sectors with high concentrations of unauthorized migrants but that, unlike agriculture, were not singled out by IRCA for preferential treatment (Kossoudji and Ranney, 1984). Females constitute a majority of immigrants in the informal sector and thus were at a disadvantage under LAW amnesty program rules, which required information on work history (Donato, Kanaiaupuni, and Stainback, 2001). This would tend to limit the positive influence of IRCA's amnesty programs on female migration. On the other hand, female migrants may have been insulated from effects of employer sanctions, which were directed at formal-sector employers. A high concentration of females in specific sectors also has implications for the impact of migrant networks on female migration (discussed below).

### ***North American Free Trade Agreement***

The second policy effect we evaluate is the North American Free Trade Agreement (NAFTA), which was only partially motivated by migration concerns but was

expected to have far-reaching impacts on migration flows. NAFTA, by opening up new export markets, was expected to stimulate employment in Mexico's manufacturing and agricultural export sectors, offering local alternatives to migration. However, it also removed protection for producers of importables in Mexico, with potentially adverse effects on employment. The main impact of NAFTA in rural areas was the phase out of price supports for eleven agricultural field crops and the processing, storing, and marketing activities of the state-run National Company of Popular Subsistence (CONASUPO, Yunez and Barceinas: 2004). Under the PROCEDE<sup>1</sup> program, communally owned land was privatized. Credit subsidies offered by the Mexican National Agricultural Bank, BANRURAL were reduced (White, Salas and Gammage, 2003). Mexico also dismantled their support for import substitution model, which was generally expected to have a greater impact on the urban than rural sector of the economy (White, Salas, and Gammage, 2003).

In the long run, proponents argued, trade liberalization policies will open markets in Mexico, encouraging export of goods, which would then decrease migration pressures.<sup>2</sup> That is, in the long run, trade and migration may be substitutes. After Mexico joined NAFTA, Mexican agricultural exports to the United States did indeed increase. However, in the short run, NAFTA could displace rural workers as production shifts from importables to exportables and labor markets adjust to new market realities. Displacement of workers was expected to be a result of dismantling agrarian policies as

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<sup>1</sup> The Certification Program of Ejido Rights and Urban Property Títulos (PROCEDE) was Article 27 of the New Agrarian Law. PROCEDE was meant to regulate individual rights and use of both agricultural land and land that was used for homes and community use.

<sup>2</sup> Mexican's President Carlos Salinas de Gortari and U.S. Presidents George Bush and Bill Clinton argued this to gain support for NAFTA.



required by NAFTA. For rural workers displaced by policies related to NAFTA, migration may have been a vehicle to overcome short term financial shocks.

Some models predicted that employment in Mexico would rise by two percent because of foreign investment (Martin, 2004). Computable general equilibrium models predicted that the increase in labor demand generated by exports to the United States would be insufficient to absorb agricultural workers displaced from agricultural activities that had been protected by government policies prior to NAFTA (Levy and van Wijnberger: 1992, and Robinson *et.al.*: 1991). In 2000, with a GDP growth rate of 6.6 percent, Mexico created only 525,000 jobs, while the working age population grew by twice this number (Papademetriou, 2003). A recent study by Martin (2004) cited only ten percent of total migration could be attributed to NAFTA policies. This, together with the potentially conflicting effects of NAFTA on migration, raises questions about how much role NAFTA had in shaping migration after 1994.

The migration effects of NAFTA, like those of IRCA, are likely to be gender specific. Most farmers and landowners in Mexico are males. Policies such as privatization and decreases in price supports thus could disproportionately encourage migration by males. Dismantling of the national agricultural bank could encourage migration by males, in order to overcome credit constraints. The growth of *maquiladoras*, labor-intensive manufacturing operation with a large female workforce along the U.S.-Mexico border, could increase the incidence of internal migration and discourage international migration by females. If woman's employment opportunities in rural areas are limited, we would expect to find less of an impact of NAFTA on female than on male migration to the United States.

### ***Border Control***

The third policy that we evaluate is the increase in enforcement along the U.S. - Mexico border. While IRCA increased border controls, in 1993 enforcement was increased sharply in high traffic areas, especially along the California and Texas state borders (Cerruitti and Massey, 2004). Between 1994 and 1999 the number of “line hours” that the border was monitored increased by 300 percent and the number of border officers increased by seventy-five percent. The budget for border enforcement doubled between 1993 and 1997 (Orrenius, 2004). In the 1990s there were four major crack downs— “Hold the Line,” “Operation Gatekeeper,” “Operation Rio Grande,” and “Safeguard”—intended to curtail unauthorized immigration along the easiest routes of entry (Cerruitti and Massey, 2004).

The increase in border enforcement has counteracting effects. Vigilant border enforcement and crackdowns in certain states ultimately discouraged unauthorized immigrants from returning to their home countries, and stays in the United States were extended. During this time period there was a 75-percent decrease in border apprehensions, suggesting that migrants changed the location of where they crossed the border (Orrenius, 2004). Some observers attribute the increase in deaths along the border to changing patterns of entry in response to increased enforcement at traditional border crossings (Orrenius, 2004), while others have suggested that migrants and border patrols partake in a cat and mouse game. The border control catches the migrant at the border and releases him back into Mexico where he will try again and likely succeed (Donato and Patterson, 2004, Kossudji, 1992).

Increased border enforcement could have two effects on female migrants. First, several studies have shown that women are more risk averse to crossing borders illegally

and without documents (Donato and Patterson, 2004). Legal documents are generally not available to new migrants from rural Mexico, and smugglers charge high fees for aiding their clients obtain “documented” entry (that is, entry at U.S. immigration check points with falsified documents). Therefore, the increase in border enforcement could disproportionately increase the costs of unauthorized entry for new female labor migrants. However, it also may disproportionately discourage unauthorized female migrants from returning to Mexico (and having to repeat the border entry) once they are in the United States.

All three policies’ possible impacts on migration are complex and theoretically ambiguous and can only be determined empirically. In order to isolate the effects of policy changes on migration we need to control for the plethora of individual, household and community variables influencing migration decisions over time, as well as macroeconomic shocks that may have affected migration.

### ***Impacts of Migration Networks***

A plethora of studies have cited the importance of migration networks in determining the propensity to migrate for an individual (Boyd, 1989, Massey et. al., 1993, Menjivar, 1995, Munshi, 2003). Networks can be defined as the number of previous migrants residing in the United States. They provide information on housing, employment, and survival skills to newly arrived migrants (Davis and Winters, 2000). The availability of networks decreases migration costs, by providing would-be migrants with critical information about border crossing and employment. Past migrants also may assist in financing the costs of future migrants. In our analysis, migration networks or

contacts with employed migrants in the United States are represented by lagged stocks of employed villagers in the United States.

There are compelling reasons to expect the effects of networks to depend on the gender of the migrants. If the economic value of networks stems from the provision of job information that is sector specific, the large sectoral concentration of unauthorized female workers may limit the influence of male migrant networks on female migration. Past studies have shown that women do not receive the same benefits from migration networks as male migrants and may seek out information and assistance only from previous female migrants (Davis and Winters, 2000). Therefore, the decision to migrate and the choice of employment for female migrants is a function of the number of previous female migrants and the sector in which these female migrants work (Davis and Winters, 2000). In order to evaluate the gender specificity of network effects, we control separately for the lagged village stocks of males and females employed in the U.S.

### ***Community Impacts***

Community characteristics are also essential in determining the propensity to migrate, since many sending areas have a long history of migration. Although the Bracero Program's influence was felt throughout Mexico, it was concentrated in the west-central states. We would thus expect communities in West-Central Mexico to have different migration rates than other communities. Furthermore, community characteristics such as land holdings, agricultural production, and employment opportunities will affect migration patterns. We control for sending-area characteristics and community level heterogeneity by using fixed effects.

### ***Economic Impacts***

Macroeconomic shocks have been identified by past studies as influencing Mexico-to-U.S. migration (e.g., see Massey and Espinosa, 1997). The macroeconomic variables that we include are changes in the peso-dollar exchange rate and shifts in per-capita GDP for both countries. Mexican currency devaluations could encourage migration by increasing the purchasing power of remittances in Mexico. An increase in GDP in the U.S. may reflect increased availability of jobs, raising the expected economic benefits for new migrants (Todaro, 1969). The impact of an increase in the Mexican GDP is more ambiguous. On one hand, it could indicate employment opportunities at home, which discourage migration. Alternatively, income growth in the home country may enable households to overcome financial constraints on migration, itself (Schiff, 1996). Our econometric analysis controls explicitly for these macroeconomic variables in order to isolate the impacts of policies on migration flows.

### ***Data***

The data used to estimate the model are from a nationwide rural household survey carried out jointly by the University of California, Davis, and El Colegio de Mexico in Mexico City. The Mexico National Rural Household Survey (*Encuesta Nacional a Hogares Rurales de Mexico*, or ENHRUM) provides retrospective data on migration by individuals from a sample of rural households that is both nationally and regionally representative (see <http://precesam.colmex.mx>). Past studies of Mexican labor supply to the U.S. employment sectors used proxies including border apprehensions (e.g., Torok and Huffman, 1986) or data from surveys of small numbers of villages. Usually surveys have not collected migration flows over extended periods of times and thus are unable to

evaluate if policies have a long term impact on the dynamics and trends of migration. We hope that our dataset will fill this lacuna in the literature.

The survey was carried out in January and February 2003 in all of Mexico's five census regions (See Figure 1).<sup>3</sup> INEGI (*Instituto Nacional de Estadística, Geografía e Informática*), Mexico's national census office, designed the sampling frame to provide a statistically reliable characterization of Mexico's population living in rural areas, defined by the Mexican government as communities with fewer than 2,500 inhabitants. For reasons of cost and tractability, individuals in hamlets or disperse populations with fewer than 500 inhabitants were not included in the survey. The survey was designed to be representative both nationally and regionally. The result is a sample of 1,760 households from 80 villages that is representative of more than 80 percent of the population that the Mexican census office considers to be rural. Since this data set is nationally representative of the rural sector and has 23 years of observation, we can evaluate how policies have impacted the long time trend of migration, both male and female, throughout rural Mexico.

From each household the ENHRUM survey assembled complete migration histories from 1980 through 2002 for (a) the household head, (b) the spouse of the head, (c) all individuals who lived in the household 3 months or more in 2002, and (d) a random sample of sons and daughters of either the head or his/her spouse who lived outside the household longer than 3 months in 2002. The migration histories included the state where individuals worked and their employment sector, agriculture or non-

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<sup>3</sup> Mexico was divided into 5 regions, reflecting INEGI's standard regionalization of the country: Center, South-Southeast, Center-West, Northwest, and Northeast. One of these 5 regions, the West-Central is the focus of Mexico Migration Project (MMP) surveys (Population Studies Center, University of Pennsylvania, Philadelphia (producer and distributor), [www.pop.upenn.edu/mexmig/welcome.html](http://www.pop.upenn.edu/mexmig/welcome.html)). The MMP surveyed a random sample of households within communities, but the sample of MMP communities is not random.

agricultural. The data allow us to calculate the share of each village's population that was employed in the U.S. in each year from 1980 through 2002, and also to delineate migrants by U.S. employment sector and gender.

To construct migration histories, individuals were asked to recall employment information from 1980 through 2002. Individuals may be unable to remember their employment history for 22 years; however, when employment is coupled with a life event such as international migration, there is a smaller likelihood that data will be misreported. A study by Smith and Thomas (2003) showed that when respondents are asked to recall information linked to salient events, such as marriage or birth of a child, the misreporting is insignificant. Also, when asked to recall labor or migration histories, individuals reported more accurately moves that either involved a long distance or an extended stay.

### ***Econometric Methodology***

The dependent variables ( $M_{jsgt}$ ) in our analysis are defined as the percentage of village  $j$  labor employed by U.S. sector  $s$  ( $n$  = non-agricultural,  $a$  = agricultural), disaggregated by gender ( $m$  = male,  $f$  = female) at time  $t$ . The village share of migrant labor is our dependent variable because our goal is to evaluate whether the overall flow of migration from rural Mexico was affected by the three policies, and whether policy impacts differed by gender.

The first model is intended to capture the basic dynamics of migration to two U.S. sectors, agricultural and non-agricultural, for males and females. The share of male or female village population observed in either agricultural or non-agricultural jobs at time  $t$ ,

$M_{jsgt}$ , is regressed on the same share lagged one year ( $M_{jsgt-1}$ ) and a time trend ( $t$ ), controlling for a vector of village fixed effects,  $\alpha_j$ :<sup>4</sup>

$$M_{jsgt} = \alpha_j + \gamma t + \delta_1 M_{jsgt-1} + u_{jt} \quad (1)$$

Essentially, equation (1) estimates the dynamic nature of employed migration over time and allows us to evaluate the role of networks and the inertia of employed migration overtime. Village fixed effects,  $\alpha_j$ , are used in order to control for community level dynamics in the migration trend, since each village can have its own history and dynamics with respect to migration. Therefore, all villages have their own time trend and the village effect can be separated from the impact of migration history and policy effects. Using a fixed effects model isolates the effect of the time trend in the independent variable  $t$  and the influence of networks and inertia in the lagged migration share.

This model is estimated using the standard least square dummy variable (LSDV). Although using LSDV will have a downward bias on  $\delta$ , this bias diminishes as the number of observations in the time dimension ( $T$ ) increases (Judson and Owen, 1999). Judson and Owen show that the bias becomes negligible as  $T$  approaches 30. In our dataset  $T$  equals 22, which indicates that there will be some bias, but it will be small. Judson and Owen also conclude that when  $T$  is greater than 20 the bias on other variables in the equation is negligible, which is important in estimating impacts of policy variables on migration flows.

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<sup>4</sup> We use the percentage rather than the sum of villagers who migrated because of our concern that the size of village populations in the synthetic cohorts created using retrospective data is biased downward as one goes back in time, as individuals are removed from the population due to death (and thus are not available to be counted in 2003).



In the second model we add the lagged stock of female (male) migration in the same and different employment sector to evaluate whether networks are gender and employment-sector specific:

$$M_{jsgt} = \alpha_j + \gamma t + \delta_1 M_{jamt-1} + \delta_2 M_{jaft-1} + \delta_3 M_{jnmt-1} + \delta_4 M_{jnft-1} + u''_{jt} \quad (2)$$

In the final model we add three policy variables: dummy variables for IRCA (1 for all time periods beginning in 1986, the year of IRCA's implementation) and NAFTA (1 beginning in 1994, 0 before); and the percentage change in border enforcement expenditures ( $\Delta BE_t$ ). We also include the three macroeconomic variables: the percentage change between time t-1 and t in the peso-dollar exchange rate ( $\Delta ER_t$ ) and the US and Mexican GDP ( $\Delta USGDP_t, \Delta MGDP_t$ ):

$$M_{jsgt} = \alpha_j + \gamma t + \delta_1 M_{jaft-1} + \delta_2 M_{jamt-1} + \delta_3 M_{jnft-1} + \delta_4 M_{jnmt-1} + \beta_1 IRCA_t + \beta_2 NAFTA_{it} + \beta_3 \Delta BE_t + \theta_1 \Delta ER_t + \theta_2 \Delta USGDP_t + \theta_3 \Delta MGDP_t + u''_{jt} \quad (3)$$

While other methods may be used to evaluate the impact of NAFTA and IRCA (e.g., trade flows or changes in real wages in Mexico and the U.S.), these variables are not exogenous to migration. Policy shocks have an exogenous impact on village migration shares, making it possible to evaluate the long run impact on the rate and dynamics of labor migration. The vector of fixed effects,  $\alpha_j$ ;  $\delta$ ;  $\beta_k, k = 1, \dots, 3$ ; and  $\theta_l, l = 1, \dots, 3$  are parameters to be estimated, and  $u_{jt}$ ,  $u'_{jt}$ , and  $u''_{jt}$  are stochastic errors. Under the null hypothesis of no policy impacts on migration the coefficients  $\beta_k = 0 \forall k$ .

### ***Econometric Results***

The data set for this sample provides information on migration from 80 villages over 23 years (from 1980 to 2002); however, one year (80 observations) was lost as a result of lagged right-hand-side variables. Thus, the total sample size is 1759. In all the models the sample was restricted to individuals 12 years of age or older. This was done so that only individuals that were of working age were included in the model; the study attempts to analyze policy variables on labor migration.

Descriptive statistics show striking differences between male and female migration rates and employment sectors (Table 1). Village migrants, both males and females, are overwhelmingly employed in the non-agricultural sector. On average, approximately 5 percent of male villagers but only 1 percent of female villagers are employed in the non-agricultural sector in the United States. Female migrants have a very small presence in the agricultural sector (0.14 percent of female villagers, on average, were observed in U.S. farm jobs over the 22-year period), while 2 percent of males are employed in this sector.

### ***Results for Migrants in the Agricultural Sector***

Table 2 reports econometric results for the share of female village populations employed in U.S. agricultural jobs. Column 1 of Table 2 shows results from the model that only controls for the lagged stock of village female agricultural migration. The coefficient on lagged migration is significant and positive, indicating that previous female migrants in the same employment sector significantly impact the current participation rate. When the lagged stocks of migrants, disaggregated by gender and sector of employment, are included in the analysis (Column 2), only the coefficient on the lagged share of female villagers in non-agricultural jobs is significant. The coefficient on this

variable is negative, suggesting competing network effects between nonfarm and farm jobs for female migrants. That is, other things being equal, an increase in village female population employed in non-agricultural jobs decreases the future share of female villagers in farm jobs.

When the macroeconomic and policy variables are included in the model, our results indicate that a favorable Mexican economy has a positive effect on female migration to the U.S. agricultural sector (final column, Table 2). This finding is consistent with Schiff (1996) and others who argue that income growth loosens liquidity constraints on future migration. Growth in Mexico's GDP, other things being the same, appears to enable rural households to financing the border crossing and other migration costs for female workers. A one percentage point change in the exchange rate has a positive and significant effect on the number of female migrants in the agricultural sector. The sign on changes in exchange rates is of the expected sign, because as the peso devalues the value of a dollar sent home by migrants increases in peso terms. However, none of these policy variables is statistically significant for female migration to U.S. farm jobs.

In contrast to the results for female agricultural migrants, there is evidence of significant network effects for male migrants to U.S. agriculture (Table 3). The coefficient on lagged male migration in agricultural labor is significant and positive, indicating that previous employment of males in agricultural jobs increases future male migration to this same sector. The coefficients on the lagged stock of female migration in agricultural employment and male migration in the non-agricultural sector are also significant (Column 2, Table 3). A surprising result is that an increase in the share of

female villagers in U.S. agricultural jobs is associated with a decrease in the male village share in U.S. agriculture. That is, the cross-gender network effect is negative for males in agriculture. However, networks for males are not as sector-specific as they are for females. The lagged rate of male participation in U.S. non-agricultural jobs has a positive effect on future male migration to agricultural jobs. This may suggest that both farm and nonfarm-based male networks are helpful to new male migrants seeking employment in U.S. agriculture.

Similar to the results for female agricultural migrants, currency devaluations and Mexican GDP growth have positive effects on male agricultural migration, but the effects are much larger for males than for females (last column, Table 3). The magnitudes of the coefficients on these macroeconomic variables are approximately six times larger for males than for females in agriculture. One policy variable is statistically significant for male agricultural migration: changes in border control expenditures have a positive and significant effect on male agricultural migration participation. This finding provides support for previous studies suggesting that increased border control decreased the cyclical return of migrants and encouraged longer U.S. stays. Furthermore, the finding that this variable was not significant for female agricultural labor migration suggests that, in this sector, female migrants are deterred by border controls than male migrants.

### ***Results for Migrants in the Non-Agricultural Sector***

Table 4 presents findings of our econometric analysis of female migration to U.S. nonfarm jobs. Our results suggest a clear sector-specific network effect for female migrants outside of agriculture. Neither past male nor past female migration to farm jobs significantly affects future migration by females to nonfarm jobs. This stands in contrast

to the finding presented in Table 2 that the lagged share of village females in non-agricultural jobs reduces the future share in farm jobs. The coefficient on lagged male participation in non-agricultural employment is significant and positive. This result suggests that same-sector network effects exist for both genders. However, the effect of lagged female nonfarm migration (0.90) is far greater than the effect of lagged male nonfarm migration (0.02). The gender composition of the migration network matters.

Contrary to the results for female migration in the agricultural sector, we found that immigration policies have significant but mixed effects on female migration to the non-agricultural sector (final column, Table 4). Both NAFTA and IRCA negatively affect the number of females employed in the non-agricultural sector, while changes in border enforcement have a positive effect. The supply of female village labor in the non-agricultural sector decreases when IRCA is implemented in 1986 and again when the implementation of NAFTA initiates in 1994. A negative coefficient on female villager participation in non-agricultural employment implies that NAFTA released migration pressures and opened up new markets in Mexico, possibly creating internal migration work opportunities for women (e.g., in *maquiladoras*, or labor-intensive manufacturing plants, near the Mexico-U.S. border). A negative coefficient for IRCA indicates that female migration was more sensitive to the threat of employer sanctions and/or less stimulated by amnesty programs, as suggested by several studies. While the effects of NAFTA and IRCA are negative, that of border enforcement expenditures is positive, consistent with the argument that increased border control discouraged return migration while encouraging longer stays by female migrants in the U.S. Among macroeconomic

variables, only the percentage change in U.S. GDP is significant. Increases in U.S. GDP are associated with an increase in the female village share in U.S. nonfarm jobs.

Network effects for male migration to non-farm jobs are also sector- and gender-specific (Table 5). Past migration by males to nonfarm jobs significantly increases future male migration to those jobs. When the other three network variables are included, only one—the lagged stock of female migrants in non-agricultural employment—is significant (Column 2, Table 5). There is no evidence that males or females employed in agriculture constitute a significant assistance network for new male migrants in the non-agricultural sector. The finding that male agricultural migration has no impact on future male migration to nonfarm jobs is in contrast to the cross-sector effect reported in Table 3 (Column 2). Male migrants employed in the non-agricultural sector appear to constitute a network for males migrating to agricultural jobs, but not vice-versa.

As for females in the non-agricultural sector, all of the policy variables are significant for male migration to nonfarm jobs (last column, Table 5). NAFTA and IRCA decrease participation in migration in the non-agricultural sector, and changes in border control expenditures have the opposite effect. While these results are similar in sign to the results for female nonfarm migration, the magnitude of the effect is larger for males. The NAFTA coefficient is twice as large for males as for females in absolute value (-0.007 versus -0.003). It may be that NAFTA favored expansion of employment in Mexico for males more than for female villagers. The effect of border expenditures is also twice as large for males (0.008) as for females (0.004). The net effect of border enforcement on the share of villagers in the U.S. depends on both the deterrent effect on new border crossings and the deterrent effect on return migration. The larger positive

effect on male nonfarm migration could suggest that males who are in the U.S. are less likely to return to Mexico and risk being captured if they attempt reentry. More plausibly, perhaps, it may indicate, as suggested earlier, that although border enforcement discourages return migration by women, new female migration is more sensitive to risky border crossings than are new male migrants. The coefficient on IRCA is similar for the two genders, -.004 and -.003 for males and females, respectively. The effects of IRCA would appear to be more gender-neutral than those of NAFTA and border enforcement.

### *Regional effects*

There are sharp differences in migration experience among the five rural regions of Mexico, which may influence the impact of policy variables.<sup>5</sup> For example, West-Central Mexico traditionally has been the largest sender of migrants to the United States, with far and away the highest current participation in international migration and the most international migration experience. In this region, nearly 28% of all households have at least one family member in the United States, and the average household had .62 U.S. migrants. By contrast, 7.5% of households in the South-Southeast have at least one family member in the U.S., with an average of 0.10 U.S. migrants per household.

When the same models were analyzed by region, there were no statistically significant changes in the signs of our policy and network variables. However, certain variables were significant in some regions but not in others. Selected results of the analysis are presented in Tables 6 and 7. Only differences in the policy variables will be discussed here.

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<sup>5</sup> We also examined the models for impacts of age, since our sample become progressively younger as we move back in time. We examined two age cohorts, individuals between 12 and 80 and 12 and 65, in both cases the only statistically significant changes were for males participating in the agricultural sector. The NAFTA dummy variable was significant and negative.

Policy variables presented statistically significant differences across regions only for agricultural migration. In the econometric results for agricultural participation rates for males and females, the NAFTA dummy variable was negative in the Northwest Region (Tables 6 and 7). However, the effect on female agricultural migration rates is small in magnitude (-.001) compared with the effect on male participation rates (-.006). The South-Southeast region regression produced a significant negative coefficient on the NAFTA dummy variable, similar in magnitude to the Northwest region.

For female agricultural migration participation rates, changes in border control expenditures have differing signs in the Central and the West Central regions. In the Central region an increase in border control decreases migration rates, while in the West Central region it increases participation rates among females in the agricultural sector. The West-Central region has a long history of migration, and increases in border control expenditures in this area could have encouraged family reunification.

### ***Discussion***

The objective of this paper is to examine gender and sector dynamics of Mexico-to-U.S. migration and to explore whether NAFTA, IRCA and border enforcement policies impacted the propensity to migrate differently for female and male migrants employed in agricultural and non-agricultural jobs. By controlling for community characteristics, networks, and macroeconomic variables, the impact of the three policies was isolated. We found that the impacts of these policies are both gender- and employment sector-specific.

Overall, the three policies analyzed have no impact on male or female migration to the U.S. agricultural sector. NAFTA significantly affects U.S. farm labor migration



only from two regions of Mexico (the Central and West-Central), and only for males. This is not surprising when one considers that it is primarily male migrants who are employed in the agricultural sector, and NAFTA had a potentially bigger impact on male than on female agricultural labor supply.

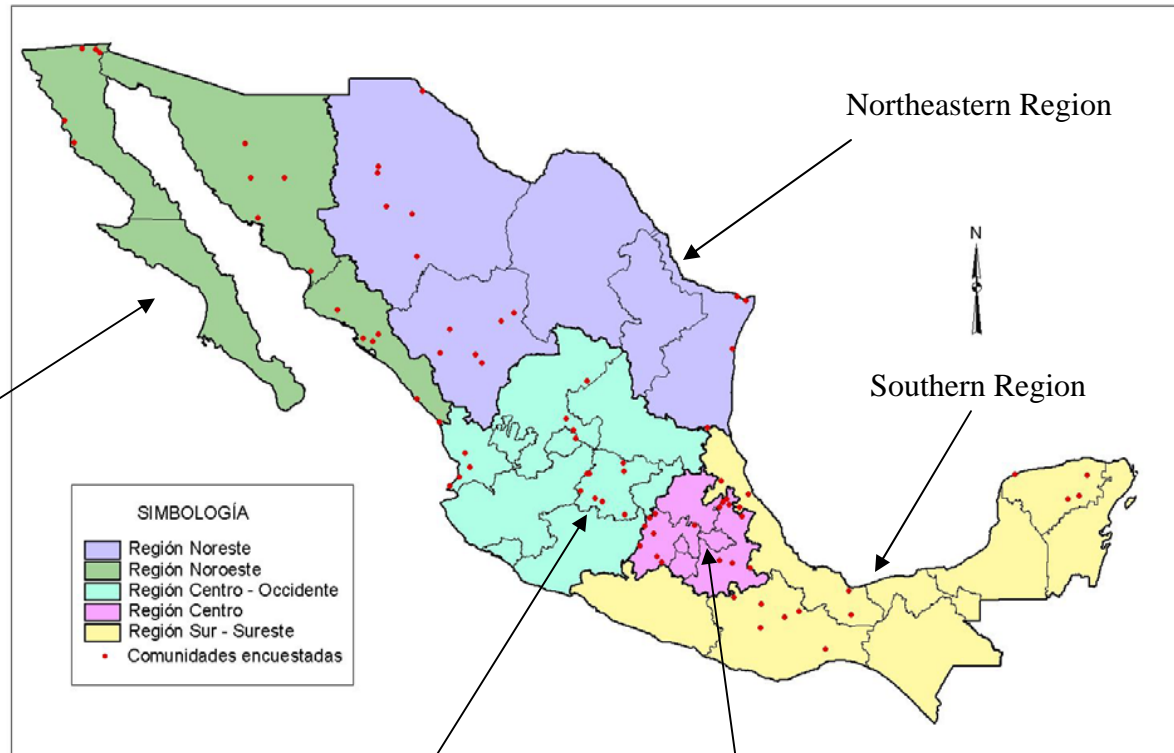
The three policies have a significant effect on both male and female migration to the U.S. non-agricultural sector. Border control expenditures and NAFTA had a larger impact on male than on female non-agricultural migration rates. The negative effect of IRCA was similar for males and females. Overall, the three policies had a smaller impact on female than on male migration to U.S. jobs. Our findings are consistent with the hypothesis that NAFTA slightly reduced migration pressures in Mexico. One avenue for further research is to investigate the interaction between NAFTA and national migration. Inasmuch as NAFTA decreased international migration for males, there may have been a shift in internal migration for males, as well.

The results of this research present compelling evidence that networks are both gender- and employment-sector specific. Cross-gender network effects are nil for migration to U.S. farm jobs. The opposite appears true for migration to U.S. non-farm jobs. Furthermore, there is some evidence of negative network effects. Male participation in agricultural migration is negatively associated with female participation, and females are less willing to work in agriculture the higher the rate of previous female migration to the non-agricultural sector. Cross-network effects for non-agricultural jobs are positive, but they are very small compared with own-gender effects. The findings reported in this paper reveal that the gender as well as sector composition of networks matters.

**ENCUESTA NACIONAL A HOGARES RURALES DE MÉXICO (ENHRUM), 2003  
REGIONES Y DISTRIBUCIÓN GEOGRÁFICA DE COMUNIDADES ENCUESTADAS**

**Figure 1:**  
ENHRUM 2003 Regions  
and Distribution of  
Communities Surveyed

Northwestern  
Region



Northeastern Region

Southern Region

Fuente: Elaborado en el Laboratorio de Análisis Espacial, Coordinación de Servicios de Cómputo, El Colegio de México con base en datos de la ENHRUM, 2003.

West Central Region

Central Region

Table 1. Variable Definitions and Means

<b>Variable</b>	<b>Description</b>	<b>Mean</b>
T	Time Trend	11
Female Ag. Migration	Share of Female Villagers Employed in U.S.	.0014
Male Ag. Migration	Share of Male Villagers Employed in U.S.	.0203
Female Non. Ag. Migration	Share of Female Villagers Employed in U.S.	.0105
Male Non. Ag. Migration	Share of Male Villagers Employed in U.S.	.0497
% Change ER	% change in Peso-Dollar exchange rate from previous year	.0138
% Change Border Control	% change in INS border enforcement expenditures in millions of 2000 US\$	.138
NAFTA	Dummy variable = 1 beginning in 1994	0.39
IRCA	Dummy variable = 1 beginning in 1986	0.74
% Change MGDGP	% change Mexico per capita GDP	.025
% Change US GDP	% change US per capita GDP	.0304

**Table 2.**  
**OLS Coefficients for three Dynamic Models—Female Agricultural Participation in Migration**  
**(standard errors are in parentheses)**

All Regions

Variables	Model I	Model II	Model III
Constant	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
T	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Female Ag. Migration Lag	0.758 (0.017)**	0.756 (0.017)**	0.756 (0.017)**
Male Ag. Migration Lag		0.001 (0.004)	0.001 (0.004)
Female Non-Ag. Migration Lag		-0.010 (.005)*	-0.010 (.005)*
Male Non- Ag. Migration Lag		0.003 (0.003)	0.003 (0.003)
NAFTA			0.000 (.000)
IRCA			0.000 (.000)
% Change Border Control			0.000 (.001)
% Change ER			0.002 (0.001)*
% Change MGDP			0.006 (0.004)*
% Change US GDP			-0.003 (0.005)
R <sup>2</sup>	.798	.798	.798

Dependent Variable: Weighted total of female international agricultural workers in village

All models were estimated with village fixed effects. N=1759. \*\*Significance at .05 level \* Significance at .10 level

**Table 3.**  
**OLS Coefficients for three Dynamic Models—Male Agricultural Participation in Migration**  
**(standard errors are in parentheses)**

All Regions

Variables	Model I	Model II	Model III
Constant	-0.002 (.003)	-0.002 (.003)	-0.006 (.003)*
T	0.000 (.000)**	0.000 (.000)**	0.000 (.000)*
Male Ag. Migration Lag	0.710 (.016)**	0.703 (.016)**	0.706 (.016)**
Female Ag. Migration Lag		-0.176 (.071)**	-0.172 (.071)**
Female Non-Ag. Migration Lag		0.003 (.023)	0.003 (.023)
Male Non- Ag. Migration Lag		0.025 (.011)**	0.026 (.011)**
NAFTA			-0.003 (0.002)
IRCA			0.001 (0.001)
% Change Border Control			0.008 (0.003)**
% Change ER			0.012 (0.004)**
% Change MGDP			0.032 (.015)**
% Change US GDP			0.037 (0.020)*
R <sup>2</sup>	0.915	0.916	0.916

Dependent Variable: Weighted total of male international agricultural workers in village

All models were estimated with village fixed effects. N=1759. \*\*Significance at .05 level \* Significance at .10 level

**Table 4.**  
**OLS Coefficients for three Dynamic Models—Female Non-Agricultural Participation in Migration**  
**(standard errors are in parentheses)**  
All Regions

Variables	Model I	Model II	Model III
Constant	-0.003 (0.002)	-0.002 (.002)	-0.005 (0.002)**
T	0.000 (0.000)**	0.000 (.000)**	0.000 (0.000)**
Female Non-Ag. Migration Lag	0.907 (0.014)**	0.896 (.015)**	0.895 (0.015)**
Male Non- Ag. Migration Lag		0.019 (0.007)**	0.018 (0.007)**
Female Ag. Migration Lag		-0.008 (0.046)	-0.004 (0.046)
Male Ag. Migration Lag		-0.004 (0.007)	-0.003 (0.007)
NAFTA			-0.003 (0.001)**
IRCA			-0.002 (0.001)*
% Change Border Control			0.004 (0.002)**
% Change ER			0.004 (0.003)
% Change MGDGP			0.014 (0.010)
% Change US GDP			0.022 (0.013)*
R <sup>2</sup>	0.875	0.876	0.876

Dependent Variable: Weighted total of female international non-agricultural workers in village

All models were estimated with village fixed effects. N=1759. \*\*Significance at .05 level \* Significance at .10 level

**Table 5.**  
**OLS Coefficients for three Dynamic Models—Male Non- Agricultural Participation in Migration**  
**(standard errors are in parentheses)**

All Regions

Variables	Model I	Model III	Model IV
Constant	-0.008 (0.005)*	-0.008 (0.005)*	-0.012 (0.005)**
T	0.001 (0.000)**	0.001 (0.000)**	0.001 (0.000)**
Male Non-Ag. Migration Lag	0.825 (0.017)**	0.809 (0.015)**	0.806 (0.018)**
Female Non-Ag. Migration Lag		0.083 (0.037)**	0.078 (0.037)**
Female Ag. Migration Lag		0.163 (0.115)	0.166 (0.115)
Male Ag. Migration Lag		0.020 (0.019)	0.022 (0.019)
NAFTA			-0.007 (.003)**
IRCA			-0.004 (.002)*
% Change Border Control			0.008 (.004)*
% Change ER			0.010 (.007)
% Change MGDP			0.013 (.025)
% Change US GDP			0.039 (.033)
R <sup>2</sup>	0.936	0.937	0.937

Dependent Variable: Weighted total of male international non-agricultural workers in village

All models were estimated with village fixed effects. N=1759. \*\*Significance at .05 level \* Significance at .10 level

**Table 6.**  
**OLS Coefficients for three Dynamic Models—Female Agricultural Participation in Migration**  
**(standard errors are in parentheses)**

Variables	Central	West-Central	Northwest	Northeast
Constant	0.001 (0.002)	0.003 (0.001)**	0.002 (0.001)**	0.001 (0.002)
T	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)*	0.000 (0.000)
Female Ag. Migration Lag	0.753 (0.041)**	0.580 (0.046)**	0.876 (0.029)**	0.756 (0.037)**
Male Ag. Migration Lag	0.005 (0.020)	0.001 (0.005)	-0.002 (0.009)	-0.004 (0.012)
Female Non-Ag. Migration Lag	-0.047 (0.024)*	0.024 (0.017)	0.004 (0.008)	-0.003 (0.012)
Male Non- Ag. Migration Lag	0.013 (0.010)	-0.002 (0.004)	0.023 (0.007)**	-0.002 (0.008)
NAFTA	-0.001 (0.001)	0.000 (0.001)	-0.001 (0.001)**	0.000 (0.002)
IRCA	0.000 (0.001)	0.000 (0.001)	0.000 (0.000)	0.000 (0.001)
% Change Border Control	0.003 (0.001)**	-0.003 (0.001)*	0.000 (0.001)	-0.001 (0.002)
% Change ER	0.002 (0.002)	0.003 (0.002)	0.001 (0.001)	0.003 (0.003)
% Change MGDG	0.013 (0.008)	0.017 (0.008)**	0.002 (0.005)	-0.002 (0.012)
% Change US GDP	-0.013 (0.011)	0.003 (0.011)	0.004 (0.007)	-0.009 (0.016)
R <sup>2</sup>	.633	.535	.856	.853

Dependent Variable: Weighted total of female international agricultural workers in village

All models were estimated with village fixed effects.

N=351. \*\*Significance at .05 level \* Significance at .10 level



**Table 7.**  
**OLS Coefficients for three Dynamic Models—Male Agricultural Participation in Migration**  
**(standard errors are in parentheses)**

Variables	South-Southeast	Central	West-Central	Northwest	Northeast
Constant	0.007 (0.003)**	0.014 (0.004)**	0.066 (0.012)**	0.009 (0.004)**	0.001 (0.004)
T	0.000 (0.000)**	0.000 (0.000)*	0.000 (0.001)	0.000 (0.000)	0.000 (0.000)
Male Ag. Migration Lag	0.374 (0.038)**	0.633 (0.051)**	0.698 (0.037)**	0.468 (0.046)**	0.793 (0.030)**
Female Ag. Migration Lag		0.102 (0.102)	-0.150 (0.321)	-0.140 (0.148)	-0.245 (0.090)**
Female Non-Ag. Migration Lag	0.010 (0.084)	-0.110 (0.060)*	-0.080 (0.120)	0.133 (0.043)**	0.024 (0.029)
Male Non- Ag. Migration Lag	0.113 (0.021)**	0.057 (0.025)**	0.040 (0.031)	0.069 (0.034)**	-0.007 (0.020)
NAFTA	-0.005 (0.002)**	-0.003 (0.003)	-0.002 (0.007)	-0.006 (.003)*	0.001 (0.004)
IRCA	-0.001 (0.001)	-0.001 (0.002)	0.006 (0.005)	0.004 (.002)	-0.001 (0.002)
% Change Border Control	0.007 (0.003)**	0.005 (0.004)	0.014 (0.010)	0.010 (0.005)**	0.000 (0.005)
% Change ER	0.008 (0.005)*	0.006 (0.006)	0.037 (0.016)**	0.011 (0.008)	-0.005 (0.008)
% Change MGDP	0.021 (0.017)	0.009 (0.021)	0.107 (0.059)*	0.032 (0.028)	-0.005 (0.030)
% Change US GDP	0.019 (0.022)	-0.001 (0.028)	0.072 (0.078)	0.081 (0.037)**	0.008 (0.040)
R <sup>2</sup>	0.840	.782	.919	.681	.893

Dependent Variable: Weighted total of male international agricultural workers in village

All models were estimated with village fixed effects.

N=351. \*\*Significance at .05 level \* Significance at .10 level

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