3

GENDER AND THE DETERMINANTS OF INTERNATIONAL MIGRATION FROM RURAL MEXICO OVER TIME

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There is a growing awareness in social science research that the consideration of gender is critical when studying the motivations, outcomes, and barriers to international migration (see chapter 2). Nevertheless, there has been little effort to model explicitly the differences between men and women with respect to the determinants of international migration and their changes over time. This oversight is a serious shortcoming. Theoretical models and empirical findings focusing on male migration may not adequately describe migration by females, and studies that do not distinguish between males and females may misstate the effect of independent variables on migration for both genders. The lack of a structured and coherent gender focus has compromised our understanding of how even basic characteristics, including human capital, affect international migration by men and women. What little we do know makes it clear that gender cannot be ignored or represented simply as a dummy variable in econometric models.

A lack of panel data has further impeded research on international migration by gender, because such data permit researchers to investigate how trends in migration have changed and differed by gender over time. Panel data also make it possible to explore the ways in which immigration policies, economic shocks, and other key variables may affect female and male migration, perhaps in different ways.

This chapter presents the findings of an empirical study of gender and the determinants of migration from rural Mexico, using unique data from the Mexico National Rural Household Survey. This survey collected 20-year migration histories on all household members as well as on children living outside the household at the time of the survey. The migration histories make it possible to construct a retrospective panel data set to which discrete-choice econometric methods can be applied.

This chapter addresses three questions. First, what are the determinants of international migration from rural Mexico, and how have they changed over time? Second, have male and female propensities to migrate changed over time, and what are the gender differences in international migration trends? Third, how do international migration determinants and the impacts of policy and macroeconomic shocks on international migration differ between men and women?

In the first section we present a brief review of the treatment of gender in models of migration determinants, highlighting the need for gender-focused micro-econometric studies of migration dynamics. A framework to estimate the gender dynamics of international migration is proposed in the second section. The third section describes how migration histories were collected and used to construct the panel. The fourth section reports our econometric findings, and a final section presents our conclusions.

Gender in Econometric Models of Migration Determinants

Human capital models posit that variables increasing the expected earnings difference between migrant destination and origin raise the probability of migration. More recent models, in the tradition of the new economics of labor migration (NELM), expand the list of variables affecting migration beyond earnings to include other considerations, including income risk and liquidity constraints on production in the migrant's household of origin.

Gender, Human Capital, and Migration

Human capital models have focused on four categories of variables that capture an individual's expected earnings difference between migrating and staying at home: (1) earnings potential, (2) age, (3) costs of migration, and (4) probability of employment. These four categories are central to understanding the probability of migration and have guided data collection and econometric analysis. However, existing econometric studies, based primarily on cross-sectional data analysis, often have produced conflicting findings with respect to these four types of migration determinants for men and women.[1]

The first category of migration determinants relates to individuals' productivity and thus potential earnings. Economists have used total years of schooling or work experience as proxies for productivity. Experience is a key determinant of earnings in human capital models, with or without migration (Sjaastad 1962; Mincer 1974). In practice, one usually cannot distinguish the effect of experience from age in modeling earnings or migration determinants, because the first is generally a linear transformation of the second.[2]

Total years of schooling are a key variable of interest in human capital studies of migration. Most studies of migration determinants find that educational levels of migrants are higher than those of nonmigrants and that increases in schooling stimulate migration. As we discussed in chapter 2, a few empirical studies investigate the relationship between migration and education. In the Mexican context, Kanaiaupuni 2000 finds that international migration selects positively on female education. Mora and Taylor (2006), using cross-sectional data from rural Mexico, confirm this result for female and male internal migrants but find that international migration, primarily to low-skilled agricultural and service jobs, does not select positively on schooling.

As discussed in more detail in chapter 2, there are various explanations for these findings related to the economic returns to education for different individuals and in different sectors of the economy. An alternative explanation, presented by Hondagneu-Sotelo (1994), is that women with higher education feel constrained by social norms and a lack of employment opportunities in their origin country, and migration provides new opportunities for these women.

Most studies posit that, other things being equal, the young are more mobile than the old, and an increase in the cost of migrating, when wages are held constant, decreases migration more for older than for younger individuals. This is because older people have a shorter future time horizon over which to spread fixed migration costs. In chapter 2, we presented an overview of the limited empirical research available on this topic.

Regarding the cost of migration, it is typically proxied by distance to the border or the destination, on the assumption that distance is linearly related to costs. As we discussed in the previous chapter, migration costs could also be influenced by civil status, need to care for children, and migration networks. Several studies have found that single women are more likely to migrate than are married ones (Kossoudji and Ranney 1984; Cackley 1993; Kanaiaupuni 2000) and that the probability of men's migration increases with the number of children in the household, while this relationship is not observed for female migrants (Kanaiaupuni 2000).

Migration costs are also a function of an individual's migration networks, as these convey information and provide assistance to prospective migrants. In chapter 2, we discussed the reasons to expect that the effects of networks are gender specific, as well as some of the empirical evidence in this area. In terms of Mexico-specific studies, Curran and Rivero-Fuentes (2003), using cross-sectional data from the Mexican Migration Project, find that male migrant networks are more important determinants of international migration for men than for women. Richter et al. (2005) find similar results in their analysis of longitudinal data from the 2003 Mexico National Rural Household Survey. None of these studies uses individual-level panel data, however. Furthermore, there has been minimal theoretical work that investigates the benefits of networks according to gender.

Finally, the probability of employment can be affected by policy variables. Because male and female immigrants tend to be concentrated in specific sectors of the economy, immigration policies that are easier to enforce in some sectors than in others may affect migration differently for the two sexes. For example, the U.S. Immigration Reform and Control Act of 1986 made it illegal for employers to knowingly hire unauthorized immigrants. Enforcement of this act is likely to be easier and more complete in relatively formal jobs than, for example, in informal domestic service jobs in which female immigrants concentrate. Testing for the impacts of policy changes on international migration is complicated by the fact that panel data spanning the period before and after the policy shock are required. Because of the lack of detailed panel data, researchers are only beginning to explore ways in which females may respond differently than males to policy reforms.

Household Variables

While the human capital model of migration has provided researchers with intuition on the fundamental determinants of individual migration, most social science researchers agree that migration decisions take place within the context of households (for example, see Aguilera and Massey 2003; Curran and Rivero-Fuentes 2003; Munshi 2003). Ethnographic studies, including those critical of the unitary household assumption common to economic studies (Wolf 1992), highlight the importance of the household as a social unit influencing behavior. Thus household as well as individual variables influence migration probabilities.

Most household models of migration involve "split" household migration, in which individual household members may migrate and the household's demographic composition thus may change, but the household survives as an economic and social unit in the migrant-sending area.[3] In theory, any household variable affecting the opportunity cost of migrating, migrant earnings, and remittance behavior, as well as the indirect effects of migration and remittances on household incomes via their influence on liquidity and risk should be included in a model of migration determinants. In practice, the household variables that are included in migration models, with few exceptions, include physical and human capital assets, proxies for risk aversion and access to credit, and stochastic variables like weather shocks, in addition to family networks. Family migration networks are a form of capital, which, together with human and physical capital, creates disparities in the costs and benefits of migration across households and individuals.

There has been little effort to test for differences in household-level variables on international migration by men and women, but there is reason to think that gender matters. The influences of many household variables on international migration by either gender are ambiguous a priori. For example, if access to land increases potential income contributions at home by males but not by females, one would expect land to have a negative effect on migration by men but not by women. Household wealth, as a (negative) proxy for risk aversion or a (positive) proxy for access to insurance, might be expected to increase the probability of international migration, if migration is perceived to be a relatively risky activity, or the reverse, if perceived to be less risky. The effects of household wealth on male and female migration will depend on the perceived risk of migration for each gender. As a proxy for access to liquidity to finance production activities at home, wealth might be expected to decrease the probability of migration. Donato (1993) and Cerrutti and Massey (2001) suggest that land, home, and business ownership decreases the probability of migration by women. Cerrutti and Massey (2001) also find that homeownership, an indicator of wealth, increases the probability of migration for males. Kanaiaupuni (2000) supports the finding that agricultural land decreases the probability of migration for females, but she finds that it increases the propensity of migration for males. She also finds that business ownership decreases the probability of migration for both males and females.

The remittance behavior of the migrant influences the probability of migration. If male migrants remit to finance investments at home, while females remit mostly to support their household of origin at times of adverse shocks, as suggested by de la Brière et al. (2002), then household wealth might decrease the probability of migration by both genders.

Other household variables that may be included in empirical models of migration are household size, household education, and number of children. One might expect the presence of adults who can fill in for the migrant's labor on the farm to reduce the opportunity cost of migration. The education of other household members may affect the productivity of the migrant's labor at home and thus the opportunity cost of migrating. Taylor (1987) finds no significant effect of land holdings or family size on international migration from rural Mexico. Mora and Taylor (2006) find significant negative effects of land and household education, positive effects of wealth, and no effect of family size. Kanaiaupuni (2000) finds no effect of the number of children on the migration propensity of females.

Econometric Model

A human capital model compares the costs and benefits of migration with what individuals would earn if they did not migrate. A household model expands the notion of opportunity costs to include the market or imputed value of lost productivity due to the loss of the migrant's labor, and benefits may include remittances as well as other, indirect effects of migration on household welfare, including income risk.

Suppose that the opportunity cost of migration by person i of gender g at time t, w_{0igt}, is a function of a vector of observable variables denoted x_{0igt}, while the benefits of international migration by the same individual, w_{1igt}, are a function of variables x_{1igt}, such that

$$\begin{aligned} w_{0igt} &= f_{0g}(x_{0igt}; \beta_{0g}) + \eta_{0ig} + \varepsilon_{0igt} \\ w_{1igt} &= f_{1g}(x_{1igt}; \beta_{1g}) + \eta_{1ig} + \varepsilon_{1igt} \end{aligned} . \tag{3.1}$$

The vectors β_{0g} and β_{1g} contain parameters representing the effects of the observed explanatory variables x_{0igt} and x_{1igt} on w_{0igt} and w_{1igt}, respectively; η_{0ig} and η_{1ig} are unobserved individual characteristics, and ε_{0igt} and ε_{1igt} are error terms. The opportunity cost of migration, w_{0igt}, may be a wage or an expected wage at the origin or the value produced by the individual in household production activities. Thus it is influenced by both individual human capital characteristics and household assets that influence productivity. Migration benefits, w_{1ig}, include remittances, which depend both on earnings abroad and on the migrant's willingness to share these earnings with the household. They, too, are influenced by the migrant's human capital, household variables that influence success at the destination (for example, family migration networks), and motivations to remit (inheritable assets, altruism) as well as by unobserved variables.

Let

$$c_{igt} = c_g(x_{cigt}; \gamma_g) + \eta_{cig} + \varepsilon_{cigt} \tag{3.2}$$

denote migration costs, which are a function of x_{cigt}, a vector of observed individual and household characteristics, whose effect on migration costs is given by the parameters γ_g; let η_{cig} be unobserved characteristics that influence migration costs; and let ε_{cigt} denote the error term in this migration cost equation. Migration costs include travel, border crossing, and financial support until the migrant finds productive employment at the destination. Costs are affected by individual characteristics as well as household migration networks.

Migration costs and benefits are affected by unobserved individual and household variables. For example, individuals' unobserved ability affects their productivity and earnings at home and thus the opportunity costs of migrating. It also affects economic success at the destination, motivations to remit, and even the likelihood of a successful border crossing. Unobserved household characteristics, including the ability of the household head and other members, their willingness to take risks, and their access to information, certainly influence both the economic as well as the noneconomic costs of and returns to international migration by individual household members. Societal norms and attitudes may have different effects on migration by women than by men. To the extent that these norms and attitudes vary from household to household and individual to individual, they represent unobserved variables in a model of migration determinants. If correlated with other variables in the model, failure to account for these unobservables may result in biased econometric estimates of the effects of included variables on migration probabilities.

Migration decision makers, be they individuals or households, presumably make use of all of the information that is available to them to perform "a cost-benefit analysis" of international migration. That is, migration is observed if

$$w_{1igt} > w_{0igt} + c_{igt}. \tag{3.3}$$

Equation 3.3 states that the benefit of migration is greater than the cost of migrating. Substituting from 3.1 and 3.2, and assuming that the benefit and cost functions are linear in their parameters,

$$\varepsilon^*_{igt} < \eta^*_{ig} + x'_{igt}\beta_g, \tag{3.4}$$

where

$$\begin{aligned} x_{igt} &= [x_{1igt}, x_{0igt}, x_{cigt}] \\ \beta_g &= [\beta_{1g}, \beta_{0g}, \gamma_g] \\ \eta^*_{ig} &= \eta_{1ig} - \eta_{0ig} - \eta_{cig} \\ \varepsilon^*_{igt} &= \varepsilon_{0igt} + \varepsilon_{cigt} - \varepsilon_{1igt} \end{aligned} \quad . \tag{3.5}$$

We can define a dichotomous migration variable, M_{igt}, which takes on the value of 1 if person i of gender g is observed as a migrant at time t and 0 otherwise. The probability of migration, then, is

$$\Pr[M_{igt} = 1 | x'_{igt}, \beta_g, \eta^*_{ig}] = \Lambda(\eta^*_{ig} + x'_{igt}\beta_g), \tag{3.6}$$

where $\Lambda(\cdot)$ is the logistic cdf, $\Lambda(z) = e^z/(1 + e^z)$. Other distributions may be assumed. In cross-sectional analyses, it is common to assume a standard normal cdf, which yields a probit instead of a logit.

A model that pools men and women can be justified only if the parameters β_g do not vary by gender. Few microeconomic studies of migration determinants test for pooling or even control for gender, besides including a gender dummy in the list of explanatory variables. Therefore, in most studies all elements of β_g are assumed to be the same for men and women. Furthermore, unobserved characteristics of individuals, households, and communities affect the observed outcomes of migration. Few migration studies control for unobserved characteristics of individuals and households. Cross-sectional studies must assume that η^*_{ig} is the same for all individuals i (or, if a gender dummy is included, for all individuals of the same gender).

Unobserved variables are a concern unless (a) they do not explain migration behavior and (b) they are not correlated with other explanatory variables that do explain migration. It is generally unwise to make these assumptions. For example, unobserved ability is likely to be correlated with both schooling and migration behavior, and aversion to labor market participation by women is likely to affect current and past migration (and thus the existence of female migration networks), education, and other variables. Household variables in the vector x_{igt} may not be truly exogenous even if they are predetermined. For example, household wealth, education, and so forth, together with current migration, may be correlated with past migration decisions, and all may be correlated with unobserved variables.

The main econometric concern surrounding endogeneity is that the inclusion of "contaminated" explanatory variables may bias findings with respect to both these and other explanatory variables in the model. For example, if past migrants provided remittances that enabled households to accumulate wealth, then it is not clear whether it is past migration or wealth that "explains" current migration. More disconcerting is the possibility that unobserved variables may be correlated with both migration and observed household variables, confounding the interpretation of econometric estimates.

It is important to control for unobservables, η^*_{ig}, as much as possible when estimating models of migration determinants. Controlling for unobservables implies carefully selecting explanatory variables (the vector x_{igt}) and controlling for fixed effects when possible. Fixed-effects methods can control for unobservables that are time invariant.

The panel structure of the data used in this study permits the estimation of both random-effects (RE) and fixed-effects (FE) migration models. FE estimation is possible for the panel logit, but not for the probit. A drawback to fixed-effects versus random-effects estimation is that, in the former, one cannot estimate the effect of time-invariant explanatory variables on migration behavior. We use FE estimation to test for differences in migration determinants between males and females and to provide a check on the robustness of estimated parameters with respect to unobserved variables. For example, if migration persistence or policy effects change when one switches from a RE to a FE model, there is reason to be concerned about the influence of unobserved variables.

Data and Descriptive Statistics

The data used in this chapter were generated through a nationwide rural household survey—the Mexico National Rural Household Survey (Encuesta Nacional a Hogares Rurales de México, or ENHRUM)—carried out jointly by the University of California, Davis, and El Colegio de México, Mexico City. The ENHRUM survey provides retrospective data on migration by individuals from a nationally representative sample of rural households. The survey, which was carried out in January and February of 2003, reports on a sample of 22 households in 80 villages. INEGI (Instituto Nacional de Estadística, Geografía e Información), 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 dispersed populations of fewer than 500 inhabitants were not included in the survey. The resulting sample is representative of more than 80 percent of the population that the Mexican National Census Office considers to be rural.

The ENHRUM survey assembled complete labor migration histories from 1980 through 2002 for (a) the household head, (b) the spouse of the household head, (c) all the individuals who lived in the household for three months or more in 2002, and (d) a random sample of sons and daughters of either the head or his or her spouse who lived outside the household for longer than three months in 2002. The latter includes individuals who migrated but did not return to the village as well as temporary migrants. For each of these individuals, the survey asked whether the individual had worked as an internal or international migrant and, if so, in which of the 23 years, whether the work was for a wage or self-employment, and whether it was agricultural or nonagricultural. This information makes it possible to reconstruct detailed migration work histories for each individual from 1980 through 2002. The data set is unbalanced by nature because not every individual in the sample was alive in 1980.

The ENHRUM survey provides the most reliable and representative historical data available on domestic and international migration from rural Mexico. The most widely used data for analyzing Mexico-to-U.S. migration are from the Mexican Migration Project (MMP). The MMP, like the ENHRUM, collected retrospective migration data. However, the ENHRUM has several advantages over the MMP. First, the ENHRUM has a random sampling design that is nationally representative, while the MMP communities are disproportionately in high-migration areas. Second, the MMP community surveys span more than two decades, with two to five communities surveyed each year. Because of these factors, it is generally not appropriate to pool data from all of the communities in the MMP sample. Given that migration is increasing over time, differences in migration between MMP communities may simply reflect the years in which the communities were surveyed. The ENHRUM was carried out at the same time in all 80 villages; thus it can be used to analyze the determinants of migration and the effects of policy variables for the entire sample. Finally, historical information on migration in the MMP is limited to the number of trips and years of first and last migration. The ENHRUM collected its retrospective information for each year from 1980 through 2002; thus it permits analysis of circular migration and the probability of migration each year.

The major limitation of the ENHRUM, shared by the MMP, stems from joint migration (chapter 2)—that is, when all members of a household migrated prior to the survey. When this happens, no migration histories can be elicited, resulting in an underestimation of migration and migration trends over time.[4] The extent of this problem will not be known for certain until after the second round of ENHRUM is carried out in 2008. What is known is that children are significantly more likely to migrate than are household heads (for example, see Mora and Taylor 2006), and as long as at least one parent remains in the village, the survey is able to collect migration histories on all of the children. In a panel survey of two villages in a high-migration zone of West-Central Mexico, Taylor and Adelman 1996: ch. 4) find an average household attrition rate due to migration of 10 percent over a 10-year period. The relevant question for our purposes is whether the loss of whole households in the past biases the estimated effects of individual, household, and policy variables on migration presented here. If there are such biases, they generally cannot be signed a priori. However, an underestimation of migration at the end of the period, especially of female migrants, may make it more difficult to identify positive effects of policy shocks on migration.

The survey asked household members to recall employment and labor migration histories for each family member who was not present at the time of the survey. Individuals may be unable to remember their (or their migrant sons' and daughters') employment history for 23 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) shows that when respondents are asked to recall information linked to salient events, such as marriage or birth of a child, misreporting is insignificant. Moreover, individuals asked to recall labor or migration histories also report more accurately moves that involved either a long distance or an extended stay.

Only those 15 years or older were included in the analysis at any point in time. Thus 23 years of observed migration are available for individuals who were 38 years or older at the time of the survey, but only 20 years are available for an individual who was 35 at the time of the survey. There are 6,456 individuals in the sample in 2002, but 2,746 in 1980. In total, the sample contains 102,026 person-year observations on migration.

Information on education (years of completed schooling and number of repeated years) was collected for all family members. Age is included as both a demographic variable and a proxy for work experience (the Mincer experience variable).

The retrospective migration data make it possible to include in the model not only human capital variables but also previous migration work experience and family migration networks, which change over time. International migration work experience at time t is measured as the number of years prior to t that an individual worked at some time as an international migrant since 1980, the beginning of the survey time period; likewise for internal migration work experience. Following Mincer, we also include work experience squared, inasmuch as there may be decreasing returns to work experience.

The family migration network variable for person i at time t is calculated as the number of family members besides person i who were migrants at time $t - 1$ (this precludes an individual from being his or her own network). While the focus of this chapter is on international migration, family migration networks are calculated for both national and international migration. Having a family network to an internal migrant destination at time $t - 1$ has an ambiguous effect on international migration at time t. It may increase the propensity to migrate internationally, for example, if internal migrants provide individuals with general information about migration. However, it may decrease the likelihood of international migration by providing access to migrant work opportunities at internal destinations. Separate network variables are also constructed for men and women, in order to test for own- and cross-gender network effects. For example, for a given individual at time t, the female internal network variable is the sum of female family members who were internal migrants at $t - 1$.

The ENHRUM provides detailed data on household assets and other variables for 2002. However, asset histories for 1980–2002 are not available. Fixed effects can control for time-invariant unobservables at both the individual and household levels. Only higher-level fixed effects (village dummies) can be included in the RE versions of the migration models; however, a time trend is used to control for time-varying unobservables affecting all individuals and households similarly (for example, changing attitudes toward Mexican immigrants in the United States or general amenability to migration in rural Mexico over time). The time trend cannot be included in the FE model, because the differencing used to solve this model would convert it into a constant. There is no way, here or in any other migration model that we know of, to control for time-varying unobservables at either the individual or household level.

Descriptive Statistics

Tables 3.1–3.3 present descriptive statistics by person-year for the variables used in the analysis. Table 3.1 compares migrants and nonmigrants. Table 3.2 provides summary statistics by gender and migrant status. Over the entire 23-year period

Table 3.1. Descriptive Statistics, by Person-Year for Full Sample and Migrants versus Nonmigrants

Variable	Full sample	Migrant	Nonmigrant
Number of observations	102,026	5,240	96,786
Percent of total	100.0	5.1	95
Dependent variables (percent)			
International migrant	5.1	n.a.	n.a.
Agricultural sector	1.3	26	n.a.
Nonagricultural sector	3.8	76	n.a.
Individual variables			
Gender (percent female)	51	15	52
Age	35	30.7	35.24**
Years of schooling	5.08	6.3	5.01**
Family international migration networks (percent)			
Member	13.4	42.0	12.0**
Female	4.8	11.0	4.5**
Male	12.0	35.8	10.7**
Family international migration networks (number)			
Member	0.149	0.401	0.099**
Female	0.023	0.099	0.044**
Male	0.125	0.347	0.088**
Family internal migration networks (percent)			
Member	17	13.2	17.4**
Female	8.4	7.2	8.5**
Male	13.2	8.7	13.5**
Family internal migration networks (number)			
Member	0.199	0.120	0.156**
Female	0.072	0.071	0.087
Male	0.127	0.074	0.112**

Source: 2003 ENHRUM data.

** Difference in means between migrants and nonmigrants are statistically significant at 5 percent.

n.a. Not applicable.

Table 3.2. Descriptive Statistics for Person-Year, by Gender and Migrant Status

	Males			Females		
Variable	Full sample	Nonmigrant	Migrant	Full sample	Nonmigrant	Migrant
Number of observations	50,476	46,023	4,453	51,550	50,763	787
Percent of total	49.5	91.2	8.8	50.53	98.5	1.5
Dependent variables (percent)						
International migrant	8.8	n.a.	n.a.	1.5	n.a.	n.a.
Agriculture	2.5	n.a.	28	0.2	n.a.	10
Nonagriculture	6.5	n.a.	73	1.4	n.a.	89.5
Individual variables						
Age	35.2	35.6	30.9**	35	34.87	29.82**
Years of schooling	5.2	5.14	6.08**	4.9	4.89	7.63**
Family international migration networks (percent)						
Member	12.4	9.9	40.1**	14.4	13.8	54.5**
Female	4.9	4.4	9.9**	4.7	4.5	16.2**
Male	10.9	8.8	34.7**	12.9	12.5	41.8**
Family international migration networks (number)						
Member	0.140	0.096	0.611**	0.157	0.149	0.684**
Female	0.024	0.018	0.087**	0.023	0.021	0.173**
Male	0.117	0.079	0.524**	0.134	0.128	0.510**
Family internal migration networks (percent)						
Member	15.3	15.6	12.5**	19.2	19.4	21.2**
Female	8.6	8.7	7.1**	8.2	8.25	7.7
Male	10.9	11.2	7.4**	15.6	15.6	15.9
Family internal migration networks (number)						
Member	0.175	0.178	0.136**	0.223	0.223	0.231
Female	0.073	0.073	0.071	0.070	0.070	0.064
Male	0.102	0.105	0.065**	0.153	0.153	0.167

Source: 2003 ENHRUM data.

** Difference in means between migrants and nonmigrants are statistically significant at 5 percent.

n.a. Not applicable.

Table 3.3. Descriptive Statistics for Policy Variables

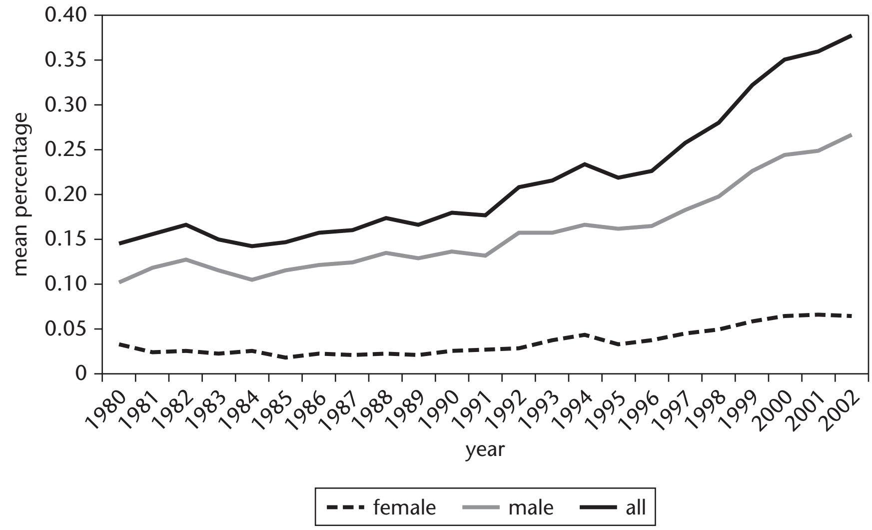
Variable	Mean
Trend	14
Lagged U.S. GDP (billion, 2000 US$)	7,543.4
Lagged Mexican GDP (billion, 1990 pesos)	799.7
Percent change in border control expenditures	0.15
Percent change in exchange rate	0.01
NAFTA (dummy = 1 in 1994)	0.49
IRCA (dummy = 1 in 1986)	0.82

Source: 2003 ENHRUM.

covered by our data, an average of 5.1 percent of the individual-year observations (over the age of 15) were international migrants; 1.3 percent worked in the agricultural sector and 3.8 percent worked in the nonagricultural sector. Of the individual-year observations 51 percent are females, but only 1.5 percent of these females are international migrants. The majority of international migrants are males; an average of 8.8 percent of the individual-year observations for males involves international migration. The low percentage of female migrants could indicate a pattern of permanent migration in which the male household head migrates first, followed eventually by the wife accompanied by the remaining family members. If female migration is more likely to be associated with joint migration, there could be a systematic undercounting of female migrants in surveys carried out in migrant-sending localities. It will not be possible to address this question until after the second round of the ENHRUM survey is conducted in 2008. An alternative explanation is that female migrants are less likely to work than male migrants. If this is the case, then the ENHRUM count of labor migration underestimates total migration more for females than for males. Analysis of 2002 total versus labor migration data indicates that this may be the case. In 2002, the only year in which we have information on both residence and work in the United States, 16 percent of labor migrants but 26 percent of all migrants were females. This finding suggests that there is, indeed, a difference in work propensity between male and female migrants.[5]

Figure 3.1 illustrates gross trends in the shares of males and females from rural Mexico who are observed as international labor migrants over time. Figure 3.1 reveals that the share of female migrants is less than that of males in every year of the series. The trend for female migration, although increasing, does not exhibit the same upturn observed for male migration in the mid-1990s. These trends do not control for other variables that may differentially affect migration by gender over time.

Figure 3.1. International Migration, by Gender, 1980–2002



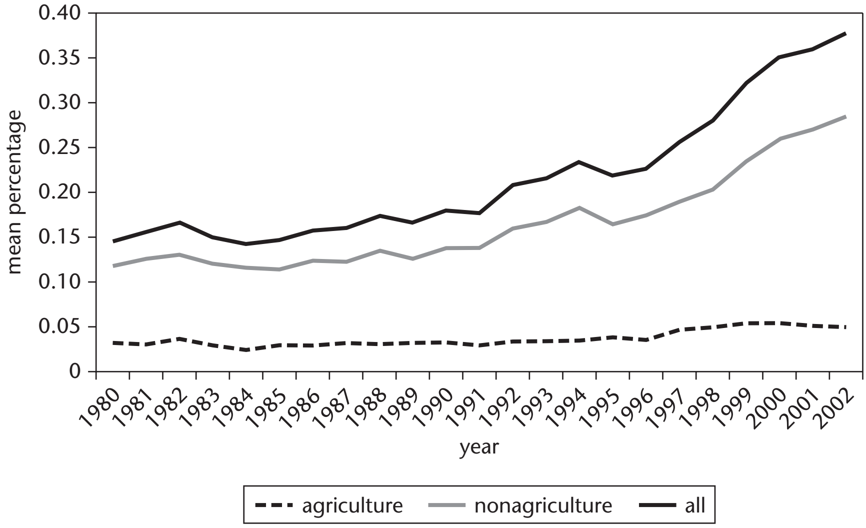
Source: 2003 ENHRUM data.

When the migration data are disaggregated by sector of employment (figure 3.2), it becomes clear that nonagricultural work absorbs an increasing share of international migrants from rural Mexico over time. Migration into nonagricultural jobs is larger than agricultural migration in all time periods, but it exhibits a much steeper climb in the 1990s. There is a slight increase in agricultural employment in 1996.

Female migrants are overwhelmingly employed in the nonagricultural sector (figure 3.3). The trend in female migration to nonagricultural jobs changes over the time period, with drops in 1980, 1984, and 1994. However, in 1996 it begins to increase at a steady rate. Male migrants are also employed primarily in nonagricultural jobs, but a higher share of males than females are in agricultural jobs (figure 3.4). There is a consistent upward trend in the graph, but once again in 1997 it increases sharply.

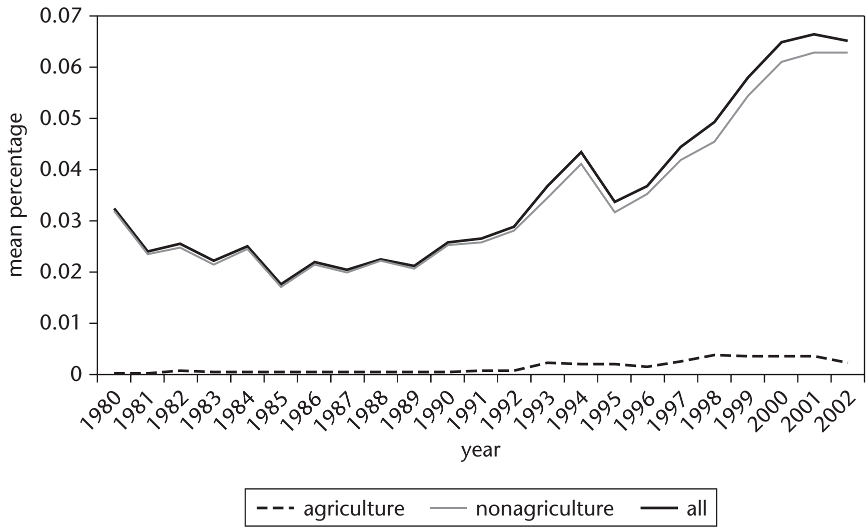
The average individual in the sample was 35 years of age and had 5.08 years of completed schooling. Schooling levels were slightly higher for males than for females (5.2 versus 4.9 years of completed schooling, respectively) and higher for international migrants than for nonmigrants (6.3 and 5.01, respectively; see tables 3.1 and 3.2). The difference between schooling of migrants and nonmigrants was larger for females than for males. Female migrants averaged

Figure 3.2. International Migration, by Sector of Employment, 1980–2002



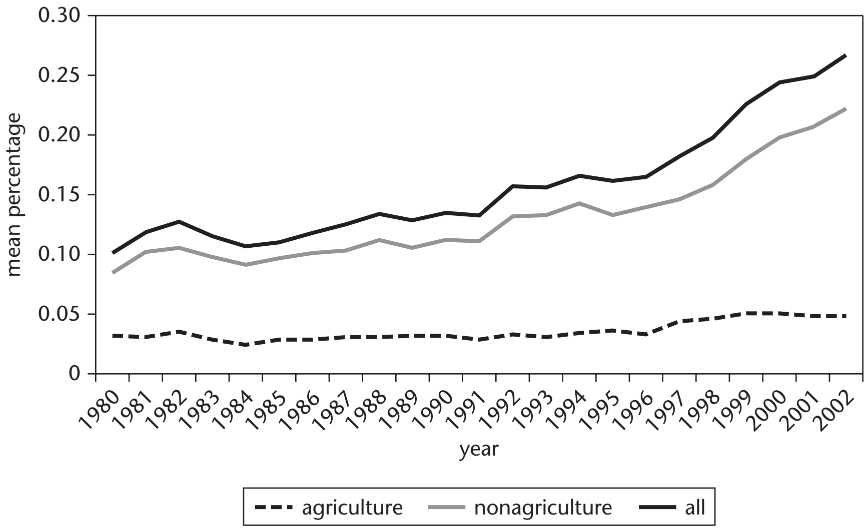
Source: 2003 ENHRUM data.

Figure 3.3. Female International Migration, by Sector of Employment, 1980–2002



Source: 2003 ENHRUM data.

Figure 3.4. Male International Migration, by Sector of Employment, 1980–2002



Source: 2003 ENHRUM data.

7.63 years of schooling, compared with only 4.89 years for female nonmigrants. Male migrants had 6.08 years of schooling, while male nonmigrants had 5.14. Internal migrants had a higher level of schooling than international migrants in the case of males (6.4 years), but not females (not shown in table).

Household migration networks can be defined by the location of the migrants, international or internal, as well as the migrants' gender. Of all individuals in the sample, 13.4 percent had at least one family member in the United States in the previous year; that is, they had access to a migrant network. The composition of the network was predominantly male: 12.0 percent of all individuals had access to a male migrant network and 4.8 percent to a female network. Slightly more females than males had family members who were international migrants in the previous year, 14.4 percent compared with 12.4 percent. Of male international migrants 40.1 percent had an international family migration network, compared with only 9.9 percent of male nonmigrants. Of female migrants, 54.5 percent had access to an international family network, compared with 13.8 percent of females who did not migrate abroad.[6]

There are also differences between international migrants and nonmigrants with respect to access to internal migration networks. A larger share of male nonmigrants than international migrants had access to family internal migration networks. However, for females it is the reverse: more female international migrants than nonmigrants had family members at internal migrant destinations. Table 3.3 summarizes the policy variables that are used in the analysis, including U.S. and Mexican gross domestic product (GDP), exchange rates, and dummy variables indicating the periods following North American Free Trade Agreement (NAFTA, 1994) and the Immigration Reform and Control Act (IRCA, 1986).

Econometric Findings

In our econometric models of international migration, as in equation 3.6, the dependent variable takes M_{igt} on the value of 1 if person *i* of gender *g* is observed as an international migrant at time *t* and 0 otherwise. For each gender, the model is estimated using the XTLOGIT procedure in Stata 9 with both fixed and random effects. The advantage of the fixed-effects model is that it is able to control for (time-invariant) unobservables when estimating the effect of time-varying variables on migration propensities. Examples of time-varying variables include migration experience and networks and policy variables. There are two disadvantages to using a conditional logistic regression like XTLOGIT. First, the effects of observed variables that do not vary over time cannot be considered. This includes important variables like schooling, which changes very little for individuals over 15 years of age. It also includes the time trend and individual's age, which vary over time but by a constant amount. The second disadvantage is that the model is identified by changes in migration status; individuals whose migration status does not change over the 23-year time period covered by our data are discarded from the sample. This omission can lead to the loss of many observations. Random-effects models do not have these disadvantages; however, they do not permit one to control for unobservables.

The XTLOGIT has other advantages. It predicts the log odds of migrating while taking into account several properties of the data that otherwise could produce inconsistent and inefficient estimates. First, the sample is unbalanced; we do not have an observation for each individual in each year. XTLOGIT produces robust parameter estimates for an unbalanced panel. Second, XTLOGIT corrects the standard errors of the estimates to take into account repeated observations across time for given individuals (Maume 2004). Therefore, it allows us to obtain coefficient estimates that are consistent and efficient, while exploiting the dynamics implicit in the panel data. In light of the advantages and disadvantages of the two methods, estimation results using both are presented in the three sets of tables that follow for female and male international migration (tables 3.4–3.6), migration to U.S. farm jobs (tables 3.7–3.9), and migration to U.S. nonfarm jobs (tables 3.10–3.12). In each of these tables, columns 1 and 2 present the estimated coefficients for the fixed effects model with and without macroeconomic and policy variables, while columns 3 and 5 present the estimated coefficients for the random-effects model. The marginal effects of explanatory variables on the migration probability are presented in columns 4 and 6 of each table. Marginal effects are not available for the fixed-effects model inasmuch as the individual effects, which are needed to calculate the marginal effect, are not consistently estimated (Corts and Singh 2002; Wooldridge 2002). However, we can compare odds ratios between the two models. Odds ratios for select variables are presented in tables 3.6 (international migration), 3.9 (international agricultural migration), and 3.12 (international migration to nonfarm jobs).[7] The Hausman specification test is also presented for each model that is estimated with both fixed and random effects. In the majority of cases we reject the null hypothesis that the random-effects model produces consistent and efficient coefficient estimates.

In all models we control for previous migration experience by including on the right-hand side the sum of the individual's total years of experience in international and national migration from 1980 up until year t as well as the square of each of these variables. Not surprising, the own-effect (for example, of international migration experience at time $t - 1$ on the probability of being observed as an international migrant at time t) is always positive and highly significant. Reminiscent of Mincer's experience variable, the quadratic own-effects generally are negative. Cross-effects (for example, of internal migration experience on international migration probabilities) are negative in some cases (suggesting competition between destinations) and positive in others (consistent with stepwise migration or a general migration experience effect).

Gender and International Migration

Both male and female international migration exhibits the quadratic experience effect described above: experience as a migrant abroad increases migration probabilities, but at a decreasing rate in both the fixed- and random-effects models (see tables 3.4 and 3.5). The marginal effect of international migration experience is larger for males than for females in the random-effects model (1.07 versus 0.12, column 4, tables 3.4 and 3.5). The cross-destination effect is negative for males (that is, internal migration experience decreases the international migration probability). In contrast, for females it is insignificant.

Family migration networks are differentiated by destination, international or internal, as well as by gender. For females, having female family members who were international migrants at time $t - 1$ increases the probability of being observed as an international migrant at time t. The own-gender effect of internal networks is not significant for females or males.

Table 3.4. Logit Results for Female International Migration

Variable	Fixed-effects (FE) model		Random-effects (RE) model			
	Estimated coefficients (1)	Estimated coefficients (2)	Estimated coefficients (3)	Marginal effect[a] (4)	Estimated coefficients (5)	Marginal effect[a] (6)
Time-invariant variables						
Constant	n.a.	n.a.	−4.912 (11.60)***	n.a.	−3.683 (−1.71)	n.a.
Trend	n.a.	n.a.	−0.023 (1.51)	−0.001	0.117 (−0.88)	0.005
Age	n.a.	n.a.	−0.087 (7.39)***	−0.004	−0.088 (7.39)***	−0.004
Years of schooling	n.a.	n.a.	0.05 (−1.58)	0.002	0.051 (−1.63)	0.002
Work experience						
International	2.131 (14.74)***	2.298 (12.72)***	2.61 (26.63)***	0.12	2.615 (26.64)***	0.11
International squared	−0.141 (13.88)***	−0.149 (12.96)***	−0.114 (23.61)***	−0.005	−0.115 (23.59)***	−0.005
National	−0.66 (−1.62)	−0.591 (−1.4)	−0.073 (−0.56)	−0.003	−0.071 (−0.54)	−0.003
National squared	0.049 (−1.27)	0.046 (−1.16)	0.001 (−0.07)	<0.001	0.001 (−0.05)	< 0.001

Migration networks						
Family members who were international migrants in $t-1$						
Number of females	1.714	1.74	1.386	0.06	1.369	0.058
	(2.19)**	(2.32)**	(4.33)***		(4.28)***	
Number of males	0.992	1.02	0.82	0.04	0.82	0.035
	(3.75)***	(3.88)***	(6.00)***		(5.99)***	
Family members who were internal migrants in $t-1$						
Number of females	0.274	0.358	−0.043	−0.002	−0.059	−0.003
	(−0.53)	(0.69)	(−0.13)		(−0.18)	
Number of males	0.969	0.943	0.28	0.01	0.274	0.012
	(2.12)**	(2.06)*	(−1.31)		(−1.28)	
Macroeconomic and policy variables						
Percent change in exchange rates	n.a.	1.191	n.a.	n.a.	0.695	0.03
		(−1.53)			(−1.17)	
Lagged Mexican GDP	n.a.	−0.004	n.a.	n.a.	0	<0.001
		(−0.7)			(0)	
Lagged U.S. GDP	n.a.	0	n.a.	n.a.	0	<0.001
		(−0.44)			(−0.48)	
Percent change in border control	n.a.	−2.715	n.a.	n.a.	−2.453	−0.11
		(2.41)**			(2.68)***	

(*Table continues on the following page*)

Table 3.4. Logit Results for Female International Migration (Continued)

	Fixed-effects (FE) model		Random-effects (RE) model			
Variable	Estimated coefficients (1)	Estimated coefficients (2)	Estimated coefficients (3)	Marginal effect[a] (4)	Estimated coefficients (5)	Marginal effect[a] (6)
NAFTA	n.a.	−0.204	n.a.	n.a.	−0.462	−0.002
		(0.51)			(−1.18)	
IRCA	n.a.	0.074	n.a.	n.a.	−0.798	−0.05
		(−0.12)			(−1.5)	
Joint test of policy variables $-\chi^2$	n.a.	9.08	n.a.	n.a.	11.78*	n.a.
Overall goodness of fit $-\chi^2$	824.57***	833.87***	888.06	n.a.	888.23	n.a.
Hausman $-\chi^2$	1,450.67***	201.31***	n.a.	n.a.	n.a.	n.a.
Number of observations	1,734	1,734	49,828	n.a.	49,828	n.a.
Number of id	112	112	3,249	n.a.	3,249	n.a.

Source: 2003 ENHRUM.

Note: Absolute value of *z* statistics is in parentheses. The number of id refers to the number of individuals.

*** Significant at 1 percent.

** Significant at 5 percent.

* Significant at 10 percent.

n.a. Not applicable.

a. Marginal effects presented as percentage points.

Table 3.5. Logit Results for Male International Migration

Variable	Fixed-effects (FE) model		Random-effects (RE) model			
	Estimated coefficients (1)	Estimated coefficients (2)	Estimated coefficients (3)	Marginal effect[a] (4)	Estimated coefficients (5)	Marginal effect[a] (6)
Time-invariant variables						
Constant	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Trend	n.a.	n.a.	−0.037	−0.022	−0.177	−0.11
			(5.23)***		(3.36)***	
Age	n.a.	n.a.	−0.094	−0.056	−0.094	−0.056
			(17.18)***		(17.21)***	
Years of schooling	n.a.	n.a.	−0.007	−0.004	−0.006	−0.004
			(−0.41)		(−0.37)	
Work experience						
International	1.284	1.48	1.789	1.07	1.787	1.06
	(31.88)***	(28.20)***	(48.42)***		(48.42)***	
International squared	−0.073	−0.08	−0.07	−0.042	−0.07	−0.042
	(27.64)***	(26.93)***	(41.54)***		(41.53)***	
National	−0.181	−0.105	−0.17	−0.101	−0.166	−0.098
	(2.62)***	(−1.47)	(4.07)***		(3.99)***	
National squared	0.008	0.007	0.011	0.0063	0.01	6.00E-03
	(2.18)**	(−1.87)	(4.25)***		(4.15)***	

(*Table continues on the following page*)

Table 3.5. Logit Results for Male International Migration (Continued)

Variable	Fixed-effects (FE) model		Random-effects (RE) model			
	Estimated coefficients (1)	Estimated coefficients (2)	Estimated coefficients (3)	Marginal effect[a] (4)	Estimated coefficients (5)	Marginal effect[a] (6)
Migration networks						
Family members who were international migrants in $t-1$						
Number of females	1.11	1.175	1.143	0.68	1.113	0.66
	(4.68)***	(4.94)***	(6.09)***		(5.92)***	
Number of males	0.403	0.531	1.1	0.65	1.079	0.64
	(3.20)***	(4.07)***	(12.69)***		(12.44)***	
Family members who were internal migrants in $t-1$						
Number of females	0.135	0.197	0.187	0.11	0.185	0.11
	(−0.67)	(−0.98)	(−1.29)		(−1.28)	
Number of males	−0.219	−0.129	−0.148	−0.088	−0.149	−0.088
	(−0.97)	(−0.56)	(−0.94)		(−0.95)	
Macroeconomic and policy variables						
Percent change in exchange rates	n.a.	0.189	n.a.	n.a.	−0.174	−0.103
		(−0.71)			(−0.75)	
Lagged Mexican GDP	n.a.	0	n.a.	n.a.	0.002	1.30E-03
		(−0.06)			(−1.2)	
Lagged U.S. GDP	n.a.	0	n.a.	n.a.	0	<0.001
		(−0.67)			(−1.71)	

Percent change in border control	n.a.	0.508	n.a.	n.a.	0.521	0.309
		(−1.6)			(−1.8)	
NAFTA	n.a.	−0.559	n.a.	n.a.	−0.151	−0.089
		(3.83)**			(−0.9)	
IRCA	n.a.	0.075	n.a.	n.a.	0.258	0.14
		(−0.37)			(−1.19)	
Joint test of policy variables (– χ^2)	n.a.	55.42***	n.a.	n.a.	17.49***	n.a.
Overall goodness of fit (– χ^2)	2,368.6***	2,425***	2,852.66***	n.a.	2,882.75***	n.a.
Hausman – χ^2	0	1,064.4***	n.a.	n.a.	n.a.	n.a.
Number of observations	8,978	8,978	48,535	n.a.	48,535	n.a.
Number of id	565	565	3,153	n.a.	3,153	n.a.

Source: 2003 ENHRUM.

Note: Absolute value of *z* statistics in parentheses.

*** Significant at 1 percent.

** Significant at 5 percent.

* Significant at 10 percent.

n.a. Not applicable.

a. Marginal effects presented as percentage points.

For females as well as for males, cross-gender network effects differ from own-gender effects. For females, the own-gender effect is larger than the cross-gender effect and the marginal effect is larger as well (columns 4 and 6, table 3.4). Not so for males in the FE model (table 3.5). Cross-gender internal migration network effects are insignificant for males (table 3.5); however, past internal migration by males is associated positively with international migration by females.

A look at the migration odds ratios (table 3.6) confirms that, for both genders, having access to international migration networks of either gender significantly increases the odds of international migration. It has been suggested elsewhere that males provide information and other kinds of support for safe passage across the border and that cultural norms discourage women from traveling abroad unaccompanied by males. However, some studies conclude that females create more extensive migration networks than males. Our finding that the cross-gender network effect is larger for male than for female migration (3.24 versus 1.70) lends cautionary support to the finding suggested by other studies that female migration networks are more influential than male migration networks.[8]

Table 3.6. Odds Ratio for Select Variables for International Migration, by Gender

	Fixed effects		Random effects	
Variable	Female (1)	Male (2)	Female (3)	Male (4)
Previous work experience				
International	9.95	4.39	13.67	5.86
International squared	0.86	0.92	0.89	0.93
National	0.55	0.90	0.93	0.85
National squared	1.05	1.01	1.00	1.01
Family members who were international migrants in t − 1				
Female	5.7	3.24	3.93	2.92
Male	2.77	1.70	2.27	2.89
Family members who were internal migrants in t − 1				
Female	1.43	1.22	0.94	1.2
Male	2.57	0.88	1.31	0.87
Macroeconomic and policy variables				
Percent change in border control	0.07	1.66	0.09	1.68

Source: 2003 ENHRUM.

Macroeconomic and policy variables are included in the models summarized in columns 2, 4, and 5 of tables 3.4 and 3.5. In the fixed-effects models for both males and females (column 2), we can reject the null hypothesis that the coefficients on these variables are jointly zero. The border control expenditure variable is significant for females in both the fixed- and random-effects models (column 2 and 4 in tables 3.4 and 3.5).[9] For males, the NAFTA dummy variable is negative and significant in the FE model.

The sign of the estimated effect of border control expenditures is different between genders. Other things being equal, an increase in border expenditures decreases the likelihood of female migration to the United States. The sign on border control expenditures in the male model is positive; however, it is not statistically significant. A 1 percentage point increase in border control expenditures decreases female migration by 0.11 percent (column 6, tables 3.4 and 3.5). The odds ratio changes associated with a 1 percent increase in border control expenditures are presented in table 3.6. In the fixed- (random-) effects model, a 1 percentage point increase in border expenditures decreases the odds of female migration by 93 percent (91 percent). These findings lend support to studies suggesting that women are more risk averse than men with respect 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 providing their clients with "documented" entry (that is, entry through U.S. immigration checkpoints with falsified documents). Although an increase in border enforcement increases the costs of unauthorized entry for new migrants, it may also discourage migrants from returning to Mexico (and having to repeat the border entry) once they are in the United States. It appears that, overall, border controls are more of a deterrent to female than to male migrants.

NAFTA's potential effects on Mexico-to-U.S. migration are complex. Trade reforms were expected to offer alternatives to emigration by stimulating export production in Mexico. However, NAFTA also was expected to trigger a contraction in the production of importables for which protections were phased out. Studies by Levy and van Wijnbergen (1994) and by Robinson et al. (1993), using computable general equilibrium models, predicted that employment created by increasing production of exportables would be insufficient to absorb workers displaced from the importables sector, leading to a rise in rural out-migration. The major catalyst for migration in these models is an anticipated decrease in maize production, which did not materialize (Taylor et al. 2005). Agricultural exports from Mexico to the United States increased sharply after 1994, when Mexico joined NAFTA, but worker productivity in Mexican agriculture also increased, depressing the demand for farm labor. The findings reported in table 3.4 suggest that, on balance, migration pressures for rural Mexican males but not females decreased with Mexico's entry into NAFTA in 1994.

Unlike the FE model, the RE model (columns 3–6 in tables 3.4 and 3.5) permits inclusion of a time trend and individual characteristics, including human capital variables, which do not change significantly over time.[10] Controlling for other variables, including migration experience and networks, the time trend effect is negative for both males and females, but it is insignificant for females (column 3, tables 3.4 and 3.5). The effect of age is negative for both males and females, consistent with the prediction of human capital theory that younger people are more mobile than older people. The RE model yields different results with regard to the effect of education on migration by females and males. Other things being equal, an increase in years of completed schooling increases the likelihood of international migration for women, but not for men.

Gender and Choice of Foreign Employment Sector

Human capital and networks not only influence whether or not an individual will migrate but also the migrant's sector of employment. Most migrants know the sector in which they are likely to be employed before they migrate, based on their education, access to networks, and policies affecting job placement. To test for differences between men and women with regard to the determinants of sector of U.S. employment, we reestimated both the RE and FE models for international migration to agricultural and nonagricultural jobs. In these models, the migration variable M_{sigt} takes on the value of 1 if person i of gender g is observed as an international migrant in sector s (agricultural or nonagricultural) at time t, and 0 otherwise.

International Agricultural Labor Migration

The results of the RE and FE estimation of the agricultural migration model are presented in tables 3.7 and 3.8, with the odds ratios of select variables presented in table 3.9. The number of observations for females in international agricultural migration is low, and there are insufficient cases of women migrating internally to include female internal migration networks in the model.[11] For female participation in international agricultural migration, there are insufficient observations to run the FE model. Thus table 3.7 only presents results from the RE model.

For females, international migration experience increases the probability of working in a U.S. farm job, regardless of which sector the experience is in. However, the cross-sector effect is slightly smaller than the own-sector effect. This contrasts with the results for male agricultural migration, presented in table 3.8. For males, past international migration experience working in farm jobs significantly

Table 3.7. Logit Results for Female International Migration to Agricultural Jobs

	Random-effects (RE) model			
Variable	Estimated coefficients (3)	Marginal effect[a] (4)	Estimated coefficients (5)	Marginal effect[a] (6)
Time-invariant variables				
Constant	−7.138	n.a.	0.945	n.a.
	(5.06)***		(−0.1)	
Trend	−0.043	<0.001	0.382	<0.001
	(−0.85)		(−0.68)	
Age	−0.063	<0.001	−0.065	<0.001
	(1.88)*		(1.93)*	
Years of schooling	−0.048	<0.001	−0.057	<0.001
	(−0.43)		(−0.5)	
Work experience				
International agriculture	6.658	<0.001	6.959	<0.001
	(9.56)***		(9.25)***	
International agriculture squared	−0.355 (9.38)***	<0.001	−0.374 (8.95)***	<0.001
International nonagriculture	4.812	<0.001	4.901	<0.001
	(3.29)***		(3.44)***	
International nonagriculture squared	−1.378 (2.24)**	<0.001	−1.362 (2.38)**	<0.001
National agriculture	−26.801	<0.001	−17.872	<0.001
	(0)		(0)	
National agriculture squared	1.262	<0.001	0.788	<0.001
	(0)		(0)	
National nonagriculture	−30.938	<0.001	−20.794	<0.001
	(0)		(0)	
National nonagriculture squared	1.28 (0)	<0.001	0.86 (0)	<0.001
Migration networks				
Family members who were international migrants in $t-1$				
Number of females agriculture	−24.361 (0)	<0.001	−14.318 (0)	<0.001
Number of females nonagriculture	1.634	<0.001	1.828	<0.001
	(2.27)**		(2.50)**	
Number of males agriculture	−1.589 (2.31)**	<0.001	−1.55 (2.18)**	<0.001
Number of males nonagriculture	−18.232 (6.66)***	<0.001	−18.869 (6.67)***	<0.001

(*Table continues on the following page*)

Table 3.7. Logit Results for Female International Migration to Agricultural Jobs (Continued)

Variable	Random-effects (RE) model Estimated coefficients (3)	Marginal effect[a] (4)	Estimated coefficients (5)	Marginal effect[a] (6)
Family members who were internal migrants in $t-1$				
Number of females agriculture	−29.101 (0)	<0.001	−18.572 (0)	<0.001
Number of females nonagriculture	−28.163 (0)	<0.001	−19.299 (0)	<0.001
Number of males agriculture	1.646 (−1.63)	<0.001	1.46 (−1.32)	<0.001
Number of males nonagriculture	−28.069 (0)	<0.001	−18.082 (0)	<0.001
Macroeconomic and policy variables				
Percent change in exchange rates	n.a.	n.a.	4.151 (−1.82)	<0.001
Lagged Mexican GDP	n.a.	n.a.	0.016 (−0.94)	<0.001
Lagged U.S. GDP	n.a.	n.a.	0.00 (−0.03)	<0.001
Percent change in border control	n.a.	n.a.	5.754 (−1.30)	<0.001
NAFTA	n.a.	n.a.	0.444 (−0.29)	<0.001
IRCA	n.a.	n.a.	0.663 (−0.32)	<0.001
Joint test of policy variables (χ^2)	n.a.	n.a.	4.37	n.a.
Overall goodness of fit (χ^2)	139.53***	n.a.	132.34***	n.a.
Number of observations	49,828	n.a.	49,828	n.a.
Number of id	3,249	n.a.	3,249	n.a.

Source: 2003 ENHRUM.

Note: Absolute value of *z* statistics in parentheses. There are insufficient observations to run the FE model, but the numbering of the columns is retained to remain consistent with other tables.

*** Significant at 1 percent.

** Significant at 5 percent.

* Significant at 10 percent.

n.a. Not applicable.

a. Marginal effects presented as percentage points.

Table 3.8. Logit Results for Male International Migration to Agricultural Jobs

Variable	Fixed-effects (FE) model: Estimated coefficients (1)	Fixed-effects (FE) model: Estimated coefficients (2)	Random-effects (RE) model: Estimated coefficients (3)	Random-effects (RE) model: Marginal effect[a] (4)	Random-effects (RE) model: Estimated coefficients (5)	Random-effects (RE) model: Marginal effect[a] (6)
Time-invariant variables						
Constant	n.a.	n.a.	−3.124	n.a.	−4.827	n.a.
			(9.04)***		(3.18)***	
Trend	n.a.	n.a.	−0.078	−0.003	−0.198	−0.008
			(6.30)***		(2.28)**	
Age	n.a.	n.a.	−0.096	−0.004	−0.096	−0.004
			(9.95)***		(9.98)***	
Years of schooling	n.a.	n.a.	−0.042	−0.002	−0.042	−0.002
			(−1.45)		−1.44	
Work experience						
International agriculture	1.007	1.275	1.821	0.074	1.824	0.007
	(16.92)***	(16.52)***	(28.64)***		(28.59)***	
International agriculture squared	−0.057	−0.066	−0.073	−0.003	−0.073	−0.003
	(14.38)***	(14.96)***	(23.30)***		(23.29***	
International nonagriculture	−0.859	−0.812	−1.074	−0.044	−1.074	−0.043
	(5.36)***	(4.64)***	(7.81)***		(7.81)***	
International nonagriculture squared	0.023	0.022	0.049	0.002	0.049	0.002
	(−1.27)	(−1.06)	(7.28)***		(7.29)***	
National agriculture	−1.072	−1.071	−0.185	−0.003	−0.181	−0.003
	(4.11)***	(3.77)***	(−1.43)		(−1.39)	

(Table continues on the following page)

Table 3.8. Logit Results for Male International Migration to Agricultural Jobs (Continued)

Variable	Fixed-effects (FE) model		Random-effects (RE) model			
	Estimated coefficients (1)	Estimated coefficients (2)	Estimated coefficients (3)	Marginal effect[a] (4)	Estimated coefficients (5)	Marginal effect[a] (6)
National agriculture squared	0.04	0.044	0.011	<0.001	0.011	<0.001
	(3.26)***	(3.25)***	(−1.45)		(−1.43)	
National nonagriculture	0.144	0.298	−0.07	−0.008	−0.068	−0.007
	(−0.77)	(−1.53)	(−0.84)		(−0.82)	
National nonagriculture squared	−0.002	−0.006	0.007	<0.001	0.007	<0.001
	(−0.23)	(−0.5)	(−1.18)		(−1.16)	
Migration networks						
Family members who were international migrants in $t-1$						
Number of females nonagriculture	0.673	1.101	0.89	0.036	0.883	0.035
	(−1.23)	(−1.93)	(1.98)**		(−1.95)	
Number of males agriculture	0.781	0.877	1.759	0.072	1.76	0.07
	(2.99)***	(3.23)***	(8.89)***		(8.86)***	
Number of males nonagriculture	−0.227	0.039	−0.139	−0.006	−0.152	−0.006
	(−0.86)	(−0.14)	(−0.57)		(−0.62)	
Family members who were internal migrants in $t-1$						
Number of females agriculture	−0.493	−0.285	−0.54	−0.022	−0.637	−0.025
	(−0.42)	(−0.24)	(−0.51)		(−0.59)	
Number of females nonagriculture	0.921	0.921	0.561	0.023	0.562	0.022
	(2.03)**	(2.10)**	(2.31)**		(2.31)**	
Number of males agriculture	−1.155	−1.144	−0.79	−0.032	−0.83	−0.033
	(−1.23)	(−1.16)	(−0.96)		(−1.00)	
Number of males nonagriculture	0.944	0.847	−0.288	−0.012	−0.295	0.001
	(−1.41)	(−1.26)	(−0.86)		(−0.88)	

Macroeconomic and policy variables						
Percent change in exchange rates	n.a.	0.659	n.a.	n.a.	0.22	0.009
		(−1.67)			(−0.63)	
Lagged Mexican GDP	n.a.	−0.006	n.a.	n.a.	−0.003	< 0.001
		(−1.92)			(−1.13)	
Lagged U.S. GDP	n.a.	0	n.a.	n.a.	0.001	< 0.001
		(−0.81)			(2.03)**	
Percent change in border control	n.a.	0.697	n.a.	n.a.	0.723	0.029
		(−1.38)			(−1.58)	
NAFTA	n.a.	−0.443	n.a.	n.a.	0.102	0.004
		(−1.88)			(−0.36)	
IRCA	n.a.	−0.585	n.a.	n.a.	−0.057	−0.002
		(−1.86)			(−0.17)	
Joint test of policy variables (X^2)	n.a.	45.32***	n.a.	n.a.	8.39	n.a.
Overall goodness of fit (X^2)	584.6***	631.70***	998.01***	n.a.	997.76***	n.a.
Hausman X^2	922.4***	9,521.25**	n.a.	n.a.	n.a.	n.a.
Number of observations	3,037		48,535		48,535	48,535
Number of id	187		3,153		3,153	3,153

Source: 2003 ENHRUM.

Note: Absolute value of *z* statistics in parentheses.

*** Significant at 1 percent.

** Significant at 5 percent.

* Significant at 10 percent.

n.a. Not applicable.

a. Marginal effects presented as percentage points.

Table 3.9. Odds Ratio for Select Variables for International Agricultural Migration, by Gender

	Fixed effects	Random effects	
Variable	Male (1)	Female (2)	Male (3)
Work experience			
International agriculture	3.58	1,052.61	6.19
International agriculture squared	0.94	0.69	0.93
International nonagriculture	0.44	134.43	0.34
International nonagriculture squared	1.02	0.26	1.05
National agriculture	1.35	0.00	0.93
National agriculture squared	0.99	2.20	1.01
National nonagriculture	0.34	0.00	0.83
National nonagriculture squared	1.04	2.36	1.01
Family members who were international migrants in t – 1			
Female agriculture	2.18	0.00	4.36
Female nonagriculture	3.01	6.22	2.42
Male agriculture	2.4	0.21	5.81
Male nonagriculture	1.04	0.00	0.86
Family members who were internal migrants in t – 1			
Female agriculture	0.75	0.00	0.53
Female nonagriculture	2.51	0.00	1.75
Male agriculture	0.32	4.31	0.44
Male nonagriculture	2.33	0.00	0.74
Macroeconomic and policy variables			
Percent change in border control	2.01	0.00	2.06

Source: 2003 ENHRUM.

increases the likelihood of agricultural labor migration, but past experience in nonfarm jobs does the opposite. That is, there is evidence of competing U.S. sector effects for men, but not for women. The effects of internal migration networks on U.S. agricultural labor migration also differ between men and women. They are insignificant for women, but for men there is evidence of competition between Mexican and U.S. farm jobs.

Network effects on agricultural labor migration, like the effects of experience, differ between sectors as well as between genders. Female networks to agricultural jobs do not have a significant effect on female agricultural labor migration. (This finding most likely is due to the paucity of such networks in the ENHRUM data: few females migrate to U.S. farm jobs, and thus few females have access to female agricultural migration networks.) However, female networks associated with nonagricultural jobs increase the likelihood of female migration to agricultural jobs (as well as to nonagricultural jobs, suggesting a general migration network effect for females). Female agricultural networks significantly increase the probability of male migration to farm jobs in the RE but not the FE model (table 3.8). Networks of male migrants in U.S. agricultural jobs significantly increase the probability of male migration to these jobs in all models (table 3.8). However, if the male family member is a nonagricultural migrant, there is no significant effect on male agricultural migration. Male networks decrease the likelihood of female migration to farm jobs (but not to nonfarm jobs).

Internal agricultural networks do not significantly affect male agricultural migration to the United States in any model. However, female internal migration networks to nonfarm jobs have a significant negative effect on male migration to U.S. farm jobs in both models.

In short, the effects of migration networks to international farm jobs are both sector and gender specific.

The effects of policy and macroeconomic variables on international agricultural migration are presented in columns 5 and 6 in table 3.7 and columns 2, 5, and 6 in table 3.8. Although the coefficients are not statistically significant, the estimates suggest that NAFTA and IRCA decreased the likelihood of female and male international migration to farm jobs.

The effects of human capital variables in the RE model have the predicted signs, but the only significant variable is age in the international farm labor migration equation for males. Education does not significantly explain international farm labor migration for either gender. For males, the effect of schooling is negative, but not quite significant at the 90 percent level.

International Nonagricultural Migration

The results of both the RE and FE estimation of the nonagricultural international migration model are presented in tables 3.10 and 3.11. Odds ratios for select variables are presented in table 3.12. As before, the results from the FE model are presented in columns 1 and 2, while the RE results are presented in columns 3 through 4.

Inasmuch as most international migration from rural Mexico goes to nonfarm jobs in the United States, the results of this regression are similar in many ways to those of the total international migration model. In the FE version of the model, nonagricultural international migration experience increases the probability that a woman will be observed as a nonagricultural international labor migrant at time *t* (although at a decreasing rate). However, having experience as an agricultural migrant negatively affects the probability of nonagricultural labor migration for

Table 3.10. Logit Results for Female International Migration to Nonagricultural Jobs

Variable	Fixed-effects (FE) model		Random-effects (RE) model			
	Estimated coefficients (1)	Estimated coefficients (2)	Estimated coefficients (3)	Marginal effect[a] (4)	Marginal coefficients (5)	Marginal effect[a] (6)
Time-invariant variables						
Constant	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Trend	n.a.	n.a.	−0.01	<0.001	0.077	0.0023
			(−0.62)		(−0.54)	
Age	n.a.	n.a.	−0.095	−0.003	−0.096	−0.0028
			(7.31)***		(7.32)***	
Years of schooling	n.a.	n.a.	0.061	0.002	0.063	0.0019
			(1.79)*		(1.84)*	
Work experience						
International agriculture	−2.791	−2.918	−0.765	−0.024	−0.843	−0.025
	(−1.54)	(1.65)*	(−1.22)		(−1.37)	
International agriculture squared	0.566	0.603	0.043	0.0014	0.048	0.0014
	(−1.26)	(−1.38)	(−0.63)		(−0.76)	
International nonagriculture	2.241	2.344	2.759	0.087	2.763	0.082
	(13.1)***	(11.08)***	(25.38)***		(25.34)***	
International nonagriculture squared	−0.148	−0.153	−0.116	−0.0037	−0.116	−0.0034
	(11.98)***	(11.06)***	(22.44)***		(22.34)***	
National agriculture	−13.831	−14.261	0.159	0.005	0.169	0.005
	(−0.01)	(0.01)	(−0.29)		(−0.3)	
National agriculture squared	1.763	1.819	−0.016	<0.001	−0.016	<0.001
	(−0.01)	(−0.01)	(−0.24)		(−0.25)	

National nonagriculture	−0.711	−0.661	−0.112	−0.0035	−0.109	−0.003
	(1.65)*	(−1.5)	(−0.77)		(−0.74)	
National nonagriculture squared	0.042	0.038	0.004	<0.001	0.003	<0.001
	(−1.06)	40(−0.96)	(−0.28)		(−0.25)	
Migration networks						
Family members who were international migrants in $t-1$						
Number of females agriculture	8.514	8.071	−3.627	−0.031	−3.705	−0.03
	(−0.01)	(−0.01)	(−0.26)		(−0.25)	
Number of females nonagriculture	1.818	1.783	1.362	0.043	1.352	0.04
	(2.04)**	(2.09)**	(4.08)***		(4.05)***	
Number of males agriculture	0.728	0.675	0.322	0.01	0.302	0.0089
	(−0.74)	(−0.7)	(−0.84)		(−0.79)	
Number of males nonagriculture	2.123	2.118	1.319	0.042	1.324	0.039
	(5.34)***	(5.33)***	(9.23)***		(9.23)***	
Family members who were internal migrants in $t-1$						
Number of females agriculture	11.12	11.289	0.77	0.024	0.749	0.022
	(−0.01)	(−0.01)	(0.57)		(−0.55)	
Number of females nonagriculture	0.032	0.076	−0.207	−0.0065	−0.221	−0.007
	(−0.05)	(−0.13)	(−0.53)		(−0.56)	
Number of males agriculture	0.286	0.273	0.744	0.024	0.744	0.022
	(−0.34)	(−0.33)	(−1.64)		(−1.64)	
Number of males nonagriculture	2.368	2.326	−0.007	<0.001	−0.019	<0.001
	(3.18)***	(3.20)***	(−0.03)		(−0.07)	

(*Table continues on the following page*)

Table 3.10. Logit Results for Female International Migration to Nonagricultural Jobs (Continued)

	Fixed-effects (FE) model		Random-effects (RE) model			
Variable	Estimated coefficients (1)	Estimated coefficients (2)	Estimated coefficients (3)	Marginal effect[a] (4)	Marginal coefficients (5)	Marginal effect[a] (6)
Macroeconomic and policy variables						
Percent change in exchange rates	n.a.	0.719	n.a.	n.a.	0.357	0.011
		(−0.79)			(−0.52)	
Lagged Mexican GDP	n.a.	−0.003	n.a.	n.a.	−0.001	<0.001
		(−0.52)			(−0.18)	
Lagged U.S. GDP	n.a.	0	n.a.	n.a.	0	<0.001
		(−0.4)			(0)	
Percent change in border control	n.a.	−2.966	n.a.	n.a.	−2.529	−0.075
		(2.27)**			(2.51)**	
NAFTA	n.a.	−0.083	n.a.	n.a.	−0.341	−0.01
		(−0.18)			(−0.79)	
IRCA	n.a.	−0.119	n.a.	n.a.	−0.886	−0.04
		(0.17)			(−1.5)	
Joint test of policy variables (χ^2)	n.a.	5.76	n.a.	n.a.	10.63	n.a.
Overall goodness of fit (χ^2)	774.1***	780.29***	823.55***	n.a.	822.22***	n.a.
Hausman χ^2	20.78**	14.24	n.a.	n.a.	n.a.	n.a.
Number of observations	1,565	1,565	49,828	n.a.	49,828	n.a.
Number of id	102	102	3,249	n.a.	3,249	n.a.

Source: 2003 ENHRUM.

Note: Absolute value of *z* statistics in parentheses.

*** Significant at 1 percent.

** Significant at 5 percent.

* Significant at 10 percent.

n.a. Not applicable.

a. Marginal effects presented as percentage points.

Table 3.11. Logit Results for Male International Migration to Nonagricultural Jobs

Variable	Fixed-effects (FE) model		Random-effects (RE) model			
	Estimated coefficients (1)	Estimated coefficients (2)	Estimated coefficients (3)	Marginal effect[a] (4)	Marginal coefficients (5)	Marginal effect[a] (6)
Time-invariant variables						
Constant	n.a.	n.a.	−2.873	n.a.	−5.857	n.a.
			(12.55)**		(5.38)**	
Trend	n.a.	n.a.	−0.019	−0.0067	−0.136	−0.047
			(2.32)**		(2.13)**	
Age	n.a.	n.a.	−0.091	−0.032	−0.091	−0.032
			(14.68)***		(14.67)***	
Years of schooling	n.a.	n.a.	−0.003	< 0.001	−0.002	< 0.001
			(−0.14)		(−0.12)	
Work experience						
International agriculture	0.229	0.29	0.098	0.035	0.099	0.034
	(−1.22)	(−1.48)	(−1.19)		(−1.21)	
International agriculture squared	0	0	−0.003	−0.001	−0.003	−0.001
	(0)	(−0.04)	(−0.65)		(−0.65)	
International nonagriculture	1.542	1.698	2.042	0.716	2.045	0.709
	(26.81)***	(23.00)***	(44.22)***		(44.15)***	
International nonagriculture squared	−0.089	−0.096	−0.081	−0.029	−0.082	−0.028
	(23.88)***	(22.72)***	(38.97)***		(38.94)***	
National agriculture	−0.433	−0.375	−0.156	−0.055	−0.148	−0.051
	(1.72)*	(−1.48)	(−1.62)		(−1.55)	
National agriculture squared	0.016	0.015	0.009	0.0032	0.009	0.003
	(−1.4)	(−1.32)	(−1.52)		(−1.46)	

(*Table continues on the following page*)

Table 3.11. Logit Results for Male International Migration to Nonagricultural Jobs (Continued)

Variable	Fixed-effects (FE) model		Random-effects (RE) model			
	Estimated coefficients (1)	Estimated coefficients (2)	Estimated coefficients (3)	Marginal effect[a] (4)	Marginal coefficients (5)	Marginal effect[a] (6)
National nonagriculture	−0.21	−0.165	−0.173	−0.061	−0.172	−0.060
	(2.25)**	(1.73)*	(3.20)***		(3.19)***	
National nonagriculture squared	0.011	0.01	0.011	0.0038	0.011	0.004
	(2.00)**	(−1.89)	(3.23)***		(3.22)***	
Migration networks						
Family members who were international migrants in $t - 1$						
Number of females agriculture	−0.44	−0.373	0.427	0.186	0.475	0.210
	(−0.08)	(−0.06)	(−0.38)		(−0.43)	
Number of females nonagriculture	1.434	1.436	1.096	0.38	1.067	0.37
	(4.65)***	(4.67)***	(5.03)***		(4.87)***	
Number of males agriculture	0.013	−0.114	0.036	0.0125	0.019	0.007
	(−0.03)	(−0.22)	(−0.14)		(−0.08)	
Number of males nonagriculture	0.575	0.679	1.336	0.468	1.32	0.458
	(3.11)***	(3.52)***	(12.65)***		(12.47)***	
Family members who were internal migrants in $t - 1$						
Number of females agriculture	0.258	0.174	0.039	0.014	0.067	0.023
	(−0.33)	(−0.22)	(−0.05)		(−0.09)	
Number of females nonagriculture	0.006	0.064	0.113	0.039	0.116	0.04
	(−0.02)	(−0.26)	(−0.66)		(−0.68)	

Number of males agriculture	−0.694	−0.81	−1.412	−0.495	−1.423	−0.493
	(−0.58)	(−0.68)	(−1.34)		(−1.35)	
Number of males nonagriculture	−0.312	−0.24	−0.052	−0.018	−0.046	−0.016
	(−1.11)	(−0.83)	(−0.29)		(−0.26)	
Macroeconomic and policy variables						
Percent change in exchange rates	n.a.	−0.182	n.a.	n.a.	-0.4	−0.139
		(−0.5)			(−1.35)	
Lagged Mexican GDP	n.a.	0.003	n.a.	n.a.	0.005	0.002
		(−1.39)			(2.05)**	
Lagged U.S. GDP	n.a.	0	n.a.	n.a.	0	<0.001
		(1.66)*			(−0.26)	
Percent change in border control	n.a.	0.335	n.a.	n.a.	0.383	0.133
		(−0.82)			(−1.06)	
NAFTA	n.a.	−0.486	n.a.	n.a.	-0.252	−0.087
		(2.61)***			(-1.23)	
IRCA	n.a.	0.802	n.a.	n.a.	0.483	0.144
		(2.88)***			(1.77)*	
Joint test of policy variables (χ^2)	n.a.	32.99	n.a.	n.a.	15.59**	n.a.
Overall goodness of fit (χ^2)	2,048.7***	2,081.8***	2,400.32***	n.a.	2,415.75***	n.a.
Hausman χ^2	0	836.99***	n.a.	n.a.	n.a.	n.a.
Number of observations	6,494	6,494	48,535	n.a.	48,535	n.a.
Number of id	410	410	3,153	n.a.	3,153	n.a.

Source: 2003 ENHRUM.

Note: Absolute value of z statistics in parentheses.

*** Significant at 1 percent.

**Significant at 5 percent.

* Significant at 10 percent.

n.a. Not applicable.

a. Marginal effects presented as percentage points.

Table 3.12. Odds Ratio for Select Variables for International Nonagricultural Migration, by Gender

Variable	Fixed effects		Random effects	
	Female (1)	Male (2)	Female (3)	Male (4)
Work experience				
International agriculture	0.05	1.34	0.43	1.10
International agriculture squared	1.83	1.00	1.05	1.00
International nonagriculture	10.43	5.46	15.85	7.73
International nonagriculture squared	0.86	0.91	0.89	0.92
National agriculture	0.00	0.69	1.18	0.86
National agriculture squared	6.17	1.02	0.98	1.01
National nonagriculture	0.52	0.85	0.90	0.84
National nonagriculture squared	1.04	1.01	1.00	1.01
Family members who were international migrants in t − 1				
Female agriculture	3,200.28	0.69	0.02	1.61
Female nonagriculture	5.95	4.20	3.86	2.91
Male agriculture	1.96	0.89	1.35	1.02
Male nonagriculture	8.31	1.97	3.76	3.74
Family members who were internal migrants in t − 1				
Female agriculture	79,924.36	1.19	2.12	1.07
Female nonagriculture	1.08	1.07	0.80	1.12
Male agriculture	1.31	0.44	2.10	0.24
Male nonagriculture	10.24	0.79	0.98	0.95
Macroeconomic and policy variables				
Percent change in border control	0.05	1.40	0.08	1.47

Source: 2003 ENHRUM.

women (significant in the second FE model; see table 3.10). This observation contrasts with the findings for female migration to agricultural jobs presented in table 3.7, for which the cross-sector experience effect is positive. For male migration to U.S. nonfarm jobs, previous migration to nonfarm jobs abroad has a significant positive effect. In contrast, past migration to agriculture does not have a significant effect. These findings suggest limited migrant mobility from farm to nonfarm jobs. In a few cases, past experience as an internal nonfarm labor migrant decreases the probability of international nonfarm migration. This cross-destination effect is generally more significant for males than for females and suggests that there may be competition between U.S. and Mexican nonfarm sectors for rural migrants' labor.

Network effects clearly are sector specific for nonagricultural labor migration by both genders. Both male and female nonfarm networks raise the likelihood of migration to nonfarm jobs by males and females. In contrast, the cross-effects of agricultural networks on nonfarm migration are not significant for either gender. The effect of internal migration networks on nonfarm international migration is insignificant in all cases for males. However, for females there is some evidence that internal nonfarm networks increase the likelihood of international nonfarm migration.

When we evaluate odds ratios (table 3.12), the importance of male networks becomes more apparent. For females, the cross-gender effect of male networks on the odds of migrating to nonagricultural jobs is greater than the own-gender network effect. The cross-gender network effect is more important than the own-gender effect for males as well, but the difference is not as large as it is for females.

For males, the effect of NAFTA on nonagricultural labor migration is significant and negative. The effect of the IRCA is significant and positive. Border control expenditures have a significant negative effect on the probability of international migration to nonfarm jobs for females, but not for males.

In the RE models, age negatively affects international migration to nonfarm jobs by both males and females. Schooling has a significant positive effect on female but not male international migration to nonfarm jobs. For females, the positive effect of schooling on nonfarm migration stands in contrast to the insignificant (negative) effect on farm migration. Schooling appears to have sector-specific effects on international migration by females, but no effect on international migration by males.

Conclusions

Our analysis of gender dynamics in international migration using a panel data set constructed from retrospective migration histories takes a step toward filling a lacuna in the social sciences literature on how the determinants of international migration as well as the migration impacts of policy and macroeconomic shocks differ between men and women. This study is unique in its ability to apply panel-data econometric methods to control for unobservable individual and household characteristics, which may confound and bias findings in cross-sectional studies, and in considering migrants' choice of economic sector in which to work as well as their decision to migrate abroad.

Fixed-effects estimation using panel data makes it possible to test the robustness of many of these results to unobserved individual and household variables. In general, we obtain qualitatively similar results using FE and RE estimation. This is reassuring, because the RE specification makes it possible to test for effects on international migration that cannot be considered in a FE model, including individual characteristics like human capital that do not vary significantly over the time period covered by our panel. However, for the majority of the models estimated we reject the null hypothesis that the RE model produces consistent and efficient coefficients. Thus when there are conflicting results from the two models, it is advisable to rely more heavily on the results obtained from the FE model.

A surprising result from our econometric analysis is that most policy and macroeconomic variables are insignificant in explaining international migration from rural Mexico by both genders, under both model specifications. U.S. border enforcement expenditures are the exception; however, their effect is not the same for men and for women. We find evidence that increased border expenditures significantly deter migration by women, but not by men. This may suggest that females are more risk averse than males or, alternatively, that cultural norms discourage women from attempting the border crossing under heightened security. A positive effect of border control expenditures on male migration raises new questions, including the likelihood that enforcement deters return migration. Are males more willing than females to play a "cat and mouse" game, in which border officials catch migrants and release them back into Mexico, whereupon they again try to cross the border and eventually succeed (see Donato and Patterson 2004)? Or does increased border enforcement raise the sunk cost of migration and thus increase the amount of time that migrants must stay in the United States in order to recoup their investment in crossing the border in ways that differ between genders?

Other key findings on the determinants of migration from rural Mexico include the following:

- The dynamics of international migration differ significantly between men and women. We easily reject the null hypothesis that the determinants of Mexico-to-U.S. migration and their changes over time are gender neutral. International migration selects differently on men than on women. This finding offers important panel-data support to findings of other studies that use cross-sectional data (see chapter 2).
- Overall, women are significantly less likely than men to migrate abroad. However, international migration selects differently on the human capital of men and women. Schooling is positively associated with international migration by females, but not by males. For females, the effect of schooling is significant only for international migration to nonagricultural jobs. This suggests that the economic returns to female education are higher in those jobs than in agriculture. It indicates that the effect of education is not simply to raise women's willingness

to migrate, as suggested by the social norms argument advanced by Hondagneu-Sotelo (1994) and others. It contradicts the finding by Curran and Rivero-Fuentes (2003) that education is insignificant in explaining migration. That study does not control for sector of employment, which could have confounded the empirical results. We find that, in order for schooling to significantly increase women's likelihood of migrating abroad, the migration must be linked specifically to nonfarm jobs.

- The gross international migration time trend is steeper for males than for females (figure 3.1). Age deters international migration slightly more for men than for women. The finding that females may migrate at an older age than males is supported by Kanaiaupuni (2000).
- Family migration networks, or contacts with family members who are already abroad, have a more important effect on migration decisions than do macroeconomic and policy variables, and these network effects are both gender and sector specific. Own-gender and sector network effects are always positive, but not always greater than cross-gender network effects. It appears incorrect to conclude that women are more dependent on female than on male networks (as concluded in Hondagneu-Sotelo 1994; Kossoudji and Ranney 1984). Our results reveal that male migration networks are not more influential than female migration networks, but they nevertheless are highly significant in explaining both male and female international migration. Males may provide critical information and assistance in crossing the border, and social norms may discourage female migration without male assistance. However, we also find that female networks are significant in explaining male migration, and in some cases they are more significant than own-gender male network effects. This lends support to studies suggesting that female networks are deeper and more extensive than male networks and may provide services that male networks cannot (Curran and Rivero-Fuentes 2003; Menjivar 2000).
- Migration network effects are sector as well as gender specific. Agricultural own-gender migrant networks are not significant in explaining migration to nonagricultural jobs for either males or females, which suggests that the contacts made by agricultural migrants do not help males or females to secure information or contacts necessary to migrate to nonagricultural jobs.
- Finally, nonagricultural employment dominates agricultural employment for international migrants of both genders, but especially for females.

Overall, our findings highlight the importance of incorporating gender into international migration models, since there sometimes are striking differences in the determinants of international migration for men and women.

Endnotes

1. See chapter 2 for a discussion of how these four categories of variables may affect the costs and benefits of migration differently for men and women.

2. Most human capital studies estimate experience as age minus education minus five. Strictly speaking, this is accurate if children enter school at age five and are fully employed when not in school. Including both age and experience thus derived in a migration regression results in a problem of multicolinearity. The only way that both variables can be included is if there is not full employment outside of school and detailed data are available on time worked, which is rarely the case.

3. Joint migration is migration by the entire household unit; that is, the household's location changes, either all at once or via sequential moves in which other household members follow the initial migrant. See chapter 2 for a discussion of split versus joint migration models.

4. When whole households migrate, the estimated trend is biased downward because the household members are not counted as migrants in 2002.

5. It also may reflect households' perceptions of whether or not female migrants work while abroad or perhaps even their reluctance to admit that female migrants are working.

6. For purposes of this analysis, "nonmigrants" refer to those who did not migrate abroad and may include internal migrants.

7. Complete results are available from the authors.

8. An odds ratio of more than 1 indicates an increased chance of international migration, while an odds ratio of less than 1 indicates a decreased chance. The odds ratio for male international migration networks, equal to 1.81 for females, means that having a male international migrant in the household increases a female's chance of migrating by 81 percent.

9. Results on macroeconomic variables should be interpreted with some caution. We assume that the time trend and macroeconomic variables capture the effects of any omitted variables. Nonetheless, the existence of any such omitted variables common across individuals at a given point in time could reduce the precision of the estimation and bias the standard errors in either the random-effects or fixed-effects model. Our estimation assumes that any omitted variables common across time periods are not correlated with the policy variables. See Moulton (1986) for a discussion.

10. For male migration we can reject the null hypothesis that the random-effects model is both consistent and efficient.

11. In order to estimate a FE model, there needs to be variation in all variables. Variables that have no variation are dropped from the model.

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