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DETERMINANTS OF MIGRATION, DESTINATION, AND SECTOR CHOICE: DISENTANGLING INDIVIDUAL, HOUSEHOLD, AND COMMUNITY EFFECTS

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Introduction

Migration is a selective process. Individual, family, and community characteristics of migrants are different than of those who stay behind. The premise of this chapter is that the selectivity of migration is different for distinct migrant destinations as well as for different sectors of employment at those destinations. For example, it is often assumed that educated people have a higher propensity to migrate internationally than less educated people. Human capital theory might predict such an outcome if schooling makes workers relatively more productive abroad than at home or if information about foreign labor markets is more available and migration costs are lower for the educated. A number of empirical studies support this assumption (see Adams 2003). However, it is not necessarily the case for unauthorized migration to low-skill labor markets abroad.

The present study includes two novel extensions of past empirical migration research. First, it incorporates both alternative destinations (internal versus international) and sectors of employment (farm versus nonfarm) into a common theoretical and empirical framework. This is important because, as we shall see, different types of individuals are selected into migration to different destination and sector regimes. Second, the study includes both family and community variables,

with potentially distinct impacts on migration to specific labor markets. Including family variables in the analysis reflects insights from the new economics of migration theory that migration decisions take place within larger social units (that is, households). Community variables include access to markets, which may influence the economic returns from local production. Past research on migration and market integration has had a country focus, and findings largely have been anecdotal (Martin 1993) or else based on applied theoretical or simulation models (Hinojosa-Ojeda and Robinson 1992; Levy and Wijnberger 1992). To our knowledge, this is the first study that tests for effects of indicators of local market integration on migration behavior.

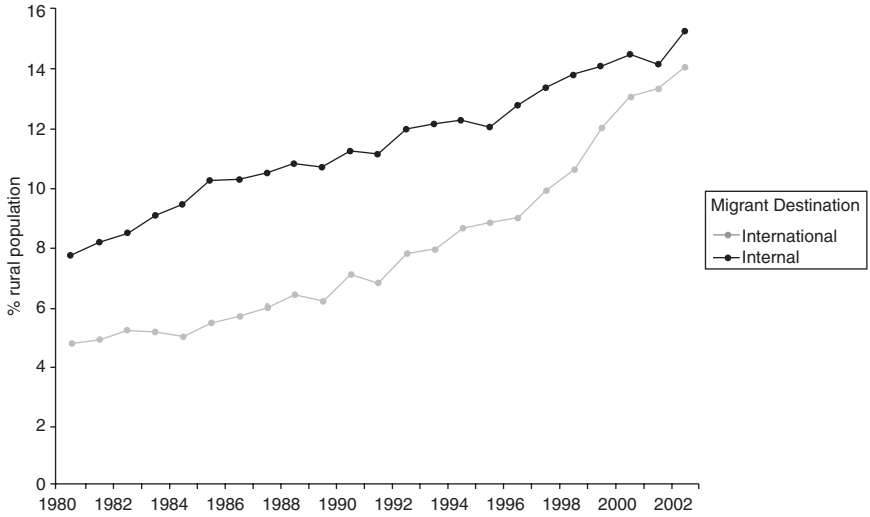
We employ limited-dependent variable methods and data from the 2003 Mexico National Rural Household Survey (*Encuesta Nacional a Hogares Rurales de México*, or ENHRUM) to model the selectivity of internal and international migration to farm and nonfarm jobs. The ENHRUM is unique in providing detailed sociodemographic and economic information on a nationally representative sample of rural households in Mexico. Current and retrospective migration data, including migrants' sector of employment, were gathered for all household members as well as for children of household heads or their spouses who were living outside of the household at the time of the survey.

Mexico is an ideal site to study the selectivity of migration and its implications. Mexico's rural economies are being transformed as migrants integrate households and communities with labor markets in Mexico and the United States. Findings from the 2003 ENHRUM reveal that people are leaving Mexico's villages at an unprecedented rate. Figure 1.1, constructed from retrospective migration data gathered in the survey, shows that the percentage of Mexico's village populations working at internal and international migrant destinations increased sharply at the end of the twentieth century.[1] More than half of all migrants leaving Mexican villages go to destinations in Mexico; however, villagers' propensity to migrate to U.S. jobs more than doubled from 1990 to 2002. This surge in migration mirrors an unexpectedly large increase in the number of Mexico-born people living in the United States revealed by the U.S. 2000 Census.[2] To date, most of our understanding of the selectivity and economic impacts of migration in rural Mexico comes from a limited number of nonrandom community case studies.[3] The ENHRUM data are nationally representative of Mexico's rural households.

Background

Understanding the selectivity of migration is important for several reasons. Characteristics of migrants, their households, and their communities of origin can shape migrants' success at their destinations as well as their impacts at home. They

FIGURE 1.1 Labor Migrants as Percentage of Mexican Village Populations, by Migrant Destination, 1980–2002



Source: ENHRUM 2003.

determine which households and communities bear the costs of human capital "lost" to migration, as well as the distribution of migration's potential benefits through remittances and the income multipliers they may create. Immigration policies attempt to influence the characteristics of legal migration, but they have less influence over the characteristics of unauthorized migrants. Because of migrant selectivity, market integration can alter the characteristics of rural populations through its influence on migration. Different theoretical models of migration imply different selectivity patterns, and these models can provide guidance for policy interventions to influence migration and its impacts, including remittance-induced development. Some sectors of migrant-destination countries rely heavily on foreign labor. For example, migrants from Mexico represented 77 percent of the U.S. farm workforce in 1997–98, up from 57 percent in 1990 (U.S. Department of Labor 1991, 2000). The determinants of migration are critical to the livelihood of these sectors.

Different migration theories imply different sets of variables shaping migration decisions and different impacts of migration on rural economies. A well-developed body of literature addresses the question of migrant selectivity by merging theories on individuals' migration decisions with human capital theory arising from the early work of Mincer (1974), Becker (1975), and others. Wages at

prospective migrant origins and destinations are assumed to be a function of individuals' skills affecting their productivity at origin and destination. In the Todaro (1969) model, human capital characteristics of individuals may influence both their wages and their likelihood of obtaining a job once they migrate. Characteristics of individuals may also affect migration costs. The human capital view of migration has the key implication that the types of individuals selected into migration are those for whom, over time, the discounted income (or expected income, net of migration costs) differential between migration and nonmigration is greatest or migration costs are lowest. Perhaps the most sophisticated application of human capital theory to migration is by Vijverberg 1995), who uses a discrete choice structural model to predict the effect of earnings at various locations on migration, while controlling for observed and unobserved variables. Unlike the present research, however, this theory does not include a farm-nonfarm dichotomy. This is important because the determinants of migration are likely to differ across sectors as well as across locations.

An excellent example of this concerns education. It is often assumed that the most educated people migrate. Such an assumption is supported by human capital theory only if schooling has a greater positive effect on earnings at the migrant destination than at origin or if that education lowers migration costs and risks. Chiquiar and Hanson (2005) find a positive correlation between education and migration from Mexico to the United States. However, their study refers to migration from all of Mexico. A positive effect of schooling is likely to be the case for internal migration to nonfarm jobs or legal international migration, but it is not necessarily the case for internal migration to agricultural jobs or unauthorized international migration to any job.

The new economics of labor migration (NELM) brings a household perspective to the analysis of migration behavior. Household variables, including assets and the human capital of household members other than migrants, are hypothesized to influence migration decisions via their effect on migration costs (including the opportunity cost to households of allocating their members to migration work) as well as the impacts of remittances and the income security that migrants provide on the expected utility of the household as a whole.

Economic and market conditions in rural areas, particularly access to markets for inputs and outputs, are likely to shape the benefits and costs of migration for rural households. We are not aware of any research that tests for the effects of *local* market integration on migration. This is surprising in light of interest at the aggregate level in interactions between market reforms and international migration.[4] We find evidence on a local level that trade and migration may be complementary to each other.

If family and community as well as traditional human capital variables shape migration decisions, omitting any of these variables from the analysis is likely to result in biased estimates of migration model parameters.

Conceptual Framework

Migration is the result of individuals and households weighing the utility that is attainable under different migration regimes with the utility from not migrating. A migration regime is defined as a combination of place (the village of origin in the case of nonmigration, internal migrant destinations, or foreign destinations) and sector of employment. There are five potential regimes in our empirical model: nonmigration, two destination types (internal and international), and two employment sectors in each (farm and nonfarm).

Migration entails a discrete, dichotomous, or polychotomous choice. A reduced-form approach, in which income or expected-income is replaced by a vector of exogenous (that is, human capital and, in the case of NELM models, household capital) variables, has been used in a number of studies using probit or logit estimation techniques (see, for example, Taylor 1986, and Emerson 1989). Multinomial logit, probit, tobit, two-stage (Heckman), and various maximum-likelihood techniques for estimating discrete-continuous models, not available or accessible two decades ago, today are widely used to estimate migration-decision models at a microlevel (individual or household). Recent studies include Perloff, Lynch, and Gabbard (1998), Emerson (1989), Taylor (1987, 1992), Stark and Taylor (1989, 1991), Lucas and Stark (1985), and Barham and Boucher (1998). Explicitly or implicitly, these empirical studies are grounded in a random-utility theoretic model in which it is assumed that households make migration decisions that maximize their welfare.

Household utility is assumed to be affected positively by income, including the income person *i*'s household receives independent of individual *i*'s regime choice and the income the individual generates under alternative migration regimes. Household income is the sum of net incomes from all household production and labor activities, excluding individual *i*. This income depends on person *i*'s family characteristics, ZF^i, including assets that affect the productivity of investments on and off the farm and migrant networks (Massey, Alarcón, and others 1987; Massey, Arango, and others 1993) that influence remittances from other family members besides person *i*. Income also may be influenced by community context variables, ZC^i, which affect the economic returns to family resources inside and outside the village. An example of ZC^i might be access to outside markets for family farm production or wage labor.

Nonmigrants have the option of supplying labor to local labor markets or to family farm production. Those who participate in the labor market receive a wage that depends on their human capital, ZH^i, and context variables that influence the returns to human capital in local labor markets. Nonmigrants who work in family farm or nonfarm production activities produce a value product that depends on family, community, and human capital variables. Migrants receive a wage that depends on their human capital as well as family and community variables influencing migration success (for example, migration networks; see Taylor 1986; Munshi 2003).

Individual, family, and human capital characteristics may affect remittance behavior, migrants' wages, and migrants' willingness to share their earnings with the household through remittances. Finally, individual, family, and community variables may influence migration costs, as well as the ability to finance these costs. Wealth and migration networks may play a particularly important role in this regard (Taylor 1987; López and Schiff 1998).

The impact of a given variable on migration probabilities is a mixture of the variable's expected influences on incomes at origin and destination and on migration costs.[5] We do not attempt to isolate these influences. Our goal in this study is to estimate the differential net effects of individual, family, and community variables on observed migration outcomes, using a reduced-form approach. The influence of a particular variable may be different for different migrant destinations and different sectors of employment, reflecting in part the differential returns to human and migration capital. Our empirical models, described below, are multinomial logits, in which the probability that individual j is paired with migration destination-and-sector regime d is given by the following.

$$prob(U_d^i \geq U_j^i \forall j \neq d) = \frac{e^{\beta_d Z^i}}{\sum_{j=0}^{J} e^{\beta_j Z^i}} \tag{1.1}$$

where Z^i is a vector of individual i's individual, family, and community characteristics; that is, $Z^i = [ZH^i, ZF^i, ZC^i]$.

Data and Variables

Data to estimate the model are from the ENHRUM. This survey provides detailed data on assets, sociodemographic characteristics, production, income sources, and migration from a nationally representative sample of rural households surveyed in January and February 2003. The sample includes 7,298 individuals from

1,782 households in 14 states. Having individuals as the units of observation permits us to fully exploit the information contained in the ENHRUM data. Our dependent variable is the migration-employment regime in which individuals were observed in 2002.

Instituto Nacional de Estadística, Geografía e Informática (INEGI), Mexico's national information and census office, designed the sampling frame to provide a statistically reliable characterization of Mexico's population living in rural areas, or 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 result is a sample that is representative of more than 80 percent of the population that the Mexican government considers as rural.

Complete migration histories were assembled from 1980 through 2002 for (a) the household head, (b) the spouse of the head, (c) all individuals who lived in the household three months or more in 2002, and (d) a random sample of all sons and daughters of either the head or his/her spouse who lived outside the household longer than three months in 2002. These retrospective data were used to construct our migration network variables.

Survey teams visited each community twice, first in summer 2002, to conduct a survey of community characteristics via interviews with local leaders, service providers, and school teachers, and again in January and February 2003, to carry out the household survey. The household survey is the source of all information on individual and family characteristics. Community variables were constructed from the community survey.

The human capital, family, and community variables in our analysis are summarized in tables 1.1 and 1.2 and described below.

Individual Characteristics

Individual variables include the standard Mincer (1974) variables: years of completed schooling; age, which captures both life cycle and experience; age squared; gender (a dummy variable equal to 1 if male, 0 if female); status in household (1 if household head, 0 otherwise); and marital status (1 if married, 0 otherwise). The average adult (12 or older) household size is 5.6, nearly evenly divided between males and females (table 1.1). The data reveal low levels of human capital. Average schooling of household members is just under 6 years, but schooling of household heads averages just over 4 years. Average schooling is highest for internal migrants in nonfarm jobs (7.3 years). It is lowest for internal migrants in farm jobs (3.8 years; see table 1.2).

Twenty-six percent of nonmigrants are household heads, compared with 18 percent of internal and 23 percent of international migrants. Most international

TABLE 1.1. Descriptive Statistics

Variable	Mean	Standard deviation	Min.	Max.
Individual Characteristics				
Household head (Dummy)	0.25	0.43	0.00	1.00
Sex (Dummy, 1 = male)	0.49	0.50	0.00	1.00
Age	34.93	17.77	12.00	100.00
Marital status (Dummy, 1 = married)	0.61	0.49	0.00	1.00
Years of completed schooling	5.91	3.66	0.00	20.00
Family Characteristics				
Number of males over 15 years in the family0	2.74	1.82	0.00	11.0
Number of females over 15 years in the family	2.83	1.85	0.00	11.00
Number of males in family with secondary education	0.91	1.17	0.00	8.00
Number of females in family with secondary education	0.87	1.15	0.00	7.00
Schooling of household head	4.03	3.54	0.00	20.00
Land value/100,000	1.16	6.56	0.00	144.00
Livestock (number of large animals in 2001)[a]	3.65	14.68	0.00	252.00
Tractors owned by household in 2001	0.06	0.24	0.00	2.00
Wealth index	0.05	2.01	−6.28	4.48
Wealth index-squared	4.03	5.08	0.00	39.46
Number of family members at internal migrant destination in 1990	0.21	0.57	0.00	5.00
Number of family members at U.S. migrant destination in 1990	0.13	0.44	0.00	5.00
Community Characteristics				
Frequency of transport	8.53	5.83	0.00	24.00
Inaccessibility during weather shocks (Dummy)	0.14	0.35	0.00	1.00
Nonagricultural enterprise in village (Dummy)	0.25	0.43	0.00	1.00

Source: ENHRUM 2003.

Note: Sample size = 7,298.

a. Livestock includes oxen, cattle, and horses.

migrants from rural Mexico work in nonfarm rather than farm jobs. In the ENHRUM sample, 78 percent of all international migrants were observed in nonfarm jobs in 2002.[6] Farm labor migration is dominated by males. The female share is highest (35 percent) for internal migration to nonfarm jobs and lowest (5

percent) for international migration to farm jobs. A higher percentage of migrants (62 percent of internal, 72 percent of international) than nonmigrants (60 percent) are married.

Family Characteristics

Family characteristics include physical capital: land, livestock holdings, and equipment. Landholdings are measured in value terms, to reflect both quality and quantity. Livestock is proxied by the number of large animals (oxen, horses, cows) owned by the household. Equipment is proxied by the number of tractors owned by the household. Family characteristics also include human capital of family members other than person i, which is measured by the number of males and females with secondary education, years of completed schooling of the household head, migration networks, and an index of family wealth.

The wealth index was constructed using the method of principal components with data on household assets, principally housing characteristics (number of rooms; materials used for the construction of floors, walls, and roofs; dummy variables indicating whether the house had running water, electricity, and sewerage) and other services and durables (telephone, television, and a refrigerator). The procedure closely follows the one used by McKenzie and Rapoport (2004). A positive value of this indicates that a household's wealth is above the average for the sample, while a negative value indicates below-average wealth. We constructed two migration network variables, calculated as the number of family members working in the United States and at internal migrant destinations in 1990. We chose 1990 to minimize potential endogeneity of migration networks.

On average, households had landholdings valued at 116,000 pesos (approximately US$11,600), 3.6 large animals, 0.21 family migrants at internal destinations, and 0.13 migrants in the United States. Few households own tractors; the average per household is 0.06. The data show that there are wide disparities in each of these variables.

Households of nonmigrants in 2002 had few migrants in 1990, an average of 0.17 internal migrants and 0.10 working abroad. Internal migrants' households had more family members at internal destinations (0.65) and few in the United States (0.05). International migrants' households had above-average numbers of family members at both international and internal destinations (0.56 and 0.19, respectively).

Summary statistics reveal that households of international migrants had above-average wealth, indicated by a positive wealth index, while internal migrant households had below-average wealth. The wealth index for nonmigrant households (0.05) is identical to the average wealth index for the full sample. The average value of landholdings is higher in households of nonmigrants (122,000 pesos)

TABLE 1.2 Variable Means by Migrant Destination and Sector of Employment

Variable	Non-migration	Migration destination			Migration-Sector regime		
		Internal migration	International migration	Mexico, farm	Mexico, nonfarm	U.S. farm	U.S. nonfarm
Individual Characteristics							
Household head (Dummy)	0.26	0.18	0.23	0.44	0.17	0.33	0.20
Sex (Dummy, 1 = male)	0.45	0.66	0.84	0.80	0.65	0.95	0.81
Age	35.45	30.81	32.57	31.08	30.80	33.04	32.44
Marital status (Dummy, 1 = married)	0.60	0.62	0.72	0.80	0.61	0.69	0.73
Years of completed schooling	5.75	7.13	6.65	3.84	7.30	6.15	6.79
Family Characteristics							
Number of males over 15 years in the family	2.66	3.01	3.52	2.12	3.05	3.60	3.50
Number of females over 15 years in the family	2.80	3.00	3.11	1.76	3.06	2.77	3.20
Number of males in family with secondary education	0.89	0.98	1.03	0.44	1.00	1.18	0.99
Number of females in family with secondary education	0.86	0.98	0.86	0.12	1.02	0.73	0.90
Schooling of household head	4.11	3.45	3.58	3.40	3.45	3.22	3.69
Land value/100,000	1.22	0.67	0.88	0.10	0.70	0.75	0.91
Livestock (number of large animals in 2001)[a]	3.60	2.26	5.83	0.32	2.36	4.47	6.22
Tractors owned by household in 2001	0.05	0.04	0.13	0.00	0.04	0.05	0.15
Wealth index	0.05	−0.85	1.03	−1.81	−0.80	0.73	1.12
Wealth index-squared	4.01	4.75	3.61	7.74	4.60	4.07	3.48

Number of family members at internal migrant destination in 1990	0.17	0.65	0.19	0.48	0.66	0.14	0.21
Number of family members at U.S. migrant destination in 1990	0.10	0.05	0.56	0.00	0.05	0.48	0.58
Community Characteristics							
Frequency of transport	8.44	9.74	8.39	8.64	9.79	8.58	8.34
Inaccessibility during weather shocks (Dummy)	0.13	0.26	0.14	0.56	0.24	0.18	0.12
Nonagricultural enterprise in village (Dummy)	0.26	0.15	0.24	0.24	0.15	0.21	0.25
N	6297	510	491	25	485	110	381

Source: ENHRUM 2003.

Note: Sample size = 7,298.

a. Livestock includes oxen, cattle, and horses.

than of internal or international migrants (67,000 and 88,000 pesos, respectively). International migrants' households average 5.8 head of livestock (oxen, cattle, and horses), compared with 3.6 for nonmigrants' households and 2.3 for households of internal migrants.

Average schooling of heads is 4.1 years in households of nonmigrants, 3.4 years in households of internal migrants, and 3.6 years in households of international migrants.

Community Characteristics

There are several candidates for indicators of access to markets and access risk. We include two indicators in our econometric model. The first is frequency of transport availability between the village and commercial centers with which villagers transact. To construct the frequency of transport variable, we (a) created a list of commercial centers (node) with which each village interacted; (b) constructed an index of frequency of regularly scheduled transportation between the village and each of these nodes, ranging from zero (less than one trip per day) to three (more than six trips per day); and (c) summed this frequency index across commercial nodes. The higher the value of this index, the greater the frequency of transport and number of outside communities with which the village is linked via regularly scheduled transportation.[7] The second indicator is a proxy for security of market access, a dummy variable equal to 1 if the village is accessible in the case of natural disasters and 0 otherwise (for example, it is located at the end of a road or across a bridge that may become inaccessible). Our list of community variables also includes the presence of local nonfarm enterprises, which may offer employment alternatives to migration.

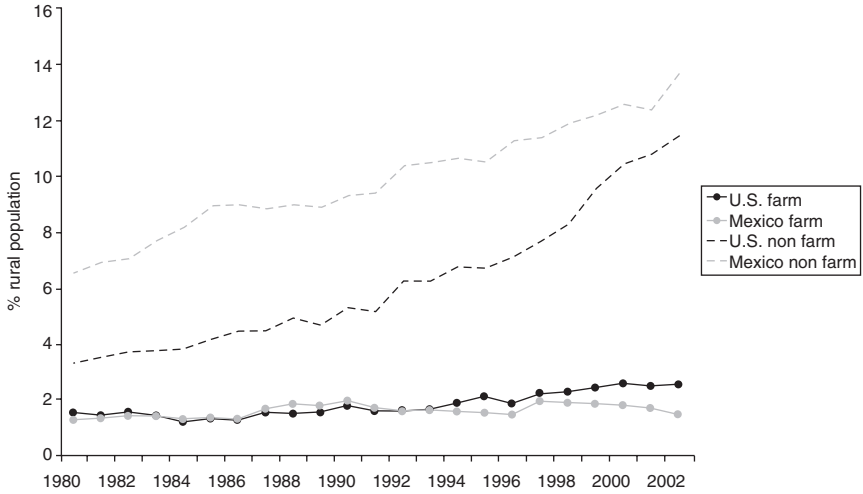
The frequency of transport index averages 8.5 but ranges from 0 to 24. Fourteen percent of villages lack access to transport during weather shocks, and one in four has a nonagricultural enterprise. Both frequency of transport and insecurity of market access are highest for households of internal migrants. The share in villages with nonagricultural enterprises is highest for nonmigrants (0.26) and lowest for internal migrants (0.15).

Correlations among this complex set of variables limit the usefulness of summary statistics to identify migration determinants. A multivariate regression approach that controls for these correlations is required to obtain reliable estimates of the effects of individual, family, and community characteristics on migrant destination and employment sector choice.

Estimation and Results

Figure 1.2 illustrates trends in the percentage of rural Mexicans employed as internal and international migrants in farm and nonfarm jobs from 1980 through

FIGURE 1.2 Labor Migrants as Percentage of Mexican Village Populations, by Migrant Destination and Sector of Employment, 1980–2002



Source: ENHRUM 2003.

2002. It shows a sharp upward trend in the percentage of villagers working as internal and international migrants in nonfarm jobs, a mildly upward trend in the percentage in U.S. farm jobs, and a declining trend in the percentage in agricultural jobs in Mexico. The decrease in internal migrants employed in farm jobs reflects a decline in Mexico's agricultural employment in the 1990s.[8] In 2002, an average of 14 percent of the Mexican village population was working in the United States. This figure is higher than for the percentage of the total Mexican population; approximately 9 percent of all Mexicans were in the United States in 2002.[9] Most international migrants from rural Mexico (82 percent) were employed in U.S. nonfarm jobs. On average, 15 percent of village populations were observed as internal migrants. Of these, 90 percent were in nonfarm jobs.

We first estimated a two-regime logit model for migration and nonmigration[10] and a three-regime multinomial model for nonmigration, international migration, and internal migration. We then expanded the model to the five destination-sector (agriculture and nonagriculture) regimes. All three models were estimated using maximum likelihood in Stata.

Table 1.3 reports the estimation results for the two- and three-regime migration models, and table 1.4 reports the results for the five-choice migration-sector regime model. The columns in these two tables correspond to migrant destinations

TABLE 1.3 One- and Two-Destination Multinomial Logit Model Results

Variable	Migration destination		
	All migration	Internal migration	International migration
Individual Characteristics			
Household head (Dummy)	−0.580 (−4.55)***	−0.652 (−3.79)***	−0.572 (−3.25)***
Sex (Dummy, 1 = Male)	1.659 (17.31)***	1.220 (10.1)***	2.302 (15.21)***
Age	0.180 (10.57)***	0.163 (7.48)***	0.201 (7.96)***
Age squared	−0.002 (−11.36)***	−0.002 (−7.52)***	−0.003 (−8.99)***
Marital status (Dummy, 1 = married)	0.324 (3.13)***	0.129 (0.97)	0.599 (4.00)***
Years of completed schooling	0.080 (5.71)***	0.144 (7.82)***	0.010 (0.55)
Family Characteristics			
Number of males over 15 years in the family	0.043 (1.53)	0.042 1.09	0.051 (1.37)
Number of females over 15 years in the family	0.032 (1.16)	−0.025 −0.65	0.065 (1.75)*
Number of males in family with secondary education	−0.105 (−2.54)**	−0.126 (−2.28)**	−0.098 (−1.74)*
Number of females in family with secondary education	0.037 (0.89)	0.115 (2.08)**	−0.029 (−0.5)
Schooling of household head	−0.074 (−5.38)***	−0.078 (−4.17)***	−0.061 (−3.21)***
Land value/100,000	−0.039 (−2.53)**	−0.048 (−1.85)*	−0.035 (−1.92)*
Livestock (number of large animals in 2001)	−0.002 (−0.62)	−0.009 (−1.18)	−0.001 (−0.49)
Tractors owned by household in 2001	0.478 (2.96)***	0.141 (0.52)	0.695 (3.6)***
Wealth index	−0.010 (−0.43)	−0.239 (−6.6)***	0.264 (7.2)***
Wealth index−squared	0.010 (1.22)	−0.016 (−1.36)	−0.009 (−0.68)

TABLE 1.3 ***(continued)***

Variable	Migration destination		
	All migration	Internal migration	International migration
Number of family members at internal migrant destination in 1990	0.557 (10.24)***	0.716 (11.91)***	0.107 (1.03)
Number of family members at U.S. migrant destination in 1990	0.813 (10.1)***	−0.221 (−1.11)	1.154 (12.3)***
Community Characteristics			
Frequency of transport	0.019 (2.89)***	0.029 (3.59)***	0.009 (0.91)
Inaccessible during weather shocks (Dummy)	0.548 (5.18)***	0.465 (3.63)***	0.633 (3.92)***
Nonagricultural enterprise (Dummy)	−0.297 (−3.09)***	−0.506 (−3.64)***	−0.061 (−0.48)

Source: ENHRUM 2003.

Note: Sample Size = 7,298. Likelihood Ratio χ^2 (42) = 1,642.86. t-statistics in parentheses. Default category: In village.

*** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent.

and sectors of employment, the rows to explanatory variables. Asymptotic t-statistics appear in parentheses underneath the parameter estimates. The estimates presented in these tables are of the vector β_d in equation 1.1. As noted earlier, they represent the utility returns to each characteristic in regime d. These have the same signs and significance as the marginal effects of explanatory variables on migration probabilities. To obtain estimates of the probabilities of participating in migration or migration/sector regimes, these must be used together with variable means as shown in equation 1.1. Estimated effects of explanatory variables on migration and sector probabilities are presented in tables 1.5 and 1.6.

Each table reports results for the three sets of explanatory variables in the model: individual, family, and community characteristics. In most cases, all three play a significant role in shaping migration decisions. However, in many cases, the effects of these variables differ qualitatively and quantitatively between migration types and sectors of employment.

TABLE 1.4 Two-Destination, Two-Sector Multinomial Logit Model Results

Variable	Migration/Sector regime			
	Mexico, farm	Mexico, nonfarm	U.S. farm	U.S. nonfarm
Individual Characteristics				
Household head (Dummy)	−0.347 (−0.53)	−0.712 (−3.99)***	−0.082 (−0.24)	−0.742 (−3.76)***
Sex (Dummy, 1 = Male)	2.007 (3.06)***	1.2037 (9.81)***	3.422 (7.18)***	2.147 (13.4)***
Age	0.107 (1.02)	0.163 (7.33)***	0.155 (3.54)***	0.219 (7.4)***
Age squared	−0.002 (−1.49)	−0.002 (−7.25)***	−0.002 (−4.34)***	−0.003 (−8.17)***
Marital status (Dummy, 1 = married)	1.135 (1.61)	0.092 (0.68)	0.513 (1.78)*	0.618 (3.73)***
Years of completed schooling	−0.258 (−2.65)***	0.158 (8.44)***	−0.015 (−0.4)	0.020 (0.93)
Family Characteristics				
Number of males over 15 years in the family	−0.103 (−0.5)	0.048 (1.25)	0.089 (1.29)	0.040 (0.99)
Number of females over 15 years in the family	−0.073 (−0.36)	−0.017 (−0.45)	−0.004 (−0.06)	0.084 (2.08)**
Number of males in family with secondary education	0.325 (1.02)	−0.139 (−2.49)**	0.075 (0.76)	−0.155 (−2.44)**
Number of females in family with secondary education	−1.119 (−1.86)*	0.123 (2.21)**	−0.072 (−0.61)	−0.022 (−0.36)
Schooling of household head	0.023 (0.25)	−0.077 (−4.04)***	−0.117 (−2.95)***	−0.044 (−2.15)**
Land value/100,000	−1.527 (−1.33)	−0.044 (−1.74)*	−0.033 (−0.85)	−0.036 (−1.78)*
Livestock (number of large animals in 2001)	−0.250 (−1.11)	−0.007 (−1.05)	0.001 (0.14)	−0.002 (−0.53)
Tractors owned by household in 2001	−28.756 (0.00)	0.123 (0.45)	−0.178 (−0.37)	0.836 (4.15)***

TABLE 1.4 ***(continued)***

Variable	Migration/Sector regime			
	Mexico, farm	Mexico, nonfarm	U.S. farm	U.S. nonfarm
Wealth index	−0.085 (−0.47)	−0.247 (−6.68)***	0.221 (3.53)***	0.293 (6.58)***
Wealth index squared	0.020 (0.43)	−0.018 (−1.57)	0.029 (1.3)	−0.029 (−1.7)*
Number of family members at internal migrant destination in 1990	0.861 (3.06)***	0.713 (11.71)***	−0.138 (−0.57)	0.167 (1.49)
Number of family members at U.S. migrant destination in 1990	−30.901 (0.00)	−0.197 (−0.99)	1.105 (7.69)***	1.167 (11.84)***
Community Characteristics				
Frequency of transport	−0.002 (−0.06)	0.031 (3.71)***	0.023 (1.27)	0.004 (0.4)
Inaccessible during weather shocks (Dummy)	2.506 (4.43)***	0.357 (2.69)***	0.835 (2.96)***	0.553 (2.97)***
Nonagricultural enterprise (Dummy)	0.920 (1.46)	−0.571 (−3.99)***	−0.225 (−0.89)	−0.024 (−0.17)

Source: ENHRUM 2003.

Note: Sample Size = 7,298.Likelihood Ratio χ^2 (84) = 1777.63. t-statistics in parentheses. Default category: In village.

*** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent.

Selectivity of Migration from Rural Mexico Total migration includes a heterogeneous mixture of migration to internal and international destinations and to farm and nonfarm jobs. The first data column of table 1.3 reveals that, despite this heterogeneity, most individual, household, and community variables are significant in explaining the movement of individuals out of villages.

Household heads are significantly less likely to migrate than non-heads-of-household. This finding is consistent with the hypothesis that household heads have family farm-specific human capital and thus a high opportunity cost of migrating. Males are significantly more likely to migrate than females. The probability of migration increases with age, but at a decreasing rate. This reflects the selectivity of migration on the working-age population but not on the very young

or elderly. Married villagers are significantly more likely to migrate than those who are not married, a finding that is similar to the positive effect of this variable in studies of labor-force participation.[11]

Other things being equal, the probability of migration rises significantly with years of completed schooling of the individual, suggesting that the economic returns to schooling, on average, are higher in migrant labor markets than in the village. However, migration is negatively associated with schooling of the household head. This is consistent with our expectation that household heads' schooling raises the productivity of labor in family production activities, thereby raising the opportunity cost of migration. There is evidence that migration propensities are lower in households with adult males (other than the migrant and head) who have secondary education. Interestingly, the number of males and females older than 15 in the family are not significantly related to migration propensities when we control for all other variables in the model. It appears that human, family, and community capital variables, not sheer numbers of adult family members, are the critical variables promoting migration.

As the value of family landholdings increases, the probability of migration decreases. This is what we would expect if household landholdings and land quality increase the productivity of family labor. Livestock holdings are not significantly associated with migration. Livestock production is not labor intensive and, unlike other land-based production activities, it does not appear to compete with migration for family labor. Controlling for these assets, our index of household wealth does not significantly affect migration in general (although this is not true for migration to specific destinations; see below). Both migration network indicators have an effect on migration that is positive and highly significant, supporting the contention by Massey, Alarcón, and others (1987) that migration is a network-driven process.[12]

All three community variables significantly explain total migration. Migration increases with villages' transportation access to commercial centers, which we use as a proxy for market integration. This finding may suggest that migration and market integration are complements on a local level. Nevertheless, other market-integration variables we tested were not significant.[13] Thus, our results leave room for the possibility that the effect of transportation on migration is ambiguous. Better transportation reduces transaction costs in labor markets, but it also lowers transaction costs in markets for local production activities that may compete with migration for family labor. The relationship between insecurity of market access and migration is positive and significant. Other things being equal, individuals in villages with insecure access to outside markets are more likely to migrate than individuals in villages where market access is secure. Migration decreases when nonfarm enterprises are present in the village.

Multinomial logit results (tables 1.3 and 1.4) reveal that the impacts of these explanatory variables are not uniform across migration destinations or sectors of migrant employment.

Internal Migration

The effects of schooling on migration are sector specific. Schooling has a significant positive effect on total migration (table 1.3) and on internal migration to nonfarm jobs (table 1.4), in which the economic returns to schooling obtained in Mexico are likely to be high. However, it is negatively associated with internal migration to farm jobs, in which skill requirements are minimal and thus the economic returns to education are likely to be small. A similar pattern is evident for the other major human capital variable. Age has a quadratic (inverted U) relationship with total migration, internal migration, and internal migration to nonfarm jobs. However, there is no significant evidence of an age (or experience) effect on internal migration to farm jobs. The negative effect of the household-head variable on migration probabilities is robust across migrant destinations. However, it is not significant for internal migration to farm jobs. Males are more likely than females to migrate internally to jobs in both sectors.

Most of the family characteristics that significantly explain migration also explain internal migration to nonfarm jobs. However, few are significant in explaining migration to farm jobs. The exceptions are the number of females with secondary education, which is negatively associated with internal farm labor migration, and the internal migration network instrument. Internal migration to nonfarm jobs is significantly and positively shaped by individuals' schooling. However, as schooling of the household head rises, the propensity for other household members to migrate internally to nonfarm jobs decreases. Landholdings have a significant negative effect on internal migration, although this effect is not significant for internal migration to farm jobs. Livestock holdings have no significant effect on internal migration to either sector. In contrast to total migration, the propensity for internal migration decreases significantly (linearly) with household wealth. The number of family members at internal migrant destinations (lagged 10 years) has a significant positive effect on internal migration to both farm and nonfarm jobs. There is no significant evidence of competition between U.S. migration networks and internal migration to either sector.

Community context variables also differentially influence internal-migrant destinations. Internal migration to nonfarm (but not farm) jobs is positively associated with the extent of village integration with outside markets. The presence of nonagricultural enterprises in the village appears to compete with internal migration to nonfarm (but not farm) jobs. Insecurity of market access increases the

likelihood of internal migration to both sectors, a finding consistent with migration's role as a risk buffer for rural households.

International Migration

There is a striking difference in the association between schooling and migration for internal and international migration. International migration for rural Mexicans overwhelmingly entails unauthorized entry and employment in low-skill jobs requiring, at most, primary schooling. Wages in those jobs frequently are more than 10 times the minimum wage in Mexico; however, they generally do not depend on education. Few U.S. farmers, contractors, or households are aware of the schooling levels of the unauthorized Mexican immigrants they hire. In light of this, it is not surprising that individuals' years of completed schooling do not significantly affect their probability of international migration to either farm or nonfarm jobs. The number of females with secondary education also is not associated with international migration to either sector. However, as in the case of internal migration to nonfarm jobs, the household head's schooling is negatively associated with international migration to both farm and nonfarm sectors.

Like internal migrants, international migrants are significantly more likely to be males and less likely to be household heads. Age has a significant inverted-U-shaped relationship with the likelihood of international migration to both farm and nonfarm jobs, and married individuals are significantly more likely to be foreign migrants.

Migration networks, proxied by the number of family members in the United States in 1990, are by far the most statistically significant family variables influencing international migration. This is consistent with many past studies of Mexico-to-U.S. migration. It is noteworthy that migration networks have a much more significant effect on international than on internal migration. This no doubt reflects the greater costs and risks, and thus the greater value of family contacts, in international migration. It generalizes Taylor's (1986) finding that networks have differential effects on internal and international migration. (That study had access to data from only two villages.)

Controlling for migration networks and other variables, there is no evidence that local market integration discourages international migration. Frequency of transport is positively associated with international migration to both sectors, although it is not significant. Controlling for market access, villages at risk of losing their access to outside markets in times of weather shocks have higher international migration probabilities. The presence of local nonfarm enterprises does not significantly discourage international migration to either farm or nonfarm jobs.

Statistical Versus Quantitative Significance

Statistical significance reported in tables 1.3 and 1.4 does not necessarily imply that variables are important quantitatively in explaining migration. Tables 1.5 and 1.6 present estimated marginal effects of variables on migration-sector choice probabilities. They were constructed using the logit parameter estimates and probability function—equation 1.1—by increasing each variable by a small amount and then recalculating migration destination-sector probabilities, holding all other variables constant at their means. For dummy variables (household head, gender, marital status), probabilities were calculated setting the variable first to one and then to zero. Other discrete variables (schooling, age, numbers of family members, tractors, migration networks) were increased by one unit above their means. Continuous variables (wealth, land value) were increased by 1 percentage point above their means. To assess the importance of the percentage effects of each variable, it is useful to remember the baseline probability of each destination and sector choice at the means of all variables. These are given in table 1.7. The highest probabilities are for migration to nonfarm sectors abroad and in Mexico (0.067 and 0.066, respectively). The lowest is migration to farm jobs in Mexico (0.003). A change in an explanatory variable may have a small absolute effect, but a large relative effect, on the probability of migration to a destination-sector combination whose baseline probability is low (for example, international migration to farm jobs). Nevertheless, it is the absolute effects that are of most interest from the standpoint of identifying variables that influence whether individuals migrate, their destinations, and their sectors of employment.

A comparison of tables 1.3 and 1.4 with tables 1.5 and 1.6 illustrates the difference between statistical and scientific significance when modeling migration, particularly for specific destination-sector combinations. Many more variables are quantitatively important in explaining the probability of leaving the village (first data column in table 1.5) than the probability of migrating to specific destinations. Fewer are quantitatively important in explaining sector of employment at specific migrant destinations (table 1.6).

All things being equal, males have a 14 percent higher probability of leaving the village as labor migrants than females. The effects of the other dichotomous variables (household head and marital status), while statistically significant, are quantitatively smaller than that of the gender variable: married individuals are 2.4 percent more likely to migrate, while household heads are 4.4 percent less likely to migrate. Schooling is both statistically and quantitatively significant. A 1-year increase in schooling above the mean of 5.9 years raises the migration probability by 0.78 percentage points. Age has a larger quantitative effect; a 1-year increase in age is associated with a 1.3-percentage-point increase in migration probability.

TABLE 1.5 Estimated Marginal Effects on Migration Probabilities

Variable	Migration destination		
	All migration (%)	Internal migration (%)	International migration (%)
Individual Characteristics			
Household head (Dummy)	−4.399***	−2.046***	−1.135***
Sex (Dummy, 1 = male)	14.234***	4.352***	6.267***
Age	1.327***	0.623***	0.499***
Age squared	−0.019***	−0.008***	−0.007***
Marital status (Dummy, 1 = married)	2.434***	0.415	1.320***
Years of completed schooling	0.767***	0.562***	0.011
Family Characteristics			
Number of males over 15 years in the family	0.391	0.150	0.118
Number of females over 15 years in the family	0.368	−0.095	0.159*
Number of males in family with secondary education	−0.943**	−0.429**	−0.209*
Number of females in family with secondary education	0.194	0.449**	−0.077
Schooling of household head	−0.639***	−0.271***	−0.132***
Land value/100,000	−0.314**	−0.002*	−0.001*
Livestock (number of large animals in 2001)	−0.017	−0.031	−0.003
Tractors owned by household in 2001	3.971***	0.450	2.263***
Wealth index	−0.072	0.000***	0.000***
Wealth index—squared	0.107	−0.002	−0.001
Number of family members at internal migrant destination in 1990	4.947***	3.664***	0.162
Number of family members at U.S. migrant destination in 1990	6.908***	−0.886	4.871***
Community Characteristics			
Frequency of transport	0.139***	0.109***	0.018
Inaccessibility during weather shocks (Dummy)	5.493***	1.897***	1.779***
Nonagricultural enterprise in village (Dummy)	−2.435***	−1.569***	−0.101

Source: ENHRUM 2003.

Note: *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent in the Multinomial Logit Model for the columns of migration destination; the marginal effects are reported for the Probit Model in the column of all migration.

TABLE 1.6 Estimated Marginal Effects on Migration-Sector Probabilities

Variable	Migration/Sector regime		
	Mexico nonfarm	U.S. farm	U.S. nonfarm
Individual Characteristics			
Household head (Dummy)	−2.117***	−0.017	−1.061***
Sex (Dummy, 1 == male)	4.110***	1.842***	4.183***
Age	0.594***	0.057***	0.407***
Age squared	−0.007***	−0.001***	−0.006***
Marital status (Dummy, 1 = married)	0.276	0.174*	1.005***
Years of completed schooling	0.595***	−0.008	0.024***
Family Characteristics			
Number of males over 15 years in the family	0.168	0.033	0.067
Number of females over 15 years in the family	−0.065	−0.002	0.152**
Number of males in family with secondary education	−0.451**	0.031	−0.242
Number of females in family with secondary education	0.460**	−0.027	−0.046
Schooling of household head	−0.256 ***	−0.039***	−0.070**
Land value/100,000	−0.002*	0.000	−0.001*
Livestock (number of large animals in 2001)	−0.025	0.000	−0.002
Tractors owned by household in 2001	0.367	−0.068	2.189***
Wealth index	0.000***	0.000***	0.000***
Wealth index-squared	−0.003	0.000	−0.002
Number of family members at internal migrant destination in 1990	3.492***	−0.060	0.238
Number of family members at U.S. migrant destination in 1990	−0.764	0.697***	3.671***
Community Characteristics			
Frequency of transport	0.111***	0.008	0.006
Inaccessibility during weather shocks	1.341***	0.403***	1.117***
Nonagricultural enterprise in village	−1.769***	−0.071	−0.008

Source: ENHRUM 2003.

Note: *** significant at 1 percent, ** significant at 5 percent, * significant at 10 percent in the Multinomial Logit Model.

TABLE 1.7 Baseline Probability for Each Migration Destination-Sector Regime

Sector of employment	Migration destination		
	Internal	International	All migrants
Farm	0.003	0.015	0.018
Nonfarm	0.066	0.052	0.119
Both	0.070	0.067	0.137
Number of migrants	510	491	1,001
Total sample size (migrants plus nonmigrants)		7,298	

Source: ENHRUM 2003.

Migration networks are important both statistically and quantitatively. The ex-ante presence of an additional family member at an internal migrant destination, all things being equal, raises the probability of migration by 5 percent, and an additional family member at a U.S. migrant destination increases the migration probability by nearly 7 percent.

Insecurity of market access appears to be the most important community variable influencing total migration and migration to each destination. The nonagricultural enterprise and frequency of transportation variables both have a quantitatively important effect on internal but not international migration.[14]

Even the most significant determinants of migration have a smaller quantitative effect on migration to specific destinations than on total migration. For example, the probability of migrating, ceteris paribus, is 14.2 percent greater for males than for females. The probability of internal migration, however, is only 4.4 percent higher for males, while that of international migration is 6.6 percent higher. From a quantitative perspective, the most significant variables explaining internal migration appear to be gender, internal-migration networks, household-head status, and inaccessibility to markets during weather shocks. The probability of internal migration increases by 0.56 percentage points per year of schooling and 0.62 percent per year of age or experience. The most important variables driving international migration from a quantitative perspective are gender, U.S. migration networks, physical capital (tractors, which are a substitute for migrant labor on the farm), and insecurity of market access. The wealth index is statistically significant in explaining migration, but the effect of a change in this variable on the probability of migration to either destination is negligible.

Because the probability of internal migration to farm jobs is very small, none of the variables have a measurable impact on the probability of internal farm labor

migration. (All are less than 0.0 and thus are not shown in table 1.6). The majority of internal migrants (more than 95 percent) are employed in nonfarm jobs; thus, the effects of explanatory variables on this destination-sector combination are similar to those on the overall probability of internal migration.

There are more quantitative differences among sectors in the case of international migration. Migration to farm jobs abroad is influenced in a quantitatively important way by gender, international migration networks, and insecurity of market access. However, the effects of these three variables are much larger quantitatively for international migration to nonfarm jobs. The gender variable has a quantitatively larger effect on the probability of international migration to nonfarm jobs than on the probability of any other destination-sector combination. Although education has a statistically significant effect on international migration to nonfarm (but not farm) jobs, this effect is quantitatively small—less than 0.02 percent per year of completed schooling. This reflects a low economic return from schooling for migrant workers from rural Mexico in U.S. farm and nonfarm jobs.

Measurement Issues and Unobserved Variables

Some variables may be affected by migration and remittances. This is a difficult methodological problem that bedevils many migration and remittances studies. For example, family investments in education, physical capital, and housing are likely to be affected by the presence of a migrant or the receipt of remittances (see Adams 1991). If the economic value of a skill is higher than the cost of acquiring it, economic logic suggests that an individual should invest in schooling. This calculus may hinge on access to migrant labor markets, which is reflected in household migration history. Individuals who do not view themselves as having a high probability of migration or access to migrant labor markets are likely to use the economic returns to schooling within the village as their reference when making schooling decisions. If returns to schooling are higher in migrant labor markets than in the village, then a positive probability of migrating may stimulate investments in schooling. This is the rationale behind recent research on the so-called "brain gain." If the individual has a positive probability of migrating to a destination where wages are high, but the returns to schooling are low, there may be a disincentive to invest in schooling. This might be the case for unauthorized migration to low-skilled labor markets abroad.

Wealth, tractor ownership, value of landholdings, and education variables are for 2001, the year in which migration decisions are modeled in our analysis. That is, they are predetermined variables. A significant portion of household landholdings are comprised of *ejido*, or reform-sector, parcels distributed to households decades earlier. Nevertheless, it may still be argued that these variables are not

truly exogenous, inasmuch as both they and current migration are correlated with past migration decisions. They may be correlated with migration choices over time, in ways that cannot be modeled explicitly using cross-section data.

The main econometric concern surrounding endogeneity is that the inclusion of "contaminated" explanatory variables may bias findings with respect to other explanatory variables in the model. To explore this possibility, we reestimated the model, omitting the explanatory variables most likely to be influenced by past migration behavior: physical assets (proxied by ownership of tractors), wealth (reflecting housing characteristics), the value of landholdings, and family schooling. None of the key results of our analysis change when these variables are excluded from the regressions.[15] One might also argue that migration networks are endogenous. We used migration networks in 1990, 12 years before the survey, as proxies for networks in an effort to minimize this potential bias. Other instruments for migration networks in 2002 were not available.

Unobserved variables also may influence migration decisions. This may bias econometric results if omitted variables are correlated with the included, explanatory variables in the model. Individual-level fixed effects estimation cannot be used to address this problem using cross-sectional data, and there are limitations to the use of fixed effects methods in limited dependent variable models generally (Greene 2004). We reestimated the model using regional dummy variables to control for unobserved regional characteristics that might affect migration decisions. None of our findings changed qualitatively, and the inclusion of location fixed effects resulted in only minor quantitative changes. All things being equal, international migration probabilities tend to be higher and internal migration probabilities tend to be lower in the central and northern regions than in the southern (default) region. The west-central regional dummy variable is significant in explaining international migration to farm jobs, but none of the regional dummy variables is significant in explaining internal migration to farm jobs. We also included distance to the Mexico-U.S. border among the community characteristics in the regression. The coefficient on this variable was just significant at the 0.10 level for internal farm migration but insignificant for all other migration-sector combinations, and the findings with respect to other variables in the model did not change.

Conclusions

The econometric results presented in this chapter indicate that migration is highly selective of individuals, families, and communities. However, this selectivity differs significantly by migrant destination and sector of employment. For example, individuals' schooling has a significant positive effect on internal migration to

nonfarm—but not farm—jobs. Schooling has no significant effect on international migration, which usually entails unauthorized entry and work in low-skill labor markets where the returns to schooling obtained in Mexico are likely to be small. Family contacts in the United States significantly affect international migration to both farm and nonfarm jobs. Networks in Mexico significantly affect internal migration, but much less for farm than for nonfarm jobs. Work experience has a significant positive effect on international migration to both farm and nonfarm jobs, but its effect on internal migration is significant only for nonfarm migration. Family landholdings do not significant affect internal migration. However, they have a significant positive effect on international migration to farm jobs. Household wealth has a significant negative effect on internal migration to nonfarm jobs but a positive effect on international migration to both sectors.

A few variables appear to have relatively uniform effects across migration-sector regimes. Schooling of household heads appears to raise the opportunity cost of migrating for other household members. Males are significantly more likely to migrate to all destination-sector combinations than are females. Insecurity of market access during weather shocks uniformly stimulates migration. The presence of nonagricultural enterprises in villages discourages migration but is statistically and quantitatively significant only for internal migration to nonfarm jobs.

Our findings have implications for modeling, theory, and policy. Migration and sector choice are interrelated. The model presented here brings both migration destinations and sectors of migrant employment into an integrated modeling framework. Not only individual but also family and community characteristics are significant in shaping migration. In particular, migrant networks, access to markets, and access risks at the community level influence migration and sector choice. As access to migrant labor markets and market integration in rural Mexico increase, migration patterns are likely to change. Moreover, as market integration and other policies, including U.S. immigration policies, change, the mix of characteristics in rural areas will be affected via the selectivity of migration to different locales and sectors.

The significant effect of network variables in internal and international migration reflects a migration momentum that can be reinforced by legalization and guest worker programs in the United States and policies and events that encourage migration within Mexico. Our findings support the conclusion of several past studies that networks of existing contacts at migrant destinations are key determinants of the magnitude of migration and sector of employment for future migrants (Taylor 1987; Munshi 2003), but there are other key determinants, as well.

We find that, at a local level, there is no evidence that integration with outside markets discourages migration. Other things being equal, the level of transportation infrastructure is positively related to migration, particularly to internal

destinations. However, when access to markets outside the village is insecure, migration propensities increase. This is consistent with migration's role as a risk management tool in rural households. In the final analysis, market openness, ceteris paribus, may simply make it easier to migrate, and exposure to market risks may create new migration incentives.

In the short run, market integration and U.S. immigrant legalization policies, which strengthened migration networks, may have accelerated the movement of populations out of rural Mexico. In the long run, the migration of people out of rural areas surely will continue in Mexico, as it has in virtually all countries experiencing income growth. The selectivity of migration on specific variables suggests that changes in the magnitude and patterns of migration will alter the characteristics of rural households and communities over time.

Endnotes

1. 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 three 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 three months in 2002. The size of both villager and migrant populations in the synthetic cohorts created using retrospective data is biased downward as one goes back in time, because as individuals die, they are removed from the population and thus are not available to be counted in 2003. Permanent migration does not pose a problem, because information about migrants was provided by other family members in the village. In the relatively rare case in which entire families migrated, overall migration estimates may be biased downward; however, it is not clear whether this would produce an upward or downward bias in the *slope* of the migration trend.

2. The Mexico-born population in the United States increased from 6.7 million to 10.6 million between 1990 and 2000 (Chiquiar and Hanson 2005).

3. These include sociodemographic surveys by the Mexico Migration Project (MMP) (Population Studies Center, University of Pennsylvania, Philadelphia; www.pop.upenn.edu/mexmig/welcome.html) and various economic surveys of communities conducted in the 1980s and 1990s by the University of California, Davis, and El Colegio de Mexico (Taylor 1986, 1987; Taylor and Yúnez-Naude 2000). Although households were sampled randomly within villages, selection of villages was not random and the surveys spanned a number of years. MMP surveys tend to focus on relatively high-migration communities in central Mexico.

4. In one of his classic papers, Mundell (1957) shows that trade and migration are substitutes in the Heckscher-Ohlin model. More recent papers have used a variety of models and have reached different conclusions. Markusen (1983) examines variants of the Heckscher-Ohlin model and finds that the two variables are complements. López and Schiff (1998) find that they are substitutes (complements) in the case of skilled (unskilled) labor. Ethier (1996) and Schiff (1996) review some of the literature's findings on substitution and complementarity.

5. Some variables, for example, education, also may affect household attitudes and tastes.

6. Although most Mexican migration is to nonfarm jobs, as mentioned previously, the majority of U.S. farm jobs are filled by Mexican workers. This is a not contradiction; agriculture accounts for a small share of total U.S. employment.

7. Note that, although treating the number of trips in categories might pose a problem in general, it does not have a perverse effect in the current case.

8. The total nonfarm payroll in Mexico increased by 73 percent from 1990 through 2001 in real terms, while the farm payroll decreased by 5.2 percent (INEGI 2003).

9. The Current Population Survey shows that there were a total of 9.82 million Mexicans in the United States in 2002. In that same year, the population of Mexico was estimated at 103 million. This means that approximately 9 percent of all Mexicans were living in the United States.

10. We also estimated a two-choice probit with identical qualitative results.

11. Most (but not all) household heads in the sample are married, but most married individuals in the sample are not heads of households. This is because the sample includes all sons and daughters of either the household head or his/her spouse. Taken together, the findings on the household head and marital status variables indicate that, other things (including marital status) being equal, household heads are significantly more likely to migrate than non-heads-of-household. Also, other things (including status as a household head) being equal, married individuals are more likely to engage in migration. Descriptive statistics (not shown) reveal that most household heads do not migrate.

12. The result on networks might be subject to an endogeneity problem. The two migration network indicators we used are for 1990, that is, measured with a 13-year lag. This was done under the assumption that it would help resolve (part of) the endogeneity problem, with the 'part' depending on the degree of serial correlation of the two indicators. Although a better alternative might have been to estimate a dynamic model, we do not have the data to do that (although we should after the household survey's second round).

13. We experimented with other proxies for market access, including distance to the nearest commercial center and quality of roads, but these variables were not found to be statistically significant.

14. It is important to remember the units in which variables are measured when comparing impacts of changes in variables on migration probabilities. In general, one would expect to find quantitatively larger effects of dummy variables, such as inaccessibility during weather shocks or gender, which take on a value of 0 or 1, than of variables that can take on a larger range of values like frequency of transport (0 to 24) and age (12 to 100).

15. When all of these variables are excluded, the nonagricultural enterprise dummy becomes statistically significant in the internal farm migration equation and, in the U.S. farm migration equation, the marital status dummy becomes insignificant while the number of males older than 15 becomes significant. There are no other qualitative changes and only minimal quantitative changes.

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