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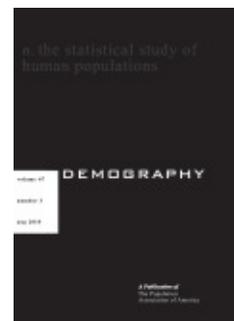
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Amuedo-Dorantes, Catalina.
Mundra, Kusum.

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SOCIAL NETWORKS AND THEIR IMPACT ON THE EARNINGS OF MEXICAN MIGRANTS*

CATALINA AMUJEDO-DORANTES AND KUSUM MUNDRA

We examine the impact of different types of social networks on the wages earned by unauthorized and legal Mexican migrants during their last U.S. trip. Familial ties raise unauthorized and legal migrants' hourly wages by an average of 2.6% and 8%, respectively, and friendship ties increase their wages by 5.4% and 3.6%, correspondingly. Furthermore, family ties seem to comparatively favor legal migrants in terms of earnings, raising their wages by approximately 0.9% more than for similar unauthorized migrants. These results underscore the potentially important role of social networks in raising Mexican migrants' earnings, particularly among unauthorized migrants. By increasing the returns to migration, social networks may provide a stimulus to continued emigration.

Social networks may facilitate migrants' assimilation to their host countries. Public interest in migrants' integration has produced a prolific literature that examines the role of social networks on a wide variety of aspects of migrants' lives, primarily their employment and earnings (e.g., Chiswick and Miller 1996; Fafchamps and Minten 2002; Granovetter 1995; Lin 1999; Mouw 2003; Rauch 2002; Rauch and Trindale 2002). Despite using very different definitions of social networks, previous work on this area has generally found that social networks enhance migrants' employment opportunities, but not necessarily their earnings (e.g., Chiswick and Miller 1996; Fernandez, Castilla, and Moore 2000; Granovetter 1973, 1974). However, to date, the literature has not examined the effect of social networks on the earnings of legal versus unauthorized migrants. This is of special interest in the case of unauthorized migrants, who reached 8.86 million in the United States in 2000, according to U.S. Census Bureau (Robinson 2001).¹ The potential endogeneity of social networks has also received scant attention. Differentiating by legal status and taking into account the potential endogeneity of social networks, we examine the role of social networks on wages earned by migrants during their last U.S. migration.

We use data on return migrants and nonmigrant Mexican households from the Mexican Migration Project (MMP). Mexican migrants constitute a particularly interesting migrant group, given that 55% of the unauthorized migrants in the United States in 2000 were Mexican (Passel 2002). Following Granovetter (1973, 1974, 1982, 1995), we distinguish between two types of ties—*familial ties* and *friendship ties*—to account for the different social capital made available through these ties (Lin 1999; Mouw 2003). We also distinguish between the impact of social networks on hourly wages earned by unauthorized and legal migrants for two reasons. First, U.S. immigration laws have favored family reunification among legal migrants, a feature that would help them broaden their family ties relative to unauthorized migrants. Second, we may expect a different reliance on networks on the part of unauthorized and legal migrants if networks help migrants overcome workplace vulnerabilities. The analysis also takes into account the potential endogeneity of social networks with respect to migrants' earnings, which may arise from a possible correlation between

*Catalina Amuedo-Dorantes, San Diego State University, Department of Economics, San Diego, CA 92182-4485; E-mail: camuedod@mail.sdsu.edu. Kusum Mundra, KM Economic Consulting, La Jolla, CA; E-mail: mundrakusum@yahoo.com. We would like to thank Susan Pozo, as well as participants at the 2004 Allied Social Science Association meetings and at the 2004 Midwest Economic Association meetings for their comments on previous versions of this paper.

1. Alternative estimates of unauthorized migration in the United States can be found in, for example, Passel (2002) or Passel, Capps, and Fix (2004).

social networks and the error terms in the earnings regression. In the following section, we review some of the definitions of social networks in the literature and highlight studies that have examined the impact of social networks on migrant earnings.

BACKGROUND: SOCIAL NETWORKS AND MIGRANT EARNINGS

The effect of social networks on the earnings of migrants differs with the definition of networks, which has varied widely in the literature. For instance, Massey et al. (1987) used data from the MMP and defined social networks as kinship, friendship, and *paisanaje* (i.e., fellow citizens). Orrenius (1999), however, defined family networks as having a relative with U.S. migration experience, whereas Chiswick and Miller (1996) measured social networks by the extent of linguistic concentration in the area where the migrant resides. Yet another definition of social networks recently used by Munshi (2003) measured social networks by the proportion of individuals in the MMP living in the vicinity of the individual in the United States and originating from the same community in Mexico. One of the most influential definitions of social networks is the one provided by Granovetter (1973, 1974, 1982, 1995), who distinguished between strong ties, which are typically kept with family members, and weak ties, which are maintained with acquaintances.

Owing to the different definitions of networks and the variety of methodologies employed, there is a wide range of findings regarding the impact of social networks on migrants' earnings in the literature. For instance, Chiswick and Miller (1996) showed that migrant groups tend to live in the areas where many others speak their language (i.e., areas with a high *linguistic concentration*). This tendency may reduce migrants' incentive to learn the new language and may explain why migrants living in ethnic enclaves earn less than their counterparts living in areas where English is spoken more frequently. In contrast, Mouw (2003) found that, once unobserved worker characteristics are controlled for, the use of contacts positively affects wages. Finally, using the MMP data, Munshi (2003) found evidence of a higher likelihood of holding a higher-paying, nonagricultural job among migrants with larger networks.

Additionally, there is a related literature investigating the effect of migrants' legal status on their earnings. For example, there is evidence of migrants' unauthorized status adversely affecting their earnings in the United States (e.g., Bean, Lowell, and Taylor 1988; Winegarden and Khor 1991). Unauthorized migrants lack appropriate work documentation and are exposed to workplace vulnerabilities that may translate to a greater difficulty in finding employment or to lower wages compared with legal migrants. In this vein, Rivera-Batiz (1999) found that male Mexican legal migrants earn, on average, 41.8% more than unauthorized workers.² Some researchers have argued that unauthorized migrants' lower wages are also due to their lower human capital (e.g., Borjas 1990; Chiswick 1984, 1988; Heer and Falasco 1983). However, differences in human capital—such as migrants' English proficiency—explain only 48% of the log-wage gap between unauthorized and legal male migrants (Rivera-Batiz 1999). Therefore, although some studies have found that most background information is insignificant in determining migrants' earnings (e.g., Kossoudji and Ranney 1986), migrants' legal status may affect their earnings independently of their personal and human capital characteristics.

However, the literature has not yet addressed networking differences between unauthorized and legal migrants or the distinct impact that these networks may have on their respective wages. Given the predominance of unauthorized Mexican migrants in the United States and the aforementioned evidence of migrants' unauthorized status adversely affecting their earnings, we examine how network contacts developed by unauthorized and legal Mexican migrants in the United States over the course of their migration experiences affected their wages during their last U.S. trip. Looking at the impact of accumulated network

2. Similar findings are reported by Kossoudji and Cobb-Clark (2002).

contacts during previous migration experiences on wages earned during the last U.S. stay is of special interest in the case of Mexican migrants because a significant percentage of them are repeat migrants (Massey et al. 1987).

DATA AND SOME DESCRIPTIVE EVIDENCE

We use data from the MMP—a survey designed to study Mexican-U.S. migration by the University of Pennsylvania and Universidad de Guadalajara.³ Our MMP data set includes detailed social, demographic, and economic information from approximately 18,000 households in 107 representative communities in 17 Mexican states.⁴ The survey was conducted annually in the winter months of 1982–1983 and 1987–2004 in communities of various sizes, ethnic compositions, and levels of economic development that are typical source regions for U.S.-bound migrants. Two to five Mexican communities were surveyed each year, with this sample expanding over time to incorporate communities in newer sending states, and approximately 200 households were randomly selected in each community.⁵ For each household, a complete life history was gathered for the household head, which includes detailed information on past migration experiences in the United States. After gathering detailed information on these households, interviewers traveled to the destination areas in the United States to administer identical questionnaires to households from the same communities in Mexico who had settled in the United States and no longer traveled back home.

Our sample consists of migrant and nonmigrant household heads interviewed in Mexico between 1982 and 2004. Additionally, we concentrate on men because of gender differences among migrants, noted in previous studies (e.g., Donato and Kanaiaupuni 2000), and the inability to carry out the analysis by gender owing to the limited number of observations on women in the MMP. The sample is of interest for three reasons. First, it allows us to adequately account for the selectivity entailed in migration while examining the impact of migrant networks on their earnings by incorporating data on both migrants and nonmigrants. Second, using return migrants in our analysis is justified because of the circular nature of Mexican migration (Lindstrom 1996; Lowell 1992; Orrenius 1999).⁶ Finally, for the purpose of this study, the use of MMP data on recurrent migrants is a potential strength because it permits a high degree of uniformity in the sample.⁷ The focus on this particular type of migrant allows us to eliminate many sources of variation and better isolate the role played by social networks on earnings (e.g., Munshi 2003; Orrenius 1999; Philips and Massey 1999).⁸

3. This data set is publicly available on the Internet at <http://mmp.opr.princeton.edu>.

4. The sample covers communities in the states of Aguascalientes, Baja California Norte, Chihuahua, Colima, Durango, Guanajuato, Guerrero, Hidalgo, Jalisco, Michoacán, Nayarit, Nuevo León, Oaxaca, Puebla, San Luis Potosí, Sinaloa, and Zacatecas.

5. Communities in the MMP were not randomly selected, but recently, Massey and Capoferro (2004) showed that the variables in the MMP compare well with the national representative data, the Mexico National Survey of Population Dynamics (Spanish acronym ENADID).

6. As noted by others in the literature (Cornelius 1976, 1978; Massey 1985; Massey et al. 1987; Ranney and Kossoudji 1983), the only permanent thing about Mexican migration is the fact that most of it is repetitive, with the average number of U.S. trips for migrants in our sample being four. It is for this reason that the MMP was conducted between November and February, coinciding with the off-season for agriculture work—a time when many migrants return to Mexico. Therefore, although it prevents us from making inferences about the entire universe of Mexican migrants, our focus on return Mexican migrants is relevant because they account for a significant fraction of Mexican migration (Massey and Zenteno 2000).

7. It is also worth noting that the sample of recurrent migrants in the MMP—that is, those interviewed in Mexico—is intended to be representative of such a group, whereas the snowball sample of Mexican migrants interviewed in the United States is not.

8. For further information regarding the methodology and survey design of the MMP, see <http://mmp.opr.princeton.edu/databases/studydesign-en.aspx>.

Table 1. Availability and Average Size of Mexican Migrants' Social Networks Offering Friendship and Familial Ties According to Migrants' Legal Status

Variables	Mean	SE	Difference in Means ^a	t Statistic
Any Friendship Ties				
Unauthorized migrants	0.4474	0.0093	—	
Legal migrants	0.4345	0.0114	-0.0129	-0.8798
Size of Friendship Ties				
Unauthorized migrants	8.6394	0.2971	—	
Legal migrants	11.4861	0.5990	2.8467	4.2575**
Any Familial Ties				
Unauthorized migrants	0.8296	0.0070	—	
Legal migrants	0.7940	0.0093	-0.0356	-3.0629**
Size of Familial Ties				
Unauthorized migrants	13.2457	0.3002	—	
Legal migrants	16.1611	0.4666	2.9154	5.2551**

^aDifferences in mean relative to the first category in the grouping. We test the hypothesis that the difference $\neq 0$, that is, that the size of social networks available to unauthorized and legal migrants is significantly different from zero.

**Statistically different from zero at $p \leq .01$.

In examining the impact of social networks on the wages earned by Mexican migrants, we distinguish between two types of ties: *familial ties* and *friendship ties*. We define *familial ties* as the number of household members or other relatives already living in the United States one year prior to the migrant's last U.S. trip. *Friendship ties* indicates the number of friends residing in the United States one year prior to the migrant's last U.S. spell. Measuring migrants' networks as of one year prior to their last trip ensures their predetermined character with respect to migrants' earnings during their last migration spell, while still providing an up-to-date measure of the network contacts they may have used during their last U.S. trip.

A detailed description of the variables used in our analysis, as well as their means and standard deviations, is included in Appendix Table A1. Worth noting is that 60% of migrants were unauthorized during their last U.S. trip, and 34% of all men in the sample migrated to the United States at some point in their lives. About 96% of those who migrated and worked earned an average real hourly wage of \$4.34 in 1982–1984 constant dollars. Additionally, 44% of migrants had friendship ties and 82% had familial ties one year prior to their last U.S. trip, with the sizes of such networks averaging 10 friends and 14 household members and relatives, respectively.

The figures in Table 1 further show that a larger fraction of unauthorized migrants, relative to legal migrants, reported having familial and friendship ties. However, these differences are statistically different from zero only in the case of familial ties, perhaps as a by-product of extended out-migration in their communities of origin. It is also interesting to note that, conditional on having familial or friendship ties, legal migrants have larger networks than unauthorized migrants. This finding could be explained by the longer U.S. stays of legal migrants, during which they develop more extended networks of friends or family members by sponsoring their immigration. In addition, the figures in Table 2 show that access to a larger-than-usual network of either familial or friendship ties is associated with higher average real hourly wages among legal migrants. However, among unauthorized migrants, only having a larger-than-usual family network helps raise earnings.

Table 2. Average Real Hourly Wages of Mexican Unauthorized and Legal Migrants According to the Size of Their Social Network of Friendship and Familial Ties

Variables	Mean	SE	Difference in Means ^a	t Statistic
Unauthorized Migrants				
With greater than average friendship ties	4.6003	0.3304	—	—
Without greater than average friendship ties	5.3681	0.1821	0.7678	2.0354
With greater than average familial ties	5.4401	0.2005	—	—
Without greater than average familial ties	4.8952	0.3290	-0.5448	-1.4139 [†]
Legal Migrants				
With greater than average friendship ties	5.2160	0.2394	—	—
Without greater than average friendship ties	4.7801	0.1921	-0.4359	-1.4201 [†]
With greater than average familial ties	6.1596	0.1716	—	—
Without greater than average familial ties	4.1703	0.2170	-1.9893	-7.1917**

^aDifferences in mean relative to the first category in the grouping. We test the hypothesis that the difference is less than zero, that is, that an above average availability of social networks increases migrants' wages.

[†]Statistically different from zero at $p \leq .10$.

**Statistically different from zero at $p \leq .01$.

METHODS

We use Heckman's (1979) selection method when examining the impact of social networks on unauthorized and legal migrants' wages during their last trip to the United States.⁹ The model is composed of two equations:

$$M_i = \beta'_1 X_{1i} + U_{1i} \quad (1)$$

$$W_i = \beta'_2 X_{2i} + U_{2i}, \quad (2)$$

where M_i is a dummy variable indicative of whether the individual has ever migrated to the United States, W_i is the hourly wage earned during the last U.S. trip adjusted for inflation using the consumer price index (CPI),¹⁰ and D_1 represents the outcome from the migration-selection rule:

$$D_1 = \begin{cases} 1 & \text{if } M_i > 0 \\ 0 & \text{if } M_i \leq 0 \end{cases}, \text{ and } W_i \text{ is observed only if } D_1 = 1 \text{ and } (U_{1i}, U_{2i}) \sim \text{bivariate normal} \\ (0, 0, 1, \sigma, \rho).$$

9. Ninety-six percent of migrants worked during their last migration in the United States, making the selection into employment redundant, and correcting for any migration selectivity suffices. However, an explanation of an alternative methodology to correct for the double selection into migration and subsequently into employment when estimating the impact of social networks on the wages earned by working migrants is available upon request.

10. The hourly wage data were checked to address any quality concerns resulting from changes in the survey instrument over time. The data seemed reasonable and, as documented by comparisons of the MMP survey instruments made available from the MMP Web site, the questions on the hourly wage earned in the United States during the most recent visit were not among the altered ones (e.g., see Cuadro D in the Comparison of Ethnosurveys I and II on the MMP Web site at). Finally, the CPI is for all urban consumers with base year 1982–1984 (U.S. Department of Labor, Bureau of Labor Statistics at <http://www.bls.gov/cpi>).

Expected wages are then given by

$$\begin{aligned}
 E(W_i | D_1 = 1) &= W_i = \beta'_2 X_{2i} + \gamma_1 \lambda_i(\cdot) \\
 &= \beta_{2,0} + \beta_{2,1} \text{Undocumented}_i + \beta_{2,2} \text{Friendship ties}_i \\
 &\quad + \beta_{2,3} \text{Undocumented}_i \times \text{Friendship ties}_i + \beta_{2,4} \text{Familial ties}_i \\
 &\quad + \beta_{2,5} \text{Undocumented}_i \times \text{Familial ties}_i + \theta' Z_{2i} + \gamma_1 \lambda_i, \quad (3)
 \end{aligned}$$

where $\gamma_1 = \sigma\rho$, $\lambda = f(\beta'_1 X_{1i}) / F(\beta'_1 X_{1i})$, and $f(\cdot)$ and $F(\cdot)$ are the standard normal density function and distribution function, respectively. Eq. (3) is estimated by maximum likelihood.

Because Eq. (1) models the decision to migrate to the United States for the first time, the vector \mathbf{X}_1 includes a variety of demographic and family characteristics that have been shown to play a significant role in Mexican immigration (e.g., Borjas 1999; Durand et al. 1996; Lindstrom 1996). Such characteristics include migrants' marital status, age, educational attainment, presence of dependents in their households, and the number of family members with U.S. migration experience.¹¹ Additionally, we include information on migrants' economic standing at the time of their first migration captured by any land, property, or business assets, as well as by their employment status before migration took place or during the survey year if they never migrated. To account for migrants' unknown intent to return back home, we control for the number of U.S. trips, the duration of their last U.S. trip, and migrants' legal status. The analysis also includes dummy variables for migrants' state of origin to account for local economic and social conditions possibly affecting the decision to migrate. Finally, accounting for the timing of migration is of interest due to fluctuations in Mexican emigration to the United States over time.¹² Therefore, we also add in dummy variables for the decade when migration took place, or when the survey was implemented if they never migrated, to address a variety of macroeconomic and data collection factors that may have influenced the individuals' decision to migrate or the information recorded in the survey, respectively.

The vector \mathbf{Z}_2 in the wage equation (3) includes a variety of variables that are known to affect migrants' earnings, such as age and general or U.S.-specific human capital factors captured by migrants' educational attainment, ability to speak English, occupation, cumulative work experience in the United States, number of U.S. trips, and the duration of their last migration spell. Additionally, \mathbf{Z}_2 includes wages earned by migrants during their first U.S. trip¹³ to purge our network estimates from their correlation with past earnings. A set of U.S. state dummy variables for where migrants resided during their last U.S. trip, as well as a set of dummy variables for the decade when the last U.S. trip took place, are included to account for special labor market conditions or economic trends possibly affecting their wages. Finally, a set of dummy variables indicative of the decade when the survey was fielded is also included to address any data collection factors possibly affecting the information recorded in the survey.

11. Although respondents are not asked about networks in the United States unless they declare having emigrated to the United States at some point in their lifetimes, we do have information regarding the number of household members (i.e., parents and siblings) with a U.S. migration history.

12. Migration grew drastically following the end of the Bracero program in 1964, with 75% of migrants last entering the United States after 1990 (Massey, Durand, and Malone 2002; Massey and Liang 1989). Orrenius (1999) showed that the family networks strengthened by family reunification laws helped increase migration from Mexico during that period in spite of enhanced border enforcement. Similarly, Massey et al. (2002) pointed to the rapid integration of Mexican and U.S. communities across the border following the passage of the North American Free Trade Agreement as another factor facilitating Mexican migration to the United States in spite of the intensification of border patrolling.

13. These are the only data on past wages available in the MMP.

We encounter a couple of econometric challenges in the analysis. First is the potential endogeneity of social networks with respect to employment and earnings (e.g., Mouw 2003; Munshi 2003), which emerges from two sources. To begin with, unobserved individual characteristics and other omitted variables possibly affecting migrants' earnings, such as enthusiasm or ability, are likely to be correlated with social networks and with other regressors in the earnings equations (e.g., educational attainment). Under such circumstances, our estimates of the effect of social networks on migrants' earnings are likely to be affected by omitted variable biases. Additionally, migrants' networking and earnings are likely to be jointly determined, leading to reverse causality. To address these issues, we first model the migration decision to account for some migrant characteristics possibly determining their earnings in the United States. Specifically, we include information on the migrant's networks as of the time of his first U.S. migration (i.e., the number of parents and siblings with U.S. experience) in the migration selection equation.¹⁴ Secondly, we measure migrants' networks during the year preceding their last U.S. trip to guarantee the predetermined nature of the networks with respect to measured earnings. In this manner, we also gauge the impact of network contacts acquired by migrants over time and up to the year prior to their last U.S. trip. Additionally, because wages at time t are a function of wages at $(t - 1)$, which, in turn, are affected by networks at $(t - 1)$, we also account for past wages to ensure that the social network estimate is not simply capturing its correlation with past wages.

A second challenge we face in our analysis is the potential endogeneity of migrants' legal status if the latter is a by-product of migrants' earnings. A large fraction of unauthorized migrants in the MMP became legal through the generalized amnesty granted by the 1986 Immigration Reform and Control Act (IRCA) (Massey et al. 2002; Orrenius 2001), curtailing any endogeneity problems between migrants' legal status and earnings. Nonetheless, we also add controls for variables that might affect earnings via their link to migrants' legal status, such as the timing of their first U.S. trip and, in the wage equation, the timing of their last U.S. trip, number of U.S. trips, U.S. experience, and the duration of their last U.S. spell.

SOCIAL NETWORKS AND MIGRANT EARNINGS

Table 3 displays the results from estimating migrants' real hourly wages during their last U.S. trip while accounting for the selectivity entailed in migration. The model is appropriately identified through the inclusion of some regressors associated with migrants' first U.S. trip exclusively in the selection equation.¹⁵ Additionally, the likelihood-ratio test at the bottom of Table 3 recommends the joint, versus separate, estimation of the migration and earnings equations.

14. In a similar study, Munshi (2003) measured networks by the proportion of the sampled individuals originating from the migrant's community in Mexico and living in the migrant's vicinity in the United States, also using data from the MMP. To the extent that this measure is contemporaneous to the migrant's U.S. employment, there is a potential for simultaneity between migrants' networks and earnings. Furthermore, Munshi did not model the migration decision; thus his emphasis was on the need to correct for the endogeneity bias contaminating the estimated effects of social networks on the migrant's earnings. This endogeneity bias emerges from the potential for unobserved labor shocks driving Mexican migration to the United States to also affect the migrant's earnings in the United States through their impact on the size of the social network available to the migrant. In our analysis, we avoid these potential sources of endogeneity by (a) defining migrants' networks by the size of the familial and friendship ties available to the migrant as of the year prior to his last U.S. trip as a means to guarantee the predetermined character of these ties relative to the migrant's earnings, and (b) explicitly modeling the migration decision and accounting for local economic and social conditions (including labor shocks) that might affect the decision to migrate through a set of dummy variables indicative of the state of origin of the migrant. The migration equation also includes information on the number of parents and siblings with U.S. experience prior to migration.

15. For those who never migrated to the United States, this information is associated with the survey date.

Table 3. Real Hourly Wage Estimates From Heckman Selection Model

Variable	Coefficients	Robust SE	Marginal Effect
Main Equation: Real Hourly Wages Last U.S. Trip			
Unauthorized during last U.S. migration	0.0022	0.0341	
Friendship ties during last U.S. migration	0.0028*	0.0013	
Unauthorized × friendship ties	0.0027	0.0020	
Familial ties during last U.S. migration	0.0045**	0.0011	
Unauthorized × familial ties	-0.0029*	0.0015	
Real hourly wage as of first trip	0.0010*	0.0004	
Age at last U.S. migration	-0.0046**	0.0013	
Years of education at last U.S. migration	0.0098**	0.0039	
Spoke English at last U.S. migration	0.0662*	0.0335	
Professional at last U.S. migration	0.7614**	0.2735	
Technical worker at last U.S. migration	0.2203	0.4387	
Agricultural worker at last U.S. migration	-0.0744	0.1684	
Manufacturing worker at last U.S. migration	0.1324	0.1678	
U.S. cumulative work experience at last U.S. migration	-0.0146*	0.1687	
Number of U.S. trips	0.0008	0.0003	
Duration of last trip to the United States	0.0047**	0.0035	
Last migrated to the United States during the 1980s	-0.2794**	0.0321	
Last migrated to the United States during the 1990s	-0.3288**	0.0387	
λ from migration equation	-0.0550*	0.0270	
Selection Equation: Ever Migrated to the United States			
Age at first migration or at survey date	-0.0564**	0.0035	-0.0128
Married at first migration or at survey date	-0.4319**	0.1049	-0.0803
Dependents at first migration or at survey date	-0.0503**	0.0196	-0.0115
Number of family members with U.S. migration experience	0.1505**	0.0220	0.0343
Years of education at first migration or at survey date	-0.0592**	0.0084	-0.0135
Employed before first migration or at survey date	-0.1222	0.1979	-0.0293
Owned any assets before first migration or at survey date	-0.5421**	0.0712	-0.1376
Regression Fit Statistics			
Number of observations		10,458	
Rho (SE)		-0.0963 (0.0472)	
Censored observations		8,054	
Log-likelihood		-3,044.526	
Likelihood ratio test of independence of the two equations, chi-square (1)		4.12***	

Notes: In addition to a constant, the employment regression includes regional dummy variables of the U.S. state to which the migrants last migrated and survey year dummy variables. Migrants in service related occupations and migrants who last migrated to the United States before the 1980s are the omitted categories. The migration regression includes a constant, regional dummy variables of the place of interview in Mexico, and dummy variables indicative of the decade when the individual first migrated to the United States or, if they never migrated, of the decade when the survey was conducted.

*Statistically different from zero at $p \leq .05$.

**Statistically different from zero $p \leq .01$.

Migration Selectivity

The bottom panel of Table 3 displays the results from modeling the decision to migrate. The figures generally confirm previous findings in the migration literature. For instance, younger household heads with more time to recoup the returns to their migration are more likely to migrate than their older counterparts. Likewise, single household heads with fewer dependents are more mobile and more likely to migrate than their married counterparts with more dependents. The presence of an additional household member with migration experience increases the respondent's migration likelihood by 3 percentage points, and less-educated Mexican household heads are more likely to migrate than their more-educated counterparts. Specifically, each additional year of education lowers the likelihood of migration by approximately 1.4 percentage points. This result is in line with the findings of Borjas (1987), who argued that migrants from countries with greater inequality—as is the case with Mexico relative to the United States—are more likely to be negatively selected. Yet, recent studies (e.g., Chiquiar and Hanson 2005) have found evidence that Mexican migrants in the United States are disproportionately drawn from the middle of the distribution of observable skills in Mexico. Similarly, using data from the MMP, Orrenius and Zavodny (2005) and McKenzie and Rapoport (2004) found that migration rates increase with education from low levels to high levels and then decline as education exceeds the national mean (about eight years of schooling). Differences with respect to our findings could be due to the use of continuous, versus categorical, variables to capture migrants' educational attainment. Lastly, migration seems to be linked to asset ownership prior to departure, with household heads who own houses, land, businesses, or similar properties prior to migration being about 14 percentage points less likely to migrate than nonproprietors.

Migrant Earnings, Legal Status, and Social Networks

Do familial and friendship ties have any discernible impact on the earnings of unauthorized and legal migrants? The top panel of Table 3 displays the estimated effects of social networks on the log real hourly wages earned by unauthorized and legal migrants during their last U.S. visit. The sample selection correction term accounting for migration selectivity is negative and statistically different from zero, signaling that Mexicans who were unable to migrate to the United States would have earned lower wages in the U.S. market than did their migrating counterparts.

Focusing on the variables of interest to the present study, we find that social networks improve migrant earnings; yet, familial ties seem more effective in raising the wages earned by legal migrants than those of their unauthorized counterparts. To facilitate a further comparison of the impact of different types of social networks on unauthorized and legal migrants' wages, we refer to the figures in Table 4. Social networks enhance unauthorized and legal migrants' earnings (see Panels A and B). Indeed, the presence of an additional family member or relative in the United States—a source of familial ties—raises unauthorized and legal migrants' average real hourly wages by 0.2% and 0.5%, respectively. Friendship ties also improve migrants' earnings, raising average real hourly wages among unauthorized and legal migrants by approximately 0.6% and 0.3%, respectively, with every friend added to the network. While these effects may seem relatively small, it is important to note that the average network providing friendship ties consists of 9 members for unauthorized migrants and 12 members for legal migrants (see Table 1). Similarly, unauthorized and legal migrants have an average of 13 and 16 family members in the United States, respectively. Therefore, familial ties improve unauthorized and legal migrants' hourly wages by an average of 2.6% and 8%, correspondingly. Likewise, friendship ties raise unauthorized migrants' hourly earnings by approximately 5.4% and those of their legal counterparts by 3.6%. On a yearly basis, familial ties raise migrants'

Table 4. Effects of Social Networks on Real Hourly Wages, by Migrants' Legal Status

Group	Computation	Real Hourly Wages	
		Coefficient	Joint Significance (chi-square)
A. Unauthorized Migrants			
With vs. Without friendship ties	$\beta_2 + \beta_3$	0.0055**	17.34
With vs. Without familial ties	$\beta_4 + \beta_5$	0.0016**	17.13
With vs. Without friendship and familial ties	$\beta_2 + \beta_3 + \beta_4 + \beta_5$	0.0071**	41.20
B. Legal Migrants			
With vs. Without friendship ties	β_2	0.0028*	5.03
With vs. Without familial ties	β_4	0.0045**	15.39
With vs. Without friendship and familial ties	$\beta_2 + \beta_4$	0.0073**	25.11
C. Differential Impact of Friendship and Familial Ties Among Unauthorized and Legal Migrants			
No friendship or familial ties	β_1	0.0022	0.00
Friendship ties	β_3	0.0027	1.78
Familial ties	β_5	-0.0029*	3.64
Friendship and familial ties	$\beta_3 + \beta_5$	-0.0002 [†]	4.56

Note: The beta coefficients used in the table above correspond to the following:

$$W_i = \beta_{2,0} + \beta_{2,1} \text{Unauthorized}_i + \beta_{2,2} \text{Friendship ties}_i + \beta_{2,3} \text{Unauthorized}_i \times \text{Friendship ties}_i + \beta_{2,4} \text{Familial ties}_i + \beta_{2,5} \text{Unauthorized}_i \times \text{Familial ties}_i + \theta' Z_{2i} + \gamma_1 \lambda_i.$$

[†]Statistically different from zero at $p \leq .10$.

*Statistically different from zero at $p \leq .05$.

**Statistically different from zero at $p \leq .01$.

earnings anywhere between \$19 and \$56, while friendship ties increase them between \$33 and \$58 in 1983–1984 dollars.¹⁶ Furthermore, to the extent that the analysis controls for the occupation held by migrants, our findings suggest that, in addition to channeling migrants into higher-paying occupations (Munshi 2003), networks raise migrants' wages within a particular type of work.

Finally, the figures in Panel C of Table 4 reveal that familial ties have a differential impact on the hourly wages earned by migrants. Specifically, each additional family member can help raise hourly wages by 0.3% more for legal migrants than for unauthorized migrants. Since legal migrants have an average of 3 more members providing family ties than unauthorized migrants, family ties raise wages by 0.9% more for legal migrants than for their unauthorized counterparts. This result is not surprising because unauthorized migrants should be at a disadvantage with respect to their legal counterparts in negotiating their working conditions.

The remaining figures in Table 3 confirm previous findings reported in the literature on migrants' earnings. For instance, there is a familial correlation between past and current wages. Similarly, migrants' general and U.S.-specific human capital—as captured by their educational attainment, ability to speak English, high-skill occupation, and duration

16. In our sample, annual earnings average \$9,681 for undocumented migrants and \$11,107 for legal migrants (in 1982–1983 dollars).

of their last U.S. trip—raises their wages. In particular, each additional year of education improves migrants' earnings by 1%. Likewise, Mexican migrants who speak English earn approximately 7% more than their employed non-English-speaking counterparts. We also find that migrants' occupation during their last U.S. trip (a proxy for skill) affects their wages, with migrants who are employed in a high-skill (i.e., professional) job earning 76% higher wages than their counterparts in the service sector. Finally, migrants who last migrated during the 1980s and 1990s earned comparatively less than migrants who came before the 1980s, reflecting the overall deterioration of real wages for unskilled workers with less than a high school education in the United States during the 1980s and 1990s (Borjas and Ramey 1994; Juhn, Murphy, and Pierce 1993).

CONCLUSIONS

Using data on return migrants and nonmigrant Mexican households from the MMP, we examine the role of familial and friendship ties on the wages of unauthorized and legal migrants during their last U.S. migration while taking into account the endogeneity of social networks with respect to earnings. Several findings are worth summarizing. First, we find no difference between unauthorized and legal migrants in their likelihood of maintaining social networks that provide friendship ties. However, possibly due to their longer U.S. residencies, legal migrants enjoy a larger number of friends offering friendship ties than unauthorized migrants. Unauthorized migrants appear more likely to maintain familial ties than legal migrants. This finding could be explained by extended out-migration in their communities of origin. Yet, conditioning on the likelihood of having familial ties, legal migrants have larger family networks, maybe as a side effect of favored family reunification by U.S. immigration laws.

Second, we confirm the fact that networks raise migrants' wages (e.g., Mouw 2003; Munshi 2003). Specifically, familial ties raise unauthorized and legal migrants' hourly wages by an average of 2.6% and 8%, respectively, whereas friendship ties increase their wages by 5.4% and 3.6%. Furthermore, family ties seem more effective at raising legal migrants' wages—by approximately 0.9% more—than those of similar unauthorized migrants. Finally, it is worth noting that, to the extent that the study controls for the occupation held by the migrant, these wage effects occur regardless of the type of work performed by the migrant.

Overall, these results point to the potentially important role of social networks in improving Mexican migrants' earnings, particularly among those legally entering the United States. These higher wages could, in some instances, result from a better job match because of information and support provided by family members and friends. Other times, social networks may affect the accumulation of human capital investment and, in turn, migrants' earnings (Bailey and Waldinger 1991; Duleep and Regets 1996a, 1996b).¹⁷ By raising the returns to migration, social networks may provide a stimulus to continued emigration.

17. In this regard, an interesting area of future research is the effect of social networks on human capital investment.

Appendix Table A1. Description of Variables Used in the Analysis

Variable	Definition	Mean	SD
Likelihood of Migrating to the United States	Equals 1 if household head ever migrated	0.3443	0.4752
Log of Real Hourly Wages	Real hourly wage during that last U.S. trip	1.4676	0.6858
For All Migrants			
Likelihood of working	Equals 1 if household head worked last U.S. trip	0.9625	0.1900
Unauthorized	Equals 1 if migrant was unauthorized last U.S. trip	0.6007	0.4898
Any friendship ties	Equals 1 if migrants had friends in the United States one year prior to their last trip	0.4376	0.4961
Any familial ties	Equals 1 if migrants had household members and other relatives in the United States one year prior to their last trip	0.8175	0.3863
Size of friendship ties	For migrants with friendship ties, the number of friends	9.8024	13.7273
Size familial ties	For migrants with familial ties, the number of household members and other relatives	14.1627	16.1474
Age	Household head's age last U.S. trip	33.4952	11.7588
Married	Equals 1 if married last U.S. trip	0.0310	0.1959
Dependents	Number of minor children last U.S. trip	2.4345	2.3702
Years of education	Years of educational attainment last U.S. trip	4.7056	3.8363
Spoke English	Equals 1 if English was spoken last U.S. trip	0.1829	0.3866
Professional worker	Occupation dummy variable for last U.S. trip	0.0050	0.0704
Technical worker	Occupation dummy variable for last U.S. trip	0.0011	0.0339
Agricultural worker	Occupation dummy variable for last U.S. trip	0.4198	0.4936
Manufacturing worker	Occupation dummy variable for last U.S. trip	0.3475	0.4762
Service worker	Occupation dummy variable for last U.S. trip	0.1716	0.3771
U.S. cumulative work experience	U.S. cumulative work experience (months) last U.S. trip	40.4728	58.9822
Owned any assets before migrating or at the survey date	Equals 1 if household head had any assets before the first U.S. migration or at the survey date	0.5404	0.4984
Number of U.S. trips	Number of U.S. trips	3.8825	5.2033
Duration of last trip to the United States	Duration of last U.S. trip (months)	23.4459	50.9403
Last migrated during the 1980s	Equals 1 if last migrated in the 1980s	0.2734	0.4458
Last migrated during the 1990s	Equals 1 if last migrated in the 1990s	0.3486	0.4766
For All Respondents			
Age at first migration/survey date	Household head's age at first migration or at the survey date	38.3420	16.4109
Married at first migration/survey date	Equals 1 if migrant was married at first migration or at the survey date	0.0715	0.2577

(continued)

(Appendix Table A1, continued)

Variable	Definition	Mean	SD
For All Respondents (cont.)			
Dependents at first migration/ survey date	Number of dependents at first migration or at the survey date	1.8314	2.0322
Number of family members with U.S. migration experience	Number of family members with U.S. migration experience at first migration or at the survey date	0.6761	1.2420
Years of education at first migration/survey date	Years of educational attainment at first migration or at the survey date	5.7066	4.5715
Employed before first migration/survey date	Equals 1 if household head was employed before migrating to the United States or at the survey date	0.9057	0.2923
Owned any assets before first migration/survey date	Equals 1 if household head had any assets before migrating to the United States or at the survey date	0.6210	0.4852

REFERENCES

- Bailey, T. and R. Waldinger. 1991. "Primary, Secondary, and Enclave Labor Markets: A Training Systems Approach." *American Sociological Review* 56:432–45.
- Bean, F.D., L.B. Lowell, and J.L. Taylor. 1988. "Undocumented Mexican Immigrants and the Earnings of Other Workers in the United States." *Demography* 25:35–52.
- Borjas, G.J. 1987. "Self-selection and the Earnings of Immigrants." *American Economic Review* 77:531–53.
- . 1990. *Friends or Strangers: The Impact of Immigrants on the U.S. Economy*. New York: Basic Books.
- . 1999. "The Economic Analysis of Immigration." Pp. 1697–760 in the *Handbook of Labor Economics*, edited by O. Ashenfelter and D. Card. Princeton, NJ and London: Elsevier.
- Borjas, G.J. and V.A. Ramey. 1994. "Time Series Evidence on the Source of Trends in Wage Inequality." *American Economic Review* 84:10–16.
- Chiquiar, D. and G.H. Hanson. 2005. "International Migration, Self-selection, and the Distribution of Wages: Evidence From Mexico and the United States." *Journal of Political Economy* 113:239–81.
- Chiswick, B.R. 1984. "Illegal Aliens in the United States Labor Market: An Analysis of Occupational Attainment and Earnings." *International Migration Review* 18:714–32.
- . 1988. *Illegal Aliens: Their Employment and Employers*. Kalamazoo, MI: Upjohn Institute for Employment Research.
- Chiswick, B.R. and P.W. Miller. 1996. "Ethnic Networks and Language Proficiency Among Immigrants." *Journal of Population Economics* 9:19–35.
- Cornelius, W. 1976. "Mexican Migration to the United States: The View from Rural Sending Communities." Monograph. MIT, Cambridge, MA.
- . 1978. "Mexican Migration to the United States: Causes, Consequences, and U.S. Responses." Monograph. MIT, Cambridge, MA.
- Donato, K.M. and S.M. Kanaiaupuni. 2000. "Women's Status and Demographic Change: The Case of Mexico–U.S. Migration." Pp. 217–42 in *Women, Poverty, and Demographic Change. International Studies in Demography*. Oxford and New York: Oxford University Press.
- Duleep, H. and M. Regets. 1996a. "Admission Criteria and Immigrant Earnings Profiles." *International Migration Review* 30:571–90.

- . 1996b. "Family Unification, Siblings, and Skills." Pp. 219–44 in *Immigrants and Immigration Policy: Individual Skills, Family Ties, and Group Identities*. Greenwich, CT: JAI Press.
- Durand, J., W. Kandel, E.A. Parrado, and D.S. Massey. 1996. "International Migration and Development in Mexican Communities." *Demography* 33:249–64.
- Fafchamps, M. and B. Minten. 2002. "Returns to Social Capital Among Traders." *Oxford Economic Papers* 54:173–206.
- Fernandez, R.M., E. Castilla, and P. Moore. 2000. "Social Capital at Work: Networks and Employment at a Phone Center." *American Journal of Sociology* 105:1288–356.
- Granovetter, M.S. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 78:1360–80.
- . 1974. *Getting a Job: A Study of Contacts and Careers*. Cambridge, MA: Harvard University Press.
- . 1982. "The Strength of Weak Ties: A Network Theory Revisited." Pp. 105–30 in *Social Structure and Network Analysis*, edited by P.V. Marsden and N. Lin. Beverly Hills, CA: Sage Publications.
- . 1995. "Afterword 1994: Reconsiderations and a New Agenda." Pp. 139–82 in *Getting a Job*, 2nd ed. Chicago: University of Chicago Press.
- Heckman, J. 1979. "Sample Selection Bias as a Specification Error." *Econometrica* 47(1):153–61.
- Heer, D.M. and D. Falasco. 1983. "Determinants of Earnings Among Three Group of Mexican Americans: Undocumented Immigrants, Legal Immigrants, and the Native Born." Paper presented at the annual meeting of the Population Association of America, Pittsburgh, April 14–16.
- Juhn, C., K.M. Murphy, and B. Pierce. 1993. "Wage Inequality and the Rise in Returns to Skills." *Journal of Political Economy* 101:410–42.
- Kossoudji, S. and D.A. Cobb-Clark. 2002. "Coming Out of the Shadows: Learning About Legal Status and Wages From the Legalized Population." *Journal of Labor Economics* 20:598–628.
- Kossoudji, S. and S.I. Ranney. 1986. "Wage Rates of Temporary Mexican Migrants to the U.S.: The Role of Legal Status." Discussion paper. Population Studies Center, University of Michigan, Ann Arbor.
- Lin, N. 1999. "Social Networks and Status Attainment." *Annual Review of Sociology* 25:467–87.
- Lindstrom, D.P. 1996. "Economic Opportunity in Mexico and Return Migration From the United States." *Demography* 33:357–74.
- Lowell, L.B. 1992. "Circular Mobility, Migrant Communities, and Policy Restrictions: Unauthorized Flows from Mexico." Pp. 137–57 in *Migration, Population Structure, and Redistribution Policies*, edited by C. Goldscheider. Boulder: Westview Press.
- Massey, D. 1985. "The Settlement Process Among Mexican Migrants to the United States: New Methods and Findings." Pp. 255–81 in *Immigration Statistics: A Story of Neglect*. Washington, DC: National Academy Press.
- Massey, D.S., R. Alarcon, J. Durand, and H. Gonzalez. 1987. *Return to Aztlan: The Social Process of International Migration from Western Mexico*. Berkeley and Los Angeles: University of California Press.
- Massey, D.S. and C. Capoferro. 2004. "Measuring Undocumented Migration." *International Migration Review* 38:1075–102.
- Massey, D.S., J. Durand, and N.J. Malone. 2002. *Beyond Smoke and Mirrors: Mexican Immigration in an Era of Economic Integration*. New York: Russell Sage Foundation.
- Massey, D.S., and Z. Liang. 1989. "The Long-Term Consequences of a Temporary Worker Program: The U.S. Bracero Experience." *Population Research and Policy Review* 8:199–226.
- Massey, D.S. and R. Zenteno. 2000. "A Validation of the Ethnosurveys: The Case of Mexico-U.S. Migration." *International Migration Review* 34:766–93.
- McKenzie, D.J. and H. Rapoport. 2004. "Network Effects and the Dynamics of Migration and Inequality: Theory and Evidence From Mexico." BREAD Working Paper, No. 063. Bureau for Research in Economic Analysis of Development, Cambridge, MA.
- Mouw, T. 2003. "Social Capital and Finding a Job: Do Contacts Matter?" *American Sociological Review* 68:868–70.

- Munshi, K. 2003. "Networks in the Modern Economy: Mexican Migrants in the U.S. Labor Market." *The Quarterly Journal of Economics* 118:549–99.
- Orrenius, P.M. 1999. "The Role of Family Networks, Coyote Prices and the Rural Economy in Migration From Western Mexico: 1965–1999." Federal Reserve Bank of Dallas Working Paper 99-10.
- . 2001. "Illegal Immigration and Enforcement Along the U.S.–Mexico Border: An Overview." *Economic and Financial Review*, First Quarter:2–11.
- Orrenius, P.M. and M. Zavodny. 2005. "Self-selection Among Undocumented Immigrants From Mexico." *Journal of Development Economics* 78(1):215–40.
- Passel, J.S. 2002. "New Estimates of the Undocumented Population in the United States." Report. Migration Policy Institute, Washington, DC.
- Passel, J.S., R. Capps, and M.E. Fix. 2004. "Undocumented Immigrants: Facts and Figures." Report. Urban Policy Institute, Washington, DC.
- Philips, J.A. and D.S. Massey. 1999. "The New Labor Market: Immigrants and Wages After IRCA." *Demography* 36:233–46.
- Ranney, S. and S. Kossoudji. 1983. "Profiles of Temporary Mexican Labor Migrants in the United States." *Population and Development Review* 9:475–93.
- Rauch, J. 2002. "Business and Social Networks in International Trade." *Journal of Economic Literature* 39:1177–203.
- Rauch, J. and V. Trindale. 2002. "Ethnic Chinese Networks in International Trade." *The Review of Economics and Statistics* 84:116–30.
- Rivera-Batiz, F. 1999. "Undocumented Workers in the Labor Market: An Analysis of the Earnings of Legal and Illegal Mexican Immigrants in the United States." *Journal of Population Economics* 12(1):91–116.
- Robinson, J.G. 2001. "ESCAP II: Demographic Analysis Results." Executive Steering Committee for A.C.E. Policy II, Report No. 1. U.S. Census Bureau. Available online at <http://www.census.gov/dmd/www/pdf/Report1.PDF>
- Winegarden, C.R. and L.B. Khor. 1991. "Unauthorized Migrants and Unemployment of U.S. Youth and Minority Workers: Econometric Evidence." *Review of Economics and Statistics* 73(1): 105–12.