Domestic and international migration from rural Mexico:

Disaggregating the effects of network structure and composition[1]

Benjamin Davis, Food and Agricultural Organization
Guy Stecklov, Hebrew University
Paul Winters, Inter-American Development Bank

[1] Authors listed in alphabetical order. The authors are grateful to participants at the session *Social Networks and U.S.-Mexico Migration* at the 2001 Population Association of America Meetings in Washington, DC for helpful comments on an earlier draft of this paper. The authors are also grateful to Chris O'Donnell for assistance with econometric issues. Content and errors are exclusively the responsibility of the authors, and not the FAO or the authors' respective institutions. This paper was published in Population Studies, **56**(2002), 291-309.

Abstract

This article explores the role of migrant networks in Mexican rural out-migration focusing on how network composition influences rural-to-rural, rural-to-urban, and rural-to-international migration. Using data from rural Mexico, migration is considered in a multiple-choice context allowing for the possibility that rural Mexicans can migrate within Mexico for agricultural and non-agricultural employment as well as to the United States. Our principle result is that the parts are greater than the whole; using disaggregated measures of migrant networks highlights the complexity of network effects on migration decisions. When modelling the migration choice with aggregate measures, US migrant networks appear more important than Mexico migrant networks. Once networks are disaggregated, however, certain types of Mexico migrant networks become very important in the decision to migrate within Mexico. Further, the impact of migrant networks in the decision to migrate is not homogeneous; the closer the bond, the greater the impact on the migration decision.

I. Introduction

Quantitative studies of Mexican migration show that individual migration decisions are greatly influenced by both current and past migration experiences of members of their migrant network (See for example, Taylor 1986; Massey and Garcia España 1987; Espinosa and Massey 1999; Massey and Espinosa 1997; Winters, de Janvry and Sadoulet 2001; Davis and Winters 2001; Munshi 2001). Networks influence migration because potential migrants use their network connections to obtain information that alter the returns to migration and, if the decision to migrate is taken, use these networks for direct assistance in the migration process thus lowering the cost of migration (Boyd 1989; Gurak and Caces 1992). Networks, therefore, serve an important function as they alter the expected income gains from, and the uncertainty associated with, migration. The degree to which networks influence the migration decision depends on how they affect the expected returns to migration. This is dependent on the composition of the migrant network to which the individual is connected. Network composition varies by the migration experiences of network migrants and by the strength of ties between the individual and network migrants. A network composed of members of the immediate family with previous migration experience within Mexico will differ, in terms of its influence on migration, from a network of associates (e.g. members of the same community) that are currently in the United States (US). In this article, we disaggregate migrant networks to determine whether the composition of migrant networks matter in the migration decision.

The tendency in studies of Mexican migration is to use fairly aggregate measures of migrant networks - that is, measures that do not discriminate between different types of network ties - and to consider migration to one destination, generally from Mexico to the United States. For example, Taylor (1986) considers domestic and international migration but uses dummy variables to represent migrant networks in the United States and Mexico. This does not allow for the possibility that certain types of network ties may be more influential than others. On the other hand, Espinosa and Massey (1999) and Cerrutti and Massey (2001), use disaggregated measures of migrant networks, including identifying the type of relationship between potential migrants and network members, but analyse only Mexico-US migration. This fails to consider the role of networks in domestic migration. The purpose of this article is to explore how the composition of migrant networks affects the migration decision focusing on the distinct influence networks have on rural-to-rural, rural-to-urban, and rural-to-international migration. The emphasis on rural out-migration is partly a reflection of data availability but is also because networks are likely to be more important in rural areas where information is less readily available. Furthermore, in rural out-migration the alternative destinations are easily identified and distinct allowing for the role of networks to be clearly established.

The remainder of this article is divided into five sections. Section II provides an overview of the migration literature, including the networks literature, and discusses the hypotheses that are tested in this paper. Section III provides an overview of the data used in the study and how network variables are constructed. In section IV, the results of multinomial logit analyses on the decision to stay at the point of origin or migrate to other rural areas, urban areas or internationally are presented. This section also discusses the implications of failing to adequately disaggregate migrant networks. Section V looks at the importance of networks on the location choice by migrants within the destination. Section VI draws general conclusions.

II. Migrant destination and network composition

The decision to migrate is generally considered as a choice between two alternatives, staying at the place of origin or migrating to an alternative destination. Quite often, potential migrants have multiple destination options, such as different urban centres or regions within a country. Of particular interest in considering alternative destination options is the choice between international and domestic migration. While the parameters that govern the decision to migrate to alternative destinations within a country may differ only slightly, they are likely to differ significantly when comparing international and domestic migration because the fixed costs of migration, the returns to migration, and the risks associated with migration are likely to be greater for international as opposed to domestic migration. A further distinction that may be made within domestic migration is between migration for agricultural work (generally rural-rural migration) and migration for non-agricultural reasons (generally rural-urban migration). As with international versus domestic migration, the parameters that govern this decision are likely to differ by individual, household and ejido. In this section, we examine the migration decision by first examining three micro-level models of migration - the neo-classical model, the "new economics of migration" and the network, or social capital, theory of migration – in light of a migration decision in a multiple-choice context. We then consider how the composition of migrant networks influences migration to alternative destinations.

MODELS OF MIGRATION

Neo-classical models explain the migration decision as a cost-benefit calculation where potential migrants compare the expected net income at the destination with the expected net income at the point of origin (Sjaastad 1962; Todaro 1969, 1976). If the potential migrant has multiple destination options, the net income comparison would be between the point of origin and all possible destinations. For international destinations, government regulations and, for undocumented migrants, the probability of apprehension and deportation, must also be considered (Borjas 1990). Migration for agricultural work is likely to require less costs and limited skill levels than non-agricultural work and, in Mexico at least, is often based on contractual arrangements (Barron and Rello 2000). Given individual characteristics, such as age, asset position, and skill level, the neo-classical model would predict that potential migrants choose the location where they would obtain the greatest expected net present value of income over some time horizon.

Based on the observation that migration can be used to overcome market imperfections, particularly in the markets for credit and insurance, the "new economics of migration" focuses on migration as a household strategy rather than an individual decision (Stark 1991). The individual migration decision is considered a joint household decision with household members, including the migrant, sharing the costs and returns to migration based on an explicit or implicit sharing rule. Migration is used as a mechanism to diversify risk and gain access to capital in the presence of market imperfections (Stark and Levhari 1982; Stark and Bloom 1985). In the event of multiple destination options, the household must allocate labor based on opportunities to diversify risk and improve net income across all potential destinations.

The network theory of migration, building upon social network theory (Granovetter 1973), stresses the importance of direct and indirect relationships in the migration decision (Boyd 1989). Current and past migrants that form one's network can be viewed as a form of social capital (Massey, Goldring and Durand 1994). While individuals may have access to other forms of social capital, our interest is in this migration-specific social capital that can be drawn upon by potential migrants with access to the migrant network as a source of support and information. Thus, networks serve as a catalyst for migration. As has been documented in other studies, migration capital within the network forms and deepens as migration begins and develops over time (See review in Durand and Massey 1992; see also for example, Hondagueu-Sotelo 1994). Early migrants provide potential migrants with information on modes of migration and job opportunities as well as direct assistance in the form of food and shelter or even finance for migration thus lowering the entry costs, enhancing the benefits, and reducing the uncertainty associated with migration (Massey, Goldring and Durand 1994; Bastida 2001). If, as would be expected, the uncertainty, benefits, and costs associated with migration vary by destination, the role of migrant networks will also vary.

Although the network theory of migration has generally stressed the positive aspects of migrant networks, there is an increasing literature noting that migrant networks are not always helpful to migrants and that having relatives, friends or co-ethnics at a destination does not always translate into access to assistance. For example, Menjivar (2000) in her study of Salvadoran migrants shows how long time residents do not necessarily assist newcomers particularly if significant social distances separate the groups. Further, she finds circumstances where newcomers are cheated and lied to by earlier migrants interested in profiting from the new migrants. Finally, she finds that assistance may be less forthcoming in times of economic crisis. Her analysis suggests that networks are not always a source of financial, material or emotional support and that such support varies across relationships and economic conditions. While recognising that the value of migrant networks may not always be positive, both the theory and empirical evidence suggest a probable net positive effect.

The purpose of this paper is not to test the validity of these various migration models. Instead, we assume that each model provides insight into the migration decision in a multiple-choice context. While much of the recent research into migration have modelled migration as a household decision (Stark 1991), migration in this paper is considered an individual decision. The literature on intrahousehold decision-making suggests that assuming a unitary household decision structure is inappropriate (Haddad, Hoddinott and Alderman 1997). Furthermore, evidence from migration studies indicates the importance of individual characteristics in the migration decision. Lucas (1985), for example, includes a number of individual characteristics including education, age and marital status in his evaluation of Batswana migration, and Emerson (1989) includes education, experience and ethnicity in his evaluation of U.S. migration. Each finds these characteristics influence migration. Incorporating these characteristics requires an individual approach. This study then assumes that individuals make the migration decision in accordance with income differentials, the characteristics of the household and presence and accessibility of migrant networks.

MIGRANT NETWORK COMPOSITION

Although recent empirical studies have noted the role of networks in the migration decision, data limitations and model abstractions have led many researchers to ignore details about the composition of migrant networks. That is, migrant networks have generally been considered homogenous with little distinction between the different types of relations connecting individuals within the network. Presumably, whether the network is made up of strong ties to family members or of weak ties to members of the same community matters in terms of the value of information and assistance provided to the potential migrant. Furthermore, the experiences of migrants in the network should influence the value of the assistance they can provide. For example, if they are currently in the United States they influence migration differently than if they have already returned from the United States. By network composition, we are then referring to the relationship of network migrants with the potential migrant (strength of ties) and the experiences of those individuals that make up the migrant network. Our objective is to understand whether the composition of networks matters and, if so, in what way.

While qualitative studies such as those by Menjivar (1995, 2000) and Hondagueu-Sotelo (1994) have carefully examined network composition, in general, quantitative studies have failed to do so. In practical terms, failing to consider network composition in quantitative studies has meant measuring networks through simple procedures such as inclusion of a dummy variable to represent one or more migrants in a person's network or adding up the total number of migrants in a given person's network. Taylor (1986), using data from two Mexican villages, examines the role of networks on the decision to migrate within Mexico or to the US. Using a multinomial logit, he finds evidence that supports the hypothesis that networks matter more for international migration since networks are risk reducing and international migration is riskier than domestic. More recent studies have attempted to further clarify the effects of having different migrant network composition. Winters, de Janvry and Sadoulet (2001) find that both family and community-based migrant networks have positive influences on Mexico-US migration and that they appear to operate as substitutes: the presence of one lessens the value of having access to the other. Davis and Winters (2001) evaluate differences in international migrant networks according to sex and find that male-based networks influence both male and female migration more than female-based networks although the location of female network members within the US influences the choice of destination of female migrants. Munshi (2001) analyses the role of Mexican community networks in helping migrants obtain employment in the US, and finds that employment outcomes are related to migrant network size, with the number of long-term migrants of particular importance. While these studies have deepened our understanding of the role of migrant networks, none have yet combined a more detailed description of the composition of migrant network while simultaneously considering the domestic and international migration options.

One aspect of network composition that requires particular attention is kinship structure. Studies have shown that both strong and weak network ties may play a role in migration with the former referring to ties to kin and close friends and the latter between acquaintances (Boyd 1989; Wilson 1998). Presumably, rather than this dichotomous distinction between strong and weak network ties, it is more appropriate to consider network relationships on a continuous scale ranging from weak to strong ties. The value of a tie depends on the relationship connecting an individual to another. In all probability, ties between immediate family are the strongest and community members the weakest with extended family members in between. Furthermore, each individual or household's network may be composed of multiple units and their total migrant network capital may be some function of the separate parts. One recent empirical study that carefully considers the composition of migrant networks is that by Espinosa and Massey (1999). Using data on the migration experiences of all household members, they construct indicators of the social capital embodied in migrant networks. Another study on female migration from Mexico to the US by Cerrutti and Massey (2001) examines the determinants of migration of husbands and wives as well as daughters. They include a number of network variables based on kinship relationships and the prevalence of migrants in the community.

Our paper seeks to extend previous results and provide insight in two main directions. The first, like the Espinosa and Massey (1999) and Cerrutti and Massey (2001) articles, is to incorporate greater detail about the structure of the migrant network which can help to clarify whether there are functional similarities for certain types of kinship and community relations in terms of migration. The second broad extension is to introduce migration destination choices, as in Taylor (1986), in order to examine how network composition may differentially affect the rural-to-rural, rural-to-urban, and rural-to-international migration choice. In particular, we seek to test the following hypotheses:

1. *Migrant networks have a stronger influence on rural-to-international than rural-to-urban, and rural-to-rural migration.*

Given that international migration is riskier than both forms of domestic migration then information on successful migration and assistance in migrating is likely to be of greater value for international migration. Furthermore, since agricultural migration in Mexico is often based on contractual arrangements migrant networks are likely to be less influential in rural-to-rural migration.

2. *Migrant network effects are not homogeneous and depend on the composition of the network.*

Migrant networks can be differentiated by the relationship of the potential migrant to the network migrant. While all network ties are assumed to positively influence migration, network migrants with closer family ties to the potential migrant (stronger ties) are likely to influence the migration decision more than distant family relations or neighbours in the same community (weaker ties).

3. *Having migrant network ties currently at the destination influences choice more than networks composed of previous migrants.*

Migrant networks can also be differentiated by the migration experience of the network migrant. Current migrants are likely to have a stronger influence on migration than network members with past migration experience.

4. *The marginal benefit of an additional network migrant is diminishing for all categories.*

The value of the first network migrant (of a particular category) is likely to have a greater influence on migration than each additional network migrant.

5. *Strong and weak network ties both influence the migration decision but serve similar purposes and are thus substitutes.*

Both strong and weak network ties positively influence migration through the provision of information and direct assistance to potential migrants. This suggests that strong and weak ties should function as substitutes.

6. *Development of a network in one destination (international or domestic) tends to limit the value of having a network in other destinations.*

The presence of a firmly developed network towards one destination is likely to limit benefits of a network in another destination. Thus it is expected that communities will either have large domestic or international networks.

7. *The migrant's choice of where to locate within the US (for international migration) or within Mexico (for domestic migration) is influenced by the specific (within country) location of network migrants.*

The presence of network migrants in a particular location increases the likelihood that a migrant will go to that specific location versus other possible locations.

III. Data

Data for this study are taken from a nationally representative sample of ejido households. The ejido sector is a product of the land reform system that was utilised by the Mexican Government from the 1930's to 1992. Land and water resources were granted to a community or a group of producers, termed *ejido*, with each producer, or *ejiditario*, obtaining usufruct rights over a parcel of land and access to common lands. A 1992 constitutional reform ended the distribution of land and established a process by which individual titles may be provided to ejidatarios, and by which ejidos may decide to privatise individual parcels. Comprised of approximately 29,000 communities and 3 million producers, the ejido sector covers 75 per cent of all agricultural producers in Mexico, and over half of the country's irrigated and rainfed land. Given the characteristics of this sector, one can interpret the data as providing insight into the migration decisions of small and medium size agricultural producers, ejido or private, in Mexico. Thus, while we cannot make inferences about non-landed households, whether rural or urban, it is expected that these types of producers would have less access to information than their urban counterparts, for international migration, and larger producers, for rural-to-urban migration, and that migrant networks would therefore be particularly important. An additional benefit of the data is that one can capture the role of the ejido community in migration.

Panel data were collected from 1287 households (including 5310 individuals) covering 261 ejidos, at two points in time, the spring and summer of 1994 and 1997. The ejidos selected for the survey were stratified by average land size and then randomly selected for inclusion in the survey. Households within the ejidos were randomly selected for inclusion. A detailed description of the data and its sampling properties can be found in Cord, et al (1998). The survey covers a wide array of household assets including land, livestock, machinery, education, and migration, as well as household demographics, land and labor market participation, migration, agricultural and livestock production, and participation in organisations. Along with the information on current household migration, information was provided by each household on the history of migration within the household and migration by the relatives of the head of household and spouse. Ejido-level data were also collected on characteristics and organisation of the ejido.

The ejido panel data show a significant increase in migration to the US during the 1994 to 1997 period. The percentage of sample households reporting any family member who had recently migrated to the US rose from three to 8 per cent between 1994 and 1997. Overall, in 1997, 44 per cent of all households had some connection to the US, whether historical migration, or family members currently living in the US. During the corresponding period, temporary migration to other parts of Mexico actually fell, from 10 to 7 per cent.

COMPARISON OF MIGRANTS AND NON-MIGRANTS

Migrants in our analysis are defined as individuals that migrated to either the US or another part of Mexico, between 1994 and 1997. The individual and household characteristics of migrant and non-migrant adults as well as ejido characteristics are presented in Table 1. Given the nature of the data set, rural-to-rural migration is most clearly defined as migration within Mexico for agricultural employment while rural-to-urban migration is defined as migration within Mexico for non-agricultural employment. Overall, we find that about 16 per cent of the sample migrated between 1994 and 1997. Of the 837 migrants in the sample of

5260 adults, 33 per cent migrated to the US, nine per cent within Mexico for agricultural employment, and 58 per cent within Mexico for non-agricultural employment. Migrants are on average significantly younger (by 12 years) and predominately male as compared to non-migrants. This is especially true for agricultural (93 per cent male) and US (80 per cent) migrants. Migrants also have higher levels of education, though this is true only for US and non-agricultural Mexico migrants. Finally, ethnicity (measured as speaking an indigenous language) is the same for migrants and non-migrants. Among migrants however, indigenous migrants are concentrated in Mexico agricultural migration and constitute only 5 per cent of US migrants.

In terms of household characteristics, families with US migrants have significantly higher total income than households with domestic migrants or non-migrating households. This is due principally to changes in returns to US and within Mexico migration as a result of the 1994-5 Peso devaluation and subsequent high inflation. The value of US dollars almost doubled while Mexican wages fell in real terms. Among migrants, households with non-agricultural migrants have greater access to irrigated land and show higher levels of agricultural modernisation. US migrating households are more linked to cattle production, with greater levels of rainfed land and cattle stocks.

Agriculture migrating households are clearly the worst off and live in greatest isolation. They have lower numbers of non-agricultural wage workers, the lowest household income, show the lowest levels of agricultural modernisation, are located in more isolated communities, and report lower levels of household infrastructure, such as electricity and telephone access.

DECOMPOSING MIGRANT NETWORKS

In creating variables to represent migrant networks, we need to make assumptions about what factors determine the value of a particular network tie. Since our focus is on migration-specific social capital, individuals that have valuable information on migration are assumed to be those that have migrated in the past or are currently migrants. Current migrants are also assumed to be in the best position to provide direct assistance to potential migrants. Additionally, the value of the information and assistance network migrants provides is closely linked to their choice of destination. For example, if they migrate within Mexico for non-agricultural work, the information is useful for that purpose. Finally, the level of information and assistance provided to a potential migrant is assumed to be dependent on the strength of the ties to the potential migrant. Members of the immediate family are assumed to have stronger ties to the potential migrant followed by the extended family and then members of the same ejido. Another possible relationship that should be explored, and is particularly relevant in Mexico, is the compadre and comadre relationship. Compadres and comadres are male and female relationships between parents and the godparents of their children. Unfortunately, this data was not collected as part of the survey. Since most of these relationships are between relatives these ties will be captured in other variables, however, this special form of relationship is not identifiable and would be of interest in future research. Migrant networks are therefore decomposed along three dimensions: 1) migration destination (US or Mexico), 2) previous or current experience, and 3) strength of ties (based on kinship).

Using these three dimensions as a basis, Table 2 presents a decomposition of migrant networks for the sample as a whole and for non-migrant and migrant categories. The data are first divided between US- and Mexico- based migrant networks. This is then divided into current and previous migration. Similar to our definition of migrant, “current” refers to network migrants that lived at the migrant destination between 1994 and 1997. “Previous” refers to those that migrated to a migrant destination at some point before 1994, but were not at the destination at the time of the survey. We then distinguish by the type of relationship to the migrant household including head of household, spouse, and other immediate family (generally the children of the head and spouse), as well as male and female siblings of the spouse and head. Since the incidence of current migration by the head or spouse was very small these were included in the category of "current, immediate family" which assumes that the value of current migration by the head and spouse is similar to current migration by other immediate household members. Similarly, the incidence for previous migration by the spouse is low and included with previous migration of the head. For the US network variables, previous migration by other immediate family is divided between those that migrated to the US and returned to the household, and those that migrated to the US and returned to some other part of Mexico but not to the household. It seems appropriate to assume that these would have different values in terms of information for US migration. For the Mexico networks variables, a distinction is made between the siblings (male and female) of the household head and spouse that are located in the same municipality and those that are in different municipalities. This is done because we do not consider family living in the same municipality to be part of the internal Mexico migrant network - quite the contrary; in fact, they may dissuade these members from migrating.

Thus far, we have only defined migrant networks in terms of individuals directly related to the potential migrant (family networks). Based on work from anthropological and sociological case studies (See for a review, Durand and Massey 1992), it is expected that other acquaintances, particularly individuals in the same ejido, will also form part of an individual's migrant network and provide valuable information on, and assistance for, migration (community or ejido network). For example, Menjivar (1995) notes that kin terms were extended to friends from their hometowns, with whom the immigrants shared whatever resources were available. At the ejido level, two network groupings are defined for both the US and Mexico: current ejido migrant network and previous ejido migrant network. The current ejido network is defined as the sum of the current migrants of all households surveyed in an ejido, minus each household's particular contribution, divided by the total number of adults in the households surveyed in that ejido. Dividing by the total number of adults is necessary to normalise the variable across ejidos and is appropriate given that the fraction of households surveyed in each ejido is approximately the same throughout the sample. The variables should be interpreted as the density of current ejido migrant networks. The previous ejido migrant network, which measures the density of previous ejido migration, is defined in a similar manner.

Turning to the descriptive statistics presented in Table 2, the first column shows the average levels of migrant networks for the entire population, the second for the non-migrants, and the remaining four columns for the various migrant sub-categories of respondents. Looking at US family networks first, the largest networks involve current migrants with each individual on average having 1.11 relatives currently in the US. The total number of US network migrants varies greatly across migrant categories. Not surprisingly, US migrants report the largest number of total US family network migrants – more than three times as many current migrants as other groups and more than two times as many previous migrants than any other group. At the ejido level, current migrants are also much higher than previous migrants with 0.29 current US migrants per head versus 0.12 previous US migrants per head. Like family networks, ejido networks are larger for US migrants than for other migrants.

Mexico networks are much larger than US networks. Overall current family migrants number on average, over the whole sample, 6.58 members per household, compared to 1.11 in the case of US networks. However, the differences across migration categories - and indeed among non-migrants - are less dramatic. Only in the case of current and previous family networks do small, but significant differences emerge between Mexico non-agricultural migrants and the other categories.

Further analyses of the data confirm that Mexico migrant networks are more widely distributed than US networks. Only 10 per cent of the population report no Mexico family migrant network. The median size of the Mexico migrant network is five, while one-third report three or less persons in their asset network and one-third report networks of size seven or more. In contrast, US migrant networks are more exclusive with 54 per cent of the sample reporting no family migrant network. Only 13 per cent report family networks of size one, nine per cent report family networks of size two and from there the size of the networks rapidly declines with less than 25 per cent of persons reporting US family networks of size three or more.

IV. Empirical results

The migration decision facing individuals in the Mexican ejido sector is whether to migrate to the US, migrate for agricultural work in Mexico, migrate for non-agricultural work in Mexico or not to migrate at all and remain at the point of origin. As such, four potential choices are available. Given that individuals decide from a set of unordered choices, the multinomial logit regression model is the most suitable tool for this analysis (Kennedy 1998). The multinomial logit allows consideration of the influence of individual, household, and community explanatory variables on the migration decision and allows assessment of the consistency of variable effects on the different outcomes. One concern with the multinomial logit is whether our chosen outcomes are appropriate in a single model or whether the assumption of independence of irrelevant alternatives (IIA) is violated. Results from the standard Hausman test of the IIA assumption suggest no statistical violation. All results presented below are described with coefficient estimates rather than odds ratios and standard errors are robust. Standard procedures are used to avoid downward biased standard errors that may be a problem due to intra-household and intra-ejido correlations. Finally, remaining at the point of origin is the reference category in all regression equations.

The first six hypotheses presented in section II are tested using a multinomial logit. The first regression recognises the role of migrant networks but follows the general practice, noted earlier, of aggregating network variables. This provides an approach to compare aggregated with disaggregated results. Along with the aggregate network variables included in this first regression are individual, household, and ejido variables, reflecting a model that considers the neo-classical model and the new economics of migration. The second and subsequent regressions are designed to provide insight into how to disaggregate network variables and the importance of network composition. These latter steps provide insight into the role of different network ties and the problem with aggregating network variables.

STEP 1: AGGREGATE NETWORKS

Table 3 presents the multinomial logit results for the first step. Before discussing the network variables, the non-network variables are considered. Many of these explanatory variables are significant, particularly for US migration. Age and education have similar effects on US migration and Mexico non-agricultural migration; both the age and education coefficients indicate positive and diminishing effects on the likelihood of migration. Furthermore, tests show that while the individual age coefficients are insignificant for Mexico agricultural migration, the age coefficients are jointly significant (joint tests of significance are not presented in the tables but were conducted for all nonlinear specifications), with the coefficients indicating a similar pattern as for US migration and Mexico non-agricultural migration. The effect of education on Mexico agricultural migration is negative although diminishing; suggesting that migration for agricultural employment may be the only option for individuals with low levels of human capital.

We consistently find that men are more likely to migrate to any of the locations than women are. To determine the magnitude of the sex coefficient, we calculate the predicted probabilities of each outcome for specific values of the sex variable with all other explanatory variables set at their mean levels (the same procedure is used to calculate all predicted probabilities). The magnitude of the sex coefficient is stronger for US migration than for Mexico non-agricultural migration where being male increases the probability of US migration from 2.1 per cent to 7.8 per cent. On the other hand, individuals from indigenous households are significantly less likely to migrate to the US. The coefficient estimate suggests that the probability of an individual from an indigenous household migrating to the US is only 1.7 per cent while the probability of an individual from a non-indigenous household is 5.7 per cent. Instead, individuals from indigenous households are significantly more likely to migrate within Mexico for agricultural work.

Household composition effects are also quite robust across models. Individuals from households with more males 15-34 are more likely to migrate with the strongest effect for Mexico non-agricultural migration. This effect is consistent across all migration destinations and is likely a household response to excess labor supply. Higher number of females 15-34 is found to induce Mexico agricultural migration. The only other significant household composition result is that individuals in households with more elderly are less likely to migrate within Mexico for agriculture. The age of the household head has positive but diminishing effects on the likelihood of US migration and Mexico non-agricultural migration and negative but diminishing effects on Mexico agricultural migration (coefficients are jointly significant for Mexico non-agricultural migration at the 5 per cent level). The relationship between land ownership and migration decisions varies across migration destinations. Higher levels of rainfed land are associated with positive but diminishing probabilities of US migration while greater access to irrigated land is associated with positive yet diminishing probability of Mexico agricultural migration. In contrast, land ownership is insignificant (both individually and jointly) for Mexico non-agricultural migration.

Variables that measure the role of community infrastructure and wealth are generally not strong determinants of individual migration decisions. The major exceptions are per head measures of common land at the ejido level, the share of access roads that are paved, and time to urban centre. The first two variables are associated with lower levels of US migration while time to urban centre is associated with a higher probability of US migration. The only other exception is that lack of access to any telephone service - an indicator of community isolation or marginality - is associated with a greater probability of Mexico agricultural migration. The regional indicators suggest that individuals in the north-Pacific and Gulf regions are less likely than individuals living in central Mexico to migrate to the US. Individuals in the Gulf region are more likely to migrate within Mexico for non-agricultural work than those in the Central region. Otherwise, there are no large regional differences in migration within Mexico.

The overall impression from the non-network variables in Table 3 is the similarity of the effects of individual characteristics on US migration and Mexico non-agricultural migration. In contrast, these same coefficients – particularly those representing the relationship between education and indigenous households and migration – suggest that Mexico agricultural migration represents a different phenomenon.

The network variables included in this regression are total US and total Mexico family migrant networks as well as total US and Mexico ejido migrant networks. The total family network variables and total ejido network variables are aggregate measures of current and previous network migrants (see Table 2). The family variables measure (for both the US and Mexico) the total number of relatives that are currently migrants or migrated in the past while the ejido variables measure the density of current and previous (US and Mexico) migration in the ejido.

The results indicate that migration to the US by family members and by other ejido members positively and significantly influence the probability of US migration. At the same time, migration within Mexico by family members (insignificant) and ejido (significant) reduces the probability of US migration. The strength of the migrant network effects on US migration contrasts with their weaker role in Mexico migration. In the case of Mexico agricultural migration, migrant networks appear to have little impact on the decision to migrate for agricultural work relative to not migrating. In the case of Mexico non-agricultural migration, migrant network effects are more in line with the direction of the US migration results. At both the household and ejido level, Mexico migrant networks increase the probability of Mexico non-agricultural migration and US networks reduce the probability of Mexico non-agricultural migration. However, none of the coefficients are significant (neither individually nor jointly). These results tend to confirm hypothesis 1: migrant networks appear to play a more important role in international migration than in domestic migration decisions. The results are also consistent with Taylor (1986), who reports similar conclusions based on a smaller sample of two communities.

STEP 2: DISAGGREGATION OF NETWORK VARIABLES

The aggregated migrant network variables presented in Table 3, however, paint only a very general picture of network effects on migration decisions. Aggregation ignores the potentially distinct roles of different kinship relation types as well as whether the network ties are between current migrants still living at the destination or previous migrants. The next step tests the importance of the more disaggregated set of network variables presented in Table 2. However, the set of network variables presented in Table 2 may not represent the appropriate disaggregation. In order to reduce the number of possibly redundant categories, we proceed by testing the distinctions between a broader range of migrant network ties to determine which ones are statistically undifferentiable. A total of five theoretically justifiable restrictions were considered as plausible categories for aggregation. The five following aggregations were tested:

1. The distinction between previous migration by the head/spouse and other immediate family members;
2. The distinction between migration by male and female siblings of head and spouse;
3. The distinction between current and previous migration;
4. The distinction between previous migration by the individual (self) and other household members; and
5. For Mexico networks, the distinction between near (live in same municipio) and far (live in another municipio) siblings of the household head.

For each of these tests, the multinomial logit model was run with and without the distinction and a likelihood ratio test was performed to determine whether the aggregation was appropriate. Two of the five aggregations, numbers 1 and 2, proved to be statistically identical across the three outcomes. These aggregations could not be rejected and these variables are aggregated in the subsequent analysis. In the other three cases, numbers 3-5, the hypotheses for aggregation was rejected and these variables are kept separate in the subsequent analysis.

Results for the disaggregated migrant networks are presented in Table 4. Note that in the interest of saving space the results for the individual, household, and ejido variables and regional dummies are not presented. Results for these variables are robust across the specifications. Along with the inclusion of the disaggregated network variables, an interaction term between age and previous migration by the individual (self) is included for both US and Mexico. This is based on the hypothesis that older individuals are less likely to migrate again even if they have the experience.

What stands out are the differences in how network effects vary by kinship ties. Immediate family members currently living in the US or who went to the US but live elsewhere in Mexico have strong positive effects on US migration. The effect of sibling networks in the US is also positive although only significant at the 10 per cent level for US migration. Previous migration by the individual (self) also has a very strong effect on US migration although, as expected, this diminishes with age. Apparently, older individuals that return to Mexico are less likely to migrate again. This corresponds to the finding that older individuals, historically migrants or not, are less likely to migrate, while previous migration increases the possibility of subsequent migration by younger individuals. The effect of household members who previously migrated to the US but are currently living in the household is insignificant. Even though previous and current ejido level variables for US migration are both positive, only the coefficient on current ejido migration is significant suggesting only current ejido networks influence US migration. The effects of Mexico migrant networks on the probability of US migration are mostly negative and insignificant although having an immediate family member that is currently a Mexico migrant or being in an ejido with substantial current Mexico migration hinders US migration. However, individuals with previous migration experience in Mexico are more likely to migrate to the US, although this effect diminishes with age. This may suggest that internal migration is a step towards international migration.

In terms of Mexico non-agricultural migration, disaggregation of the migrant network reveals the important role that migrant networks also play on migration within Mexico. In contrast to the insignificant coefficients obtained with the aggregated network variables presented in Table 3, several of the disaggregated variables show substantial and significant effects. First, both immediate family members and siblings of the head residing outside the municipality (living far) increase the probability of non-agricultural migration within Mexico. However, the effect of the immediate family is again the strongest. Second, immediate family who migrated to the US and now live elsewhere in Mexico increase the probability of Mexico non-agricultural migration. This is not surprising, as these households can provide information and experience on migration to both the US and other parts of Mexico. Third, previous migration by the individual (self) has a strong influence on migration although again this influence diminishes with age. Fourth, we find opposite signs for siblings living near and far away. The number of siblings who have remained in the same municipality as the household - the near category - serve to dissuade outward Mexico migration. Siblings in the far category potentially can provide information useful for migrants, thus facilitating the decision. Fifth, as in the US case, while the effect of current immediate family members who migrated to Mexico but are currently living in the household is insignificant, previous migration by the individual has a strongly negative and significant interactive effect on the probability of migration. The only ejido network variable which emerges significant is the measure of previous migration which suggests that individuals living in ejidos with higher levels of previous Mexico migration are more susceptible to Mexico non-agricultural migration.

As expected, almost none of the migrant network variables are significant for Mexico agricultural migration. The two exceptions are the negative effects of heads and children who migrated previously to the US and live in the household, as well as if the individual had previously migrated to the US.

The results of Table 4 shed light on three hypotheses posed earlier. First, we need to reconsider Hypothesis 1 in light of these new results. While the results of Table 3 painted a clear picture of US networks being more influential than Mexican networks, the results of Table 4 for disaggregated networks are not as straightforward. While for some variables (e.g. current migration by the immediate family) the coefficient for US migration is larger than for Mexico non-agricultural migration, for others (e.g. self-previous migration) this is not clearly the case. The results are thus ambiguous and networks appear to play a strong role in both US migration and Mexico non-agricultural migration.

Hypothesis 2 suggests that there is considerable variation in the effect of the different types of migrant network ties on the migration decision. Differences in the results for immediate family and siblings of the head/spouse for current networks and between self and immediate family and siblings for previous networks clearly suggest that migrant networks are not homogenous in terms of kinship. This result supports earlier analysis by Davis and Winters (2001) and Cerrutti and Massey (2001) which emphasise sex-specific differences in network roles. Our results thus provide further evidence on the importance of specific ties and relationships between potential migrants and their network connections. Hypothesis 2 cannot be rejected.

The other hypothesis that can now be considered relates to the difference in migrant network effects when the migration capital is current or previous (Hypothesis 3). The results related to this hypothesis are somewhat ambiguous. Previous migration by the individual to the US and Mexico has a strong influence on the migration decision. Yet, previous migration by sibling or other immediate family members in the household do not have a significant effect on migration while current migration by these groups does. However, the results show that previous migration by members of the immediate family to the US affects both the probability of US migration and Mexico non-agricultural migration. Thus, among the family network variables clear results do not emerge. At the ejido level, current US networks affect US migration but previous Mexico networks affects Mexico non-agricultural migration. Taken together the results, therefore, do not provide clear evidence that current migrant networks have a stronger influence than previous networks and the hypothesis must be rejected.

STEP 3: NON-LINEARITIES

Thus far the network variables have been introduced as simple linear effects. Non-linearities need to be considered to address Hypothesis 4 and examine whether there are diminishing or increasing marginal effects. To do this, the migrant network variables for the US are recoded into dummy variables. Network size 0 is entered as the omitted category and dummies are included for sizes 1 and 2+. Dummy variables, rather than using squared terms, are created for US migrant networks because they tend to be very small and rarely larger than 3. For Mexico migrant networks, which tend to be much larger, squared terms were introduced in the regression. The results are presented in Table 5.

To adequately determine the effect of network size on the probability of migration to a particular destination requires calculating predicted probabilities of migration. For example, on average the probability of migration to the US when an individual has no household member currently in the US is 4.1 per cent, while with 1 immediate family member in the US the probability is 6.6 per cent (an increase of 2.5 per cent) and with 2 or more the probability is 9.6 per cent (an increase of 3.0 per cent.) This indicates an increasing probability of migration for this variable. Following a similar procedure for other significant US networks, we find diminishing returns to siblings in the US and immediate family members that previously migrated but are living elsewhere in Mexico. In terms of Mexico migrant networks, a number of the disaggregated categories show non-linear effects on both Mexico non-agricultural migration and US migration. Tests of joint significance for the combination of non-linear terms show a significant effect of the following variables on Mexico non-agricultural migration: immediate family previous US migrant in Mexico, immediate family current Mexico migrant and sibling in Mexico living far. The predicted values of these variables on the probability of Mexico non-agricultural migration suggest increasing marginal benefits from having immediate family that went to the US and returned to Mexico and on having immediate family that migrated within Mexico. The greater the number of siblings of the head/spouse that are far or nearby reduces the probability of Mexico non-agricultural migration, although the effect is much stronger for multiple nearby siblings. While no clear conclusions can be drawn with respect to Hypothesis 4, the results reinforce the notion that the composition of networks matters. For both US migration and Mexico non-agricultural migration there are increasing returns to having household members who have migrated while there are diminished returns from the continued migration of the extended family.

STEP 4: INTERACTIONS

The final multinomial logit model, presented in Table 6, introduces two types of interactions to the base model (Table 3) which are designed to test Hypotheses 5 and 6. The first type of interaction is between immediate family currently living in the US and the ejido level measure of current US networks. A similar variable is constructed for testing the interaction for Mexico migration. The interaction terms test whether strong ties to migrant networks (through immediate family) and weak ties (through the ejido network) are substitutes or complements in their effect on the individual migration decision. The significant, negative sign on the interaction term for US migrant networks and the joint significance of the set of variables suggests that the networks appear to operate as substitutes for US migration. Thus, the size of the ejido (immediate family) network has a greater effect on US migration probabilities for individuals with relatively smaller immediate family (ejido) network. On the other hand, the positive sign on the interaction term for Mexico suggests Mexico strong and weak networks have complementary effects on the Mexico non-agricultural migration decision (the set of variables is jointly significant). In this case, the combination of ejido and individual level assets leads to an even greater probability of Mexico non-agricultural migration. Thus, Hypothesis 5 cannot be rejected for migration to the US and is rejected for the case of domestic non-agricultural migration.

The second set of interactions in Table 6 - interactions between US and Mexico ejido network variables - help to identify whether Mexico and US ejido networks are substitutes or complements. The only individually significant interaction term is the positive interaction effect between US and Mexico previous ejido networks on Mexico non-agricultural migration. However, the combination of ejido current US network, ejido current Mexico network and their interaction are jointly significant for US migration, and the combination of ejido previous US network, ejido previous Mexico network and interaction are jointly significant for Mexico non-agricultural migration. These results suggest that US ejido networks increase the probability of migration to the US more when Mexico ejido networks are smaller than when they are larger. They are thus substitutes for US migration. Furthermore, individuals living in ejidos with large previous US and Mexico networks - where a culture of migration exists - are likelier to migrate within Mexico for non-agricultural purposes than those with smaller Mexico networks. This indicates these networks are complements for Mexico non-agricultural migration. In this case, we reject Hypothesis 6 for the case of US migrant networks, but confirm for Mexico migrant networks.

V. Migrant choice of location within destination

Thus far, analysis of the migration decision has focused on the role of migrant networks on the decision to migrate. Networks are assumed to provide information and assistance to potential migrants that increase the probability of migration. While the empirical results indicate that international and domestic migrant networks positively influence both international and domestic non-agricultural migration, the analysis assumes that networks play a similar role regardless of their location within those general destinations. While a network migrant located in Texas might have valuable general information on migration and provide some direct assistance, presumably much of the information and assistance is location specific. As noted in Hypothesis 7, the location of network migrants is likely to influence the destination choice of migrants.

A further reason to consider the location decision relates to the use of cross-sectional data. One of the weaknesses of using cross-sectional data (even when it includes a panel dimension as in our case) is that we ignore the historical development of networks and assume that the significant associations between network variables and the migration decisions support the hypothesis that networks influence the migration decision. It may be argued that networks simply reflect the impact of factors that influenced migration in the past and continue to influence migration in the present. Individuals from the same households and ejidos have much in common, and thus one would expect inter-temporally correlated migration streams. We try to control for these factors by including household, community and regional control variables in the analysis. However, if we can show that the migrants tend to locate in the same specific locations as migrant networks it would further support our argument that the information and assistance provided by network migrants influenced the migration decisions.

Including location specific information is not possible using a multinomial logit. A conditional logit is more appropriate when data consist of choice-specific attributes rather than individual specific characteristics (Greene 1997). In this case, the migrant must consider the choice of locations within the US (for international migration) or within Mexico (for domestic migration). The number of network migrants at a particular destination is an attribute of that destination.

For a subset of 196 international migrants and 308 domestic migrants, data are available on the migrant choice of location, the location of family network migrants and the location of ejido network migrants. The categories of network migrants identified earlier had to be aggregated into family and ejido migrants, as in Table 3, because of limitations in the data. The choice of location is divided into five groups for the US: California (31.4 per cent of international migrants), Texas (27.8 per cent), other West (9.4 per cent), Midwest and North (15.5 per cent), and South (15.9 per cent). Locations within Mexico are also divided into five: North (23.1 per cent of Mexico migrants), Pacific (17.1 per cent), Central (28.5 per cent), Gulf (21.3 per cent) and South (10.1 per cent).

Tables 7 and 8 present the results of the conditional logits for location choice within the US and Mexico, respectively. Note that the location of family network migrants is simply the number of family network migrants in each location but the location of ejido network migrants is the share of total migrants in each location. The share of migrants is used in order to normalize the data since ejidos vary in size. In addition to these network variables an interaction term is included to explore the relationship between family and ejido network locations. Location dummy variables are also included in each regression. This fixed effect of each location (using one location as a reference category) accounts for the attractiveness of a location independent of any network effects. Finally, migrants' age, education and sex are included to control for individual characteristics that may influence the choice of location. Since conditional logits only examine the attributes of a choice, individual characteristics must be multiplied by location dummies to determine their effect on location choice. What is being examined is the importance of certain individual characteristics in a given location.

As seen in Table 7, the results indicate that the location of family and ejido network migrants has a positive and significant influence on the choice of location by subsequent migrants. The results thus strongly support Hypothesis 7 for international migration. The interaction term is negative and significant suggesting that the influence on the location choice of an additional family migrant in a location is less the larger the share of ejido migrants in the location. For the other variables, California is used as the reference category. The results indicate that there are other factors that are influencing migration to Texas and the Midwest/North rather than California. The results also suggest that migrants to Texas, the Midwest/North and the South tend to be younger than those migrating to California. This may be due to the fact that younger migrants are more likely to go to newer migration locations and older migrants to more established locations such as California. Finally, men and less educated migrants are more likely to go to the Midwest/North. Again this may be because this is a newer migration destination and is attracting less-skilled, male workers who are able and willing to take more risks in a new location.

In Table 8, similar results are found for Mexico network location. Namely, the location of network migrants has a positive and significant influence on migrants' choice of location within Mexico. These results further confirm Hypothesis 7. In this case, however, the interaction term is not found to be significant indicating that these network effects are independent. Using North Mexico as the reference category, domestic migrants are found less likely to go to the Pacific. Furthermore, less educated migrants are found to go to the Gulf.

VI. Conclusions

Our analysis shows that a common approach to modelling the decision to migrate - using simple aggregated migrant networks as an explanatory variable - can lead to incorrect conclusions regarding the role of migrant networks in the decision to migrate to alternative destinations. Using data from landed households in Mexico, we test a number of hypotheses regarding the role of different kinds of migration networks on the migration destination choice. Our findings indicate the following:

- While the characteristics of migrants to the US and non-agricultural Mexico are similar, Mexico agricultural migrants tend to have lower levels of education, are indigenous, and live in greater isolation.

- When modelling the migration choice with aggregate measures of migrant networks, US migrant networks appear more important then Mexico migrant networks in terms of influencing the migration decision to the respective countries. Once networks are disaggregated by kinship, however, Mexico migrant networks become very important to the Mexico migrant decision. Failing to disaggregate migrant networks by kinship relationships and migration experience may lead to inaccurate results.
- The impact of migrant networks in the decision to migrate is not homogeneous, but depends upon the composition of the network. In particular, the closer the kinship bond, the more important the impact.
- The impact of migrant networks is found to be non-linear, but may be increasing or decreasing at the margin depending on the type of asset and destination choice.
- Important interaction effects are found not only among different types of US and Mexico assets, but also between US and Mexico migrant networks. Most importantly, US and Mexico ejido level assets serve as substitutes in terms of US migration, and complements for Mexico migration.
- Finally, in confirming the importance of networks, the results show that the location of network migrants within the migrant destinations affect the location decision of subsequent migrants.

We find that aggregating the migration network data come at considerable cost and understates many of the potentially important effects of migration networks in quantitative analysis of migration. In terms of social networks the parts are more informative than the whole, and in fact the whole can be deceptive. Further analysis is needed to help elucidate the pathways through which networks affect migration decisions, particularly over time. Nevertheless, our results underline the importance of incurring the extra cost of collecting disaggregated survey data on migrant networks, as well as constructing disaggregated networks in migration analysis.

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Table 1. Individual and household characteristics of migrants

	units	Total	Non migrants	Migrants			
				Total	*US*	*Mexico agric.*	*Mexico non agric.*
Total number of individuals		5260	4423	837	274	73	490
Percent of total			84.1	15.9	5.2	1.4	9.3
Individual variables							
age	years	36	38	26	27	29	25
gender	%	53	50	71	80	93	63
education	years	5.38	5.16	6.61	6.15	5.26	7.04
indigenous	%	16	16	15	5	37	18
Household variables							
age, head of household	years	54	54	55	54	51	55
family members <15	#	1.59	1.58	1.61	1.76	2.12	1.46
adult males 15-34	#	1.30	1.17	2.00	1.77	1.85	2.16
adult females 15-34	#	.96	.96	1.01	1.04	1.05	.98
adult males 35-59	#	.74	.73	.79	.79	.80	.79
adult females 35-59	#	.67	.65	.75	.78	.73	.74
adults >59	#	.35	.36	.29	.30	.15	.30
total household income, 1997	Pesos	12834	12439	15135	22563	6728	11543
irrigated land, 1994	Has	.97	.97	.94	.60	.46	1.20
rainfed land, 1994	Has	6.02	5.79	7.27	9.41	5.85	6.20
high yield variety seeds, 1994	%	18	18	19	16	5	22
chemicals, 1994	%	45	45	46	51	37	44
formal credit, 1994	%	26	26	27	26	22	28
informal credit, 1997	%	2	2	2	2	1	2
participation in organization	%	26	26	26	17	24	31
Ejido variables							
per capita ejido common lands	Has	21.10	21.34	19.79	18.92	15.28	20.84
share of access road that is paved	share	.51	.51	.53	.45	.41	.59
time to urban center, public transport	min	46	46	46	43	73	45
electricity	%	90	90	90	92	75	91
piped water in house	%	47	47	48	54	35	46
no telephone access	%	33	34	30	27	59	29
Location							
North	%	21	21	26	39	18	19
Northern Pacific	%	9	9	8	2	4	12
Center	%	36	36	36	35	35	37
Gulf	%	21	21	20	14	23	22
South	%	13	14	10	10	19	10

Table 2. Composition of migrant networks

	Total	Non migrants	Migrants			
relationships are with respect to the household head and spouse			*Total*	*US*	*Mexico agric.*	*Mexico non agric.*
Total number of individuals	5260	4423	837	274	73	490
Percent of total		84.1	15.9	5.2	1.4	9.3
United States						
Total family (current + previous)	***1.63***	***1.53***	***2.17***	***3.98***	***.73***	***1.27***
Total current (family)	*1.11*	*1.05*	*1.45*	*2.86*	*.46*	*.74*
immediate family	.40	.39	.47	.85	.18	.28
male siblings of head/spouse	.33	.31	.46	1.02	.06	.18
female siblings of head/spouse	.37	.35	.52	.99	.22	.29
Total previous (family)	*.52*	*.49*	*.72*	*1.12*	*.27*	*.53*
self	.04	.04	.03	.03	.04	.02
head/spouse	.11	.10	.17	.23	.03	.14
other immediate family, live in household	.02	.02	.04	.05	.00	.04
other immediate family, do not live in household	.11	.09	.18	.29	.09	.13
male siblings of head/spouse	.12	.11	.16	.26	.10	.10
female siblings of head/spouse	.12	.12	.14	.26	.01	.09
Total Ejido (current + previous)	*.41*	*.39*	*.52*	*.96*	*.19*	*.30*
ejido network, current (per capita)	.29	.28	.37	.71	.15	.20
ejido network, previous (per capita)	.12	.11	.14	.25	.04	.09
Mexico						
Total family* (current + previous)	***6.83***	***6.80***	***7.09***	***6.16***	***6.89***	***7.66***
Total current (family)*	*6.58*	*6.53*	*6.83*	*5.98*	*6.69*	*7.34*
immediate family	1.89	1.91	1.76	1.14	2.00	2.10
male siblings, far (live in another municipio)	2.21	2.17	2.42	2.13	2.57	2.58
female siblings, far (live in another municipio)	2.48	2.45	2.64	2.71	2.12	2.66
male siblings, near (live in same municipio)	2.42	2.42	2.45	2.46	2.55	2.44
female siblings, near (live in same municipio)	1.72	1.74	1.60	1.51	2.17	1.58
Total previous (family)	*.25*	*.27*	*.26*	*.18*	*.20*	*.32*
self	.06	.07	.03	.00	.08	.04
head/spouse	.16	.16	.20	.16	.12	.23
other immediate	.03	.04	.03	.03	.00	.04
Total Ejido (current + previous)	*1.32*	*1.31*	*1.36*	*1.28*	*1.42*	*1.39*
ejido network, current (per capita)	1.25	1.25	1.29	1.23	1.35	1.32
ejido network, previous (per capita)	.06	.06	.07	.05	.07	.07

*excludes those living in the same municipio as the household

Table 3. Migration destination choice with aggregate migrant networks.

Multinomial regression		Wald chi2(102) 917		Pseudo R2 = .25			
		Prob > chi2 = .00					
		Log likelihood = -2069					
No. of obs: 4894		**Migration to:**					
		US versus none		Mexico agricultural versus none		Mexico non-agricultural versus none	
		B	*t-stat*	*B*	*t-stat*	*B*	*t-stat*
Individual	age	.138	2.31 **	.034	.66	.268	3.07 ***
	age squared	-.002	-2.72 ***	-.001	-1.38	-.005	-3.13 ***
	education	.225	2.12 **	-.136	-2.43 **	.161	2.76 ***
	education squared	-.015	-2.13 **	.002	2.87 ***	-.008	-2.14 **
	gender (male)	1.637	8.85 ***	2.595	4.03 ***	.444	3.89 ***
Household	yes/no indigenous household	-1.161	-2.82 ***	1.163	2.57 ***	.038	.20
	# family members <15	-.010	-.21	-.082	-.75	-.024	-.59
	# adult males 15-34	.305	4.40 ***	.295	1.67 *	.500	9.77 ***
	# adult females 15-34	-.042	-.51	.262	1.64 *	-.021	-.37
	# adult males 35-59	.060	.32	-.109	-.28	-.016	-.12
	# adult females 35-59	.181	.85	-.505	-1.32	-.054	-.33
	# adults >59	.309	1.29	-1.403	-2.01 **	-.286	-1.58
	age, household head	.132	1.82 *	-.132	-1.72 *	.098	1.50
	age, household head squared	-.001	-1.78 *	.002	2.03 **	-.001	-.92
	irrigated land	.099	.84	.638	1.97 **	-.027	-.62
	irrigated land squared	-.018	-1.35	-.071	-1.95 **	.002	1.06
	rainfed land	.084	2.81 ***	.011	.17	.013	.87
	rainfed land squared	-.001	-2.35 **	-.001	-.39	.000	-.46
	yes/no formal credit, 1994	-.150	-.62	-.732	-1.51	-.226	-1.47
	yes/no organization, 1994	-.222	-.94	.344	1.02	.119	.85
Ejido	common land, per capita	-.010	-3.36 ***	-.010	-1.42	.000	.27
	share of access road that is paved	-.488	-2.33 **	-.233	-.54	.148	.93
	time to urban center, public transport	.004	1.77 *	.002	.66	.002	1.58
	household has electricity	-.203	-.65	-.259	-.41	.095	.37
	household has water	-.188	-.85	-.090	-.22	-.167	-1.13
	household does not have access to phone	-.067	-.33	1.059	2.65 ***	-.099	-.63
Location	north	.623	2.21 **	-.184	-.27	.041	.20
	north-Pacific	-.614	-1.59	-.468	-.50	.189	.84
	gulf	-.080	-.23	-.058	-.09	.193	.87
	south	.004	.01	-.385	-.67	-.203	-.95
Migrant network	US Family Network	.139	4.42 ***	-.157	-1.18	-.008	-.25
	US Ejido Network	.642	5.54 ***	-.109	-.17	-.174	-1.04
	Mexico Family Network	-.009	-.45	-.008	-.22	.018	1.32
	Mexico Ejido Network	-.298	-2.76 ***	-.098	-.50	.026	.50
Constant		-9.798	-4.04 ***	-3.018	-1.39	-10.717	-4.35 ***

*= significant at 90%, **= significant at 95% and ***= significant at 99% .

Table 4. Migration destination choice. Disaggregate migrant networks.

Results for individual, household and ejido variables regional dummies and constant not reported.		Migration to: US versus none		Mexico agricultural versus none		Mexico non-agricultural versus none	
		B	*t-stat*	*B*	*t-stat*	*B*	*t-stat*
Migrant network	Immediate family, currently in US	.309	3.82 ***	.267	1.21	-.063	-.86
	Siblings of head/spouse, currently in US	.095	1.70 *	-.052	-.27	-.002	-.04
	Self, previous US migrant	3.484	2.23 **	-38.860	-18.69 ***	-.402	-.23
	Self US*age	-.163	-4.47 ***	.044	.95	.009	.17
	Immediate family, previous US migrant in HH	.063	.28	-36.586	-62.93 ***	.123	.69
	Immediate family, previous US migrant in Mexico	.752	3.97 ***	-.544	-.64	.570	2.60 ***
	Sibling, previous US migrant in Mexico	.075	.79	.140	.22	.042	.46
	Ejido, current US migration	.702	5.06 ***	.419	.81	-.249	-1.30
	Ejido, previous US migration	.689	1.45	-4.162	-1.51	.079	.19
	Immediate family, current Mexico migrant	-.110	-1.73 *	.178	.97	.128	2.93 ***
	Sibling of head/spouse, current Mexico migrant living far	-.005	-.21	-.023	-.62	.038	2.44 ***
	Sibling of head/spouse, Mexico living near	-.002	-.08	-.026	-.46	-.033	-1.76 *
	Self, previous Mexico migrant	6.285	1.87 *	-1.821	-.59	5.117	3.50 ***
	Self Mexico*age	-.257	-2.19 **	.026	.37	-.165	-3.31 ***
	Immediate family, previous Mexico migrant	-.067	-.29	-.329	-.60	-.019	-.14
	Ejido current Mexico migration	-.239	-1.86 *	-.170	-.74	-.043	-.56
	Ejido previous Mexico migration	.230	.19	1.408	.67	2.811	4.26 ***

*= significant at 90%, **= significant at 95% and ***= significant at 99% .

Table 5. Migration destination choice. Disaggregate migrant networks, non-linear terms

		Migration to:					
Results for individual, household and ejido variables regional dummies and constant not reported.		US versus none		Mexico agricultural versus none		Mexico non-agricultural versus none	
		B	*t-stat*	*B*	*t-stat*	*B*	*t-stat*
Migrant network	Immediate family, currently in US, 1	.630	2.07 **	-.960	-.78	.072	.28
	Immediate family, currently in US, 2+	1.124	3.43 ***	.541	.70	-.308	-1.07
	Siblings, currently in US, 1	.541	1.62	.074	.10	-.332	-1.50
	Siblings, currently in US, 2+	.691	2.25 **	-1.729	-1.56	.044	.21
	Self, previous US migrant	3.405	2.29 **	-43.766	.	-.304	-.17
	Self US*age	-.159	-4.55 ***	-.274	.	.002	.04
	Immediate family, previous US in HH, 1	-.218	-.89	-46.063	.	.022	.10
	Immediate family, previous US in HH, 2+	.706	1.34	-42.464	.	.808	1.88 *
	Immediate family, previous US in Mexico, 1	1.000	2.32 **	.425	.48	.317	1.06
	Immediate family, previous US in Mexico, 2+	1.357	2.63 ***	-43.743	.	1.433	2.06 **
	Sibling, previous US in Mexico, 1	.293	.84	-.748	-.67	.633	2.51 ***
	Sibling, previous US in Mexico, 2+	.416	1.06	1.435	1.10	-.170	-.51
	Ejido, current US migration	.674	4.98 ***	.789	1.59	-.278	-1.51
	Ejido, previous US migration	.680	1.46	-3.492	-1.52	.234	.59
	Immediate family, current Mexico	-.170	-.99	.196	.53	.184	1.86 *
	Immediate family, current Mexico, squared	.008	.25	-.003	-.08	-.009	-.64
	Sibling, current Mexico living far	-.028	-.61	.182	1.46	-.002	-.06
	Sibling, current Mexico living far, squared	.000	.09	-.016	-1.75 *	.002	2.12 **
	Sibling, Mexico living near	-.104	-1.68 *	-.082	-.68	-.039	-.79
	Sibling, Mexico living near, squared	.008	1.94 *	.005	.67	.000	-.06
	Self, previous Mexico migrant	6.431	1.84 *	-2.021	-.62	5.182	3.66 ***
	Self Mexico*age	-.262	-2.15 **	.029	.40	-.167	-3.41 ***
	Immediate family, previous Mexico	-.331	-.84	9.146	.	-.369	-1.31
	Immediate family, previous Mexico, squared	.218	1.14	-9.499	-15.61 ***	.275	1.72 *
	Ejido current Mexico migration	-.236	-1.86 *	-.182	-.75	-.044	-.56
	Ejido previous Mexico migration	.032	.03	.961	.46	2.935	4.27 ***

*= significant at 90%, **= significant at 95% and ***= significant at 99% .

Table 6. Migration destination choice. Disaggregate migrant networks, interaction terms

Results for individual, household and ejido variables regional dummies and constant not reported.		Migration to: US versus none		Migration to: Mexico agricultural versus none		Migration to: Mexico non-agricultural versus none	
		B	*t-stat*	*B*	*t-stat*	*B*	*t-stat*
Migrant network	Immediate family, currently in US	.478	4.62 ***	-.332	-.71	-.085	-.76
	Siblings, currently in US	.097	1.71 *	-.025	-.14	.004	.08
	Self, previous US migrant	3.560	2.27 **	-35.652	-20.08 ***	-.478	-.27
	Self US*age	-.165	-4.51 ***	.066	1.83 *	.011	.21
	Immediate family, previous US in HH	.055	.25	-32.316	-56.87 ***	.155	.87
	Immediate family, previous US in Mexico	.688	3.52 ***	-.476	-.60	.621	2.87 ***
	Sibling, previous US in Mexico	.106	1.08	-.009	-.02	.000	.00
	Ejido, current US migration	.755	3.15 ***	-.512	-.39	-.506	-1.39
	Ejido, previous US migration	.834	1.55	-4.412	-1.15	-.522	-.92
	*Immediate family*Ejido US Migration*	*-.200*	*-2.36* **	*.408*	*1.69* *	*.058*	*.51*
	Immediate family, current Mexico	-.100	-.94	.421	1.79 *	.057	.87
	Sibling, current Mexico living far	-.005	-.20	-.020	-.52	.041	2.67 ***
	Sibling, Mexico living near	-.003	-.13	-.020	-.35	-.033	-1.73 *
	Self, previous Mexico migrant	6.408	1.95 *	-1.228	-.41	5.037	3.46 ***
	Self Mexico*age	-.264	-2.32 **	.011	.16	-.162	-3.28 ***
	Immediate family, previous Mexico	-.113	-.47	-.532	-.94	-.013	-.09
	Ejido current Mexico migration	-.245	-1.34	-.066	-.22	-.170	-1.52
	Ejido previous Mexico migration	.711	.50	.690	.30	1.845	2.38 **
	*Immediate family*Ejido Mexico migration*	*-.011*	*-.15*	*-.184*	*-1.63*	*.051*	*1.64* *
	*Ejido US*Ejido Mexico, current*	*.031*	*.18*	*.461*	*.87*	*.218*	*1.17*
	*Ejido US*Ejido Mexico, previous migration*	*-4.905*	*-.99*	*17.014*	*.75*	*7.405*	*2.22* **

*= significant at 90%, **= significant at 95% and ***= significant at 99% .

Table 7. Choice of location for international destination

Conditional logit	Wald chi2(19) =	231	
	Prob > chi2 =	.00	
	Log likelihood =	-200	
	Pseudo R2 =	.37	

No. of obs: 980 = (196x5 locations)

		B	*Z-stat*	
Regional dummies	Texas	2.607	2.03	**
	Other West	.276	.19	
	Midwest and North	3.613	2.60	***
	South	2.398	1.61	
Network size/share at location	Location of household network	1.518	7.41	***
	Location of ejido network	2.116	8.05	***
	Household*ejido location	-1.163	-3.63	***
Individual characteristics	Age*Texas	-.055	-2.07	**
	Age*West	-.033	-1.09	
	Age*Midwest/North	-.119	-3.45	***
	Age*South	-.100	-2.72	***
	Education*Texas	-.102	-1.00	
	Education*West	-.012	-.10	
	Education*Midwest/North	-.197	-1.89	*
	Education*South	-.098	-.93	
	Gender*Texas	-.119	-.20	
	Gender*West	.391	.49	
	Gender*Midwest/North	1.264	1.70	*
	Gender*South	1.109	1.44	

*= significant at 90%, **= significant at 95% and ***= significant at 99% .

Table 8. Choice of location for domestic destination

Conditional logit	Wald chi2(19) =		414	
	Prob > chi2 =		.00	
	Log likelihood =		-289	
	Pseudo R2 =		.42	
No. of obs: 1540 = (308x5 locations)				
		B	*Z-stat*	
Regional dummies	Pacific	-1.736	-1.73	*
	Center	-.475	-.52	
	Gulf	1.444	1.40	
	South	-1.898	-1.60	
Network size/share at location	Location of household network	1.443	4.96	***
	Location of ejido network	1.984	11.45	***
	Household*ejido location	.019	.04	
Individual characteristics	Age*Pacific	.024	.89	
	Age*Center	.000	.01	
	Age*Gulf	-.024	-.85	
	Age*South	.018	.56	
	Education*Pacific	.032	.47	
	Education*Center	.009	.14	
	Education*Gulf	-.235	-2.73	***
	Education*South	.075	.97	
	Gender*Pacific	.480	1.02	
	Gender*Center	.248	.58	
	Gender*Gulf	.229	.46	
	Gender*South	.546	.95	

*= significant at 90%, **= significant at 95% and ***= significant at 99% .