University of New England

Graduate School of Agricultural and Resource Economics
&
School of Economics

Disaggregating Mexican migrant networks:
The parts are greater than the whole

by

Benjamin Davis, Guy Stecklov and Paul Winters

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Abstract

In this paper, we explore the role of social networks in the migration decision focusing on the distinct influence networks have on domestic and international migration. The analysis focuses particular attention on the composition of migrant networks in order to improve our understanding of how network composition influences the migration decision. Using data from rural Mexico, we consider migration in a multiple-choice context allowing for the possibility that individuals 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 social networks highlights the complexity of network effects on migration decisions. When modeling the migration choice with aggregate measures of migrant networks, US migrant networks appear more important then Mexico migrant networks for the choice of migration to the respective countries. Once networks are disaggregated by kinship, however, Mexican migrant networks become very important to the Mexico migrant decision. Further, the impact of migrant networks in the decision to migrate is not homogeneous; the closer the kinship bond, the more important the impact. The effect of migrant networks is non-linear and depends upon the type of relationship and destination choice. Finally, US and Mexico ejido level migration assets serve as substitutes in terms of US migration, and complements for Mexico migration.

Key Words: migration, networks, Mexico, network composition

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1.   Introduction

Social networks play a key role in migration. Evidence suggests that potential migrants are able to obtain information through network connections that alter the returns to migration and, if the decision to migrate is taken, they use these networks for direct assistance in the migration process. In this paper, we explore the role of social networks in the migration decision focusing on the distinct influence networks have on domestic and international migration. The analysis focuses particular attention on the composition of migrant networks in order to improve our understanding of how network composition influences the migration decision. Using data from rural Mexico, we consider the migration decision in a multiple-choice context – factoring in the possibility that individuals can migrate within Mexico for agricultural and non-agricultural employment as well as to the US. Including network variables in this analysis allows measurement of how migration influences their decision and sheds light on the mechanisms that drive migration.

2. International and domestic migration 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 centers 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, particularly if international migration is undocumented and from a less developed to a more developed country. This is 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 because of differences in costs, benefits and uncertainty. In this section, we examine the migration decision by first examining three micro-level models of migration -- the neoclassical model, the "new economics of migration" and the network, or social capital, theory of migration.

2.1 *Models of migration*

Neoclassical 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 then the net income comparison would be between the point of origin and all possible destinations. For international destinations, government regulations, particularly workplace

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 neoclassical 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 fact that migrants are often initially funded by the household and send remittances to the household is seen as evidence that individual migration decisions are part of a broader household strategy. 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. While improving net income of the household may be one motivation for migration, migration is also used as a mechanism to diversify risk and gain access to capital in the presence of market imperfections. 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 stresses the importance of direct and indirect relationships in the migration decision (Boyd, 1989). Networks of migrants are viewed as a form of social capital that can be drawn upon by potential migrants with access to the network (Massey et al, 1993). Migrant networks are formed over time as migration proceeds. Initially, within a household or community, certain individuals migrate based on individual or household reasons. These early migrants, who form the initial basis of the network, then provide potential migrants 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. The information and direct assistance provided to potential migrants lower the entry costs, enhance the benefits and reduce the uncertainty associated with migration. If, as would be expected, the uncertainty, benefits and costs associated with international migration are greater than for domestic migration then migrant networks are likely to play a more important role in international migration (Taylor, 1986).

Given this perspective on migrant networks as providers of information and assistance, the network theory of migration can be viewed at the micro-level as complementary to the neoclassical and new economics of migration rather than as an alternative (Winters, de Janvry and Sadoulet, 2001). Networks serve as a conduit for information on the expected returns and the variance of returns to migration, and reduce entry costs to migration. The migration decision is still based on net income differentials and the relative uncertainty between income generating options, but these factors are migrant specific and a function of network access.

The purpose of this paper is not to test the validity of these models. Instead, we assume that each model provides insight into the migration decision. While much of the recent research into migration, particularly the new economics of migration, have modeled migration as a household decision, migration in this paper is considered an individual decision. The literature on intrahousehold decision-making suggests that assuming a unitary household decision structure may be inappropriate. Furthermore, evidence from migration studies indicates the importance of individual characteristics in

the migration decision and 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 of network capital.

2.2 *Migrant networks*

Although several recent empirical studies have noted the role of networks in the migration decision, data limitations and model abstractions have led many researchers, primarily in economics, to ignore details about the structure and composition of migrant networks. That is, migrant networks have generally been considered homogenous with no distinction between the different members of the network. In practical terms, this has meant measuring network density by simply putting a dummy variable to represent one or more network members or adding up the total number of members of a network (Taylor, 1986; Winters et al, 2001; Davis and Winters, 2001)

Taylor's (1986) analysis of Mexican migration offers one of the earliest efforts to determine how migrant networks affect the migration decision. Taylor uses data from two Mexican villages to examine 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. While this study provided valuable insights, domestic and international networks are defined as a dummy variable if households knew any person in either domestic or international destinations.

More recent studies have attempted to further clarify the differential effects of network composition. For example, Winters, de Janvry and Sadoulet (2001) find that both family and community-based networks have a positive influence on Mexico-US migration and that they are substitutes, meaning the presence of one lessens the value of having access to the other. Furthermore, they find that the location of family network migrants in the US influences the destination choice of subsequent migrants. Davis and Winters (2001) evaluate differences in international migrant networks according to gender 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) analyzes the role of Mexican community networks in helping migrants obtain employment in the US, and finds that employment outcomes are related to network size, with the number of long term migrants of particular importance. While each of these studies has taken steps to understand the role of migrant networks, all fail to consider the composition of networks in much detail and simultaneously consider the domestic and international migration options.

Increased appreciation of the specific characteristics of networks should provide useful information about the role of migrant social networks. One aspect of network composition that requires particular attention is its kinship structure. Studies have shown that both strong and weak networks may play a role in migration with the distinction being the former is between close friends and kin and the latter involves relationships between acquaintances (Boyd, 1989; Wilson, 1998). Presumably, rather than this dichotomous distinction between strong and weak networks, 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 and history of interaction between the migrant and the other

individual. 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. Clearly, determining how migrant network capital may be counted is an important part of this research. Answering this question will greatly facilitate the estimation of how various types of migrant networks affect the migration destination choice.

One recent empirical study that does consider the composition of migrant networks is a study of female migration from Mexico to the US by Cerrutti and Massey (2001). In examining the determinants of migration of husbands and wives as well as daughters, they include a number of network variables based on the kinship relationships and the prevalence of migrants in the community. Our paper seeks to extend this and other previous results and provide insight in two main directions. The first, like the Cerrutti and Massey (2001) paper, 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 ejido 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, and other individual, household and ejido characteristics, may differentially affect the international and domestic migration choice as well as the choice of domestic migration for agricultural and non-agricultural work. More specifically this paper seeks to test the following hypotheses:

1. *Characteristics of migrants tend to vary across migrant destination choice.*
   The returns to migration are expected to be lowest for agricultural migration, then for non-agricultural migration and then for international migration.[1] Similarly costs and risk are expected to be highest for international migration, then non-agricultural migration (since it tends to be to urban centers) and then agricultural migration. These differences across migration destination are likely to result in variation in the importance of migrant characteristics in each location.

2. *Migrant networks have a stronger influence on international as opposed to domestic 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 this type of migration.

3. *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 networks are assumed to positively influence migration, network

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[1] If international migration is for agricultural purposes then the expected returns to international agricultural migration may not exceed migration for domestic non-agricultural reasons. The ejido data is not rich enough to properly identify international migration for agricultural purposes. On average it seems reasonable to assume that the returns to international migration would be higher than domestic migration.

migrants with closer family ties to the potential migrant (strong ties) are likely to influence the migration decision more than more distant family relations or neighbors in the same ejido (weak ties).

4. *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 or capital of the network migrant. Network migrants that are currently at a particular destination are likely to have a stronger influence on migration than network migrants with previous experience.

5. *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.

6. *Strong and weak network ties both influence the migration decision but serve similar purposes and are thus substitutes.*
While both strong and weak network ties positively influence migration the value of each set of ties is less the greater is the other set of ties. Strong and weak ties are then substitutes in the provision of information and direct assistance.

7. *Development of a network in one destination (international or domestic) tends to preempt network development in other destinations.*
The presence of a firmly developed network towards one destination is likely to inhibit the formation of a network in another destination. Thus it is expected that communities will either have large domestic or international networks.

8. *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.

3. Data

Data for this study are taken from a nationally representative sample of ejido households.[2] Given the characteristics of this sector, one can interpret the data as providing insight into the migration decisions of small and medium size producers, ejido or private, in Mexico. Thus, while we cannot

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[2] The ejido is the land reform mechanism utilized by the Mexican Government from the 1930's to 1992. Land and water resources were granted to a community or a group of producers, or ejido, with each producer obtaining usufruct rights over a parcel 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 privatize individual parcels. The ejido sectors covers 75 percent of all agricultural producers in Mexico, and over half of the country's irrigated and rainfed land.

make inferences about non-landed households, whether rural or urban, the data are unique in that one can capture the role of the ejido community in the social network of 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.[3] 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 organizations. 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. Community-level data was also collected on characteristics and organization of the ejido.

The ejido panel data show a significant increase in migration to the US during the 1994 to 1997 period. While in 1994 only three percent of panel households had family members who recently migrated to the US, between 1994 and 1997 this rose to eight percent. Overall, in 1997 44 percent of all households had some connection to the US, whether historical migration, or children or siblings living in the US. During the corresponding period, temporary migration to other parts of Mexico actually fell, from 10 to seven percent.

3.1 *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 are presented in Table 1. Overall, we find that about 16 percent of the sample migrated between 1994 and 1997. Of the 837 migrants in the sample out of a total of 5260 adults, 33 percent migrated to the US, 9 percent within Mexico for agricultural employment, and 58 percent 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 percent male) and US (80 percent) migrants. Migrants also have higher levels of education, though this is true only for US and non-agricultural Mexican migrants. Finally, the incidence of 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 wage labor and constitute only 5 percent of US migrants.

In terms of household level characteristics, families with US migrants have significant higher total income then Mexico 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, non-agricultural migration households have greater access to irrigated land and show higher levels of agricultural modernization. US migrating households are more linked to cattle production, with greater levels of rainfed land and cattle stocks.

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[3] A detailed description of the Mexico data and its sampling properties can be found in Cord, et al (1998). The total 1997 dataset, panel and non-panel, numbered 1665 households. The surveys were carried out by the Secretariat of Agrarian Reform and the World Bank with assistance from the University of California, Berkeley.

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 modernization, are located in more isolated communities, and show lower levels household infrastructure such as electricity and telephone access.

3.2 *Construction of social networks*

For the purposes of this paper, migrant networks are defined as the collection of individuals that have migrated in the past. These network migrants are an asset to potential migrants because they may offer information and assistance – a form of migration capital. Yet, not all assets are the same and some types of network ties will be more valuable than other types for the potential migrant. Our effort in this section is to provide a brief sketch of the distribution of migration network assets for individuals in our sample. This includes data on the quantity and quality of network assets, information on the most dominant types of kinship relationships within the network, if the network migrant is currently at the destination or has returned, and whether the network assets are primarily accessible to a relatively small part of the population or whether the networks are more evenly distributed.

The size of a family migrant network is measured by the number of family members, including both immediate family members and relatives of the head of household and spouse, who migrated to the US or other parts of Mexico prior to 1994. To further understand the composition of networks, US and Mexico migration social networks are divided into categories based on migration status (current and previous) and kinship to the head of household. In the case of the US, "current" refers to the number of children, spouses, or siblings of the head of the household or spouse who currently live in the US. "Previous" refers to those that migrated to the US at some point in the past (pre-1994), but resided in Mexico at the time of the 1994 survey. This includes the head, spouse or children who still lived in the household at the time of the survey, as well as children and siblings of the spouse and head who did not live in the household. The total US migration assets are simply the sum of these various categories. The two ejido network groupings are respectively the sum of the current and previous 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. Dividing by the total number of adults is necessary to normalize 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 neighborhood, or ejido, migrant networks.

The construction of Mexico migrants assets is similar, with the exception of the separation of the children and siblings who live in Mexico and have never migrated to the US into two groups - those living in the same municipality and those outside the municipality. This is done because we do not consider family living in the same municipality to be internal Mexico migration assets—quite the contrary, in fact, they may dissuade these members from migrating. These assets are not included in the total Mexico social network, nor in the ejido network.

Turning to the Mexican migration assets, the data suggest that Mexican migrant network assets are widely distributed. Only 10 percent of the population report no family migrant assets. The median size of the Mexican migrant network is 5, while one-third report 3 or less persons in their asset network and one-third report networks of size 7 or more. In contrast, US migration assets are more exclusive with 54 percent of the sample reporting no family migration assets. Only 13 percent report

family networks of size 1, 9 percent report family networks of size 2 and from there the size of the networks rapidly declines with less than 25 percent of persons reporting US family networks of size 3 or more.

Descriptive statistics on social networks for the entire sample are presented in Table 2. The first column shows the average levels of social 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 social networks first, the largest networks involve current migrants. The largest category within the US are the siblings who compose approximately 60 percent of the total reported migrant assets and among those most are still living in the US. Children of the household head provide less than one third of the migrant assets of the respondents, most of who reside in the US. Prior migration by current household members provides only 0.17 network assets for respondents. The total number of US migrant assets varies greatly across migrant categories. Not surprisingly, US migrants report the largest number of total US migrant assets – more than two times as many current migrants as other groups.

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

4. Empirical results

The migration decision facing individuals in the Mexican ejido sector is whether to migrate to the US (MUS), migrate for agricultural work in Mexico (MMA), migrate for non-agricultural work in Mexico (MMNA) or not to migrate at all and remain at the point of origin (NOM). As such, four potential choices are available. Given that individuals decide from a set of unordered choices, the multinomial logit regression model (MLRM) is the most suitable tool for this analysis (Kennedy, 1998). The MLRM 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 MLRM 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 are described with coefficient estimates rather than odds ratios and standard errors are robust. Standard procedures are used to avoid downward biased standard errors which may be a problem due to intra-household and intra-ejido correlations. Finally, remaining at the point of origin (NOM) is the reference category in all regression equations.

Seven hypotheses are tested using MLRM and the results are presented sequentially The first regression excludes network variables, thus reflecting a model that only considers the neoclassical model and the new economics of migration. The second step recognizes the role of migrant networks but follows the general practice, noted earlier, of aggregating network variables. The third and subsequent steps are designed to provide insight into how to aggregate network variables and the importance of network composition. These latter steps provide insight into the role of different

network ties. Another advantage of this sequential approach is that each model is nested within the base model allowing us to evaluate the robustness of the results as well as to test more complex hypotheses.

Table 3 presents the MLRM results for the first step, which includes individual, household and ejido variables but omits any of the potential direct effects of migrant networks. Many of the explanatory variables are significant, particularly for MUS.[4] Age and education have similar effects on MUS and MMNA; both the age and education coefficients indicate positive and diminishing effects on the likelihood of migration. While the individual age coefficients are insignificant for MMA tests show they are jointly significant[5], with the coefficients indicating a similar pattern for MUS and MMNA. The effect of education on MMA is negative although diminishing, suggesting that migration for agricultural wage labor may then be the option for individuals with low levels of human capital.

One of the most strikingly consistent results throughout the regressions is the role of gender . For all migration outcomes, men are more likely to migrate than women. The magnitude of the coefficient is stronger for MUS than for MMNA where being male increases the probability of migration to the US from 2.1 percent to 7.8 percent[6]. On the other hand, MUS for individuals from indigenous households is significantly less likely. The coefficient estimate suggests that the probability of an individual from an indigenous household migrating to the US is only 1.7 percent while the probability of an individual from a non-indigenous household is 5.7 percent. Instead, individuals from indigenous households are significantly more likely to MMA and to be indifferent between NOM and MMNA.

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 MMNA. 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 MMA. The only other significant household composition result is that individuals in households with more elderly are less likely to MMA. The age of the household head has positive but diminishing effects on the likelihood of MUS and MMNA and negative but diminishing effects on MMA. Coefficients are significant individually only at the 10 percent level but are jointly significant for MMA at the 10 percent level and MMNA at the 5 percent level.

The relationship between land ownership and migration decisions varies across migration destinations. Higher levels of both irrigated and rainfed lands are associated with positive but diminishing probabilities of MUS. Better off rural ejido households are more likely to migrate to the US as one might expect given the higher fixed costs associated with this destination. In contrast, land ownership is insignificant (both individually and jointly) for migration to Mexico (both MMA and MMNA).

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[4] As is required for the MLRM all results are interpreted with respect to the NOM category.
[5] Joint tests of significance are not presented in the tables but were conducted for all nonlinear specifications.
[6] We estimate the magnitude of coefficient estimates in this and other cases by calculating the predicted probabilities of each outcome for specific values of the explanatory variables. Unless otherwise noted, all explanatory variables are set at their mean levels.

Variables that measure the role of community infrastructure and wealth are generally not strong determinants of individual migration decisions. The major exceptions are per capita measures of common land at the ejido level and the share of access roads that are paved. Both these variables are associated with lower levels of MUS. The only other exception is that lack of access to any telephone service—an indicator of community isolation or marginality—is associated with greater probability of MMA. 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 MMNA than those in the Central region . Otherwise, there are no large regional differences in migration within Mexico.

The overall impression from Table 3 is the similarity of the effects of individual characteristics on MUS and MMNA. In contrast, these same coefficients – particularly those representing the relationship between education and indigenous households and migration – suggest that MMA represents a different phenomenon. Our first hypothesis asks whether individual characteristics affect migration choices differently according to the destination. The results suggest that while there is variation in the magnitude of results, substantial similarities exist between international and non-agricultural domestic migration. The next step is to introduce social networks as variables in the model to measure their influence on migration decisions.

Results are presented in Table 4. We include measures of the total US and total Mexico migrant networks as well as ejido-level US and Mexico migrant networks. As noted earlier, the coefficient estimates for the individual, household and ejido variables appear robust to the addition of the migrant network variables. The results for the network variables indicate that larger past migration to the US by current household members and by other ejido members positively and significantly influences the probability of MUS. At the same time, larger past migration within Mexico by household members (insignificant) and ejido (significant) reduces the probability of MUS.

The strength of the migrant network effects on US migration contrasts with their weaker role in Mexican migration. In the case of MMA, migrant networks appear to have little impact on the decision to migrate for agricultural work relative to not migrating. In the case of MMNA, migrant networks effects are more in line with the direction of the MUS results. At both the household and ejido level, Mexican migrant networks increase the probability of MMNA and US networks reduce the probability of MMNA. However, none of the coefficients are significant (neither individually nor jointly). These results tend to confirm hypothesis 2: 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.

The aggregated migrant network variables, 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 in the destination or previous migrants. The next step tests the importance of a more disaggregated set of network variables. However, in order to reduce the number possibly redundant categories, we proceed by testing the distinctions between a broader range of migrant network ties to determine

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which ones are statistically undifferentiable. A total of five theoretically justifiable restrictions were considered as plausible categories for aggregation.[7] Two of the five aggregations proved to be statistically identical across the three outcomes: previous migration by the head and other household members and current migration by the male and female siblings of the household head and spouse. These groups are aggregated in the subsequent analysis. In three cases the hypothesis for aggregation was rejected and are kept separate in the analysis: the distinction between current and previous migration; the aggregation of previous migration by the individual (self) and other household members ; and the aggregation of near and far siblings of the head and spouse.

Analysis of the migration decision data with the disaggregated network variables further improves the fit of the model, as seen in Table 5. In general, the effects of prior household members currently living in the US or Mexico (not in the household) have positive effects on the likelihood of individuals migrating to those destinations. What stands out is the apparent differences in how these effects vary by kinship ties. Household members living in the US or in Mexico have a strong and significant effect on migration to either destination. The effect of sibling networks in the US is also positive although only significant at the 10 percent level for MUS. In evaluating the importance of previous migration by the individual, an interaction term is included to control for the effect of age based on the view that an individual's previous migration will be more valuable to younger, more mobile individuals. Previous migration by the individual has a large positive and significant effect on MUS and this effect decreases with age. Apparently, older individuals that return to Mexico are less likely to migrate again during the period of study. 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. Similarly, although previous and current ejido level variables for US migration are also positive, the coefficient of previous migration at the ejido level is insignificant. This suggests that only current ejido networks influence migration to the US. The effects of Mexican migrant networks on the probability of MUS are mostly negative and insignificant, except for the current ejido network variable which is significant.

In terms of MMNA, 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, several of the disaggregated variables show substantial and significant effects. First, both household members and siblings of the head residing outside the municipality increase the probability of MMNA. However, the effect of children is again the strongest. Second, children of the household head who migrated to the US and now live elsewhere in Mexico increase the probability of MMNA. 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 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

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[7] Tests of aggregation were done using likelihood ratio tests.

household 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 Mexican migration are more likely to MMNA.

As expected, almost none of the migrant network variables are significant for MMA. 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. A number of the coefficients in the MMA equations appear to be the product of a collinearity problem related to the limited number of cases in this category.

The results of Table 5 shed light on two hypotheses posed earlier. The first of these, Hypothesis 3, suggests that there is considerable variation in the effect of the different types of social network ties on the migration decision. When prior migration to the US and Mexico involves children of the household head or themselves, individuals are more likely to be positively affected in terms of migration. The effects are strongest for oneself – a reasonable outcome given that the best information on migration comes from one's own direct experience. Information from other children in the household is reliable but not as influential. Finally, the network effects are not as strong for other kinship network variables. Thus, the results 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 emphasize gender-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.

The other hypothesis that can now be answered relates to the difference in migrant network effects when the migration capital is current or previous (Hypothesis 4). The evidence to reject our hypothesis that current capital is more important than previous migration capital is primarily based on the data for the US case since the other two outcomes are less clear, but even this is not completely straightforward. For migration to the US, having networks composed of migrants currently at the destination has a stronger influence on migration choice than networks composed of previous migrants with the exception of previous migration by children which also has a strong influence on MUS.

Thus far the network variables have been introduced as simple linear effects. Non-linearities need to be considered to address Hypothesis 5 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+. Migrant network variables are categorized only for US migrant networks which tended to be very small and rarely larger than 3. For Mexican migrant networks, which tend to be much larger, squared terms were introduced in the regression.

The results are presented in Table 6. To 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%, while with 1 household member in the US the probability is

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6.6% (an increase of 2.5%) and with 2 or more the probability is 9.6% (an increase of 3.0%.) 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 household members that previously migrated but are elsewhere in Mexico. In terms of Mexican migrant networks, a number of the disaggregated categories show non-linear effects on both MMNA and MUS. Tests of joint significance for the combination of non-linear terms show a significant effect of the following variables on MMNA: child previous US migrant in Mexico, child current Mexico migrant, sibling in Mexico living far and sibling in Mexico living nearby. The predicted values of these variables on the probability of migrating MMNA suggest increasing marginal benefits from having children that went to the US and returned to Mexico and on having children that migrated within Mexico. The more siblings of the head that are far or nearby reduces the probability of MMNA, although the effect is much stronger for multiple nearby siblings. No clear conclusions can be drawn with respect to hypothesis 5. The results reinforce the notion that the composition of networks matter. For both MUS and MMNA there are increasing returns to having household members who have migrated while there are diminished returns from the continued migration of the extended family.

The final model, presented in Table 7, introduces two types of interactions to the base model which are designed to test Hypotheses 6 and 7. The first type of interaction is between children who live in the US and the ejido level measure of networks currently in the US. A similar variable is constructed for testing the interaction for Mexican migration. The purpose of the interactions is to test whether strong ties to migrant networks (through children) 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 MUS. Thus, the size of ejido network has a greater effect on US migration probabilities for individuals with relatively fewer individual level migration assets.
On the other hand, direct and indirect Mexican networks have complementary effects on the MMNA decision and the set of variables are jointly significant. In this case, the combination of ejido and individual level assets leads to an even greater probability of MMNA. Surprisingly, the result is the opposite for MMA, with this combination leading to a lower probability of migration. This suggests that as households with high individual assets gain ejido assets, they are likely to switch from MMA to MMNA. Thus, Hypothesis 6 is confirmed for migration to the US and is rejected for domestic non-agricultural migration case.

The second set of interactions in model 7 help to identify whether Mexican and US ejido networks are substitutes or complements. The only individually significant interaction term is the positive interaction effect between US and Mexican previous migration on MMNA. However, the combination of ejido current US migration, ejido current Mexico migration and their interaction are jointly significant for MUS, and the combination of ejido previous US migration, ejido previous Mexico migration and interaction are jointly significant for MMNA. These results suggest that US ejido networks increase the probability of migration to the US more when Mexican ejido networks are smaller. They are thus substitutes for MUS. Furthermore, individuals living in ejidos with large previous US and Mexican migration — where a culture of migration exists — are likelier to migrate within Mexico for non-agricultural purposes than those with smaller Mexican networks. This indicates these networks are complements for MMNA. In this case we reject Hypothesis 7 for the case of US migrant networks, but confirm for Mexican migrant networks.

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5. Migrant choice of location

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 8, the location of network migrants is likely to influence the location 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 might expect inter-temporally correlated migration streams. We try to control for these factors by including household, community and regional control variables in the analysis, but it is impossible to control for all factors. However, if we could 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 consists 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 household network migrants and the location of ejido network migrants. The categories of network migrants identified earlier had to be aggregated into household and ejido migrants because of limitations in the data. The choice of location is divided into five groups for the US: California (31.4 percent of international migrants), Texas (27.8 percent), other West (9.4 percent), Midwest and North (15.5 percent), and South (15.9 percent). Locations within Mexico are also divided into five: North (23.1 percent of Mexican migrants), Pacific (17.1 percent), Central (28.5 percent), Gulf (21.3 percent) and South (10.1 percent).

Tables 8 and 9 present the results of the conditional logits for location choice within the US and Mexico respectively. Note that the location of household network migrants is simply the number of

household network migrants in each location but the location of ejido network migrants is the share of total migrants in each location.[8] In addition to these network variables an interaction term is included to explore the relationship between household 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 gender 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. What is being examined is the importance of certain individual characteristics in a given location.

As seen in Table 8, the results indicate that the location of household and ejido network migrants has a positive and significant influence on the choice of location by subsequent migrants. The results thus strongly support Hypothesis 8 for international migration. The interaction term is negative and significant suggesting that the influence 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 due to the fact this is a newer migration destination and is attracting male, less skilled workers who are able and willing to take more of a risk in a new location.

In Table 9, similar results are found for domestic 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 8. 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.

6. Conclusions

This paper shows that a common approach to modeling 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:

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[8] The share of migrants is used in order to normalize the data since ejidos vary in size.

- 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 modeling 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, Mexican 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 comes 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 then 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 agricultural	Mexico non agricultural
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. Migration social networks

number of migrants, in relation to household head and spouse	Total	Non migrants	Migrants Total	US	Mexico agricultural	Mexico non agricultural
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						
current, children	.40	.39	.47	.85	.18	.28
current, male siblings	.33	.31	.46	1.02	.06	.18
current, female siblings	.37	.35	.52	.99	.22	.29
Total current	*1.11*	*1.05*	*1.45*	*2.86*	*.46*	*.74*
previous, live in household, self	.04	.04	.03	.03	.04	.02
previous, live in household, head	.11	.10	.17	.23	.03	.14
previous, live in household, children	.02	.02	.04	.05	.00	.04
previous, do not live in household, children	.11	.09	.18	.29	.09	.13
previous, do not live in household, male siblings	.12	.11	.16	.26	.10	.10
previous, do not live in household, female siblings	.12	.12	.14	.26	.01	.09
Total previous	*.52*	*.49*	*.72*	*1.12*	*.27*	*.53*
ejido network, current (per capita)	.29	.28	.37	.71	.15	.20
ejido network, previous (per capita)	.12	.11	.14	.25	.04	.09
Mexico						
current, children	1.89	1.91	1.76	1.14	2.00	2.10
current, live in another municipio, male siblings	2.21	2.17	2.42	2.13	2.57	2.58
current, live in another municipio, female siblings	2.48	2.45	2.64	2.71	2.12	2.66
Total current*	*6.58*	*6.53*	*6.83*	*5.98*	*6.69*	*7.34*
current, live in same municipio, male siblings	2.42	2.42	2.45	2.46	2.55	2.44
current, live in same municipio, female siblings	1.72	1.74	1.60	1.51	2.17	1.58
previous, live in household, self	.06	.07	.03	.00	.08	.04
previous, live in household, head	.16	.16	.20	.16	.12	.23
previous, live in household, children	.03	.04	.03	.03	.00	.04
Total previous*	*.25*	*.27*	*.26*	*.18*	*.20*	*.32*
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

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Table 3. Migration destination choice. No migrant networks.

Multinomial regression

Wald chi2(90) = 761   Pseudo R2 = .22
Prob > chi2 = .00
Log likelihood = -2200

No. of obs: 4966

		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	.117	2.24 **	.049	.81	.274	3.12 ***
	age (2)	-.002	-2.70 ***	-.001	-1.45	-.005	-3.19 ***
	education	.185	1.85 *	-.157	-2.81 ***	.144	2.57 ***
	education (2)	-.011	-1.73 *	.002	3.10 ***	-.007	-1.92 *
	gender (male)	1.548	8.46 ***	2.463	4.50 ***	.460	4.05 ***
Household	yes/no indigenous household	-1.288	-3.40 ***	1.191	2.82 ***	.067	.36
	# family members <15	.043	.90	-.116	-1.10	-.014	-.33
	# adult males 15-34	.234	3.40 ***	.323	1.98 **	.488	9.47 ***
	# adult females 15-34	.022	.30	.251	1.73 *	-.035	-.62
	# adult males 35-59	.012	.07	-.002	.00	-.025	-.19
	# adult females 35-59	.326	1.52	-.520	-1.46	-.052	-.32
	# adults >59	.127	.58	-1.536	-2.10 **	-.256	-1.42
	Age, household head	.119	1.76 *	-.115	-1.55	.112	1.70 *
	Age, household head (2)	-.001	-1.59	.001	1.90 *	-.001	-1.13
	Irrigated land	.254	1.84 *	.366	1.18	-.033	-.75
	Irrigated land (2)	-.034	-1.81 *	-.041	-1.23	.002	1.09
	Rainfed land	.084	3.14 ***	-.028	-.45	.008	.52
	Rainfed land (2)	-.001	-2.50 ***	.000	-.13	.000	-.22
	yes/no formal credit, 1994	-.334	-1.40	-.749	-1.55	-.186	-1.22
	yes/no organization, 1994	-.216	-.93	.384	1.13	.115	.83
Ejido	Common land, per capita	-.007	-1.95 **	-.004	-.95	.000	.13
	share of access road that is paved	-.427	-1.96 **	-.269	-.66	.171	1.07
	time to urban center, public transport	.002	.99	.001	.30	.002	1.27
	Household has electricity	.257	.77	-.636	-1.21	.012	.05
	Household has water	.070	.32	-.130	-.34	-.150	-1.03
	Household does not have access to phone	-.115	-.55	1.057	2.71 ***	-.052	-.33
Location	North	.432	1.47	.130	.21	.077	.39
	North-Pacific	-1.030	-2.80 ***	-.424	-.47	.289	1.32
	Gulf	-.720	-1.94 **	-.020	-.04	.347	1.74 *
	South	-.441	-1.52	-.065	-.13	-.167	-.81
Constant		-9.662	-4.34 ***	-3.524	-1.77 *	-10.839	-4.45 ***

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

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Table 4. Migration destination choice. Aggregate migrant networks.

			Wald chi2(102) 917	Pseudo R2 = .25

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 (2)	-.002	-2.72 ***	-.001	-1.38	-.005	-3.13 ***
	education	.225	2.12 **	-.136	-2.43 **	.161	2.76 ***
	education (2)	-.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 (2)	-.001	-1.78 *	.002	2.03 **	-.001	-.92
	Irrigated land	.099	.84	.638	1.97 **	-.027	-.62
	Irrigated land (2)	-.018	-1.35	-.071	-1.95 **	.002	1.06
	Rainfed land	.084	2.81 ***	.011	.17	.013	.87
	Rainfed land (2)	-.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 Migration Network	.139	4.42 ***	-.157	-1.18	-.008	-.25
	US Ejido Migration Network	.642	5.54 ***	-.109	-.17	-.174	-1.04
	Mexico Family Migration Network	-.009	-.45	-.008	-.22	.018	1.32
	Mexico Ejido Migration 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% .

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Table 5. Migration destination choice. Disaggregate migrant networks.

Multinomial regression

Wald chi2(141) = 26605   Pseudo R2 = .28
Prob > chi2 = .00
Log likelihood = -1987

No. of obs: 4894

		US versus none		Mexico agricultural versus none		Mexico non-agricultural versus none	
		B	t-stat	B	t-stat	B	t-stat
Individual	age	.170	2.87 ***	.047	.90	.272	3.15 ***
	age (2)	-.003	-2.99 ***	-.001	-1.63	-.005	-3.16 ***
	education	.260	2.37 **	-.128	-2.11 **	.174	2.89 ***
	education (2)	-.016	-2.37 **	.002	2.53 ***	-.009	-2.39 **
	gender (male)	1.924	9.33 ***	2.656	3.88 ***	.472	3.96 ***
Household	yes/no indigenous household	-1.145	-2.86 ***	1.073	2.39 **	.062	.32
	# family members <15	.000	-.01	-.061	-.50	-.017	-.43
	# adult males 15-34	.296	3.91 ***	.368	1.70 *	.551	10.66 ***
	# adult females 15-34	-.036	-.42	.288	1.67 *	.012	.20
	# adult males 35-59	.117	.59	-.178	-.46	.030	.24
	# adult females 35-59	.113	.54	-.671	-1.75 *	-.156	-.95
	# adults >59	.205	.88	-1.403	-1.91 *	-.376	-2.11 **
	Age, household head	.110	1.64	-.086	-.97	.085	1.31
	Age, household head (2)	-.001	-1.67 *	.001	.87	-.001	-.93
	Irrigated land	.121	.94	.627	1.76 *	-.011	-.23
	Irrigated land (2)	-.019	-1.21	-.065	-1.71 *	.000	.04
	Rainfed land	.078	2.90 ***	.008	.12	.018	1.22
	Rainfed land (2)	-.001	-2.70 ***	-.001	-.39	.000	-.69
	yes/no formal credit, 1994	-.117	-.50	-.834	-1.67 *	-.394	-2.48 **
	yes/no organization, 1994	-.225	-.92	.391	1.12	.183	1.25
Ejido	Common land, per capita	-.011	-3.33 ***	-.010	-1.67 *	.000	.42
	share of access road that is paved	-.601	-2.64 **	-.262	-.51	.182	1.18
	time to urban center, public transport	.004	1.46	.002	.56	.002	1.57
	Household has electricity	-.205	-.63	-.055	-.08	.314	1.18
	Household has water	-.160	-.75	-.095	-.23	-.218	-1.42
	Household does not have access to phone	-.111	-.52	1.066	2.64 ***	-.154	-.95
Location	North	.548	2.04 **	.110	.16	-.096	-.47
	North-Pacific	-.788	-1.98 **	-.180	-.19	.122	.53
	Gulf	-.138	-.39	.049	.08	.176	.78
	South	-.015	-.05	-.455	-.78	-.188	-.88
Migrant network	Children in US	.309	3.82 ***	.267	1.21	-.063	-.86
	Siblings in US	.095	1.70 *	-.052	-.27	-.002	-.04
	Self previous US migration	3.484	2.23 **	-38.860	-18.69 ***	-.402	-.23
	Self US*age	-.163	-4.47 ***	.044	.95	.009	.17
	Head/Child previous US migrant	.063	.28	-36.586	-62.93 ***	.123	.69
	Child 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
	Child Mexico current migrant	-.110	-1.73 *	.178	.97	.128	2.93 ***
	Sibling Mexico migrant living far	-.005	-.21	-.023	-.62	.038	2.44 ***
	Sibling Mexico migrant living near	-.002	-.08	-.026	-.46	-.033	-1.76 *
	Self previous Mexico migration	6.285	1.87 *	-1.821	-.59	5.117	3.50 ***
	Self Mexico*age	-.257	-2.19 **	.026	.37	-.165	-3.31 ***
	Head/Child 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 ***
Constant		-10.346	-4.55 ***	-4.065	-1.67 *	-10.532	-4.35 ***

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

Multinomial regression Wald chi2(162) : 3682 Pseudo R2 = .29

Prob > chi2 = .00

Log likelihood = -1964

No. of obs: 4894

		US versus none		Mexico agricultural versus none		Mexico non-agricultural versus none	
		B	t-stat	B	t-stat	B	t-stat
Individual	age	.162	2.84 ***	.048	.90	.273	3.11 ***
	age (2)	-.002	-2.96 ***	-.001	-1.59	-.005	-3.13 ***
	education	.277	2.56 ***	-.135	-2.26 **	.180	2.91 ***
	education (2)	-.017	-2.44 ***	.002	2.79 ***	-.009	-2.46 ***
	gender (male)	1.897	9.28 ***	2.703	3.81 ***	.478	3.96 ***
Household	yes/no indigenous household	-1.059	-2.51 ***	1.177	2.64 ***	.115	.60
	# family members <15	.026	.56	-.095	-.72	-.006	-.16
	# adult males 15-34	.297	3.91 ***	.372	1.67 *	.572	10.62 ***
	# adult females 15-34	-.051	-.61	.296	1.69 *	.009	.14
	# adult males 35-59	.098	.48	-.063	-.15	.021	.16
	# adult females 35-59	.100	.46	-.670	-1.64	-.146	-.87
	# adults >59	.290	1.20	-1.325	-1.85 *	-.344	-1.97 **
	Age, household head	.119	1.65	-.112	-1.24	.083	1.28
	Age, household head (2)	-.001	-1.69 *	.001	1.12	-.001	-.95
	Irrigated land	.129	1.14	.774	2.04 **	-.016	-.33
	Irrigated land (2)	-.020	-1.57	-.082	-1.97 **	.000	.02
	Rainfed land	.081	2.66 ***	.001	.01	.016	1.07
	Rainfed land (2)	-.001	-2.36 **	.000	-.25	.000	-.54
	yes/no formal credit, 1994	-.175	-.73	-.853	-1.79 *	-.381	-2.31 **
	yes/no organization, 1994	-.218	-.85	.199	.54	.188	1.30
Ejido	Common land, per capita	-.011	-3.53 ***	-.011	-1.71 *	.001	.60
	share of access road that is paved	-.652	-2.71 ***	-.303	-.62	.196	1.26
	time to urban center, public transport	.004	1.67 *	.003	.64	.002	1.31
	Household has electricity	-.158	-.48	-.223	-.36	.336	1.22
	Household has water	-.279	-1.21	-.112	-.26	-.233	-1.51
	Household does not have access to phone	-.120	-.57	1.092	2.71 ***	-.158	-.97
Location	North	.630	2.30 **	.043	.06	-.052	-.25
	North-Pacific	-.509	-1.29	-.279	-.30	.177	.76
	Gulf	-.086	-.23	.009	.02	.130	.56
	South	-.019	-.06	-.488	-.80	-.249	-1.11
Migrant network	Children in US 1	.630	2.07 **	-.960	-.78	.072	.28
	Children in US 2+	1.124	3.43 ***	.541	.70	-.308	-1.07
	Siblings in US 1	.541	1.62	.074	.10	-.332	-1.50
	Siblings in US 2+	.691	2.25 **	-1.729	-1.56	.044	.21
	Self previous US migration	3.405	2.29 **	-43.766	.	-.304	-.17
	Self US*age	-.159	-4.55 ***	-.274	.	.002	.04
	Head/Child previous US migrant 1	-.218	-.89	-46.063	.	.022	.10
	Head/Child previous US migrant 2+	.706	1.34	-42.464	.	.808	1.88 *
	Child previous US migrant in Mexico 1	1.000	2.32 **	.425	.48	.317	1.06
	Child previous US migrant in Mexico 2+	1.357	2.63 ***	-43.743	.	1.433	2.06 **
	Sibling previous US migrant in Mexico 1	.293	.84	-.748	-.67	.633	2.51 ***
	Sibling previous US migrant 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
	Child Mexico current migrant	-.170	-.99	.196	.53	.184	1.86 *
	Child Mexico current migrant (2)	.008	.25	-.003	-.08	-.009	-.64
	Sibling Mexico migrant living far	-.028	-.61	.182	1.46	-.002	-.06
	Sibling Mexico migrant living far (2)	.000	.09	-.016	-1.75 *	.002	2.12 **
	Sibling Mexico migrant living near	-.104	-1.68 *	-.082	-.68	-.039	-.79
	Sibling Mexico migrant living near (2)	.008	1.94 *	.005	.67	.000	-.06
	Self previous Mexico migration	6.431	1.84 *	-2.021	-.62	5.182	3.66 ***
	Self Mexico*age	-.262	-2.15 **	.029	.40	-.167	-3.41 ***
	Head/Child previous Mexico migrant	-.331	-.84	9.146	.	-.369	-1.31
	Head/Child previous Mexico migrant (2)	.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 ***
Constant		-10.444	-4.44 ***	-3.491	-1.35	-10.486	-4.30 ***

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

Table 7. Migration destination choice. Disaggregate migrant networks, interaction terms

Multinomial regression Wald chi2(140) : 18135   Pseudo R2 =   .28

Prob > chi2 =   .00

Log likelihood = -1974

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	.169	2.85 ***	.045	.81	.275	3.16 ***
	age (2)	-.003	-2.97 ***	-.001	-1.48	-.005	-3.16 ***
	education	.264	2.42 ***	-.134	-2.24 **	.174	2.90 ***
	education (2)	-.016	-2.46 **	.002	2.68 ***	-.009	-2.39 **
	gender (male)	1.956	9.31 ***	2.661	3.86 ***	.484	4.09 ***
Household	yes/no indigenous household	-1.167	-2.92 ***	1.093	2.49 ***	.045	.24
	# family members <15	.003	.07	-.057	-.45	-.014	-.34
	# adult males 15-34	.296	3.96 ***	.371	1.75 *	.556	10.85 ***
	# adult females 15-34	-.042	-.47	.304	1.76 *	.014	.23
	# adult males 35-59	.088	.45	-.102	-.26	.027	.21
	# adult females 35-59	.111	.53	-.650	-1.74 *	-.191	-1.19
	# adults >59	.231	.99	-1.624	-2.09 **	-.376	-2.13 **
	Age, household head	.106	1.59	-.117	-1.26	.093	1.44
	Age, household head (2)	-.001	-1.60	.001	1.17	-.001	-1.06
	Irrigated land	.114	.91	.750	2.14 **	-.018	-.37
	Irrigated land (2)	-.018	-1.18	-.077	-2.06 **	.000	.19
	Rainfed land	.078	2.93 ***	.013	.20	.012	.81
	Rainfed land (2)	-.001	-2.71 ***	.000	-.41	.000	-.26
	yes/no formal credit, 1994	-.085	-.36	-.794	-1.62	-.396	-2.48 ***
	yes/no organization, 1994	-.226	-.92	.310	.88	.179	1.22
Ejido	Common land, per capita	-.011	-3.31 ***	-.011	-1.75 *	.000	.28
	share of access road that is paved	-.603	-2.62 ***	-.225	-.44	.170	1.11
	time to urban center, public transport	.004	1.53	.003	.73	.002	1.51
	Household has electricity	-.291	-.94	-.136	-.20	.399	1.40
	Household has water	-.129	-.61	-.100	-.23	-.196	-1.27
	Household does not have access to phone	-.066	-.31	1.006	2.47 ***	-.150	-.93
Location	North	.530	2.02 **	.288	.43	-.103	-.50
	North-Pacific	-.817	-2.14 **	-.169	-.17	.065	.28
	Gulf	-.175	-.50	.121	.20	.210	.93
	South	-.029	-.10	-.373	-.61	-.179	-.84
Migrant network	Children in US	.478	4.62 ***	-.332	-.71	-.085	-.76
	Siblings in US	.097	1.71 *	-.025	-.14	.004	.08
	Self previous US migration	3.560	2.27 **	-35.652	-20.08 ***	-.478	-.27
	Self US*age	-.165	-4.51 ***	.066	1.83 *	.011	.21
	Head/Child previous US migrant	.055	.25	-32.316	-56.87 ***	.155	.87
	Child previous US migrant in Mexico	.688	3.52 ***	-.476	-.60	.621	2.87 ***
	Sibling previous US migrant 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
	Child*Ejido US Migration	-.200	-2.36 **	.408	1.69 *	.058	.51
	Child current Mexico migrant	-.100	-.94	.421	1.79 *	.057	.87
	Sibling Mexico migrant living far	-.005	-.20	-.020	-.52	.041	2.67 ***
	Sibling Mexico migrant living near	-.003	-.13	-.020	-.35	-.033	-1.73 *
	Self previous Mexico migration	6.408	1.95 *	-1.228	-.41	5.037	3.46 ***
	Self Mexico*age	-.264	-2.32 **	.011	.16	-.162	-3.28 ***
	Head/Child previous Mexico migrant	-.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 **
	Child*Ejido Mexico migration	-.011	-.15	-.184	-1.63	.051	1.64 *
	Ejido US*Mexico current migration	.031	.18	.461	.87	.218	1.17
	Ejido US*Mexico previous migration	-4.905	-.99	17.014	.75	7.405	2.22 **
Constant		-10.301	-4.51 ***	-3.604	-1.47	-10.595	-4.38 ***

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

Table 8. Choice of location for international destination

Conditional logit regression

	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 9. Choice of location for domestic destination

Conditional logit regression

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% .