

**Fortune, Risk, and Remittances: an Application of Option  
Theory to Participation in Village-Based Migration Networks**

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# Fortune, Risk, and Remittances: an Application of Option Theory to Participation in Village-Based Migration Networks

*Fortune and Risk are contending conceptions of the role of chance in the universe. From Chance ... there issues both "hazard" and "opportunity" ... The conception of Fortune is founded on the possibility of exercising some measure of choice over the outcomes one will accept from Chance.*  
Paul A. David, 1974

## Introduction

Two concepts, risk and networks, have become essential components of the tool kit used in analyzing migration processes in less-developed countries. These concepts converge when membership in a network reduces the costs and risks of migration. But implicit in much of the discussion of migrant networks is the idea that networks provide not only security but also opportunity – that the jobs held by other members in the network become more accessible to the migrant, so that network relationships represent “social capital” that migrants can draw upon to enhance their economic mobility.<sup>1</sup> One of the earliest studies to recognize the importance of networks for undocumented Mexican migrants in the United States says, “the network receives its signals from the larger society and in turn creates *options* for its members (emphasis ours)” (Mines and de Janvry, 1982:446). This paper develops the concept of options more fully, both as broadly-construed alternatives as in the quote above, and as an economic asset with value to the migrant, by integrating options theory into the literature on migration, risk and networks.

An option is a contract which entitles, but does not oblige, its owner to a particular course of action. Options expand opportunities, and so are valuable. Like diversification, their value is embodied in common wisdom: “don’t burn your bridges” is as meaningful as “don’t put all your eggs in one basket.” This wisdom is perhaps even more important in peasant societies, where the margin for failure is small. A review of research in the 1960’s concluded: “In the game against an

uncertain world, peasant strategy is to keep the range of options open and to widen the range whenever possible” (Brookfield (1970), quoted in Chapman and Prothero, 1983:615)).

Because options can be used to manage risk, they are often confused with insurance. In fact, a put option that gives its owner the right to dispose of an asset at a specific price, in conjunction with ownership of that asset, “is functionally equivalent to an insurance policy that protects its owner against economic loss from a decline in the asset’s value below the exercise price” (Merton, 1998:337). Insurance is thus a type of option – one that is concerned only with the downside of an asset’s distribution of potential returns, or “hazard” – while options more generally can take advantage of the upside, or “opportunity.” In both, the potential for loss is fixed, but with insurance the potential for gain is limited to the value of the insured asset, while with an option the potential for gain can be unlimited.

Another difference between options and insurance is that insurance is triggered by a specific set of circumstances, while when to exercise an option is, within limits, at the discretion of the decision maker. For example, home insurance pays only upon a specified loss; a home mortgage with the privilege of prepayment, in contrast, gives one the option to pay off the mortgage at any time. The flexibility given by this temporal dimension has been recognized in peasant agriculture, where “decision makers may respond to uncertainty not only with diversification, reduction of cash inputs, or risk diffusion, but by adoption of strategies that have enough flexibility to adjust to unforeseen or stochastic events” (Roumasset, 1979:16).

Because they are valuable, options usually have a price. Just as one pays for the option to buy a stock if its price rises, one might pay more for a health insurance program that allows choice of doctors, take a lower paying job in a

company with greater potential for growth, or sow an early-maturing but lower-yielding grain variety to maintain the flexibility to sow a second crop if the rains come early enough. Likewise, access to the employment options provided by a migrant's network is conditional upon engaging in activities that affirm the migrant's membership in the community where the network is based, including visits home, gifts, remittances, and contributions to community projects. Option theory thus posits a reason beyond altruism and insurance for the links which endure between migrants and their communities of origin.

Option theory applied to migrant networks is rooted in the theoretical and empirical analysis of households, risk and migrant networks, and the first section of the paper will review aspects of this literature relevant to the issues at hand. It will provide support for the propositions that networks are valuable to migrants because they expand opportunities, that these networks are anchored in the home community, and that support of kin in the community is essential for membership in the network. Readers familiar with this literature who are in agreement with these propositions may wish to skip this section. The second section reviews the growing literature on remittance motivations and, like the previous section, might be skipped by some readers. The third section translates and applies the variables of financial option theory to the remittance decision of migrants, and the last section tests the model with data on Mexican migrants to the United States. The paper concludes with a brief discussion of the implications of the model for the retention of rural ties under different circumstances.

## **Networks, risk and opportunity**

### *Circular migration, risk and households*

The development of theory to explain population mobility in less-developed countries has often been in response to what were considered anomalies

to conventional cost-benefit calculations by individuals. Todaro's pioneering contribution explained the first obvious paradox – that of continuing migration to the urban areas of developing countries despite high rates of urban unemployment – by showing that if the migrant considers expected wages, the high wages of the formal sector might more than offset the low probability of securing a job there (Todaro, 1969).

The second anomaly to be explained was that of circular migration, which had emerged in the 1970s as a major form of mobility in developing countries. It was apparent that the individual might not be the most appropriate unit of analysis in a model designed to illuminate this process, because the individual migrant would have no reason to return to the rural area unless the difference between expected rural and urban incomes were to narrow. There followed a shift in the unit of analysis from the individual to the household, which was said to develop “strategies” that include sending out members to earn money that would be pooled for the joint consumption of all (Wood, 1981).

Two reasons were given for households to engage in circular as opposed to permanent migration: it was cheaper to maintain the family in the country than in the city, and the household could reduce risk by pooling the earnings from several activities. Risk reduction was accomplished by diversification, which involved consideration not only of the distribution of the returns of different occupations, but also of the correlation between these returns (Stark, 1982). Inclusion of this second dimension of risk led to powerful and often surprising conclusions: an occupation that might by itself be extremely risky, such as undocumented migration to the United States, could actually reduce the risk of the household income portfolio if the returns from that occupation were relatively uncorrelated with other sources of household income (Roberts, 1982). Other decisions made within households in less-developed countries, including the accumulation of

livestock (Binswanger and McIntire, 1987), marriage (Rosenzweig and Stark, 1989), and fertility (Cain, 1983) were also shown to be partly motivated by diversification. These household-based strategies were employed to compensate for the lack of market-based alternatives in developing countries.

Employing the concept of the household as a decision-making unit without considering gender, age, and the process by which decisions are negotiated among the individuals that comprise it has been sharply criticized (Hart, 1992; Pessar, 1999). Rather than assume its members engage in a common strategy, it was necessary to examine the household's internal dynamics. Is a cohesive family structure maintained over space in developing countries? If so, why does the individual maintain economic links to other household members when breaking them could increase his or her individual income?

An answer to this paradox was provided by the theory of household economics: the family was preferred over other forms of economic organization because altruism limited opportunistic behavior by individuals (Becker, 1981), while ease of monitoring the actions of family members reduced the costs of transactions among them (Ben-Porath, 1980). Identity is particularly important for transactions which extend over long periods of time and about which information on the quality of what is being exchanged is imperfect, such as insurance. Migrants might want to retain ties to their rural household after having gone to work elsewhere because they are insuring themselves against unemployment, sickness, and old age in situations where good markets for these services are not available. The household was perceived to be a risk-reducing machine, binding members together by providing mutual insurance at low cost, and then leveraging the power of the larger unit through diversification. Economic theory combined with an understanding of the social conditions of peasant households led again to an enrichment of migration theory.

### Networks and risk

The most significant “stylized fact” to emerge in the recent literature on migration in less-developed countries is that it takes place within well-defined village and community networks. The importance of social networks had been percolating in the anthropological and immigration literature for some time, especially concerning European migration streams. But it wasn’t until the late 1970s, when Mexican migration to the United States came under intense scrutiny, that networks were recognized to be so central to contemporary labor migration. It became obvious that most Mexican migrants traveled, lived and worked with fellow villagers, and that these social networks were very specific from village to destination (Mines and de Janvry, 1982). Research in Thailand (Fuller, Kamnuansilpa and Lightfoot, 1990), East Africa (Elkan, 1967), India (Banerjee, 1982), and China (Zhao, 2000) confirmed the importance of networks for circular migrants in other developing countries.

More recently, the network itself has been elevated to the status of an independent unit of analysis with the introduction of the concept of a transnational community. These are migrants networks connecting origins and destinations which are “woven together so tightly that, in an important sense, they have come to form a single community spanning the various locales ... a ‘transnational migrant circuit.’”(Rouse, 1992: 45). Chavez (1988) calls families with close ties to communities in both Mexico and California “binational families,” and found that the majority of families living in the United States continue to send money to families in Mexico (Chavez, 1994). Over 65 percent of the households in the small Dominican village of Miraflores have relatives in Boston, and establish such close social and economic ties that “it is as if village life takes place in two settings” (Levitt, 1998: 22). Based upon overwhelming evidence that this phenomenon is not abating, Goldring (1998:166) asks, “Why do transmigrants maintain ties to

their place of origin? Why do so many continue to send and spend money (in Mexico), even after appearing to have ‘settled’ in the United States?”

The formation of transnational networks has been explained by their ability to reduce both the costs and the risks of migration (Massey et al., 1987; Neuman and Massey, 1994). The main way by which they are said to reduce risks is by enlarging the solidarity unit beyond the household, providing an incentive for individuals and families to share risks with others facing uncertainties that are less covariant (Bromley and Chavas, 1989:731). The advantages of networks are thus the same as those of households – through interpersonal relationships, individuals acquire “relation-specific” information within social networks that reduces monitoring and transaction costs, allowing these larger units to more effectively insure against risks (Fafchamps, 1992:148).

But empirical research has found no evidence to support either function. Longitudinal data collected in Mexico and the United States do not provide evidence that the accumulation of social capital lowers the costs of migration (Neuman and Massey, 1994:11). And if networks were to reduce risks, then stronger networks should reduce the need for village-based insurance, which should have the effect of lowering remittances as payments for this insurance (motivations to remit will be discussed in detail in the next section). But analysis of the same data found that, “contrary to the predictions, social capital tends to increase the probability of remitting, which rises as the number of relatives living in the United States increases” (Massey and Basem, 1992). Why continue to maintain these ties to the home community when networks are so strong in the destination? This is the latest paradox in migration theory.

The answers provided so far – altruism and risk reduction – seem incomplete, mere extensions of the benefits of household membership. Even together, they lack the power of expected income to explain migration in the face of

urban unemployment; of diversification to explain circular migration; or of altruism and insurance to explain household strategies. The emergence of transnational networks is neither the historical norm nor inevitable: a theory that explains their growth must explore as well the question “under what conditions do networks weaken and/or disappear?” (Boyd, 1989:655). The answer that this paper proposes – that networks offer mobility as well as security, and that network membership is contingent upon the maintenance of rural ties – extends the concept of risk once more to include fortune, the upside of the distribution of potential returns

#### *Networks and opportunity*

Many studies have noted that membership in a network enhances a migrant’s opportunities. An important reason for the prevalence of circular migration in Southeast Asia was that permanent migrants would lose their village contacts, restricting future job opportunities (Fan and Stretton, 1985). More than half the rural migrants to Delhi got information on jobs from friends and relatives already working in the city, thus undertaking a rural-based search for urban jobs (Banerjee, 1984b). Migrants to Mexico City made frequent trips home, not only to maintain old social alliances, but also to continue or to establish critical economic linkages (Kemper, 1981:222). And while networks might not reduce the costs of migration from Mexico to the United States, they did raise the benefits by increasing both wages and the number of hours worked (Neuman and Massey, 1994).

Employee referral of friends and relatives is the major way that networks enhance the economic mobility of participants, both in internal (Banerjee, 1984a:243) and international (Philpott, 1968:47) migration. Even high-paying jobs held by later generations of Mexican migrants to the United States were usually

obtained through the network; “in each case a similar process was repeated, with one person finding a job and then inviting other *paisanos* (people from the village) to come and work in the same firm” (Massey et al., 1987:167). Thus, it is clear that membership in a network not only reduces risk but also increases economic mobility, “joining security and mobility in a single goal continuum” (Greenhalgh, 1988:638). Security and mobility, risk and fortune, insurance and options: all express the two sides of chance.

There is, however, a significant conceptual difference between these two sides of chance, which has implications for how the migrant views the distribution of earnings of the jobs held by members of the network. A migrant who can “sample” different jobs within a labor market before making a final choice of destination will choose the destination with the highest variance in earnings, for it is there that repeated sampling will result in the highest payoff (David, 1974; McCall and McCall, 1987). Risk involves acquiescence to the distribution of potential outcomes, accepting its mean; fortune involves exercising a measure of choice from among potential outcomes.<sup>2</sup> In the former case, for the same level of average earnings, a risk-averse migrant would prefer a smaller variance of earnings, while in the latter a larger variance would be preferable.

Following a similar line of reasoning, membership in a network will not only lower risk by easing a migrant’s entry into the jobs held by other members, but also increase the range of jobs from which the migrant may choose. The former could be construed as insurance against unemployment, with the average earnings of other network members for the period of extra employment representing the expected insurance payoff. The latter increases opportunity: the migrant, through membership in the network, will have more occupational alternatives. Therefore, a migrant who is able to choose from among the jobs held by other network members will prefer the higher variance in earnings that would result from network members

working in a variety of occupations and locations. The larger and more diverse the network in the destination area, the greater its value to the migrant as a vehicle for economic mobility.<sup>3</sup>

### Networks and the community

The locus of migrant networks is the community of origin: migrants from the same community are called *paisanos* in Mexico, where “the community of origin is the organizing element in transnational social space” (Goldring, 1996:78), and *tongxiang* in China, where “the concept of native place was a critical component of personal identity” (Goodman, 1995). Migrants maintain close contact with their community of origin through visits, remittances and gifts to family, and donations to community projects. Granting that the network provides important benefits to the migrant, would it not be possible to enjoy these benefits without having to maintain these contacts? The advantages of such a strategy are obvious: not only the savings in travel costs, remittances and gifts, but the accrual of more job-specific human capital if it were not necessary to disrupt employment by returning for regular visits to the community (Lindstrom, 1996:359).

The answer to the question is negative, because network membership is contingent upon community membership, and community membership requires regular reaffirmation. For migrants to Shanghai, “native-place identity was invoked less as a birthright than as a delicate plant which demanded constant cultivation” (Goodman, 1995:8). In Taiwan during the 1960s, migrants took “care in maintaining their relationships with each other (because) these relationships are considered voluntary, not obligatory, and laborers believe they must be nurtured” (Gallin and Gallin, 1974:355). Trips home affirm the migrant’s place in the Mexican community: “when (migrants) return with gifts for their family, extended and fictive kin, and friends, they are asserting and maintaining their community

membership” (Goldring, 1998:181). In contrast, “women who marry out, men who abandon their families, or people who do not maintain contact with fellow villagers” are no longer considered part of the community and the network based there (Goldring, 1996:81).

The community of origin is not only the conceptual locus of the network but also the place where much of the interchange of information concerning opportunities actually occurs. Because of this, circular migrants often return to their villages at a particular time of year. Mexican migrants to the United States usually return for the celebration of their village’s patron saint (Massey et al., 1987). In China, despite overcrowded railways and strenuous attempts by the government to spread out the flow, most rural migrants return from the cities during the Spring Festival (Roberts, 1997): a study of Chinese labor migrants found one of the three most significant variables explaining urban job mobility was if the migrant returned home each year (Liu and Chan, 1998). The exchange of information among migrants from diverse locations and occupations that occurs during these gatherings is instrumental in maintaining and expanding the network, and increases the value of the option to move within it. Were altruism or insurance from one’s own family the only motives for returning to the village, there would be no need for migrants to synchronize their journeys.

Another reason that the community is central to the migrant network is because the network encompasses former migrants who reside there. Mexican migrants were found to have closer ties to previous migrants than to those currently living in the United States, prompting speculation that ties to former migrants might provide access to a broader array of employment options than do ties to U.S. residents (Neuman and Massey, 1994:18).

The community is also the social and geographical locus of the valorization of the migrant’s status. Returning with expensive gifts for family or with money

to share in celebration, contributing to community projects, and investing earnings in cattle and land “are material expressions of shared, but negotiated, ideas about community status” (Goldring, 1996:88) that offer individuals and families an opportunity for social mobility (Goldring, 1998:182). The status conferred by the flow of goods and services to family and community enhances the value of a migrant’s employment options within the network, because it makes it more likely that he or she will be the first to hear of a new opportunity.

So far we have explored how the migrant gains from membership in the community and the network anchored there. What the community gains from the migrant network is more obvious – in the case of most of the communities we have cited, their continued existence is dependent upon the remittances and expenditures generated by migration. In a community in Michoacán, Mexico, “*compadrazgo* (godparent) relationships ensure villagers of material advantages from migrants ... Rather than their smallholdings being their security, their networks, into which they invest much effort and time, are their principal form of security and flexibility” (Fletcher, 1999:48). It would indeed be strange if membership in such a community-based network, providing tangible benefits to the migrants that comprise it, should not be used by that community to enforce the major benefit conferred by migrants to the community, their support. This leads to the question posed by Philpott (1968:472) regarding Caribbean migrants to Britain: “What mechanisms of social control operate to induce migrants to meet their obligations to the home community, mainly by sending back money?”

Although there are important exceptions such as direct contributions to community projects,<sup>4</sup> the majority of migrant spending flows to and through family at the place of origin. In less-developed countries, family loyalty is “an important cultural norm ... maintained by assessing strong sanctions against those who deviate from them and by offering rewards for those who adhere to them”

(Nugent, 1985:78). Individuals who fulfill family obligations are rewarded with respect and esteem, while those who don't are punished by a loss of reputation (Pollack, 1985:586).

Remittances, the results of which are easily visible in the form of improved housing, clothes and appliances (Banerjee, 1984b:241), are the strongest evidence to the community that the migrant is providing support for close relatives at home. On the Caribbean island of Montserrat, migrants anticipate the general community approval of a man who "never sent an empty letter all the time he was out." Even children there are taught the appropriate behaviour expected of migrants, through the praise of those who send remittances and condemnation of those who do not (Philpott, 1968:472, 468).

A disloyal migrant suffers a loss of reputation not only in the village but also in the destination, for the constant circulation of migrants means that people in one locale are aware of actions taken by individuals in the other (Fletcher, 1999:49). The network acts to reinforce the values of the community: for Montserratian migrants in Britain, "as long as his social ties are mainly with other Montserratians there is something of a continuing general reminder about what the migrant should be doing for the people back home" (Philpott, 1968:473). Thus, punishment of disloyal migrants can be decentralized, with sanctions imposed by well-informed family members used as a signal that other villagers should punish as well (Fafchamps, 1992:159). Portes and Sensenbrenner (1993: 1332) call the social capital emerging from the monitoring capacity of immigrant communities "enforceable trust," where "predictability in the behavior of members of a group is in direct proportion to its sanctioning capacity."

The link between the community and the migrant's support of his own family are reinforced through kinship relations within the network. Many members are related by marriage, so that if a migrant were to fail to support his immediate

family he would likely be hurting members of the families of his fellow migrants. The community is more than one end of a bundle of linear relationships between each migrant and his immediate family: it rather comprises the intertwined relationships among migrants, kin and others at both origin and destination.

This section has provided support for the ideas that networks are valuable to migrants because they expand opportunities, that these networks are anchored in the home community, and that support of kin in the community is essential for membership in the network.<sup>5</sup> Together, these provide the foundation of the option motive for remittances. If (in addition to altruism) insurance provided by the family were the only motive for remittances, the loss of insurance benefits should be a sufficient sanction if the migrant were to cease remitting, and it would not be necessary for the community to impose additional sanctions. But if there exists additional benefits of network membership that the migrant could enjoy without paying their costs, the community has an incentive to impose additional sanctions in order to prevent “free-riders” on the network, for the community as a whole suffers when migrants cease support.

### **Motivations to remit**

Remittances provide the most direct and measurable form of support from the migrant to home, and this section examines more closely the contrast between the option motive to remit and other remittance motivations. The primary motives for remittances identified in the literature are altruism and exchange, with exchange encompassing both insurance and investment. Altruism and insurance strongly complement one another, for altruistic families help insure their members against disaster.

An altruistic migrant derives utility from increasing the utility of those at home; with conventional assumptions concerning the utility of income,

remittances will rise with an increase in the migrant's income and fall with an increase in family income (see Table 1). The first prediction is supported by data from Botswana (Lucas and Stark, 1985), Kenya (Hoddinott, 1994), India (Banerjee, 1982), and Mexico (Massey and Basem, 1992). However, as incomes increased beyond a certain point, remittances stayed constant in Kenya and actually declined in India. If other motives would cause remittances to fall with increased income, a declining marginal utility of extra income remitted could cause even altruistic migrants to reduce remittances at high levels of income.

*TABLE 1 ABOUT HERE Effects of variables on remittances under different remittance motivations*

The second prediction, that migrants will remit more to families in need, also generally receives support. Kaufman and Lindauer (1986) found that, for a given loss in income, needier families received higher transfers, and Malaysians in poor health received more remittances than those in good health (Bommier, 1996). Need and thus remittances should increase with more dependents at home, a prediction supported by Massey and Basem (1992) in Mexico, but not by Hoddinott (1994) in Kenya. In both Rwanda (Clay and Vander Haar, 1993) and Malaysia (Bommier, 1996) the contribution of each migrant child to their parents did not decrease as the number of migrant donors increased, as would be expected if these remittances were primarily intended to meet parental need.

Because income variability of migrants and their families makes both worse off by increasing their insecurity, the altruism motive predicts the opposite sign for this variable than that for increases in income. Cox and Jimenez (1998) found support for this hypothesis among network participants in urban Colombia, where a stable income significantly reduced the probability of receiving transfers and raised the probability of giving transfers.

According to the insurance motive, migrants negotiate an implicit contract with their family to send remittances in exchange for support in times of unemployment, illness, and old age. The predictions about remittances resulting from the insurance motive are less straightforward than those resulting from altruism. Higher migrant income would increase remittances if insurance is a normal good (more is consumed at higher levels of income), or if the level of subsistence benefits considered acceptable during unemployment or old age increases with higher levels of current income. However, if higher levels of income make the migrant less risk-averse, remittances could decrease. Thus, the net effect of higher migrant income on remittances is indeterminate, as indicated by the “?” in Table 1.

The migrant must also be concerned with the effect of remittances upon the family’s ability and willingness to provide insurance. In a one-way insurance contract, where the migrant remits in exchange for insurance, higher family income should increase remittances because the family is more capable of providing that insurance. If, however, the insurance contract is reciprocal (the migrant insures the family as well as the family insuring the migrant), or if hard times were to undermine the long-term viability of family enterprises were remittances not received, and thereby endanger the family’s ability to fulfill its insurance obligations to the migrant, the migrant may well remit more when family income declines, making the net effect indeterminate (Stark and Lucas, 1988), another “?” in Table 1.

Income variability is the primary variable affecting remittances under the insurance motive. The reasoning in the previous paragraph applies equally to the variability of family income: more variability may increase remittances as an insurance payment to the family, or decrease remittances because the family is less capable of providing insurance. Riskier migrant income, on the other hand,

increases the migrant's need for insurance and should unequivocally raise remittances if insurance, rather than altruism, is the primary motive. Cox and Jimenez's (1998) finding that income stability raises the probability of giving money and gifts thus supports the altruism over the insurance motive.

Because it is difficult to measure income variability, proxy variables have often been used in empirical analysis. If the variability of migrant income decreases over time as the migrant gains more experience and location-specific human capital, remittances should be negatively related to length of time in the destination. In India the probability of remitting was positively related to length of time in the city, and there was no evidence of ties weakening over time (Banerjee, 1982:351), and for Pacific Islanders in Australia "the remittance-decay hypothesis has no empirical validity" after controlling for age and other variables (Brown, 1997). The legal right to live and work in a country or city should make it easier to get a job and reduce income variability, but Massey and Basem (Massey and Basem, 1992) found the possession of documents by Mexican migrants in the United States increased remittances even after controlling for income.

A relatively simple prediction of the insurance model focuses on old-age security: remittances will increase as the migrant ages and approaches retirement. Remittances in Kenya did increase with the age of the migrant, but after a certain age they leveled off (Hoddinott, 1994). Older Thai migrants remitted a lower percentage of their income (Fuller, Kamnuansilpa and Lightfoot, 1990), while the percentage of Philippine migrants who remitted declined with age, from 60 percent of those between 26 and 35 to only 37 percent of those over age 45 (Trager, 1984). Separation of the decision to remit from the amount remitted for Salvadorian migrants showed that while the amount remitted was an inverted U that traced an earnings profile as migrants aged, those in their middle ages were the least likely to remit at all (Menjívar, et al., 1998).

If the principal function of networks is to provide insurance, then stronger networks should decrease the need for insurance provided by the family and reduce remittances. Massey and Basem, measuring the strength of Mexican migrant networks by the number of the migrant's relatives living in the United States, found the probability of remitting was significantly *increased* by having more family members in the United States: "rather than indicating a growing orientation to the United States and a lower propensity to remit, ties to relatives in the United States appear to indicate a stronger commitment to Mexico and a higher probability ... of remitting." They address this paradox by pointing out that "migrant networks improve access to employment," which "might indicate the existence of a broader family strategy for socioeconomic improvement through migration" (Massey and Basem, 1992:204). Migrants' ties to networks afford them mobility, but require that they maintain strong links to home.

A third category of remittance motivations is investment. One view of investment is that it represents the fulfillment of one side of an implicit mutual contract with the family. In this context, remittances from children to parents may be a repayment of the investment made in their education.<sup>6</sup> Remittances from children to parents may also be an investment by the migrant in potential parental bequests; if this is true, then greater household income and wealth should increase remittances. Land held by the family, the principal and most measurable component of household wealth in rural areas, was found to positively affect remittances in Kenya (Hoddinott, 1994), but not in India (Banerjee, 1982).

A second connotation of investment is that the migrant is investing in real assets that will provide an income flow upon return. Where capital markets are underdeveloped, migrants might remit more for investment purposes to dynamic rural communities with greater possibilities for the productive employment of capital than to poor communities. In Mexico, 19 percent of remittances to

dynamic communities were spent on productive investments, such as farm land, businesses and livestock, while only 5 percent of remittances to poor communities went for productive investment (Lindstrom, 1996).<sup>7</sup>

### **Financial option theory applied to remittances**

The analysis of options was first developed to determine the value of financial options like puts and calls, and later applied as “real options” to decision processes where the costs and benefits of maintaining flexibility are explicitly considered (Trigeorgis, 1996). A major type of application has been to capital investment decisions, where the decision should rarely be construed as “invest all” or “invest nothing,” but instead may involve an incremental investment that maintains the possibility of future action, exploiting the temporal dimension of options. Making this incremental investment is the equivalent of buying an option to expand in the future, and the value of the option (what the decision-maker should be willing to pay for the incremental investment) can be rigorously derived by application of the Black-Scholes model (Black and Scholes, 1973), developed to price options sold in financial markets. In this model, the value of a call option, which permits its owner to buy a stock at a specified price, depends upon five variables: the current price of the stock, the time until expiration of the option, the interest rate, the volatility of the stock’s price, and the specified price at which the call’s owner can buy the stock, called the exercise price.<sup>8</sup>

The effect of most of these variables upon the value of a call option is intuitively obvious. An increase in the stock’s price allows for greater profit from owning the call and raises its value, while an increase in the exercise price lowers potential profit and decreases its value. The owner of a call does not own the stock itself but only right to buy it, and thus will profit from upward movements in the stock’s price while being protected from downward movements. Therefore,

greater volatility, by increasing the dispersion of future stock prices, increases the value of the call option. Similarly, a longer time until expiration, because it allows for greater movement in the stock's price, increases the value of the call. Because variability generally equates to risk, and risk usually reduces value, these last two conclusions are not so intuitive as the first two.

*TABLE 2 ABOUT HERE Principal variables and their effects on remittances in models of financial options and network mobility options*

Translating these variables to migration networks is straightforward (see Table 2). The asset which the migrant can claim is one job within the portfolio of potential jobs available through the network at a future time. The price that the migrant pays for the option on this asset is the support given to family and community that is paid to maintain membership in the network, which can be measured by a portion of remittances. The higher the present earnings in these jobs (the current stock price in the Black-Scholes model), the higher the value of the option. The higher the migrant's earnings in his or her current job (the exercise price that will be given up by exercising the option and taking another job), the lower the value of the option. Because the migrant will only exercise the option when higher paying jobs are available through the network, greater potential dispersion of network earnings (the stock's volatility) will increase the value of the option.

According to the model, a migrant will continue to send remittances in order to maintain the option to change jobs within the network. In exercising the option, the migrant utilizes the network to obtain employment in a better job. If that job is stable, the migrant could cease remitting without effective sanctions (those resulting in restricted mobility). This would be the case for permanent migration, when the potential benefits provided by the network in obtaining future

employment would no longer be enough to offset the cost of network membership. However, since jobs held by migrants are often unstable and cannot be relied upon to provide permanent employment, or because an even better job may become available later through the network, or finally because the migrant's mobility within the new occupation might be dependent upon maintaining a good relationship with the person who provided the referral, the migrant will often obtain another option at the same time as exercising the old by continuing to remit, thus retaining membership in the network. Only when the migrant approaches retirement (the time of expiration of the last potential option) will the value of the option decline significantly.

The option motive thus provides unambiguous predictions about the effect of major variables upon migrant remittances (see Table 1). Higher migrant income will decrease remittances, unlike under the altruism motive. The interaction of the altruism and option motives provides one possible explanation for the empirical findings discussed earlier, where remittances increase with more income (the altruism motive dominates) until income is high enough to reduce the potential benefits from changing jobs (the option motive dominates). Higher and more variable family income, by increasing the range of earnings from which the migrant can choose, will increase remittances. Older migrants will remit less because the value of the option declines as the migrant approaches retirement, while the insurance motive predicts increased remittances. And most relevant for our analysis linking options and networks, larger and more diverse networks – that is, networks that provide contact with more persons working in a wider variety of occupations and destinations – will, by enhancing the value of the network as a vehicle for economic mobility, increase remittances.

This is an important conclusion, for it provides a testable hypothesis that is the opposite of that found in the insurance motive. There, stronger networks

provide an alternative to insurance provided by the family: while *access* to the network might still be dependent upon remitting, the size and density of the network works in the opposite direction, leading to a negative or at best ambiguous prediction of the net effect of network strength on remittances.

The link between the option motive and networks is that the migrant will be sanctioned by removal from the network if remittances are not sent to the household. This link is dependent upon monitoring of the migrant's actions, which should be more effective within "small, stable communities (where) disloyalty can be easily detected and communicated" (Nugent, 1985:91). Thus, remittances should be greater to households in small communities than to those in large communities.

### **The model applied to Mexican migration to the United States**

*TABLE 3 ABOUT HERE Descriptive statistics for variables determining migrant remittances*

In this section, data from the Mexican Migration Project (1995), collected on a random sample of 5,680 households in 30 communities in Western Mexico, are used to examine the different motivations to remit.<sup>9</sup> A definition of the variables we will be considering and the basic statistics describing them appears in Table 3. The altruism motive can be examined by the number of dependents and/or a spouse left behind to measure need, and the migrant's earnings to measure ability to provide. The investment motive can be investigated with number of years of education, for which remittances could be a repayment, and the amount of land owned by the family, which could represent either a potential bequest or an asset that remittances are intended to maintain. The insurance motive can be analyzed with the migrant's earnings, age, amount of experience in the U.S., whether the

migration was legal or illegal, and the network variables: the size of the network, the dispersal of the network, and whether the migrant used the network to get a job. The option motive can be examined with these same variables, as well as the size of the origin community.

Using this data, we regress these variables on the log of remittances. Because the equation only uses information on those who did remit money, we include a variable to correct for this selection bias.<sup>10</sup> The results are summarized in Table 4, with the coefficients multiplied by 100 indicating the percentage change in the amount remitted due to an increase of one unit of the variable, holding all else constant.

*TABLE 4 ABOUT HERE Determinants of levels of migrant remittances*

The major goal of the analysis is to investigate the impact of networks on remittances; the insurance motive suggests a negative relationship because a strong network increases the migrant's security, while the option motive suggests a positive relationship due to the opportunities provided by network connections.

The network coefficients strongly support the option motive. Migrants who found their job through a network remit 28.5 percent more than those who did not, with a high level of statistical significance. The number of locations in which the migrant's home community has placed migrants, which is relevant for testing the hypothesis that the range and diversity of the network are of value to the migrant in providing options for economic mobility, significantly impacts the level of remittances, with each additional location increasing remittances by 5.2 percent. Furthermore, each additional friend or relative with U.S. experience significantly increases remittances by 0.4 percent, indicating the value of a larger, stronger network. Given that the average size of a village in the sample was 189 households, and in 49 percent of these the household head was a migrant or ex-

migrant, this network effect would increase remittances by at least (many households had more than one migrant) 37 percent.

In addition to the network variables, the data permit examination of several other predictions of the option and/or insurance motives for migrant remittances. The total number of months that the migrant has worked in the U.S. positively and significantly affects the level of remittances. The option motive would suggest that time spent in the United States, by giving the migrant experience and confidence, would enhance geographic mobility and effective utilization of the network, while the insurance motive predicts that U.S. experience should increase the migrant's security and therefore lower remittances. Illegality raises remittances, which is consistent not only with the insurance motive but with the option motive as well. The option motive is contingent upon the network being the primary avenue of economic mobility; this would be the case for illegal migrants, while legal migrants can use more formal channels. The positive signs for age and community size fail to point in the direction predicted by the option motive, but neither is significant.

The altruism and investment motives receive mixed support. The increase in remittances from an increase in earnings supports altruism, but the negative sign of the square of wages suggests that after a certain point this relationship levels off. This is consistent with either the argument that altruism dominates remittance decisions when income is low but that above a certain level of income the migrant becomes less risk-averse, or that the high level of current income decreases the value of the option. The insignificance of the number of children left behind and the negative impact of leaving a wife behind do not support altruism. The model gives mixed support for different versions of the investment motive: an additional year of education significantly increases remittances by 8.8 percent, suggesting the possibility of repayment for prior investments in education, while the amount of land owned by the household has no significant impact on the level of remittances.

## **Discussion**

Altruism, insurance, and investment are three potential motives for migrant remittances that have been explored in the literature. The model developed in this paper posits an additional motive – that remittances allow migrants to participate in employment networks based in the village, and thus are in part a payment for the option to change jobs within this network. The social capital of network membership is an asset that has value, for it makes jobs held by other network members accessible to the migrant through the exchange of information and referrals. However, this asset has a price: to maintain membership in the network the migrant has to be a part of the larger village community where it is based, which requires meeting socially-prescribed obligations of family support through remittances, gifts to family and community, and regular visits home. A part of these costs can be considered as the price the migrant pays for the option to change jobs within the network.

Option theory, developed in financial economics, provides concrete hypotheses about the effect of key variables upon the value of this option, which are tested using data on Mexican migrants to the United States. The data support the key hypothesis that network connections increase remittances: specifically, a more disperse network, more friends and relatives with migration experience, and the migrant's use of network connections to get a job, all increase the amount the migrant remits to Mexico. If insurance were the primary motive, remittances should fall because network connections reduce risk.

The option model of migrant remittances is firmly grounded in the literature on migration, networks and remittances in three ways. First, the option motive complements other motivations for remittances – all can operate together, or one can be dominant in particular circumstances. Altruism and insurance reinforce one another because altruistic family members help one another and thus provide

mutual insurance; insurance and investment because by investing in assets at home, insurance benefits are protected. Likewise, the option motive complements these other motives because an option provides insurance in case of loss of current income; because investment in assets at home expands employment options; and because remittances are partly dependent upon the community enforcing altruism upon the migrant.

Second, the option motive builds upon the insights from financial economics concerning risk and flexibility, some of which have already been applied to migration in analyzing the diversification of household income sources. Like in that case, where the addition of a risky income source could reduce the risk of the household income portfolio, the results of this application are somewhat counterintuitive. According to option theory, stronger networks should increase remittances rather than decrease them, and ties to the origin community may remain important even though the migrant's economic position in the destination is made more secure by these networks. These counterintuitive predictions result from having deepened our understanding of uncertainty: in the case of diversification by incorporating the correlation among returns, and in the case of options by considering fortune as well as hazard. This may help us to understand the enduring ties between mature migrant streams and their places of origin, especially in circumstances where economic mobility is restricted in either origin or destination.

Third, the option motive completes the integration of networks into the analysis of migration, networks and remittances. The migration-remittance and migration-network links have been well established both theoretically and empirically. The option motive links remittances and networks, and by so doing not only highlights the importance of networks in providing mobility, but also

provides an explanation for previous empirical findings that stronger networks increase remittances.

The option motive predicts that networks and support for the community in which they are based will be particularly strong where personal contacts are the main avenue for economic mobility. When alternative information or mobility channels become available through education or job markets that are less network-dependent, ties to home could be broken unless maintained by other motives. Perhaps this might help explain why remittances to communities in Mexico with a preparatory school were found to be lower than to those without (Durand, et al., 1996), or why education increases the probability of frequent trips home for undocumented migrants, who encounter strong barriers to economic mobility in the U.S., while decreasing that probability for migrants within Mexico (Massey and Espinosa, 1997).

The model of network participation based on employment options is consistent with a particular dynamic that has been observed in longitudinal studies of migration networks – that the diversity of destinations within the network increases and then decreases over time. During the early stages of network formation, the network provides incomplete information about job opportunities in the destination, prompting migrants to try their luck in new destinations without network connections: “as more people are drawn into the process, some migrants inevitably seek out better opportunities in new places and occupations. In this way the diversity of foreign destinations, jobs, and strategies increases.” As this process continues, “someone from the sending community achieves a position of responsibility that enables him or her to channel employment, housing, and other resources to fellow townspeople,” and “the migration stream begins to focus more narrowly and the diversity of jobs, destinations and strategies to constrict (Massey, Goldring and Durand, 1994:1501). This constriction of network

diversity is consistent with migrants using the network as a ladder for economic mobility, honing in on the best jobs available within the network. Yet the very success of the network in enhancing mobility eventually undermines this function, as destinations converge and the development of migrants' human capital replaces networks as the primary determinant of their economic success. The locus of the network moves to the destination or evaporates altogether, and "settlement" as it is conventionally defined occurs.

One implication of the model is that anything that weakens the information flow within the network will reduce the value of the option, both because sanctions for non-remitting migrants will be less effective and because knowledge of alternative employment opportunities is limited. Thus, the option value of village-based networks should be particularly strong if migrants are working in imperfect labor markets where personal relationships are important in obtaining jobs, and if frequent contact between the migrant and disperse members of the network is possible through visits and other means of communications. These are precisely the conditions that have characterized migration between the Mexico and the United States, and so it is not surprising that migrants have maintained particularly strong ties there. Where migrants are effectively cut off from their villages, as in the Chinese Diaspora during the first half of the 20<sup>th</sup> century, the link between remittances and employment options provided by village-based networks is severed, and transnational communities are less likely to emerge.

It follows from the above that remittances to home may not diminish over time, as hypothesized by the altruism and insurance motives, as the migrant establishes emotional and financial security in the destination. This lends theoretical support to evidence that remittance streams worldwide have not declined as migration networks have matured (Taylor, 1999), which has important

policy implications for how governments view out-migration and the economic development of sending areas.

Insurance and diversification have proved to be useful concepts because they point empirical research toward the examination of particular types of behavior. While it is sometimes difficult to test these propositions empirically (in the case of the diversification hypothesis, there is scant empirical evidence to support the deliberate pooling of occupations with non-covariant earnings within households), this does not diminish the conceptual utility of the theory as a tool to understand labor allocation decisions. Likewise, the evidence that we have used to support option theory is by no means conclusive. The data on remittances are imperfect and can support a number of interpretations, and the key propositions of the model – that networks are valuable to migrants because they expand opportunities, that these networks are anchored in the home community, and that support of kin in the community is essential for membership in the network – have been supported by anecdotal evidence from several settings.

These limitations do not diminish the conceptual utility of option theory to aid in understanding the value of networks to migrants; instead, they underscore the importance of closely examining how networks actually function. How is membership in the network attained and lost? How do migrants communicate information about opportunities to one another? Under what conditions do networks based in the village shift their locus to the destination? These are important questions that are emerging in current research, which will form the foundations upon which future theoretical generalizations are based.

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## Notes

1. The concept of social capital in family demography has been summarized by Astone et al. (1999) applied to Mexican migration networks by Massey and his colleagues in Massey (1987), and developed in a series of articles summarized in Massey and Espinosa (1997)
2. The temporal dimension of options mentioned earlier is essential to this choice. In Mexico, "typically, a letter arrived one day, or a return migrant uncle or brother appeared, and an opportunity – an invitation or a proposition to migrate – suddenly materialized. ... Instead of careful household calculation, it appears that often migration is the result of a social opportunity which must be grasped and acted upon immediately" (Hondagneu-Sotelo, 1995).

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3. The reader will recognize the similarity of the argument about the advantages of diversity in destinations within the network with that of “the strength of weak ties” (Granovetter, 1983). Because community networks bridge geographic clusters within a network, “weak ties tend to be stronger bridges to new information about employment opportunities than strong ties” (Wilson, 1998: 397).
  4. In Mexico, “migrants’ financial contributions to fiestas, their support of church and school projects, and their annual return to the Fiesta of the Virgin of Guadalupe maintain social and cultural ties. There are requisite amounts of money and time migrants must contribute to remain in good standing with the local community” (Fletcher, 1999:49).
  5. The question that arises here in economic theory is if the network is a public good – one that is “non-rival” and “non-excludable.” If it is, and since each migrant increases the value of the network to the others, why charge for membership? We would argue it is both rival and excludable: the former because the quality of “relation-specific” information depends upon time-consuming personal contact and because the network includes non-migrant members of migrant households whose benefits might be reduced if migrants were allowed to join without remitting (much in the same manner as shareholder dilution in the issuance of stock options), and the latter for reasons enumerated in the body of the paper. Gardner (1995:80) provides support for exclusion from Indian migration networks: “though migration was an opportunity which was theoretically open to everyone who could find a small amount of capital for their fares to Calcutta, the network was not equally accessible to all.”
  6. Banerjee(1982), Hoddinott(1994)and Bommier (1996) all found that higher levels of education increased remittances, while Massey and Basem (1992) found that completion of primary school lowered remittances from Mexican migrants to the United States. Since education should increase job stability and reduce risk, it might be argued that the reduced need for insurance overwhelmed the repayment of education motive or, as Taylor (1986) suggests, education might hold less relevance for Mexican migrants in the United States, where the jobs they hold do not usually require high levels of education. An alternative approach is to question the repayment of education motive althogther: “it is difficult to accept that when a child goes to school and invests in human capital, he or she is consciously entering into an informal agreement voluntarily, i.e., that the child could refuse the agreement or modify the terms” (Lianos, 1997:74).
  7. However, it should be noted that classification of the uses of remittances as consumption or investment may not capture their underlying purpose: remittances destined for housing and weddings could actually be productive investments: a good marriage can expand the family’s influence and its chances of economic prosperity, while housing can provide security in old age (Mooney, 2001).
  8. Robert Merton and Myron Scholes, who developed option theory in collaboration with the late Fischer Black, were recipients of the 1997 Nobel Prize in economics for this contribution. Merton

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notes that it is not necessary that the underlying asset of a real option be priced in a market – examples include how much vocational education to acquire before starting work, a lease which gives customer the right to buy a car, a PPO vs. an HMO with proscribed set of doctors – “each solves an option-pricing problem as to the value of that flexibility ... (for real options) the underlying asset is rarely traded in anything approximating a continuous market and its price is therefore not continuously observable either” (Merton, 1998). Because of its wide application to a variety of situations where the value of maintaining or expanding an opportunity depends upon the uncertain future value of an asset, option theory has been called “the most successful theory not only in finance but in all economics” (*The Economist*, 1991).

9. The survey gathered information about family characteristics and migration experience, including detailed data on the wages and remittances sent by the household heads who had migrated to the United States. Of the households surveyed, 2,776 of them reported a household head who had been or was currently a migrant. Data on remittances was obtained from 84 percent of these migrant households, and 69 percent of those with valid remittance data did actually remit on a monthly basis. The final sample was limited to those 1,009 migrants who had remitted since 1929 and who had provided valid information on the other variables in the model. All data are reported for the period of the migrant’s most recent trip to the United States.

10. We correct for the selection bias of looking only at those who remitted by including a lambda coefficient (Heckman’s sample correction estimator) in the multiple regression model, derived from a probit regression estimated to predict a dichotomous variable equaling one if the migrant remitted and zero otherwise.