# Social and Economic Determinants of Migration and Remittances:

# An Analysis of 22 Thai Villages

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February 28, 2006

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The primary goal of this paper is to understand and jointly model individuals' motivations to migrate and to remit. Understanding these motivations is important to explain migration patterns, as well as assessing the consequences of migration on the sending households and communities. The economics literature identifies a number of motivations for migration at the individual or household-level. Microeconomic theory suggests that migration is an individual strategy to maximize income, while new economics of migration argues that it is a household strategy to minimize risks to household income. These theories assert that motivations for migration are purely economic, yet they take for granted how and why migrants send back remittances. To be more specific, the theory of migration as an individual strategy for income maximization makes no claims or predictions about remittances. However, by a plausible conjecture, one can argue that an income-maximizing individual has no motivations to remit. At the other extreme is the household theory of migration, where an individual is assumed to migrate to improve the origin household's income. Clearly, given this motive, migrants are assumed to remit back at least part of their earnings. Hence, implicit in these economic theories of migration are strong assumptions about how migration motivations influence remittance behavior.

While the economic motivations to migrate may indeed determine the remittance behavior, a growing literature on migrant remittances argues that several characteristics of household relations may factor into an individual's remittance behavior. A number of studies suggest that motivations for migrants' remittances are similar to motivations for other intra-household transfers. Among these motivations are altruism (Agarwal and

Horowitz 2002), insurance and inheritance-seeking (de la Briere, Sadoulet et al. 2002; Lucas and Stark 1985). Another strand of the literature suggests that motivations to remit may be determined by incentives and forces that are specific to migrants, such as a desire to maintain linkages with the community of origin (Guarnizo 2003), the intention of return migration (Ahlburg and Brown 1998), paying back economic support received during the migration process (Durand, Kandel et al. 1996), and investment opportunities in the communities of origin (Foster 1995; Durand, Kandel et al. 1996; Blue 2004).

Despite these theoretical arguments and empirical findings suggesting linkages between motivations to migrate and motivations to remit, few studies to date have considered individuals' migration decision and their respective remittance behavior as possibly interrelated phenomena. Moreover, prior work has not studied how relations within the household such as gender expectations or reciprocity obligations may simultaneously affect the motivations to migrate and to remit. This paper attempts to address this gap in the literature, and understand whether (and how) migration and remittance behavior may be interrelated. Focusing on the Thai internal migration as the specific case, the study subjects several hypotheses from the literature to empirical scrutiny using a unique multi-level survey data from 22 rural villages. The survey follows migrants in their new destinations during the decade from 1984 to 1994. This period covers a time of economic transition in Thai history, and captures the initiation and maturation of migration flows from rural to urban areas. Different than other data on migration available to researchers, these data contain information on all individuals within an age range in the villages (i.e., not just a random sample), and also allow us to observe migration prospectively.

Moreover, the data set includes information on remittances households receive (albeit only for the 1994 cross-section), as well as other household and village characteristics.

The empirical results show that a common set of economic and social factors determine individuals' migration and remittance behavior in the Thai setting. Specifically, relative economic position of the household within the community, characteristics of household structure and relations, as well as village migrating and remitting norms all factor into rural-urban migration-remittance patterns observed in Thailand.

Below, I begin by reviewing the economic theories of migration, and identifying their predictions regarding remittances. I then review the literature on remittances to determine the economic and social factors shown to affect remittance outcomes. The ultimate purpose of this endeavor is to merge these two literatures, based on the argument that migration decision may not be independent from remittance behavior, and hence establish a more general theory of remittances and migration as interconnected phenomena.

## BACKGROUND AND HYPOTHESES

Neoclassical micro-economics defines migration as an individual strategy for income maximization. Namely, given their differential earnings potentials (which are typically proxied by human capital), individuals migrate when the expected gain from migrating to a destination is greater than that from staying in the origin (Todaro 1969). Similar models conceptualizing migration as an individual decision to maximize income are provided by Hay (1980), Kalzuny (1975), Nakosteen and Zimmer (1980), Navratil and Doyle (1977),

Yezer and Thurston (1976). This simplistic view of migration behavior has been challenged by Stark and Taylor (1986), who instead suggest that migration is a household strategy for risk minimization. These authors argue that when markets are imperfect, households allocate their members to different markets (local and international) in order to diversify risks to income. Another key insight of this so-called 'new economics of migration,' is that households send workers abroad not only to improve income in absolute terms, but also to increase their relative income, and to reduce their relative deprivation compared with some reference group, like the community. (Stark, Taylor, and Yitzhaki 1986; Stark and Taylor 1989; Stark 1991; Stark and Bloom 1985).

As one moves from models where migration is motivated by individual incentives, to models where household characteristics determine an individual's migration motivations, the issue of remittances arises naturally. The conventional approach assumes that migrants, who are motivated by incentives to improve the position of their household, maintain their linkages and send their earnings back as remittances (Agarwal and Horowitz 2002). Adhering to this approach, I use insights from the household theories of migration mentioned above to hypothesize about individuals' migration and remittance patterns. Namely, I expect that poorer, or more relatively deprived, households will be more likely to send migrants and also to receive higher amounts of remittances (Stark, Taylor and Yitzhaki 1986). Moreover, I expect that households with less diverse sources of income will be more likely to send migrants and receive higher amounts of remittances (Stark and Taylor 1986). More formally, I hypothesize that:

**H1:** The lower the household's income (or wealth), the higher the likelihood of sending a migrant, and the higher the likelihood of receiving remittances, *ceteris paribus*. (*Maximizing household income hypothesis)*

**H2:** The lower the household's income (or wealth) relative to other households in the community, the higher the likelihood of sending a migrant, and the higher the likelihood of receiving remittances, *ceteris paribus*. (*Minimizing household's relative deprivation hypothesis)*

**H3:** The less diverse the sources of the household's income, the higher the likelihood of sending a migrant, and the higher the likelihood of receiving remittances, *ceteris paribus*. (*Diversifying risks to household income hypothesis)*

Note that while these hypotheses draw on the economic theories of migration, they are different in one important respect: They recognize and make explicit these economic theories' claims about migrant remittances, making it possible to subject these claims to empirical scrutiny. After reviewing the migration literature, I now turn to the studies of migrant remittances. Note that, as the literature on motivations for migration, the studies of migrant remittances selectively focus on a single aspect of the migration-remittances process. Namely, while these studies try to explain migrants' motivations for sending back remittances, they leave out the motivations that caused individuals to become migrants in the first place.

Despite the significance of migrant remittances for many households in developing countries, the literature has not yet reached a consensus on migrants' remittance motivations. Table 1 lists references to the remittance motivations most commonly cited in the literature. The two principal competing explanations for remittances in the literature are altruism and risk sharing. Models of altruism, presented in the works of Banerjee (1984) and Johnson and Whitelaw (1974), simply embed the utility of other household members in the migrant's utility function. Models in which risk-sharing motivates remittances, such as in Stark (1991) and Stark and Levhari's (1982) work, view remittances as part of a self-enforcing, cooperative contract between the migrant and household.

-- Table 1 about here --

Agarwal and Horowitz (2002) assess the significance of these two competing hypotheses in explaining the remittance patterns of Guyanese international migrants. They argue that if the risk-sharing hypothesis holds, then migrants' remittances should serve as a premium for their future insurance against unemployment and low wages. Accordingly, they hypothesize that the amount remitted by the migrants should be positively correlated with these risks to their income in destinations. Their empirical results do not support this hypothesis, but instead demonstrate significant differences in remittance behavior of multiple and single migrants from a household. The authors conclude that these differences support the altruistic incentive to remit. Following a similar strategy, I argue that, if remittances are related to altruistic behavior of migrants, the above hypotheses (H1-H3) should not hold. Namely, the amount remitted by a migrant should not be

correlated with the amount of household's income, or with the risks to the migrant's income.

In addition to the altruism or risk sharing, remittances may also part of current or future exchanges of favors in a household. Following from the bargaining theory of intrahousehold transfers (Lee, Parish and Willis 1994), migrants may send remittances in exchange for non-monetary help from other household members, for example, in the form of household chores or child-care. Therefore, a migrant sending household's composition, dependency and domestic structure influence the amount of remittances received (Goldring 2003; Kanaiapuni and Donato 1999). More formally, one may expect that:

> **H4:** The higher the number of migrant's dependents residing in the household, the higher the likelihood of sending remittances to the origin household, *ceteris paribus*. *(Bargaining hypothesis)*

Remittances may also constitute an advance payment to favors expected from household members in the future. As an offset of the bargaining hypothesis, researchers have argued that remittances may be related to an inheritance-seeking behavior on the part of the migrants. Namely, migrant sons or daughters may send remittances to maximize their probability of inheriting, and the amount inherited. Evidence for this hypothesis is provided by De la Briere, Sadoulet et al. (2002), who show that remittances to Dominican Republic from migrants in the US reflect an investment in future inheritance. They find

that child-to-parent remittances are positively correlated with parental inheritable assets, and negatively correlated with the amount of brothers they would have to share their inheritance with. A similar finding by Hoddinott (1994) suggests that remittances from a migrant reflect the ability of the household members (the parents in particular) to offer rewards in the form of land bequests. Drawing on these arguments and empirical findings, I hypothesize that:

> **H5:** The higher the prospects for future inheritance from household members, the higher the likelihood of a migrant's sending remittances, *ceteris paribus*. *(Bargaining / Inheritance seeking hypothesis)*

Other than fulfilling these altruistic, insurance or inheritance seeking motivations of migrants, remittances may represent a mechanism for migrants to invest in the origin communities. Conceptualized as such, the amount of remittances received depend on the investing conditions in the communities of origin and destination. For example, there is evidence that remittances from international migration are sensitive to interest rate differentials between sending and host community (Foster 1995). Similarly, the remittances from Mexicans living in the US are sensitive to investment conditions in the sending communities, including available infrastructure, inflation rate, and access to land (Durand, Kandel et al. 1996). Adding to this line of arguments, I suggest if household members may provide the security of investments (for example, protecting the land or house) in the origin community, migrants may be more likely to send remittances. Therefore, I expect that:

**H6:** The more favorable the investing conditions in the origin community (e.g., returns to investment, or security of investments), the higher the amount of remittances from migrants, *ceteris paribus*. *(Investment hypothesis)*

While investment decisions may be an important part of sending remittances, Durand et al. (1996) show that they cannot account for the complexity of migrants' remitting behavior. These authors argue that remittances also reflect migrants' family ties in their country of origin, or how assimilated they are in their receiving country. Empirical evidence provided by numerous studies confirms this hypothesis. For example, Blue's (2004) research in Cuba shows that remittances depend on the strength of the ties between migrants and the receiving households. Length of stay in the U.S. decreases the amount remitted, while visits to Cuba increases remittances. Similarly, Brown (1997) and Ahlburg and Brown (1998) find that the intentions of return migration plays an important role in migrants' remittances. Moreover, qualitative research on transnational migration shows that remittances provide international migrants a way of maintaining their linkages and influence with their communities of origin. In the case of Mexican migration to the US, for example, migrants' remittances and governments' incentives to sustain the flow of remittances, has given migrants additional influence on the political and public spending decisions of their communities of origin (Roberts, Frank et al. 1999). Given this evidence, I expect that:

**H7:** The stronger a migrant's the intentions to return or links to the community, the higher the likelihood of sending remittances, *ceteris paribus*. *(Maintaining linkages / intentions to return hypotheses)*

As a final venue, remittances may be considered as a way for migrants to pay back their household's past investments in them (e.g., covering education or migration costs). The literature provides mixed evidence for migrants' remittances responding to past parental investments in the form of education. While the probability of remitting increase with migrants' education in the case of Mexican's living in the US (Durand, Kandel et al. 1996) and of Nepalese rural migrants to the cities (Regmi and Tisdell 2002), the education level of the migrant does not affect the remittances among rural-to-urban migrants in China (Cai 2003), and among Samoan and Tongans migrants in Australia (Ahlburg and Brown 1998). In addition to being a repayment of education investments in the migrant, Durand et al. (1996) suggest that remittances may also be in return for the loans to cover the smuggling fees to destination (Durand, Kandel et al. 1996). In order to test these ideas, I hypothesize that:

> **H8:** The higher the investments of the household in the migrant (in the form of education or remittances), the higher the likelihood of migrant's sending remittances, *ceteris paribus*. (*Repayment of past loans*)

Figure 1 summarizes the overall model implied by these hypotheses, where migration and remittances are conceptualized as interrelated events motivated or constrained by economic as well as relational considerations (such as, maximizing income, or maintaining linkages to household or community).

–-Figure 1 about here –

**THE THAI SETTING**

To evaluate the theoretical elaboration outlined above, this study analyzes rural-urban migration and remittance patterns in Thailand following a period of dramatic economic change and growth from the mid-1980s to the mid-1990s. During this period, Thailand led the world in economic growth, averaging nine percent each year (Jansen 1997). In the decade from the mid-1980s the country's economic base also shifted from agriculture to exports (Bello, Cunningham, and Poh 1998; Phongpaichit and Baker 1996, 1998; Suksiriserekul 2000; Warr and Nidhiprabha 1996). From 1985 to 1995, the share of manufacturing in exports increased from 49 to 84% (Phongpaichit and Baker 1996). The growth in manufacturing exports fueled an increase in demand for labor in Bangkok and its provinces, where the majority of industrial activities are concentrated (Tambunlertchai 1990).

Much of this labor is provided by rural migrants from the Northeastern part of the country, where 40% of the population lives in poverty (Hafner 2000). Different than internal migrants in other countries, the Thai migrants traveling to urban areas are demographically diverse. Most of these migrants are in their teens or early twenties, and a half of these migrants are women (Chamratrithirong et al. 1995; Mills 1997). In addition to the economic context and diverse demographic characteristics of migrants, Thailand is also unique in remittance patterns of migrants. Research shows that remittance motivations of Thai migrants are affected by social norms as much as economic necessity

(Osaki 2003). In other words, besides supporting households in times of economic need, sending remittances is a way for migrants to maintain linkages to their origin families and communities, and as such, it is a practice deeply rooted in altruism. This different cultural and economic context make Thailand a unique setting to understand how migration and remittance decisions are interrelated.

## DATA

The data for this study come from the Nang Rong surveys of twenty-two Thai villages, conducted as part of a longitudinal data collection effort by University of North Carolina and Mahidol University in Thailand.[1] A relatively poor district in a historically poor region of Thailand characterized by high fertility and limited land availability for future development, Nang Rong is an important source of migrants to urban centers in Thailand, primarily Bangkok. Figure 2 displays a map of Nang Rong and its relative location within Thailand and the province of Buriram.

--Figure 2 about here--

I use the first two waves of the Nang Rong survey data for my analyses (the 1984 and 1994 waves). The 1984 data collection was a census of twenty-two villages and included information on individual demographic data, household assets and village characteristics. The 1994 data collection not only replicated the 1984 survey, including a census of all

[1] The data and information about the surveys are available at http://www.cpc.unc.edu/projects/nangrong/.

households and information about former 1984 village members, but also included a 10-year retrospective life history about education, work, and migration, as well as key social and demographic events, information about siblings and their current residence, and a special survey of migrants. Table 2 summarizes the currently available data across the three separate components of data collection (social, network and spatial) and three levels of analysis (individual, household and village). As shown in the table, the data on remittance flows is only available for two cross-sections (1994, 2000). For the analyses at hand, I use the 1994 household and village surveys in combination with the longitudinal life history data from 1984 to 1994. More explicitly, the 1994 questionnaire asked each household member if they have migrated and/or sent remittances in the past 12 months. The dependent variables for the analyses in this paper are based on these questions. On the other hand, several explanatory variables (such as work experience, accumulated migration experience at the individual, household and village level, distribution of migration experience in the community) are based on the 10-year retrospective life history data. (Unfortunately, the life history survey only asked about migration, education and work histories, and did not inquire about remittance patterns, which restricts us to cross-sectional analyses.) These data are further combined with village-level survey in 1994, and several measures of village development level are added to the set of explanatory variables.

--Table 2 about here –

The combination of (cross-sectional) household, village and (10-year longitudinal) individual level data allows a strong test of the effects of social and economic factors on migration-remittance patterns for several reasons. First, while most surveys collect data from randomized samples of individuals or households, the Nang Rong survey contains information about all individuals and household members in the study villages. The survey provides detailed information on individual migration, education and work histories, as well as on socio-economic characteristics of households and villages. Second, the research design of the Nang Rong survey minimizes sample selection bias that plagues most retrospective data collection efforts. When data are collected retrospectively, individuals absent at the time of the survey are excluded from the sample. Missing data can bias results if the excluded individuals are a non-random sample of the population. (For example, in our case, the excluded individuals may be migrants that are at their new destinations.) This sample selection problem, or nonrandom sample attrition, may confound any conclusions drawn about the effect of migrant social capital on migration propensities. The Nang Rong survey minimizes this problem by a migrant follow-up component, which identifies the migrants who were absent during the time of the survey and finds them in their new destinations. Related project manuscripts report that the success at finding migrants was remarkably high (Rindfuss et al. 2002). On average about 44% of the migrants were successfully interviewed at some point in the six months following the 1994 village surveys.

## OPERATIONAL MEASURES

As the dependent variables, I propose to create two binary indicators for migrating and remitting based on the following questions in 1994 household questionnaire: "Has this person migrated (for more than two months) in the past 12 months?" and "Has this migrant sent any goods or money in the past 12 months?" Alternatively, treating migrating and remitting as a single joint decision, I also create a categorical variable which indicates whether an individual has migrated and/or remitted in the past year. That is, individuals are considered (1) 'migrant-remitters' if they have migrated and remitted, (2) 'migrant-non-remitters' if they have migrated but not remitted, and (3) 'non-migrants' if they have not migrated.

Table 3 summarizes the proposed independent variables along with the hypotheses they are designed to test. In order to assess the effect of a household's economic standing on migration-remittance behavior of its members, I propose to use land and durables[2] owned by the household along with an indicator of household's debt in 1994 as the independent variables. To evaluate the importance of a household's relative economic position, I employ the relative deprivation index suggested by Stark and Taylor (1986). For each household, the relative deprivation of the household in land (or durables) owned is equivalent to the product of two terms: the share of households with more land (or durables), and the average difference between the land owned by the index household and the higher levels of household land (or durables). Note that as a household's ownings

[2] Land owned is measured in rai (1 rai=1600m2). Durables are measured by counting the number of household assets (television, vcr, refrigerator, sewing machine, truck, car or motorcycle).

increase compared with others in the village, both terms decrease, so that the household with the highest number of land (or durables) in the village is the lowest in this index. For sake of comparability, I scale both relative deprivation indices in land and durables to range between 0-10.

To test whether the diversity of household income sources affects an individual's propensity to migrate and/or remit, I propose two operational measures: the number of economic activities household is involved in (silk weaving, silk worm raising, other cloth weaving, charcoal making), and the number of crops household plants (rice, cassava, sugar cane). For household demographic indicators, I include measures of female-to-male ratio, dependency ratio[3], number of children in the household, and number of migrants (excluding the index individual) in the household. To test whether prospects of inheritance affect remitting behavior, I include a binary indicator for daughters in the household, which is anticipated to have a positive effect on the remittance propensity. (Although the inheritance norm is bilateral in Thailand, sons usually abdicate their land inheritance to their sisters or brothers-in-law since they will be moving to their wife's household and receive, instead, some other form of inheritance.) Another explanatory variable, the number of other potential heirs, on the other hand, is expected to decrease propensity of remitting since it reduces the prospects for inheritance. Finally, also included is an interaction term between land ownings and daughter indicator to assess whether the amount of inheritable assets have a higher impact on daughters' (i.e., potential heirs of those assets) remittance patterns.

[3] Dependency Ratio = (Number of hh members aged younger than 15 or older than 64)/(Number of hh members between 15-64)

To assess whether links to the community increase remittance propensities, I measure the number of return trips in the past 10 years for migrants, which captures their frequency of contact with origin household and village. An indicator of remittances sent by the household to the migrant is also included to observe whether reciprocity obligations foster more remittances from the migrant. Percent of households receiving remittances and percent of durables bought through remittances in the villages are the explanatory variables added to evaluate how the remittance norms in the village affect migrants' remitting behavior. To control for differences in village development levels, two indicators are included: presence of a secondary school in the village, and remoteness of the village to urban centers.[4]

Finally, several measures of work and migration experience are added as control variables. (Note that both work and migration experience are measured over a 10-year period from 1984 to 1994.) Household and village level migration experience (measured by accumulated number of migration trips by household and village members respectively) are included, along with measures of the distribution of migration experience (measured by the Gini of accumulated village migration trips) and destination diversity of migration experience (measured by Shannon's entropy of village trips to different destinations, scaled to vary between 0-10). The underlying idea is that prior

[4] A village is considered remotely located if there are three or more obstacles to traveling to the district town. The obstacles are the presence of a portion of the route to the district town that is a cart path (unpaved, rutted, and narrow), the lack of public transportation to the district town, travel to the district town takes an hour or more, that during the year there are four or months of difficult travel to leave the village, and it is 20 or more kilometers to the district town.

migration experience in the household or village reduces the costs of migrating for potential migrants (through information and direct help provided by prior migrants). Moreover, the village-level experience is more accessible and useful to individuals if it is more uniformly distributed among village members (i.e., has a lower gini coefficient) and if it is more diverse in terms of opportunities it provides (i.e., it is more diverse across different destinations). The remaining operational variables are rather self-explanatory, hence, I refer the reader to Table 3.

-- Table 3 about here --

**EMPIRICAL STRATEGY**

My empirical strategy for evaluating how migration and remittance decisions are interrelated follows four steps. First, adhering to the conventional approach in the literature, I treat migrating and remitting as independent decisions and estimate two separate probit equations. Second, I take into account the possibility for endogeneity of the two decisions by performing a bivariate probit. In a third step, I model migration as a selection mechanism for remittances, and test whether the partial observability of remittance decisions leads to biased estimates of the effects of the explanatory variables. Fourth, and finally, I assume that individuals may be choosing from three possible migration-remittance strategies (not migrate, migrate-not remit, and migrate-remit) and estimate a multinomial logit model. Below each method is explained in further technical detail.

**Probit Models**

Let migration and remittance decisions by an individual be represented by two binary dependent variables $y_1$ and $y_2$. Assuming that each of these equations is generated by a probit equation, if the errors from these two equations are independent, our model is:

$$y_1^* = x\beta_1 + \varepsilon_1 \qquad (1)$$

$$y_2^* = x\beta_2 + \varepsilon_2 \qquad (2)$$

where $y_j^*$ are unobserved latent variables, related to our binary dependent variables as follows:

$$y_j = \begin{cases} 1 & \text{if } y_j^* > 0 \\ 0 & \text{if } y_j^* \le 0 \end{cases} \quad j = 1,2 \qquad (3)$$

If we assume that the error terms $\varepsilon_1$ and $\varepsilon_2$ are i.i.d. standard normal, the probability $\pi_j$ of observing a positive outcome is:

$$\pi_j = \Phi(x\beta_j) \qquad (4)$$

where $\Phi$ is the standard normal c.d.f. The inverse transformation of the above equation, which gives the linear predictor as a function of the probability, gives rise to two probit models (for $j$=1,2).

The underlying assumption for the separate probit models (1)-(2) is that the error terms from the migration and remittance equations are not correlated. If we relax this

assumption, and assert that $(\varepsilon_1, \varepsilon_2)$ are i.i.d. bivariate normal with correlation $\rho$, we end up with a bivariate probit specification. Indeed, if the correlation $\rho$ between the errors is non-zero, then the bivariate probit specification is more efficient than two separate probit equations. Note that, to determine whether our substantive expectation about a non-zero correlation (i.e., endogeneity of migration and remittance decisions) is supported empirically, we can evaluate the magnitude and significance of the correlation coefficient, $\rho$.

Next, we can consider migration equation as a selection mechanism for observing remittance outcomes. Namely, we observe remittance decision, $y_2$, if and only if a person migrates ($y_1 = 1$). Then, if $y_1 = 0$, we have no information on $y_2$. This leads to a specification where the first probit equation for migration is completely observed, but for the second equation of remitting, we have a selected sample. As Meng and Schmidt (1985) argue, in the case of a non-zero $\rho$, separately estimating the migration and remittance equations will lead to selectivity bias in the estimates of the latter. We can account for the sample selection bias by employing a variant of Heckman's (1979) two-step selection model. Because in our case both the selection and outcome equations have binary dependent variables, a bivariate probit model with sample selection, which has previously been used by Van de Ven and Van Pragg (1981) and Boyes, Hoffman and Low (1989), is proposed. (Note that if the two equations are indeed correlated, this specification corrects for sample selection bias in the remittance equation. Conversely, if there is no correlation, then this procedure is identical to estimating the two equations

separately. Again, by observing the magnitude and significance of the correlation term, we can determine whether sample selection indeed biases our results.)

To estimate the proposed probit models, this paper postulates that migration and remittance decisions are affected by a common set of human capital, household and village characteristics. Therefore, for each of the three empirical strategies proposed above, the migration and remittance equations include indicators of individual characteristics, household physical capital and economic activities, household human capital and demographics, as well as village infrastructure and investment opportunities. In addition to these common factors, migration is a function of migrant networks, and resources of information or help provided villagers who have previously migrated. These ties and resources may reduce the costs and risks of migrating for potential migrants (Massey and Zenteno 1999), yet they should not affect the level of household-specific remittances (Taylor, Rozelle and De Brauw 2003). (Note that these variables, which affect migration but not remittances, ensure that the Heckman selection model is identified.) Similarly, given migration, motivations to remit may be affected by inheritance prospects for the individual and links between the migrants and their origin households and villages, hence these variables are only included in the remittance equation.

**Multinomial Logit Model**[5]

An alternative to the bivariate probit specification is to treat the four possible outcomes related to migration-remittance behavior as being generated from a multinomial distribution, which results in the multinomial counterpart of the simple probit or logit models. It is important to note a behavioral distinction: while in the bivariate specification the focus is on modeling two related decisions, with each decision involving two alternatives, in the multinomial model there is a single decision among four alternatives. (Note that in our case only three of these alternatives are observable.) Apart from this behavioral distinction, Weeks and Orme (1999) show that both approaches are statistically linked, and the multinomial model is a more general model nesting the bivariate probit model. Therefore, we employ this empirical specification as an alternative to the proposed bivariate probit models.

Specifically, we can observe that the substantive problem suggests three possible states for an individual: nonmigrant, migrant-nonremitter, and migrant-remitter. This problem can be expressed as a multinomial logit model using a double-selection framework proposed by Tunali (1996). Consider an individual who chooses among three options: not migrating $(y_n^*)$, migrating and not remitting $(y_m^*)$, and finally, migrating and remitting $(y_r^*)$. Note that the not migrating option entails that individual does not migrate

[5] Note that I am using multinomial logit rather than multinomial probit model, due to the computational burden introduced by the latter (i.e., Stata routine mprobit does not converge). Moreover, because there is no threat to the independence of irrelevant alternatives (IIA) assumption that the logit model is based on, probit model does not possess any advantages over the logit models. (This is because the dependent variable exhausts all the possible choices. Moreover, both Hausman and Small-Hsiao tests of IIA assumption cannot be rejected in our model. )

throughout the time horizon, the migrating option entails that individual migrates at least once but does not remit back to the origin household, and the migrating and remitting option entails that individual migrates and sends back remittances at least once.

Denoting by $y_n^*$, $y_m^*$ and $y_r^*$ the benefits associated with each option, we consider the following system of structural equations:

$$y_n^* = x\alpha_n + \varepsilon_n \qquad (5)$$

$$y_m^* = x\alpha_m + \varepsilon_m \qquad (6)$$

$$y_r^* = x\alpha_r + \varepsilon_r \qquad (7)$$

where $x$ denotes the vector of explanatory variables, $\alpha_s$ ($s = n,m,r$) denote the unknown parameter vectors for nonmigrants, migrant-nonremitters and migrant-remitters respectively; and $\varepsilon$ denotes random disturbances. Next, we define, $y_1^* = y_m^* - y_n^*$, as the net benefit of migrating to an individual relative to not migrating, and define $y_2^* = y_r^* - y_m^*$ as the benefit of remitting relative to not remitting. Note that $y_1^* + y_2^*$ is the benefit of migrating and remitting relative to staying in the origin community.

We can write the reduced-form counterpart of equations (5)-(7) as follows:

$$y_1^* = x\beta_1 + \varepsilon_1 \qquad (8)$$

$$y_2^* = x\beta_2 + \varepsilon_2 \qquad (9)$$

where $\beta_1 = \alpha_m - \alpha_n$, $\beta_2 = \alpha_r - \alpha_m$, $\varepsilon_1 = \varepsilon_m - \varepsilon_n$, and $\varepsilon_2 = \varepsilon_r - \varepsilon_m$.

Now, if we let

$$d = \max\left(0, y_1^*, y_1^* + y_2^*\right) \qquad (10)$$

the decision rule for an individual's migration-remittance behavior becomes

$$\begin{aligned} &\text{Not migrate } (s = n), && \text{if } d = 0, \\ &\text{Migrate, but not remit } (s = m), && \text{if } d = y_1^*, \qquad (11) \\ &\text{Migrate and remit } (s = r), && \text{if } d = y_1^* + y_2^*. \end{aligned}$$

Note that the decision rule depicted in equation (10) gives rise to a multinomial logit model under certain assumptions regarding the error terms in (4)-(6).

Given this decision mechanism, we only observe the discrete migration-remittance response of an individual. If we let $MR_i$ denote the migration-remittance response of individual *i*. Note that $MR_i$ can take three values, 'migrant-remitter', 'migrant-nonremitter' and 'nonmigrant', which we index 1,2, and 3. Note that, picking 'non-migrant' category as our baseline, we can calculate log-odds for the other categories relative to the baseline, and then let the log-odds be a linear function of the predictors, as follows. Let $\pi_{ij} = \Pr\{MR_i = j\}$ denote the probability that *i*-th response falls in the *j*-th category. Using a multinomial logit model, we assume that the log-odds of each response, denoted $\eta_{ij}$, follows a linear model:

$$\eta_{ij} = \log \frac{\pi_{ij}}{\pi_{iJ}} = x_i \beta_j$$

where $\beta_j$ is a vector of regression coefficients (for $j$=1,2) and t $J$ is the index for the baseline category, which is 3 (nonmigrants) in our case. Note that in estimating the multinomial logit equation, all explanatory variables (suggested to affect migration and remittances) are included on the right hand side.

## RESULTS

### Descriptive Analysis

Table 4 first examines differences between nonmigrants, migrant-nonremitters and nonmigrants in individual, household and village characteristics descriptively. The descriptive table shows that 42% of the all sample are migrants, and 75% of the migrants send remittances to their households. There are significant gender differences in these patterns: Men are more likely to migrate, yet among migrants, women are more likely to remit. Half of the migrants and one-third of the remitters are married. While migrants are more likely to be educated, there are no differences in education levels by remitting status. Compared with non-migrants, migrants live in households and villages with higher levels of past migration experience. Migrants have more experience in non-farm work than non-migrants, and they are more likely to come from poorer families. Migrants are also more likely to come from families where the number of dependents is lower, hence the amount of labor the family can allocate to migration is higher. Among migrants, those with inheritance prospects are more likely to send remittances. Village remittance norms encourage both migrating and remitting. Migrants and remitters among migrants are more likely to come from villages where a considerably percentage of houshold

receive remittances. Similarly, among migrants, those who remit tend to receive remittances from their households. These results invite application of more rigorous techniques to determine whether these differences between individuals in human capital, household and village characteristics explain the differences in their migration and remittance propensities.

-- Table 4 about here--

**Determinants of Migration and Remittances**

Table 5 displays the estimates from four statistical models predicting migration and remittances for individuals in the 22 study villages in Nang Rong. The most common approach in the literature conceptualizes migration and remittance decisions as independent and models them separately. This approach, presented in the first column of Table 5, constitutes our baseline model. The estimates from the baseline lead us to the following conclusions: Men are more likely to migrate, yet less likely to send remittances. Being married is a detriment to both migrating and remitting. An increase in the years of completed education corresponds to an increase in the propensity to migrate, yet has no effect on the propensity to remit. Having work experience outside farm work seems to increase the likelihood of migrating and remitting. As expected, past migration experience at the individual and village level increases migration propensities, yet the distribution and diversity of village level experience have no effect.

Interesting results are observed for the effects of household assets and economic activities. Individuals from poorer households are more likely to become migrants, and as the relative deprivation of their household increases, their likelihood of sending remittances increases. This finding supports the hypotheses implied by the new economics of labor migration theory. Interestingly, the number of economic activities household engages in decreases individuals' likelihood of migrating, while increasing their likelihood of remitting once they migrate. This surprising finding can possibly be explained by household demographic structure. Namely, in households with a limited number of working age adults, an increase in the number of economic activities may lead the household to allocate their members to these activities instead of migration. Once someone migrates, though, these economic activities may provide investment opportunities attracting remittances from the migrant.

-- Table 5 about here –

Moving on to household demographic characteristics, migration propensity increases as the female to male ratio in the household increases, yet decreases as the number of children increase. While the number of children may proxy the need for some household members to remain in the villages, the female to male ratio may signify the opposite – the freedom of certain household members to leave. Namely, if there are more females in the household to look after the children and the elderly, than other females in the household may be more likely to become migrants. For men as well, if women undertake farm work, the female to male ratio may similarly have a positive effect on migration. Existence of

other migrants in the household makes individuals more likely to migrate, yet less likely to remit. On the one had, if there are other migrants in the household, they may help other household members to migrate, and hence, positively affect migration propensities. On the other hand, if there are other migrants from the household, each migrant may be less compelled to send remittances, as the responsibility of supporting the household is divided among all migrants. A surprising finding related to household demography is that inheritance prospects (that is, being a potential heir) seem to have no effect of sending remittances. Moreover, quite contrary to my expectations, the number of other potential heirs seem to increase the propensity to remit. Given the hypothesis about inheritance seeking, I would expect the opposite effects regarding these indicators.

Next, moving on to the village characteristics, I expect to observe opposing effects of village development level on migration and remittance behavior. More explicitly, I expect less migration out of more developed villages, yet, given the investment opportunities hypothesis, I also expect higher remittances to more developed villages. The empirical findings do not seem to support either expectation. The only significant factor, remoteness of the village to urban centers, works in the opposite direction to our expectations. While we expect more remote villages to receive more remittances, the empirical estimate tells otherwise. Apart from the development indicators, village remittance norms, which are expected to positively affect both migration and remittances, do not seem to have any significant influence on either outcome. Again, the only significant indicator, percent of durables bought by remittances in the village, seems to work counter to my expectations and decrease the propensity to migrate. Finally,

considering the links between migrants and their origin households and villages, the frequency of contact with the household increases propensity to remit for migrants. Similarly, the reciprocity obligations, enforced by household remittances sent to the migrant, strongly increases migrants' likelihood of remitting.

In sum, the findings from the baseline, independent models for migration and remittances, partly support our hypotheses. In particular, hypothesis from the new economics of labor migration suggesting more migration and remittances in relatively deprived households is strongly supported. On the other hand, bargaining and inheritance seeking motivations for sending remittances do not find any support in our data. Conversely, ties to origin households and villages have a high impact on the remitting behavior. Taken together, these findings support prior research that argues altruism is the primary motivation for remitting in the Thai context (Osaki 2003). Now, I turn to alternative models to assess whether these findings are consistent across different model specifications. In explaining estimates from these models, I only highlight their differences from the baseline model.

Results from the bivariate probit estimation presented in Column 2 of Table 5 tell a slightly different story than the baseline model estimates. First of all, the correlation coefficient between migration and remittance equations (rho), is close to unity and significant at 1% level. This estimate provides strong support to the substantive expectation that migration and remittance decisions are endogenous. Moving on to the results, different than the baseline model, in the bivariate probit estimation, sex no longer

seems to have any effect on migration or remittance propensities. Second, the effects of prior work experience on remittances are now more significant as we observe that compared to other occupations, those working in factory, construction or service work are far more likely to send remittances. The effects of household assets and demographic characteristics are similar to those estimated in the baseline model, yet there are considerable differences in the estimates of village infrastructure effects. Namely, while village development indicators had no effect in the baseline model, here I find that the presence of a secondary school in village significantly lowers the propensity to migrate and remit. This finding is sensible if we consider that a secondary school increases the opportunity cost of migrating, as with more schooling individuals can ensure higher wages later on. The negative effect of a school on remittances is harder to explain, especially if we consider the school as an opportunity for migrant parents to invest in their children's education. (Yet, this becomes less of an issue if we take account of the demographic characteristics of our sample. Namely, migrants are aged 18-35, and not likely to have children that have reached the age to attend secondary school (i.e., age 13).) Different than the baseline model, we also find that remitting norm in the village (measured by the percent of households receiving remittances) has a positive effect on both migration and remittance behavior. In sum, different than the conclusions drawn from the baseline model, using the bivariate probit specification, I find support that migration and remittance decisions are interrelated. Taking account of this endogeneity, I also observe that village norms become far more important, and gender differences become less significant in comparison to the baseline model.

As a next step, I consider the possibility of sample selection bias, as remittance decisions are only observed for a selected portion of the sample, namely, the migrants. To take account of this partial observability, I employ a Heckman-type censored probit model,[6] the results of which are displayed in the third column of Table 5. Because the estimates of this model are virtually indistinguishable from those of the baseline model, and because the correlation coefficient, rho, is practically null and insignificant, I conclude that there is no evidence for the proposed selection mechanism.[7]

Finally, I turn to the estimates from the multinomial logit model, presented in the fourth column of Table 5. (Note that these estimates are on a logit, not probit, scale). The results are similar to those given by the bivariate probit specification with a few exceptions. First, by assuming that individuals choose from three options (not migrate, migrate-not remit, and migrate-remit), I find that sex is an important predictor of choosing migrate-not remit rather than not migrate strategy. Particularly, while being a man has no impact on choosing to be a migrant-remitter rather than a non-migrant, it strongly influences choosing to be a migrant-nonremitter. Similarly, and to my surprise, married individuals are more likely to choose migrate-not remit option and less likely to choose migrate-remit

[6] Heckman's selection model rather than a Tobit model is used, because the latter does not allow for specifying different set of explanatory variables for the selection and outcome equations.

[7] However, it may be worthwhile to have some skepticism toward this result. Namely, to evaluate the suitability of the Heckman selection model, I employ a Wald test. The statistic compares the model to the null of independence of selection and outcome equations. In our case, the null cannot be rejected with p=0.707. Yet, as argued in recent work by (Brandt and Schneider 2004), this test statistic has an incorrect size (i.e., the probability of rejecting the null when it is true). Similarly, examining the properties of Wald and other tests for sample selection bias, Eklof and Karlsson (1999) find that the performance of these tests becomes worse as sample sizes become smaller, the correlation between the regressors in the selection and outcome equations increase, and as selection becomes more severe. In my case, I suspect that the Wald statistic may not be significant due a moderate sample size (N=2800) and the fact that the selection and outcome equations share most of their regressors, and hence the inference about selection suggested by this statistic may not be accurate.

option rather than not migrate option. A possible explanation to this, which needs further justification, is that married migrants may be choosing to move together, hence not remitting, or choosing to stay in the village together. A second difference of this model compared with other three models is that the inheritance expectations hypothesis is supported by the estimates. Namely, I find that being a heir significantly increases the likelihood of being a migrant-remitter rather than a non-migrant. Apart from these few differences, the multinomial logit estimates are very similar to the estimates from the bivariate probit specification. In sum, results from the four models, as well as the predicted probability estimates presented in Table 6, are overwhelmingly in agreement.

-- Table 6 about here--

In conclusion, because we have evidence to believe that remittance and migration models are endogenous, the bivariate probit specification is the appropriate specification. As Meng and Schmidt (1985) note it should provide the most efficient estimation. Yet, there is recent research by Weeks and Orme (1999) that shows how multinomial and bivariate discrete choice models are statistically linked, hence the multinomial logit specification could also be our model of choice. At this juncture the behavioral distinction between the two models can be the decision criterion. Namely, depending on our substantive belief, we can choose the bivariate model if individuals are supposed to make two separate, but linked, decisions. Conversely, if we think that individuals choose from three alternative actions of not migrating, migrating bur not remitting, or migrating and remitting), then we can use the multinomial logit (or probit) specification. In our case, because this

distinction is not of substantive interest, and because both models provide consistent estimates, I do not choose one model over the other.

## CONCLUSION

This paper proposes to model individuals' migration decision and their respective remittance behavior as interrelated events. Prior work typically assumes independence or complete dependence between migration and remittance decisions. To relax this assumption, this study first reviews the economic theories of migration, identifying their predictions regarding remittances. The literature on remittances is also reviewed to determine the economic and social factors that affect remittance outcomes. The hypotheses on the determinants of migration and remittance behavior are then combined under a single framework, and tested on a unique, multi-level data set of Thai internal migrants.

The empirical results affirm that a common set of economic and social factors influence both migration and remittance behavior. In agreement with the widely accepted new economics of migration paradigm, I find that rural villagers in Thailand are more likely to migrate and send remittances if their households are relatively deprived (in terms of land or other assets) with respect to other households in the village. However, other economic explanations of migrating and remitting, such as inheritance seeking, do not seem to apply to Thai individuals. This findings is consistent with prior research which finds altruism is the main motivation for young adults to migrate to urban centers and remit their earnings to support their families in the Thai context. In addition to altruistic motives, I find social factors to be important in influencing migration and remittance

behavior. Specifically, individuals are more likely to migrate when there are prior migrants in their household or community, which suggests the importance of social networks and/or village norms. Reciprocity obligations within the household and remittance norms within the village also seem to have important effects on migrants' decisions to remit.

In sum, these results show that a common set of social and economic factors determine migration and remittance patterns in the Thai context. Specifically, economic needs of the family, combined with village networks and norms that facilitate migrating and encourage remitting, explain individuals' migration and remittance behavior. Methodologically, the findings show the need for jointly modeling migration and remittance behavior, while taking into account potential endogeneity and sample selection biases. Future work could employ similar analyses to demonstrate whether and how migration and remittance decisions are interrelated in different settings.

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## TABLES AND FIGURES

**Table 1. Overview of Remittance Motivations in the Literature**

| Motivation | Reference |
|---|---|
| Altruism | Agarwal and Horowitz (2002)<br>Benarjee (1984)<br>Johnson and Whitelaw (1974) |
| Self-Interest | |
| Risk sharing / Insurance motivations | Lucas and Stark (1985)<br>Rosenzweig and Stark (1989)<br>Stark (1991)<br>Stark and Levhari (1982)<br>Stark and Lucas (1988) |
| Bargaining / Inheritance seeking | De la Briere et al. (2002)<br>Regmi and Tisdell (2002) |
| Investment | Blue (2004)<br>Durand, Kandel et al. (1996)<br>Foster (1995)<br>Hoddinott (1994) |
| Maintain linkages / Intentions to return | Ahlburg and Brown (1998)<br>Brown (1997)<br>Guarnizo (2003)<br>Regmi and Tisdell (2002)<br>Roberts, Frank et al. (1999)<br>Roberts and Morris (2003) |
| Repayment of past loans | Durand, Kandel et al. (1996) |

**Table 2. Description of Available Data**

| | **Social Survey Data (1984-2000)** | **Social Network Data (1994, 2000)** | **Spatial Data (1994, 2000)** |
|---|---|---|---|
| | **Characteristics** | **Ties** | **Locations** |
| **Village** | Developmental indicators<br>Agricultural land<br>Buildings and institutions | School, temple and water sharing<br>Tractor hiring<br>Labor sharing<br>Shared market outlets for crops<br>Transportation networks | Village centroids<br>Health center locations<br>Factories, schools and roads<br>Village-level distance measures<br>Landmark features |
| **Household** | Household assets<br>Household debt<br>Agricultural activities | Rice harvest networks<br>Equipment sharing networks<br>Remittance flows | Housing unit locations<br>Household-linked agricultural plots |
| **Individual** | Demographics<br>Education, employment, family and migration histories | Sibling networks<br>Marriage networks<br>Migrant support networks<br>Borrowing Networks | Migration destinations |

**Table 3. Summary of Expected Direction of Regression Coefficients by Hypotheses**

| Proposed Operational Variables | Expected effect on | | By Hypothesis | |
|---|---|---|---|---|
| **Household/Community Characteristics** | **Migration** | **Remittances** | | |
| Land owned by the household | - | - | H1 | The lower the household's income/ wealth, the higher the propensity to migrate and remit. |
| Durables owned by the household | - | - | | |
| Household has debt? | + | + | | |
| Relative Deprivation Index of hh in land (0-10) | + | + | H2 | The lower the household's relative income/ wealth, the higher the propensity to migrate and remit. |
| Relative Deprivation Index of hh in durables (0-10 | + | + | | |
| No of economic activities hh is involved in (0-4) | - | - | H3 | The less diverse the household's income/assets, the higher the propensity to migrate and remit. |
| Number of crops hh plants (0-3) | - | - | | |
| Female to male ratio in hh | - | + | H4 | The higher the number of dependents in the household, the higher the propensity to remit. |
| Household dependency ratio | - | + | | |
| Number of children in the hh | +/- | + | | |
| Number of other migs in hh | +/- | - | | |
| Is individual a potential heir (daughter)? | | + | H5 | The higher the prospects for inheritance, the higher the propensity to remit. |
| Number of other potential heirs | | - | | |
| Land*heir | | + | | |
| Is there a secondary school in village? | +/- | + | H6 | The better the investing conditions in the community, the higher the propensity to remit. |
| Is village remote to urban centers? | +/- | - | | |
| Percent of land available for purchase in village? | +/- | + | | |
| Number of return trips | | + | H7 | The stronger a migrant's links to the community, the higher the propensity to remit. |
| Percent of hhs receiving remittances in village | | + | | |
| Percent of durables from remittances in village | | | | |
| Hh sends remittances to migrant? | | + | H8 | The higher the past investment of the household in the migrant, the higher the propensity to remit. |
| Migrant's education | | + | | |
| **Individual Characteristics** | | | | |
| Age | +/- | +/- | | |
| Sex | +/- | +/- | | |
| Married | +/- | +/- | | |
| Years of education | +/- | +/- | | |
| **Prior labor market experience** | | | | |
| Ever worked in farm? | +/- | +/- | | |
| Ever worked in factory? | + | +/- | | |
| Ever worked in construction? | + | +/- | | |
| Ever worked in service? | + | +/- | | |
| **Prior migration experience** | | | | |
| Ever migrated? | + | | | |
| Migration trips by household members | + | | | |
| Migration trips by village members | + | | | |
| Gini of trips by villagers | - | | | |
| Destination diversity of trips by villagers (0-10) | + | | | |

**Table 4. Descriptive Statistics, by Migration and Remittance Status of Individual**

| | Non-migrant | Migrant - Non-remitter | Migrant - Remitter |
|---|---|---|---|
| Individual Characteristics | | | |
| Age | 25.32 * | 24.27 | 24.27 # |
| Sex | 0.43 * | 0.60 * | 0.46 |
| Married | 0.53 | 0.51 * | 0.34 # |
| Years of education | 6.97 * | 10.65 | 10.21 # |
| Prior work experience | | | |
| Ever worked in farm? | 0.91 * | 0.73 * | 0.80 # |
| Ever worked in factory? | 0.13 * | 0.45 * | 0.56 # |
| Ever worked in construction? | 0.16 * | 0.24 | 0.23 # |
| Ever worked in service? | 0.01 * | 0.24 | 0.25 # |
| Prior migration experience | | | |
| Ever migrated? | 0.41 * | 0.95 | 0.96 # |
| Migration trips by household members | 1.51 * | 2.72 | 2.71 # |
| Migration trips by village members | 175.52 * | 184.87 * | 179.11 # |
| Gini of trips by villagers | 0.58 * | 0.55 | 0.55 # |
| Destination diversity of trips by villagers (0-10) | 6.01 * | 6.18 | 6.18 # |
| Household Physical Capital and Economic Activities | | | |
| Land owned by the household | 6.96 * | 6.26 | 6.28 # |
| Durables owned by the household | 1.65 * | 1.46 | 1.51 # |
| Household has debt? | 0.62 | 0.59 | 0.61 |
| Relative Deprivation Index of hh in land (0-10) | 2.10 | 1.99 * | 2.16 |
| Relative Deprivation Index of hh in durables (0-10) | 2.10 | 2.19 | 2.11 |
| No of economic activities hh is involved in (0-4) | 0.32 | 0.31 * | 0.46 # |
| Number of crops hh plants (0-3) | 1.14 * | 0.98 | 0.99 # |
| Household Human Capital and Demographics | | | |
| Female to male ratio in hh | 0.53 * | 0.50 * | 0.53 |
| Household dependency ratio | 0.29 * | 0.21 * | 0.17 # |
| Number of children in the hh | 1.38 | 1.33 * | 1.15 # |
| Number of other migs in hh | 1.38 * | 3.03 | 2.91 # |
| Is individual a potential heir (daughter)? | 0.27 | 0.27 * | 0.32 # |
| Number of other potential heirs | 1.49 * | 1.65 * | 2.02 # |
| Village Infrastructure and Investment Opportunities | | | |
| Is there a secondary school in village? | 0.11 * | 0.14 | 0.11 |
| Is village remote to urban centers? | 0.80 * | 0.89 * | 0.85 # |
| Percent of land available for purchase in village | 66.09 * | 68.62 | 68.62 # |
| Percent of hhs receiving remittances in village | 38.53 * | 41.97 | 42.51 # |
| Percent of durables from remittances in village | 22.12 * | 24.12 | 24.57 # |
| Links between Individual and Household | | | |
| Number of return trips | 0.21 * | 0.78 | 0.74 # |
| Hh sends remittances to migrant? | 0.00 * | 0.14 * | 0.24 # |
| N | 1623 | 292 | 897 |
| % in sample | 58% | 10% | 32% |
| % in migrants | - | 25% | 75% |

NOTE: Prior work experience, migration experience and return trips are measured over a 10-yr period from 1984-94
* Denotes that two-tailed difference of means test s significant at 10% level. Non-migrants are compared to migrant that do not remit, who are compared to migrants that remit.
# Denotes that two-tailed difference of means test is significant at 10% level. Remitting migrants are compared to non-migrants.

**Table 5. Estimates from 4 Models Predicting Migration and Remittances (During the Past 12 months) in 22 Rural Thai Sending Communities**

| | (1) SEPARATE PROBITS | | (2) BIVARIATE PROBIT (BP) | | (3) BP with SELECTION | | (4) MULTINOMIAL LOGIT | |
|---|---|---|---|---|---|---|---|---|
| | Migrate | Remit | Migrate | Remit | Migrate | (Remit \| Migrate) | Migrate & Not Remit | Migrate & Remit |
| **Individual Characteristics** | | | | | | | | |
| Age | 0.01 | 0.05 *** | 0.00 | 0.02 *** | 0.01 | 0.05 *** | -0.04 * | 0.04 *** |
| Sex (=Male) | 0.15 * | -0.32 *** | 0.09 | 0.03 | 0.16 * | -0.33 *** | 0.64 *** | 0.08 |
| Married | -0.18 * | -0.58 *** | -0.21 ** | -0.38 *** | -0.18 * | -0.57 *** | 0.46 ** | -0.47 *** |
| Years of education | 0.01 *** | 0.00 | 0.01 *** | 0.00 ** | 0.01 *** | 0.00 | 0.02 *** | 0.02 *** |
| **Prior work experience** | | | | | | | | |
| Ever worked in farm? | -0.47 *** | 0.23 ** | -0.49 *** | -0.23 *** | -0.46 *** | 0.24 *** | -0.94 *** | -0.56 ** |
| Ever worked in factory? | 0.77 *** | 0.25 *** | 0.98 *** | 1.00 *** | 0.77 *** | 0.22 | 1.07 *** | 1.45 *** |
| Ever worked in construction? | 0.06 | 0.16 | 0.40 *** | 0.45 *** | 0.06 | 0.15 | -0.28 | -0.12 |
| Ever worked in service? | 1.51 *** | 0.06 | 1.57 *** | 1.00 *** | 1.50 *** | 0.02 | 2.59 *** | 2.68 *** |
| **Prior migration experience** | | | | | | | | |
| Ever migrated? | 1.29 *** | | 0.45 *** | | 1.29 *** | | 2.33 *** | 2.47 *** |
| Migration trips by household members | 0.00 | | -0.01 | | 0.00 | | 0.01 | -0.01 |
| Migration trips by village members | 0.00 *** | | 0.00 | | 0.00 *** | | 0.00 | 0.00 * |
| Gini of trips by villagers | -1.07 | | -0.04 | | -1.06 | | -3.62 | -1.84 |
| Destination diversity of trips (0-10) | 0.03 | | 0.03 | | 0.03 | | -0.07 | 0.06 |
| **Household Physical Capital and Econ Activities** | | | | | | | | |
| Land owned by the household | -0.02 ** | 0.02 | -0.01 | -0.01 | -0.02 ** | 0.02 | -0.05 * | -0.02 |
| Durables owned by the household | -0.12 *** | 0.03 | -0.10 ** | -0.04 | -0.12 *** | 0.03 | -0.26 * | -0.22 *** |
| Household has debt? | 0.00 | 0.06 | -0.01 | -0.02 | 0.00 | 0.06 | -0.25 | -0.10 |
| Rel Dep of hh in land (0-10) | -0.10 *** | 0.14 *** | -0.07 *** | 0.00 | -0.10 *** | 0.14 *** | -0.39 *** | -0.13 ** |
| Rel Dep of hh in durables (0-10) | -0.02 | -0.01 | -0.02 | -0.01 | -0.02 | -0.01 | -0.03 | -0.05 |
| No of econ activities of hh (0-4) | -0.05 | 0.18 *** | -0.03 | 0.06 ** | -0.05 | 0.18 *** | -0.32 *** | -0.01 |
| Number of crops hh plants (0-3) | -0.16 *** | -0.02 | -0.17 *** | -0.13 ** | -0.16 *** | -0.01 | -0.43 ** | -0.41 *** |
| **Household Human Capital and Demographics** | | | | | | | | |
| Female to male ratio in hh | 0.41 * | -0.23 | 0.30 | 0.16 | 0.42 * | -0.23 | 0.90 * | 0.82 |
| Household dependency ratio | 0.14 | -0.23 | 0.00 | -0.05 | 0.14 | -0.23 | 0.62 ** | 0.16 |
| Number of children in the hh | -0.09 *** | -0.05 | -0.08 ** | -0.09 *** | -0.09 *** | -0.05 | -0.07 | -0.16 ** |
| Number of other migs in hh | 0.36 *** | -0.09 *** | 0.32 *** | 0.20 *** | 0.36 *** | -0.10 *** | 0.76 *** | 0.64 *** |
| Is individual a potential heir (daughter)? | | 0.13 | | 0.09 | | 0.13 | 0.19 | 0.37 ** |
| Number of other potential heirs | | 0.14 ** | | 0.04 | | 0.14 ** | -0.27 ** | -0.06 |
| Land*Heir | | 0.00 | | 0.00 | | 0.00 | -0.02 | -0.03 ** |
| **Village Infrastructure and Investment Opportunities** | | | | | | | | |
| Is there a secondary school in village? | -0.11 | -0.13 | -0.17 ** | -0.14 *** | -0.10 | -0.13 | -0.22 | -0.37 ** |
| Is village remote to urban centers? | -0.05 | -0.26 ** | 0.10 | -0.06 | -0.05 | -0.26 ** | 0.16 | -0.21 * |
| % land available for purchase in village | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| % hhs receiving remittances in village | 0.01 | 0.00 | 0.01 ** | 0.01 ** | 0.01 | 0.00 | 0.01 | 0.00 |
| % durables from remittances in village | -0.01 *** | 0.01 | -0.01 *** | 0.00 | -0.01 *** | 0.01 | -0.04 *** | -0.02 ** |
| **Links between Individual and Household** | | | | | | | | |
| Number of return trips | | -0.05 | | 0.04 | | -0.05 | 0.54 *** | 0.46 *** |
| Hh sends remittances to migrant? | | 0.35 *** | | 0.23 *** | | 0.35 *** | 23.79 | 24.38 *** |
| Intercept | -0.69 | -0.70 | -1.30 | -1.90 *** | -0.70 | -0.61 | 0.75 | -2.45 |
| Rho | | | 0.99 *** | | -0.07 | | | |
| N | 2803 | 1182 | 2801 | | 2801 | | 2801 | |
| Pseudo-R2 | 0.47 | 0.10 | | | | | 0.44 | |
| Log-Likelihood | -1017 | -592 | -1725 | | -1609 | | -1438 | |

***p<0.01, **p<0.05, *p<0.10 Standard errors are adjusted for 22 village clusters. Reference category for multinomial logit is non-migrants.

**Table 6. Predicted Migration and Remittance Probabilities By Model**

| | Observed | Separate Logits | Multinomial Logit | Bivariate Probit (BP) | BP w Sample Selection |
|---|---|---|---|---|---|
| P(migrate) | 0.42 | 0.42 | 0.42 | 0.42 | 0.42 |
| P(remit)* | 0.32 | 0.32 | 0.32 | 0.31 | 0.75 |
| P(remit \| migrate) | 0.75 | 0.74 | 0.75 | 0.75 | 0.73 |
| P(migrate, remit) | 0.32 | 0.31 | 0.32 | 0.30 | 0.32 |

* Full sample (migrants and non-migrants) is used in computing the observed probability.

**Figure 1. Theoretical Model of Migration and Remittances**

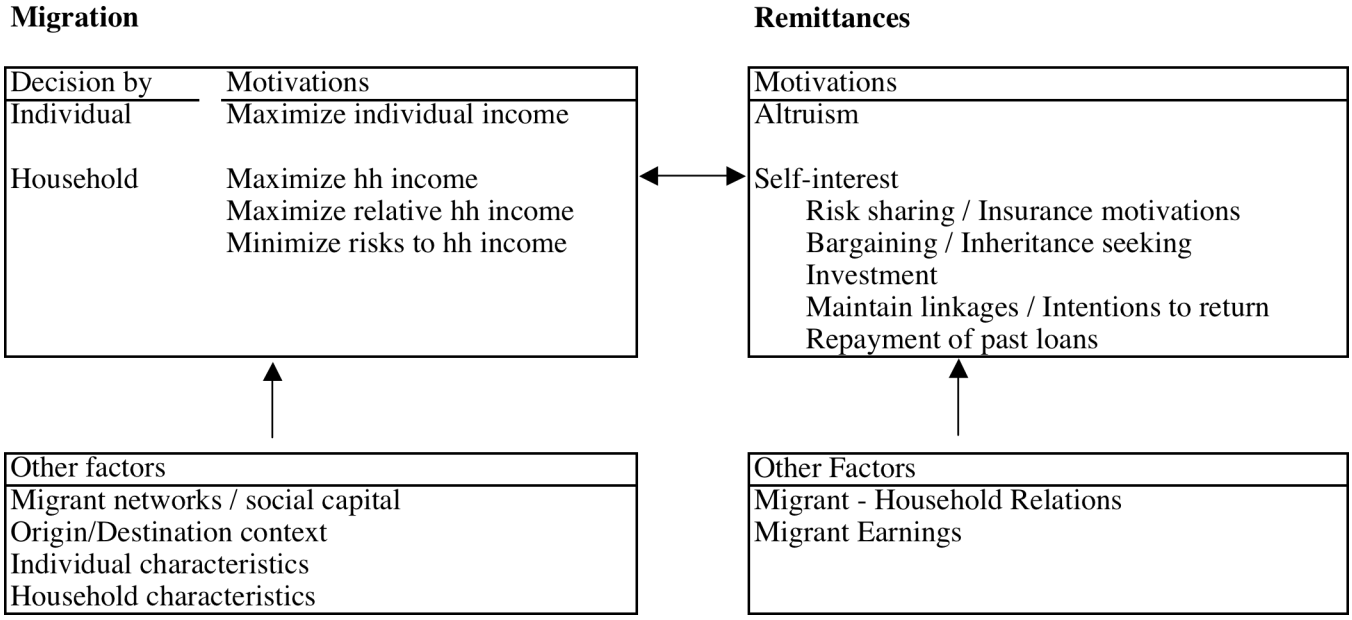

**Figure 2. Map of the Study Site**