Internal Migration, Remittances and Community Development

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Abstract

This paper evaluates how rural-urban migration and remittance flows alter the level and distribution of household assets in 22 sending communities in Nang Rong, Thailand. Principal components analysis is used to construct an index of household assets from sixteen asset indicators measured in 1994 and 2000. The index is decomposed into productive and consumer assets, which constitute two broad categories of investments, with potentially different implications for future household wealth and community development. The changes in the total, productive and consumer asset indices over 6 years are then modeled as a function of migration-remittance behavior of households in 1994, and other household and village characteristics in 1994 and 2000. Because households' migration-remittance behavior is non-random, a propensity score matching technique is used to correct for selectivity bias, where selection is specified as a multinomial choice among three household strategies: not migrate, migrate-not remit, migrate-remit. The findings show that households' migration and remittance choices have a significant effect on the level and nature of their subsequent investments, and this effect depends strongly on households' initial wealth. While rich households face a decrease in productive assets due to migration of their members, poor households gain assets, and improve their relative status within their communities.

1. INTRODUCTION

When researchers study the impact of migration upon sending communities, they evaluate the amount and distribution of resources, especially migrant remittances. Recent findings indicate that international remittances from migrants amount to 126 billion dollars annually, a figure that is 50 percent higher than the total of official development assistance (Ratha 2005). Rural-urban migration within developing countries also yields remittances and can serve the vital purpose of income and wealth redistribution. Despite the critical potential of remittances for understanding distributional and developmental outcomes in sending communities, until now few data sources allow for adequate modeling of these consequences of migration-remittance flows (Taylor 1997, 1999; Edwards and Ureta 2003; Rapaport and Docquier 2003).

This paper uses a multi-level, longitudinal survey data on internal migration and remittance flows in Nang Rong, Thailand, in order to evaluate how households' migration and remittance choices affect their absolute and relative economic positions in their communities. The statistical analyses aim to determine (1) what factors are associated with households' migration and remittance behavior, and how these factors differ by households' initial wealth status, (2) how households' migration and remittance behavior alter their position within communities with respect to total, productive and consumer asset holdings, and (3) how overall distribution of assets within communities changes as a result of migration and remittance flows. Addressing these questions is important to assess the immediate economic effect of migration on households, and to predict the long-term developmental effects of remittances on sending communities.

To assess the changes in households' economic status over time, I build on a methodology recently developed by Filmer and Pritchett (2001), and compute a household asset index based on principal components analysis of several asset indicators in data. A burgeoning literature discusses how developmental consequences of migration-remittance flows depend on whether households invest in productive or consumer assets, yet few studies to date have evaluated the changes in the two types of assets separately (Durand et al. 1996, McKenzie 2005). To address this issue, I decompose the total asset index into two components of productive and consumer assets and explore how migration-remittance choices affect the kinds of investments households make. For each household, I compute the total, productive, and consumer asset indices for two time periods, 1994 and 2000, and use their difference over time as the dependent variable for the analyses.

In examining the effect of migration-remittance flows on household assets, I take into account sample selectivity. Namely, households do not randomly select among different migration-remittance strategies, and it is necessary to take into account the potential selection bias in evaluating the effect of households' migration-remittance strategies on the subsequent changes in their wealth (Axelsson and Westerlund 1998; Nakosteen and Zimmer 1980; Tunali 1986). Propensity score methods provide a useful strategy to address the selection issue, by matching households on a range of characteristics, and comparing the matched groups in order to identify the impact of migration-remittance behavior. These methods were originally developed for evaluating the effect of binary treatments, but recently Imbens (2000) and Lechner (2001) have extended their

application to multi-valued treatments using a two-stage estimation strategy, which is used in this study. In particular, the first stage of the estimation assumes that household members choose among three alternative strategies of 'not migrating', 'migrating but not remitting', and 'migrating and remitting'. A multinomial logistic equation is used to model households' selection into one of the three sub-samples. In the second stage, changes in three types of asset indices are modeled as a function of migration-remittance strategies as well as other household and village characteristics, using the inverse of the predicted probabilities from the first-stage as sample weights to adjust for selection (Foster 2003; Imbens 2000). As a benchmark to these analyses, I use ordinary least squares regression and find that it produces similar results, which suggests that selection does not significantly bias the results in the Thai data. To test the assumption of 'selection on observables' that propensity score matching technique relies on, I employ an instrumental variables approach, which does not require that assumption. The results remain robust to method selection.

The findings from the statistical analyses suggest that households' migration and remittance choices have a significant effect on the level and nature of their subsequent investments, and this effect may depend on households' initial wealth status. Namely, for rich households, sending migrants to urban centers creates a labor shortage for overseeing their ongoing economic activities in the village, and forces a decrease in their productive investments. By contrast, for poor households, who are typically not involved in as many economic activities as wealthier households, sending migrants and receiving remittances

relieves the consumption burden of the household, and consequently aids in increasing productive investments, and improving relative position within the village.

Counter to the popular belief that migration earnings are spent on consumer goods, I find that migration-remittance strategies are not correlated with an increase in consumer assets. On the contrary, having migrants decreases the investment in consumer goods for rich households. In terms of transitions in economic status, I find that poor households, who choose a migrant-remitter strategy in 1994, are more likely to increase to a medium-wealth status by 2000. By contrast, rich households, who choose to send migrants (with or without remittances), are more likely to decrease to a medium-wealth status. Hence, the overall effect of migration-remittance flows in the 22 Thai villages is decreased inequality in the distribution of assets among households in the village.

The remainder of this paper is organized as follows. Section 2 provides a brief review of prior research on how households' migration-remittance choices affect the level and distribution of resources within communities. Section 3 outlines the methodological strategy and describes the study setting and data. After presentation of estimation results in Section 4, the final section outlines the conclusions and paths for future research.

2. BACKGROUND

Researchers have long noted the importance of migrant remittances for development of sending communities or nations. In his chapter in *Worlds in Motion*, Taylor (1997) notes that immigrant workers annually remitted around 75 billion dollars back to their countries

of origin, a figure that is 50 percent higher than the total of official development assistance. Today, this figure has increased to 126 billion dollars annually according to the World Bank estimates (Ratha 2005). In addition to influencing national development directly through remittances, international migration is also thought to affect development indirectly through the investments that migrants make in productive activities at home. Recent findings suggest that these indirect effects may be as important as the direct effects in determining the direction and nature of international migration's influence on economic growth (Durand et al. 1996; Taylor 1999). International migrant remittances are, therefore, understood as a critical and understudied element of development outcomes in origin countries (Edwards and Ureta 2003; Rapaport and Docquier 2003; Sumata 2002).

Rural to urban migration within developing countries also yields remittances and can serve the vital purpose of income and wealth redistribution. De Haan (1999) provides a comprehensive overview of the empirical estimates of urban-to-rural remittances in the literature. To give a few examples, according to Williamson (1988), remittances to rural communities range from 10 to 13 percent of urban incomes in Africa, and are thought to be in the same order in Asia. Reardon (1997) finds that migration earnings constitute at least 20 percent of total non-farm earnings in Africa, rising to a level of 75 percent in areas close to major cities. Rempel and Lobdell (1978) estimate that remittances account for up to 40 percent of income in rural households, and Knowles and Anker (1981) note similar proportions and conclude that remittances are more important for poorer than richer households in Kenya. While Adepoju and Mbugua (1997) suggest that migrants

often remit up to 60 percent of their incomes, another author, Findley (1997), in the same volume on Africa, cites research showing that migrants remit between 5 to 15 percent of their income.

This uncertainty about the magnitude of urban to rural remittances further exacerbates the debates in the literature about the developmental consequences of migrant remittances (Goldring 2003). Some researchers argue that migrant remittances initiate a development dynamic by lessening the production and investment constraints in the economy (Stark and Lucas 1988; Taylor 1999), by providing income growth opportunities (Taylor 1999) or by creating a vessel for risk diversification (Lauby and Stark 1988). Others regard migration as producing a cycle of dependency and stunted development in sending communities (Papademetriou and Martin 1991). While the positive view is based on the argument that migrants bring back skills, and that the remittances are spent to support productive agricultural activities, the critics' view asserts that skills acquired in destination locales are irrelevant in the local labor market and that remittances are spent on consumption rather than productive investments (Goldring 2003; Papademetriou and Martin 1991).

As a preliminary step to clearing the ambiguity in the literature about the developmental effects of migration and remittances, this study will attempt to evaluate how migration-remittance flows change the level and distribution of household assets in 22 rural communities in Nang Rong, Thailand. Nang Rong is a poor district located in the historically poor Northeastern region of Thailand, and is a major provider of migrant

workers to urban centers, such as Bangkok or Eastern Seaboard. Empirical evidence from other study settings suggests that sending migrants, and receiving remittances, provide households with higher income gains (Greenwood 1985, Polacheck and Horvath 1977). In a study of Mexican communities, Taylor (1992) finds that migrant remittances have long-term asset accumulation effects for the migrant sending households. Prior research also shows that households' returns to migration-remittance outcomes may depend on their initial economic status in the community. Stark et al. (1988) observe that poor households may not able to access the opportunities for finding jobs in the destination. Skeldon (1997) argues that the extremely poor are generally excluded from migration opportunities; and Mallee (1995) observes that migrants do usually not come from the poorest districts. In addition to economic status, the selection of households on other characteristics may influence their overall benefits from migration-remittance strategies (Axelsson and Westerlund 1998; Nakosteen and Zimmer 1980; Tunali 1986).

Synthesizing from prior studies, in the 22 Thai communities studied in this paper, I expect that migrant sending households will acquire more assets and improve their economic standing in their communities. Further, based on my observations in fieldwork in the region, I expect that migration-remittance flows will increase households' investments in productive assets and activities, rather than consumer goods. I also expect that the changes in households' assets (as a result of migration-remittance behavior) will depend on households' initial economic status. Due to the lack of opportunities other than farm work in these Thai communities, poor households, which typically do not own any land, will benefit more from sending migrants compared with wealthy households.

Finally, I expect that households will be selected on several observable characteristics such as wealth, education, demographic characteristics, etc. in their choice of migration-remittance strategies. Therefore, I will control for potential sample selectivity in all my analyses.

As a further point that has not been explored in prior work, it is important to note that migrants may help the household economy not only by sending back remittances, but also by the sheer fact of leaving and hence relieving the household's burden of supporting them. Hence, I expect a higher increase in wealth for households with migrants (compared to those without), whether these migrants remit or not. Depending on the initial wealth status of the household, this expectation may work differently. Namely, for wealthier households with a considerable number of productive assets, such as land or cattle, migration of a household member may mean loss in labor power, which could be productively allocated in the origin village. Hence, such households may actually lose income and, subsequently, assets as a result of migration, especially if the migrants do not send back remittances to compensate for the loss in labor power. Alternatively, if migrants send remittances, they may help diversify the sources of income for wealthier households, and strengthen their existing investments. For poorer households, due to lack of other opportunities in the origin village, migrant members have the potential to boost household assets, through remittances, or through reducing consumption needs of the household by their absence. In all these arguments, household size becomes an important moderating factor. Specifically, if a wealthy household is large in size, the loss in labor stock by migration may not significantly affect the household economy. Similarly, for

poor households, the decrease in consumption needs, due to migrants' leaving, may not be as significant in larger households. To evaluate the validity of these ideas, I will employ statistical models with interactions, and explore how household wealth and size moderate the relationship between migration-remittance behavior and subsequent wealth accumulation. In the next section, I explain the available data in detail, and develop the required methodology to test the proposed arguments.

3. METHODS

Study Setting and Data Collection

The data for this study come from 22 rural villages in Nang Rong, a district in the poor Northeastern region of Thailand. To test the relevance of the arguments outlined above, the study analyzes changes in household assets from 1994 to 2000 as a result of migration-remittance flows in 1994. The study period follows a time of dramatic economic change and growth in Thailand from the mid-1980s to the mid-1990s. During this time 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 were concentrated (Tambunlertchai 1990). Much of this labor was provided by rural migrants from the Northeastern part of the country, where 40 percent of the population lived in

poverty (Hafner 2000). This upward trend in migration stopped abruptly with the financial crisis of 1997, followed by a devaluation of the Thai currency, the baht.

The survey is conducted as part of a longitudinal data collection effort by University of North Carolina and Mahidol University in Thailand.[1] I use three waves of the Nang Rong survey data for my analyses (1984, 1994, and 2000) collected from 22 villages. (Note that, originally data were collected from 51 villages in 1984. Yet, in only 22 of those 51 villages were migrants followed up and interviewed in their new destinations in 1994. Preliminary analyses with the 51-village data set suggested that the absence of information on migrants may bias the results. Therefore, the sample of this study was restricted to observations from the 22 villages.)

The 1984 data collection was a census of villages, which 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 households and information about former 1984 village members, but also included a 10-year retrospective individual 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. The data on remittance flows are from the household questionnaires, and only available for two cross-sections (1994, 2000).

For the analyses at hand, I use the 1994 and 2000 household and village surveys in combination with the longitudinal life history data from 1984 to 1994. More explicitly,

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

the 1994 household questionnaire asked each household member if they had migrated and/or sent remittances in the past 12 months. The household level migration-remittance outcomes are based on these questions. Both 1994 and 2000 household questionnaires included questions on household assets. Information was gathered on both productive assets (e.g., land, cattle, tractors) and consumer assets (e.g., TVs, VCRs, refrigerators). The list of assets measured was slightly expanded in 2000, but for the sake of assessing change, only the assets that were common to both the 1994 and 2000 questionnaires are used in the analyses. For some of the other explanatory variables (such as accumulated migration experience at the household and village level), information from the 10-year retrospective life history data, covering the period from 1984 to 1994, is used. 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. (Note that the financial crisis of 1997 may have affected the asset holdings of the households in our sample. Since we only have cross-sectional data on asset holdings in 1994 and 2000, we cannot evaluate the effect of the financial crisis; hence need to assume that it affected all the households to the same degree.) Finally, the data from household and life history questionnaires were combined with village level surveys in 1994 and 2000, and several measures of village development level are added to the set of explanatory variables.

Statistical Methodology

The analysis to evaluate the effect of migration-remittance flows on the change in household assets over time comprised several steps. First, because households do not

randomly choose among different migration-remittance strategies, it is necessary to take into account the potential selection bias in evaluating the effect of households' migration-remittance strategies on the subsequent changes in their wealth. In other words, simple comparisons of changes in assets of households choosing different migration-remittance strategies may be misleading as they do not identify the effect of those strategies per se. In particular, such comparisons may be confounding the effect of migration-remittance strategies with that of the factors that lead households to choose those strategies in the first place.

Statistical matching methods can be used to address this issue. These methods typically specify a distance measure among observations based on some characteristics, and then group those observations into minimum-distance 'matched' categories. This process gets more complex as the number of characteristics to be matched-on increase. To avoid the complexity, Rosenbaum and Rubin (1983) have suggested using the propensity score, the conditional probability of receiving a treatment (i.e., choosing a migration-remittance strategy in our case) given several characteristics, as the matching criterion. Hence, propensity score matching effectively reduces a multi-dimensional matching problem to a single-dimension one.

Propensity score methods were originally developed for two-group situations, in which one group receives the treatment and the other does not. Recently, Imbens (2000) has extended the methodology to multi-group situations, where each group may receive a different treatment. Basically, Imbens (2000) observes that propensity score matching is

essentially a weighting scheme, which involves weights formed as the inverse of the predicted probability that a subject would receive a treatment that it actually received. Based on this observation, then, choice among polytomous treatments can be modeled (using a multinomial or ordered logit) to estimate the predicted probabilities that a subject receives a given treatment. The inverse of these predicted probabilities can then be used as sample weights in the subsequent models of treatment effects to adjust for selection.

In this paper, I used this strategy outlined by Imbens (2000) and later employed by Foster (2003), to assess the effect of migration-remittance choices on households' subsequent asset gain. In the first stage of the analyses, I used a multinomial logistic regression model of households' migration-remittance behavior to estimate the propensity scores. Then, the inverse of the predicted probabilities (i.e., the propensity scores) from the first-stage estimation were used as sample weights in the second-stage model of change in household assets from 1994 to 2000.

A large number of variables, such as household economic status and demographics, household and village-level migration experience, village development level, are included in the estimation of the propensity scores in the first stage. The same variables used to form the match in the first stage are used in the regression analysis of asset change in the second stage, with the exception of household and village-level migration experience indicators, which are only included in the former. The migration experience indicators are assumed to affect the choice of migration-remittance behavior but not the change in household assets. In an instrumental variables specification, these variables

would constitute the identifying instruments, which are only included in the selection equation but excluded from the outcome equation. Such an exclusion restriction does not apply to propensity score methods. In fact, as Heckman and Navarro-Lozano (2004) argue, the matching literature does not provide any guidance on the choice of conditioning variables in the first-stage estimation of propensity scores. In this paper, because we want to be able to compare our results from propensity score models to those from an instrumental variables estimation (advantages and disadvantages of which are discussed below), we keep the identifying variables in the first-stage model of propensity score estimation. The details of the methodology are given below.

First-Stage Multinomial Selection.[2] The first-stage estimation involves computing predicted probabilities of migration-remittance outcomes for households using a multinomial logit equation. Each household faces a choice among three possible migration-remittance strategies: not migrate, migrate but do not remit, and migrate and remit. Because the second-stage model of change in assets over time takes the household as the unit of analysis, I assume that household members reach a joint decision on the migration-remittance strategy to undertake.[3] Then, the problem can be expressed as a multinomial logit model using the double-selection framework proposed by Tunali

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

[3] This assumption is only relevant for identifying the selection mechanism, and does not necessarily carry implications for how the decision was made within the household. In other words, I am assuming that certain household and village characteristics may make some households more likely to have migrant-nonremitters or migrant-remitters. This assumption does not imply that all household members act together, or the decision to migrate was consensual.

(1996). Consider a household who chooses among three options: not migrating (y_n^*), migrating and not remitting (y_m^*), and finally, migrating and remitting (y_r^*). (The asterisk * denotes that the variable is latent.) Denoting by y_n^*, y_m^* and y_r^* the benefits associated with each option, we consider the following system of structural equations:

$$y_n^* = x\gamma_n + z\phi_n + \varepsilon_n \qquad (1)$$

$$y_m^* = x\gamma_m + z\phi_m + \varepsilon_m \qquad (2)$$

$$y_r^* = x\gamma_r + z\phi_r + \varepsilon_r \qquad (3)$$

where *x* denotes the vector of explanatory variables that influence both migration-remittance behavior and asset change, and hence are included in both stages of analysis. Vector *z* contains variables that only affect migration-remittance behavior; γ_s and ϕ_s (*s*=*n*,*m*,*r*) denote the unknown parameter vectors for nonmigrants, migrant-nonremitters and migrant-remitters respectively; and ε denotes random disturbances. Next, we define, $y_1^* = y_m^* - y_n^*$, as the net benefit of migrating to a household 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 (1)-(3) as follows:

$$y_1^* = x\beta_1 + z\theta_1 + \varepsilon_1 \qquad (4)$$

$$y_2^* = x\beta_2 + z\theta_2 + \varepsilon_2 \qquad (5)$$

where $\beta_1 = \gamma_m - \gamma_n$, $\beta_2 = \gamma_r - \gamma_m$, $\theta_1 = \phi_m - \phi_n$, $\theta_2 = \phi_r - \phi_m$, $\varepsilon_1 = \varepsilon_m - \varepsilon_n$, and $\varepsilon_2 = \varepsilon_r - \varepsilon_m$. Now, if we let

$$d = \max\left(0, y_1^*, y_1^* + y_2^*\right) \qquad (6)$$

the decision rule for a household's migration-remittance behavior becomes

$$\begin{aligned} &\text{Not migrate } (s = n), && \text{if } d = 0, \\ &\text{Migrate, but not remit } (s = m), && \text{if } d = y_1^*, \qquad (7) \\ &\text{Migrate and remit } (s = r), && \text{if } d = y_1^* + y_2^*. \end{aligned}$$

Note that the decision rule depicted in equation (6) gives rise to a multinomial logit model under certain assumptions regarding the error terms in (1)-(3).

Given this decision mechanism, we only observe the discrete migration-remittance strategy of a household *i*, MR_i, which can take three values, 'migrant-remitter', 'migrant-nonremitter' and 'nonmigrant' indexed 1,2, and 3, respectively. Taking '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 household chooses the *j*-th strategy. Using a multinomial logit model, we assume that the log-odds of each response, denoted η_{ij}, follow a linear model, which constitutes our first-stage equation:

$$\eta_{ij} = \log \frac{\pi_{ij}}{\pi_{iJ}} = x_i \beta_j + z_i \theta_j \qquad (8)$$

where β_j and θ_j are vectors of regression coefficients (for *j*=1,2) and *J* is the index for the baseline category, which is 3 (nonmigrant households) in our case.

Second-Stage Ordinary Least Squares Regression. Second-stage equation expresses the change in household assets over time as a function of the household's migration-remittance strategy (modeled in the first stage) and explanatory variables that capture household and village characteristics. Let *a* indicate the level of household assets and *x* denote a vector of explanatory variables. We have observations at two points t_0 and t_1 and define $\Delta a \equiv a_{t_1} - a_{t_0}$ and $\Delta x \equiv x_{t_1} - x_{t_0}$. Then, change in the assets of household *i* from t_1 to t_0 is given by

$$\Delta a_i = x_i\alpha + \Delta x_i\delta + MR_{ij}\omega + \upsilon_i \qquad j = 1,2 \qquad (9)$$

where MR_{ij} is the indicator of household *i* choosing a migration-remittance outcome *j*, α, δ, and ω are vectors of regression coefficients, and υ is a vector of errors. Following Imbens (2000), to match households on their propensity scores, the sample in the second stage is weighted by the inverse of the predicted migration-probabilities from the first-stage, π^*_{ij} (multiplied by the actual outcome MR_{ij}; recall that Imbens (2000) forms the weights as the inverse of the predicted probability that a household would choose a strategy that it actually chose).

Alternative Models. A simpler way of adjusting for preexisting differences among households that choose different migration-remittance strategies is including several covariates as controls in an ordinary least-squares (OLS) regression, namely, only estimating the second-stage model without controlling for selection. OLS regression assumes that all the differences among non-migrant, migrant-nonremitter, and migrant remitter households are captured by the covariates. This assumption becomes problematic if the distribution of the covariates varies substantially with migration-remittance choices

of households (Foster 2003; Imbens 2000), in other words, if there is selection of households on the observable characteristics. Therefore, I use the OLS estimates as a benchmark to assess whether selectivity indeed biases our results. I find that the results from OLS regressions (presented in the Appendix Table A4) are similar to those generated by propensity score methods, and conclude that selection does not confound the results significantly in the Thai data.

Both ordinary regression and propensity score matching methods rely on the assumption of 'selection on observables', that is, controlling for the covariates (used in regression in the former and matching in the latter), households choose among different migration-remittance strategies randomly. (This assumption is also called 'conditional independence assumption' (CIA), implying that selection into treatments is independent from the outcomes given observable characteristics.) The instrumental variables estimation relaxes the 'selection on observables' assumption of the propensity score method, by using instruments, that is, factors that affect the selection process into migration-remittance choices, but do not affect the outcome of interest. More specifically, the variation in an instrument helps us identify causal effects because the effect of that variation on the outcome is entirely reflected through the choice of migration-remittance behavior (Frolich 2004).

Several empirical studies in the migration literature suggest that households may be self-selected, or selected on unobservable characteristics, in their migration-remittance choices (Axelsson and Westerlund 1998; Nakosteen and Zimmer 1980; Tunali 1986). By

applying instrumental variables approach, I attempt to address this issue, and rule out the possibility of selection on unobservables (which propensity score methods assume away). It is important to keep in mind that the instrumental variables approach, though addressing a broader range of issues than propensity score methods (such as selection on unobservables), relies heavily on the availability of valid instruments.[4]

In our case, the instrumental variables method was applied as follows[5]: The first-stage estimation was identical to that of propensity score matching, and involved modeling migration-remittance behavior of households by a multinomial logit model. Indicators of migration experience at the household and village-level included only in the first-stage model were used as instruments, and hence were assumed to affect households' choice of migration-remittance strategy, but not the subsequent changes in their assets. In the second stage, changes in three types of asset indices were modeled as a function of several household and village characteristics, as well as the predicted migration-remittance probabilities from the first-stage model to control for sample selectivity.

The estimation results, presented in the Appendix Table A4, are in agreement with the results of the propensity score method. Because the latter method involves fewer assumptions, and because the validity of the instruments used in the former cannot be

[4] Note that matching and instrumental variables are different in approach. In matching, we are essentially looking for observed characteristics that are highly correlated with the error term from the outcome equation. Once we condition on those characteristics, we assume that assignment of treatment (migration-remittance behavior in our case) is random. By contrast, instrumental variables strategy is to look for variables (i.e., instruments) that are uncorrelated with the error term of the outcome equation. The assumption is that instrument affects the outcome indirectly through the independent variables in the model, which is hard to test empirically.

[5] The two-stage estimation approach used in the study is based on Dubin and McFadden (1984), who consider a probit selection mechanism, and has been applied to multinomial logit case by Kane et al. (2000).

verified, I present propensity score matching as the main methodology of the paper. The fact that the results are robust to method selection increases my confidence in the ideas proposed in the paper.

Dependent Variables. The dependent variable in the first stage of the model, migration-remittance strategy of the household, is constructed from individual level life history data, where migration moves of all household members were recorded. Using this information, I define a household as 'nonmigrant' if there are no migrants among household members in 1994. A household with migrants, none of whom send remittances, is considered 'migrant-nonremitter'. Finally, a household with migrant members at least one of whom sends remittances is considered 'migrant-remitter.' (According to this definition, 326 (of 937 total) households in the sample are categorized as non-migrant, 127 as migrant-nonremitter, and 484 as migrant-remitter. 63 households have both migrant-nonremitter and migrant-remitter members, and in 9 of those cases, the number of the former exceed the number of the latter. Hence, if we were to change the definition of a migrant-remitter household as a household with more migrant-remitter members than migrant-nonremitter members, then the classification for only 9 households would change. The results are robust to this change.)

Principal Components Analysis. The primary dependent variable in the second stage is the change in the assets owned by a household from 1994 to 2000. Most socio-economic status evaluation in development research uses consumption expenditures as a measure. This study uses household assets instead of consumption expenditures for two reasons.

First, Nang Rong surveys do not collect information on household consumption expenditures, but measure several different categories of household assets. Second, in the rural Thai setting, even if consumption data were available, they would not be reliable as households are involved in farming and cattle-raising, and consume a large portion of their produce. Therefore, instead of household consumption expenditures, an index of household assets is employed to measure household economic status. There are sixteen asset categories measured at the household level in the data (see Table A1 in the Appendix for a list of asset categories).Building on a methodology devised in a recent, highly cited paper by Filmer and Pritchett (2001), I combine these asset measures into a single asset index for each household. This methodology is based on principal components analysis (PCA), which aggregates information from several indicators into a few dimensions.[6,7]

The generic PCA procedure is developed for samples from a multivariate normal distribution, and only suitable for continuous data. Yet, demographic surveys, including those analyzed by Filmer and Pritchett (2001) or the Nang Rong survey used in this study, typically contain categorical or count measures of household assets. Filmer and Pritchett (2001) attempt to address this issue by creating binary indicators for each

[6] Alternative methods to this approach include simply summing the number of assets, which may be problematic if the value or importance of assets for households varies (e.g., a sewing machine and a car would both get the same weight). Using sensible weights for assets, such as prices, and summing up is another alternative for creating an index. Yet, price data are not available in the survey, and cannot be reliably estimated (e.g., even if we know the average price of a tractor, we would not know how old a household's tractor is).

[7] Note that PCA analysis is based completely on the variation in the data, that is, if an asset is owned by everyone in a village, then it will have a low weight in the final asset index. This type of analysis cannot identify if certain assets are substitutable or equivalent. It is the researcher's duty to identify such cases based on the substantive purpose for which the asset index is being computed, and introduce variables selectively into PCA.

category of an asset (i.e., convert an ordinal variable to several binary indicators), and then employ PCA. Recently, Kolenikov and Angeles (2004) showed that qualitative knowledge on the ordering of categories (e.g., housing quality ranging from one-story to four-story) could be put into use by inputting a *polychoric* correlation matrix in the PCA procedure, instead of the original Pearson's correlation coefficient.[8] This methodology not only produces more accurate rankings of assets, but also avoids the spurious correlation introduced by creating several binary indicators from a single categorical variable in the Filmer and Pritchett (2001) procedure.

In short, using the `polychoricpca` routine implemented in Stata by Kolenikov and Angeles (2004), I computed weights for each of the sixteen asset indicators. These indicators vary from continuous measures (household land, cows, buffalos or pigs raised by household) to count (number of TVs, VCRs, refrigerators, cars, motorcycles, itans (i.e., small tractors), tractors, rice threshers, and sewing machines), to binary or categorical variables (house has windows, household uses gas or electricity for cooking, whether water is piped into household). The descriptive statistics for each of the asset indicators are given in Table A1 of the Appendix. Since PCA is sensitive to the scaling of variables, all continuous variables were standardized to mean 0 and variance 1 before computations. The PCA weights were computed globally by combining data from 1994 and 2000 for the sake of consistency. For the same reason, only the asset indicators measured in both time periods were included.

[8] Polychoric correlation is the maximum likelihood estimate of the underlying correlation between the unobserved normally distributed continuous variables from their discretized versions. See Kolenikov and Angeles (2004) and Olsson (1979) for details.

-- Table 1 about here --

Most migration and development research is concerned with whether households invest in productive assets that provide a means of subsistence in origin communities or simply purchase consumer assets for personal use. The household's choice among these two broad categories of alternatives is thought to have diverse implications for development, inequality, and future migration patterns in migrant-sending rural communities. By dividing our asset measures into two categories of productive versus consumer assets, and computing a combined index for each category, we can empirically observe the investment patterns of Nang Rong villagers.

The first column of Table 1 displays the scoring coefficients of the first principal component generated by the polychoric PCA procedure. (For comparisons to the coefficients generated by the Filmer-Pritchett procedure, see the Appendix, Table A2.) The first principal component is used as it has the greatest variance and extracts the largest amount of information from the data. The second and third columns report the coefficients when the PCA analysis is run separately for productive and consumer assets. Productive asset index contains data on land ownership, cattle raised by the household (cows, buffalos or pigs), and farming vehicles the household owns (itans (i.e., small tractors), tractors, rice threshers), which are assumed to provide potential means of subsistence to the household. The consumer asset index, by contrast, is constructed from measures of housing quality (windows, cooking fuel, water pipe) and durables owned by household (TVs, VCRs, refrigerators, sewing machines, cars, and motorcycles). The

assumption is that these consumer goods do not provide households any potential monetary gains, and hence, are not productive investments. (Note that certain consumer assets, such as cars, motorcycles or sewing machines can be considered productive as well. For example, household members can use cars or motorcycles to go to work, or to transport children to schools. Similarly, a sewing machine can be used to produce clothing which can be sold. To consider these alternatives, I experimented with categorization of assets, where cars, motorcycles and sewing machines were considered 'productive', yet the results remained unaltered.) The overall PCA scores for each household are computed for three categories of assets (total, productive and consumer) by multiplying the values of each asset category with the coefficients generated by PCA, and summing all them up. For the sake of comparability and ease of interpretation, the three asset indices are scaled to [0,10] range.

Independent Variables. Independent variables for the analyses are obtained from the household and village questionnaires of 1994 and 2000. In the first-stage model, which predicts the migration-remittance outcomes in 1994, only the household and village characteristics measured in that year are included. Among the independent variables, the number of dependents (aged 65 or more) and children (aged 14 or less) capture the degree of dependency within the household, and could exert a positive effect on migration-remittance behavior if the need for extra income to support the dependents is surpassed by the need for their care in the household. Number of heirs in the household captures the members with future inheritance prospects, and is expected to affect migration-remittance behavior positively if the heirs try to prove their worth by sending

remittances. Based on qualitative evidence from Thailand (Curran et al. 2005), I expect women to be more likely to migrate, and send remittances, and include the female-to-male ratio as an independent variable to capture this pattern. The number of economic activities the household is involved in (silk weaving, silk worm raising, other cloth weaving, charcoal making), household debt, and indices of productive and consumer assets proxy household's economic standing in 1994.

Indicators of migration experience, accumulated over a 10-year period from1984 to 1994, are added as identifying variables to the multinomial logit equation in the two-stage specification (i.e., these variables affect migration- remittance behavior, but not the change in the level of household assets). Note that identifying variables are only necessary for the instrumental variables methodology, and are not required for (nor prohibited from) propensity score models. Accumulated number of household migration trips is included to capture the effect of prior migration experience on a household's choice among migration-remittance strategies. Village level migration experience (measured by accumulated number of migration trips by village members) is also included, along with a measure of the destination diversity of migration experience (measured by Shannon's entropy of village trips to different destinations).[9] The

[9] Diversity, measured by Shannon's entropy index, is computed as follows:

$$Diversity = \frac{-\sum_{i=1}^{n} p_i \times \log(p_i)}{\log(n)}$$

where n is the number of possible destinations and p_i is the proportion of trips to destination i. Minimum diversity occurs when all trips are concentrated in one destination and the index equals zero. Maximum diversity occurs when each destination contains the same proportion of trips, yielding an index of 1. In the Thai context, I identify ten possible categories that exhaust all possible destinations for Nang Rong residents: Buriram, Korat, any other provinces in the North Eastern region, Chon Buri, Rayon, Eastern Seaboard, Bangkok, Bangkok Metropolitan Area, Other and International.

underlying idea, based on and confirmed by Garip (2006), is that prior 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 useful to individuals if it is more diverse in terms of the opportunities it provides (i.e., more diverse across different destinations). Note that all the accumulated experience indicators are lagged by one year to prevent endogeneity, and the diversity index is standardized to have mean of 0 and standard deviation of 1.

To control for differences in origin village characteristics, the first-stage model includes measures of productive and consumer asset inequality in the village (measured by a gini coefficient). Months of water shortage in the village captures the risks to farming income, and the potential need for income diversification for households. Proportion of households receiving remittances is a measure of remittance norms within the village, while remoteness of village to urban centers, and years since village is electrified are measures of village development level. Three binary variables indicating the presence of a school, a temple, and a newspaper reading room, respectively, are added as independent variables. Finally, the amount of land available for purchase in the village is also included as a measure of potential investment opportunities for households.

In the second-stage model of household asset change, binary indicators for households' choosing migrant-nonremitter and migrant-remitter status (note that nonmigrant status is

the reference category) are used as independent variables.[10] The second-stage equation includes all the variables from the first-stage estimation, except for migration experience indicators. Additionally, the changes in certain household characteristics (number of dependents, number of children, household size, number of economic activities) between 1994 and 2000 are included as independent variables in the second-stage model. (Note that the dependent variable in the second-stage model (change in the asset index), and several independent variables in both stages of the estimation (index of household productive assets, index of household consumer assets, gini of productive assets in the village, and gini of consumer assets in the village) are standardized to mean 0 and standard deviation 1.)

4. RESULTS

Table 2 compares sample characteristics in 1994 and 2000 by household migration-remittance status. Difference of means tests show that, compared with non-migrant households, migrant households (both remitters and nonremitters) have a higher number of dependents and children, heirs and household members. This finding suggests that dependents, children or a larger household size may provide incentives for migrating, either for the purpose of leaving a household with high care demands and low prospects for future inheritance, or for the purpose of supporting the remaining household members by sending remittances. Migrant sending households are also higher in migrant social capital resources, captured by the amount and diversity of prior migrant trips. Remittance receiving households tend to live in communities with established remittance norms,

[10] Note that in the instrumental variables model, these indicators are replaced with the predicted probabilities from the first-stage model to control for selectivity on unobserved characteristics.

proxied by the percentage of households receiving remittances. The migration-remittance strategy is more prominent in more developed villages that have been electrified earlier, and have a temple. Existence of a school presents an alternative to migrating for younger adults, and hence migrant-remitter households tend to originate from villages with no schools.

-- Table 2 about here --

These descriptive findings invite application of more rigorous techniques to evaluate whether and how migration/remittance behavior of households affects their level of assets over time. In the analyses that follow, I start by modeling households' migration-remittance behavior, and use the estimates to adjust for selection. Based on the ideas developed earlier, I next employ statistical models of asset change with interactions, and explore how household wealth and size moderate the relationship between migration-remittance behavior and subsequent wealth accumulation. Then, to better explore the relationship between households' initial wealth and wealth accumulation due to migration-remittance flows, I estimate the model of asset change separately for three sub-samples: poor households, medium-wealth households, and rich households. The results are explained in detail below.

Migration-Remittance Choices of Households

The estimates from the multinomial logit model of households' migration-remittance choices are presented in odds ratios in Table 3. In a sample including all households, I find that the number of dependents and children in the household decrease the odds of

choosing to migrate, possibly due to the increased need for care in such households. Number of heirs in the household is an important determinant of choosing migrate-remit rather than not-migrate strategy, with relative odds of 1.4 to 1. The fact that the number of heirs increases the odds of choosing migrate-remit strategy, but not migrate-not remit strategy, suggests that heirs may be trying to show their parents that they are deserving of future inheritances. Or alternatively, when there are many heirs, households may become more likely to allocate labor to the migrate-remit strategy. One of the most significant determinants of a household's choosing migrant-remit option, is the female-to-male ratio in the household. This finding is consistent with the qualitative evidence suggesting that female migrants are much more likely to send remittances compared with male migrants (Curran et al. 2005). Interestingly, increase in household size only increases the odds of choosing migrate-not remit strategy, but not migrate-remit strategy. Because in larger households the consumption expenditures are higher, household members may be choosing to migrate for the purpose of relieving household's burden of supporting them. Households' economic status seems to have a small effect; households with more productive assets seem to be less likely to send migrants and receive remittances.

Prior migration experience at the household and village level increases the odds of sending migrants for households. The number of prior trips in the household equally increases a household's odds of being in the migrant-nonremitter or migrant-remitter category rather than the nonmigrant category. Interestingly, the number of trips in the village, as well as the diversity of trips by destination, seem to increase the odds of choosing migrate-not remit strategy more than the odds of migrate-remit strategy. This

result suggests that when there are many migrants in the village, some household members may decide to migrate not necessarily to support their households, but possibly to follow their friends in the village. This interpretation is consistent with my observations in the fieldwork, where younger migrants constantly mentioned their friends' migrating as a motivation for their own decisions to migrate.[11]

-- Table 3 about here --

Moving on to the village characteristics, the inequality in the distribution of productive assets in the village (measured by a gini coefficient) decreases the odds of sending migrants for households, while the inequality in consumer assets increases the odds. In villages with highly unequal distribution of productive assets (which proxy potential means of income for households), households that do not have these assets may be likely to work as hired labor for those who have them, and hence be less likely to migrate. (This practice is common in these rural villages.) By contrast, in villages with an unequal distribution of consumer assets, relative deprivation of households who are lower in terms of these assets, may act as a motivation for sending migrants, and explain the significant positive effect of the gini coefficient (Stark and Taylor 1981). Along similar lines, in villages where a higher percentage of households receive remittances,

[11] In November 2005, I conducted focus group interviews in selected villages of Nang Rong. I chose 8 study villages with differential migration patterns, and in each village, conducted three separate focus groups with: (1) village leaders (village headman, village committee members, and "mothers' group" members), (2) migrant sending household members, and (3) return migrants. Focus groups consisted of six to eight participants, typically equal number of men and women. During the two weeks I spent in Nang Rong, I completed a total of 24 focus group interviews with 158 participants. These interviews explored the consequences of individuals' migration and remittances behavior for sending communities, and provided the basis for some of the interpretation I present in this study.

households become more likely to send migrants and receive remittances, possibly to decrease their relative deprivation with respect to other households.

Other village characteristics, such as remoteness of village to urban centers, or years since electrification, or presence of a newspaper reading room, that proxy village development level, all have the expected effect: the more developed the village (that is, less remote, longer since electrification, and with a newspaper reading room), the higher the prospects of households for sending migrants. One surprising observation is the negative effect of presence of a school, which possibly provides an alternative to migrating for younger migrants, on the odds of migrating. Amount of land available for purchase in the village seems to provide a motivation for households to send migrants.

Changes in Households Assets from 1994 to 2000

Table 4 reports the estimates from the second-stage linear regression models, where predicted probabilities of households' being migrant-nonremitter and migrant-remitter are used as sample weights to control for selectivity. The dependent variable in the first model is the change in the household asset index from 1994 to 2000, standardized to have mean 0 and standard deviation 1. In the second and third models, the change in the productive and consumer assets are used separately as dependent variables, in order to evaluate the effect of households' migration-remittance behavior on the nature of their subsequent investments.

The results show that households' migration-remittance strategies in 1994 have no effect on the changes in their overall, productive or consumer assets from 1994 to 2000. Other household and village characteristics, by contrast, seem to have a strong effect on changes in households' asset holdings. The number of dependents decrease the household assets (both productive and consumer) by possibly increasing the consumption needs of the household. Household size in 1994, as well as the increase in household size from 1994 to 2000, positively affects the increase in productive household assets. Recall that household size increased the chances that household members migrated but not remitted, which I interpreted as a strategy to decrease household costs by sending a migrant and effectively reducing the household size. This strategy seems to create a desired effect of increasing household assets in larger households, despite the fact that such households are not more likely to receive remittances (see Table 3 and the explanations in the preceding section). Households with more productive assets in 1994 seem more likely to lose productive assets and gain consumer assets by 2000. Recall that in the first-stage model, households with more productive assets were found to be less likely to send migrants and receive remittances. Then, the losses in productive assets for wealthier households may be a result of their lower likelihood of following the migrate-remit strategy.

To better substantiate these conjectures, I explore how wealth and household size moderate the effect of migration-remittance behavior on the changes in household assets. Namely, in all three models, I introduce interaction terms between household wealth and migrant-remitter status, and between household size and migrant-remitter status. While

the inclusion of the former interaction terms leads to interesting insights, the latter ones do not seem to have an effect. I find that choosing a migrant-nonremitter strategy hurts wealthier households, causing them to lose some of their productive assets by 2000, as evidenced by the negative coefficient of the interaction term in the second model. By contrast, choosing a migration strategy (with or without remittances) causes wealthier households to obtain more consumer assets. These findings suggest that migration-remittance choices may have different effects on wealth accumulation depending on households' initial economic status. These effects are not necessarily linear as assumed by the models with interaction terms between migrant-remittance behavior and wealth. Accordingly, in the following set of analyses, I categorize households by initial wealth, and run separate models to account for the possible non-linearities in the relationship of initial wealth to wealth accumulation subsequent to migration-remittance flows.

Before I move on the separate analyses by wealth, it is worthwhile to elaborate on how village characteristics affect asset accumulation in the whole sample. Among village characteristics, the inequality in the distribution of consumer assets, captured by a gini coefficient, increases the odds that households gain consumer assets. This result is consistent with the interpretation of household behavior in the first stage, namely, the inequality of consumer assets creates an incentive for households to send migrant-remitters, and decrease their relative deprivation. The increase in household assets is lower in villages with lower development levels, for example, villages that are remote to urban centers, or villages without a temple. The months of water shortage in the village, proxying risks to local income, seems to lead households to obtain more productive

assets, possibly as a risk-diversifying strategy. The amount of land available for purchase in the village has a positive effect on the increase in assets, although only in productive assets, as it did on the households' probability of sending migrants in the first-stage model.

-- Table 4 about here --

Changes in Households Assets from 1994 to 2000, by Households' Initial Wealth

Using the percentiles (33^{rd} and 67^{th}) of the overall asset index in 1994, I categorize households as poor, medium-wealth, and rich. When the sample is divided by household wealth as such, the story on the effect of migration-remittance behavior on households' subsequent wealth accumulation changes considerably. Starting with a model of change in productive assets, presented in Table 5, the migration-remittance behavior, which did not have any effect in prior modes, now has a strong effect on households' productive asset gain. Moreover, this effect differs significantly by households' initial economic status. Specifically, household assets increase for poor households that choose to send migrants, whether those migrants send remittances or not. Interestingly, migrant-nonremitters seem to contribute to an increase in household productive assets more than migrant-remitters. This finding supports the idea that, in poor households, migrants contribute to the household economy by the sheer fact of leaving, and relieving the households' burden of supporting them. Hence, the effect of remittances on the household economy is smaller compared with the effect of declining consumption expenditures due to migration. This argument, if true, implies that the relief in household

expenditures due to migration will be less in larger households. Because the consumption needs remain high, even with migrants away, such households will be less likely to increase their assets. This conjecture is supported by the negative coefficients of the interaction terms between migration-remittance indicators and household size. Namely, the positive effect of having migrants (remitter or nonremitter) on the increase in productive assets decline with household size. (Recall that the interactions between migration-remittance choices and household size were not significant in the models of Table 4. The fact that these terms become significant in separate models by wealth suggests that the interaction is three-way among household size, wealth, and migration-remittance behavior.)

-- Table 5 about here --

Skipping the medium-wealth households for now, and moving on to the rich households, the effect of migration-remittance behavior on productive assets is the opposite of that for poor households. Having migrants that do not remit hurts rich households, causing a decline in their productive assets. Having migrant-remitters, on the other hand, has no effect on the productive wealth. One can argue that higher wealth households are already involved in several economic activities that consume part of their labor stock. Such households may need to send migrants to diversify their sources of income, and minimize risks to their wealth. Yet, when migrants do not send remittances, they do not compensate for the households' loss in labor. Such households, then have less incentive to obtain more productive assets (e.g., cattle or land), as there is less labor power to dedicate to their maintenance. This interpretation is supported by the negative coefficient of

household productive assets, and the positive coefficient of household size. Namely, the more productive assets a household has, the less incentive there is to obtain more assets due to manpower constraints. This effect is counteracted by household size, which, by increasing the labor power of the household, increases the plausibility of obtaining and overseeing more productive assets. The argument also implies that the issue of labor loss should be less of a concern in large households, where more members can be allocated to local economic activities. The positive coefficient of migrant-nonremitter indicator and household size confirms this expectation.

To summarize, migrant-nonremitter strategy hurts rich households, by causing labor shortage and decrease in productive assets, but this negative effect declines with increasing household size. By sharp contrast, migrant-remitter or migrant-nonremitter strategies both benefit poor households, by relieving the consumption burden, but this positive effect is felt less in larger households. These two opposing forces due to migration, namely increasing labor shortage and decreasing consumption needs in household, seem to nullify one another for medium-wealth households. In the second model of Table 4, we find that household assets do not change for medium-wealth households regardless of their migration-remittance behavior. The interaction terms of migrant-remitter status and household size also have no effect.

The effects of the other household and village characteristics included in the analyses also differ by households'' initial wealth status. An increase in number of dependents causes a decline in the productive assets of medium-wealth and rich households, but not

poor households. Female-to-male ratio affects only poor households, causing a decline in their productive assets from 1994 to 2000. Household debt also only affects poor households, creating an incentive to invest more in productive assets. Inequality in consumer assets at the village level provides a motivation to increase household productive assets for poor households only. Months of water shortage disproportionately affects rich households, causing them to obtain more productive assets. This finding may be the result of rich households' attempting to diversify their income-generating assets, for example, investing in cattle when there are risks to income from working their land. Interestingly, village development level (e.g., electrification, presence of a school, temple or factory) only affects the productive wealth accumulation of the rich households, possibly because they are more likely to benefit from such amenities.

Table 6 replicates the same analyses by initial household wealth to predict changes in household consumer assets. Interestingly, the models of consumer asset change have a poor fit (R^2 around 0.20) compared with the models of productive asset change (R^2 around 0.50). The coefficient estimates suggest that, unlike the popular view in the literature that migration earnings are spent on consumer goods, migration-remittance strategies are not correlated with an increased consumption in the Thai rural villages. By contrast, for rich households that choose the migrating-but-not-remitting strategy, we see a decline in consumer good investments, possibly reflecting the decrease in household size due to migrant members. This idea is supported by the positive coefficient of interaction term between migrant-nonremitter indicator and household size. Namely,

consumer good accumulation decreases for migrant-nonremitter households, but the rate of decrease is lower in larger households.

Number of dependents decrease consumer assets in medium-wealth and rich households, but not poor households. Similarly, number of children decrease consumer assets in only rich households. An increase in household economic activities decreases the investment in consumer goods for rich households, possibly for the sake of more productive investments. Living in a village with an unequal distribution of consumer goods increases the investment in consumer goods for poor households, and even more for rich households. Similarly, the presence of a temple increases investment in consumer assets for rich households most, followed by medium-wealth households, and finally by poor households.

-- Table 6 about here --

To sum up, the estimates from the statistical models provide evidence that households' migration-remittance choices have a significant effect on the level and nature of their subsequent investments. The results also show that the direction and magnitude of this effect depends on households' initial wealth and size. Namely, sending migrants creates a labor shortage for wealthier households, who need manpower to oversee their already existing productive activities, and hence, forces a decrease in productive assets. Poor households, on the other hand, not suffering from a need for labor in the origin village, are relative gainers from a strategy of sending migrant-remitters. To better explore these

patterns, let's first look at the changes in the level and inequality of assets in villages, and then observe whether poor households can improve their relative position within their villages through a strategy of migrating.

Changes in the Inequality of Household Assets

One important question is whether the asset index, generated from the first principal component of sixteen asset categories, is suitable for inequality analysis. The technical answer to this question has been worked out in a recent article by McKenzie (2005), who shows that, while the asset index may be a good proxy for the level of wealth, it may provide poor measures of inequality due to issues of clumping or truncation. Figures 1 to 3 plot the distribution of total, productive and consumer asset indices, respectively, to help us visually determine whether these issues should be of concern. Note that the distribution of assets over time is approximated by a Kernel density estimator. Similar to a histogram, this method divides the data into intervals to produce a density estimate. Yet, unlike in a histogram, the data intervals are allowed to overlap. Then, each observation in an interval is weighed according to its distance from the center, rather than equally as in a histogram. As a result, the Kernel density estimate provides a smoother approximation of the data distribution.

-- Figures 1 & 2& 3 about here --

Both the productive and consumer asset indices show evidence of clumping and truncation at the bottom (i.e., the density does not approach zero at the minimum value of

the index). The total asset index, which uses sixteen indicators of productive and consumer asset measures, by contrast is much smoother, with no evidence of clumping or truncation. Table 7 presents the mean values and gini coefficients for the overall, productive and consumer asset indices in 1994 and 2000. The values provide a story that is consistent with the figures, namely the mean levels of three types of assets increase in villages, while the inequality in their distribution decreases.

-- Table 7 about here --

Now, the question is, how does the inequality in asset distribution actually decrease? Does it decrease because the rich households lose assets, or because the poor households obtain assets? To answer these questions, I employ a simple descriptive analysis: I observe changes in a household's category with respect to the overall asset index from 1994 to 2000. I choose to use the overall asset index, rather than the productive or consumer asset indices, as the latter show evidence of truncation and clumping, which may bias inequality analyses. The overall asset index, which is much smoother in distribution, is better suited to discriminate households in terms of their wealth.

To generate the results displayed in Table 8, I categorize households as poor, medium-wealth, and rich, based on the percentiles (33^{rd} and 67^{th}) of the overall asset index in 1994 and 2000. Then, for each wealth category in 1994, I compute the percentage of climbers (households that ended up in a higher wealth category in 2000), the percentage of stable households (whose wealth category did not change), and the percentage of decliners

(households that were in a lower income category in 2000). The results show dramatic differences in transitions of households by migration-remittance strategies and initial household wealth. Specifically, among poor households, those that select the migrant-remitter strategy are more likely to improve their relative economic position. In this wealth category, 46 percent of migrant-remitter households are among the climbers, as opposed to only 33 percent of migrant-nonremitter households, and 40 percent of non-migrant households. Among medium-wealth households, non-migrant households are the most likely to improve their status, followed by migrant-remitters, and finally by migrant-nonremitters. By contrast, for rich households' economic position, the migration-remittance strategy creates the worst outcome, where 47 percent of households choosing this strategy actually decline in wealth status. The decline rate is much lower for nonmigrant households, among the wealthy, followed by the migrant-nonremitters.

To summarize, the migrant-remitter strategy disproportionately benefits poor households, helping them to improve their relative economic standing in the village. Medium-wealth and rich households are more likely to lose their relative status through a strategy of sending migrants. These observations are in line with my findings from the statistical analyses, namely, rich households are likely to lose their assets by sending migrants, as they lose labor power which could be allocated to their economic activities in the village. Poor households, on the other hand, gain by sending migrants and receiving remittances, as they face no opportunity costs in the origin village.

-- Table 8 about here --

5. CONCLUSION

In this paper, I evaluated the effects of rural-urban migration and remittance flows on household assets in 22 sending communities in the Nang Rong district of Thailand. The empirical literature on migration and development is bifurcated on this question. While some studies find that migration-remittance flows have long-term asset-accumulation effects for households, others show that remittances only result in increased consumption. The former finding implies that migration-remittance flows may be beneficial for households, providing them with means of subsistence in the village in the long-term, and potentially improving their relative economic status. The latter observation, by contrast, depicts a less optimistic future, with no paths to economic progress for the household. In this study, I considered both sides of the argument, assessing both the changes in households' productive and consumer investments subsequent to their migration-remittance behavior. Unlike most previous empirical work, I took into account the potential selectivity of migration-remittance choices in evaluating the changes in household assets over time. To identify which groups in a village benefit most from migration-remittance flows, I also separated my analyses by households' initial economic status.

The results supported some of the established findings in the literature, but also suggested unique insights on the distributional consequences of migration-remittance flows in sending communities. Namely, I found that, in the 22 Thai villages, households' migration-remittance choices in 1994 significantly affect the level and nature of their subsequent investments from 1994 to 200, yet differently by households' initial economic

status. In particular, while rich households face a decrease in productive assets due to migration of their members, poor households gain productive assets, and improve their relative status within their communities. Counter to the popular belief that migration earnings are spent on consumer goods, in the Thai case, I found that migration-remittance strategies are not correlated with an increase in consumer assets. These findings were also confirmed in a descriptive analysis of households' transitions in economic status from 1994 to 2000. Namely, I found that the migrant-remitter strategy disproportionately benefits poor households, who become much more likely to move to a medium-wealth category. By contrast, rich households become more likely to lose their relative status through a strategy of sending migrants. The overall effect of migration-remittance flows in the villages, then, is an increased level of assets, and a decreased inequality in assets, which results from both poor moving up, and rich moving down in the distribution.

Future work on this question should be attentive to the differential effects of migration-remittance flows on different wealth groups of households. More generally, the selectivity of migration-remittance behavior on wealth, or other observable or unobservable characteristics, should be taken into account. In fact, the inconsistencies in the empirical findings encountered in the literature may be an artifact of differential selection mechanisms of households into migration-remittance choices.

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APPENDIX

Descriptives for Asset Measures Used in PCA

-- Table A1 about here --

Comparison to Filmer-Pritchett PCA Procedure

-- Table A2 about here --

Table A2 displays the scoring coefficients for the total, productive and consumer asset indices employing the Filmer and Pritchett (2001) procedure. Different than polychoric PCA, this procedure disregards the information on the ordering of categories of an asset, and converts each category to a binary indicator. Kolenikov and Angeles (2004) demonstrate the potential flaws of this strategy, briefly (a) its tendency to introduce spurious correlations by representing different values of a categorical variable by several binary indicators, and (b) its potential to underestimate the variance explained by the first few components of PCA (Kolenikov and Angeles 2004).

The results presented in Table A2 demonstrate that Filmer-Pritchett procedure fails to capture the monotonocity of scores in different values of a variable. For instance, while the scores for the different values of 'number of tractors' are monotonically increasing (that is, the more tractors a household has, the higher it is in terms of wealth), the scores generated by the Filmer-Pritchett procedure do not reflect this expected ordering. Also,

the variance explained by the first Filmer-Pritchett PCA component is much lower than its polychoric counterpart. Despite these differences, the overall asset index, which is the sum of assets weighed by scoring coefficients, generated by Filmer-Pritchett method is highly correlated with that of polychoric PCA (Correlation coefficients for total, productive and consumer asset indices are 0.91, 0.63 and 0.86, respectively.).

OLS Regression Results

-- Table A3 about here --

Instrumental Variables Regression Results

-- Table A4 about here --

TABLES

Table 1. Scoring Coefficients for Total, Productive and Consumer Asset Indices Generated by Polychoric PCA

Variable		Total Asset Index	Productive Asset Index	Consumer Asset Index
House has windows		0.385		0.406
Use gas or electricity in cooking		0.120		0.124
Water piped to house		0.280		0.281
Number of tvs				
	1	0.110		0.118
	2	0.765		0.820
	3	1.038		1.113
	4	1.161		1.246
Number of vcrs				
	1	0.755		0.793
	3	1.229		1.291
Number of refrigerators				
	1	0.443		0.456
	2	1.214		1.249
Number of cars				
	1	0.714		0.761
	2	1.052		1.121
	3	1.214		1.294
Number of motorcycles				
	1	0.285		0.287
	2	0.694		0.698
	3	0.951		0.957
	4	1.172		1.179
Number of sewing machines				
	1	0.388		0.389
	2	0.656		0.658
Household land*		0.103	0.433	
Number of itans				
	1	0.283	0.647	
	2	0.523	1.196	
Number of tractors				
	1	0.003	0.028	
	2	0.041	0.421	
	3	0.088	0.903	
	4	0.114	1.174	
Number of rice threshers				
	1	0.033	0.253	
	2	0.045	0.345	
Number of cows raised*		0.060	0.207	
Number of buffalos raised*		0.133	0.027	
Number of pigs raised*		0.073	0.071	
Variance explained by 1st component		0.26	0.29	0.43

* Continuous variables are standardized to mean 0 and variance 1.

Table 2. Sample Characteristics in 1994 and 2000 by Households' Migration-Remittance Status in 1994

	Non-Migrant Households (N=326)		Migrant-Nonremitter Households (N=127)			Migrant-Remitter Households (N=484)		
	Mean	(s.d.)	Mean	(s.d.)	p	Mean	(s.d.)	p
Household Characteristics								
No of dependents (>64 yr old) in 94	0.47	(0.74)	0.43	(0.68)		0.51	(0.74)	
No of dependents (>64 yr old) in 00	0.86	(1.02)	1.06	(1.26)	*	1.05	(1.16)	*
No of children (<15 yr old) in 94	0.95	(0.91)	0.57	(0.77)	*	0.63	(0.81)	*
No of children (<15 yr old) in 00	1.08	(0.99)	1.45	(1.28)	*	1.30	(1.19)	*
No of heirs in 94	2.32	(1.59)	2.87	(1.91)	*	3.40	(1.86)	*
Female-to-male ratio in 94	0.52	(0.18)	0.49	(0.19)		0.55	(0.18)	*
Household size in 94	5.84	(1.93)	6.65	(1.93)	*	6.89	(2.09)	*
Household size in 00	7.29	(2.50)	8.65	(2.65)	*	8.50	(2.74)	*
No of economic activities in 94	0.25	(0.64)	0.35	(0.78)		0.39	(0.80)	*
No of economic activities in 00	0.10	(0.37)	0.16	(0.49)		0.17	(0.55)	*
Household has debt in 94?	0.65	(0.48)	0.64	(0.48)		0.63	(0.48)	
Index of hh productive assets in 94	2.72	(1.52)	2.61	(1.67)		2.63	(1.43)	
Index of hh productive assets in 00	3.03	(1.40)	2.68	(1.33)	*	2.86	(1.39)	*
Index of hh consumer assets in 94	0.34	(0.78)	0.35	(0.89)		0.31	(0.73)	
Index of hh consumer assets in 00	1.28	(1.65)	1.18	(1.70)		1.18	(1.45)	
Cumulative Migration Experience								
Migration trips by hh members from 84 to 94	1.56	(2.53)	3.48	(3.53)	*	3.71	(3.28)	*
Migration trips by village members from 84 to 94	2.52	(0.62)	2.67	(0.61)	*	2.73	(0.59)	*
Destination diversity of village trips from 84 to 94	0.05	-(1.03)	0.07	-(0.94)		0.01	-(0.99)	
Village Characteristics								
Gini of productive assets in village in 94	0.29	(0.05)	0.28	(0.05)		0.28	(0.05)	
Gini of productive assets in village in 00	0.26	(0.07)	0.27	(0.08)		0.25	(0.07)	
Gini of consumer assets in village in 94	0.86	(0.08)	0.87	(0.07)	*	0.86	(0.07)	
Gini of consumer assets in village in 00	0.64	(0.08)	0.64	(0.09)		0.64	(0.08)	
Months of water shortage in 94	2.40	(1.63)	2.25	(1.64)		2.59	(1.75)	
Months of water shortage in 00	0.52	(0.88)	0.46	(0.84)		0.43	(0.83)	
% of households receiving remittances in 94	43.89	(10.19)	44.65	(10.88)		48.28	(9.21)	*
Village remote to urban centers in 94?	0.73	(0.44)	0.80	(0.40)		0.74	(0.44)	
Years since village is electrified in 94	8.33	(3.07)	8.39	(3.41)		7.90	(2.89)	*
Is there a school in village in 94?	0.63	(0.48)	0.60	(0.49)		0.55	(0.50)	*
Is there a temple in village in 94?	0.70	(0.46)	0.76	(0.43)		0.80	(0.40)	*
Is there a newspaper reading room in village in 94?	0.44	(0.50)	0.41	(0.49)		0.43	(0.50)	
Amount of village land for purchase in 94 (x1000rai)	1.43	(0.82)	1.41	(0.87)		1.43	(0.82)	
Is there a nearby factory to village in 00?	1.76	(0.43)	1.85	(0.36)	*	1.71	(0.45)	*

*p<0.10. Two-tailed difference of mean tests are based on comparisons with non-migrant households.

Table 3. First-Stage Multinomial Regression Model Predicting Household Migration and Remittance Outcomes in 1994

	All Households	
	Migrate & Not Remit	**Migrate & Remit**
Household Characteristics		
No of dependents (>64 yr old) in 94	0.67 **	0.90
No of children (<15 yr old) in 94	0.49 ***	0.54 ***
No of heirs in 94	0.96	1.41 ***
Female-to-male ratio in 94	0.62	4.61 ***
Household size in 94	1.32 ***	1.05
No of economic activities in 94	0.85	0.89
Household has debt in 94?	0.87	0.98
Index of hh productive assets in 94	0.93	0.91 *
Index of hh consumer assets in 94	1.05	0.92
Cumulative Migration Experience		
Migration trips by hh members from 84 to 94	1.25 ***	1.27 ***
Migration trips by village members from 84 to 94	2.83 ***	1.17 *
Destination diversity of village trips from 84 to 94	1.38 ***	1.13 ***
Village Characteristics		
Gini of productive assets in village in 94	0.81 *	0.92 *
Gini of consumer assets in village in 94	3.02 ***	1.35 ***
Months of water shortage in 94	0.80 ***	0.94 ***
% of households receiving remittances in 94	0.97 *	1.05 ***
Village remote to urban centers?	0.53 **	0.76 ***
Years since village is electrified in 94	1.44 ***	1.11 ***
Is there a school in village in 94?	0.21 ***	0.65 ***
Is there a temple in village in 94?	1.42	1.17
Is there a newspaper reading room in village in 94?	1.49 *	1.19 *
Amount of village land available for purchase in 94	1.58 ***	1.11 **
N (# of Households)	937	
Pseudo-R^2	0.17	

***p<0.01, **p<0.05, *p<0.10 Standard errors are adjusted for 22 village clusters. Reference category is non-migrants. Results presented in odds-ratios. Asset indices, and gini of these indices, are standardized to mean 0 and standard deviation 1.

Table 4. Propensity Score-Adjusted Linear Regression Model Predicting Changes in Household Assets from 1994 to 2000

	All Assets	Productive Assets	Consumer Assets
Household Migration-Remittance Strategy			
Migrant-Nonremitter	-0.49	-0.19	-0.48
Migrant-Remitter	0.15	0.10	-0.02
Household Characteristics			
No of dependents (>64 yr old) in 94	-0.21 ***	-0.17 ***	-0.22 ***
Change in no of dependents 94 to 00	-0.07	-0.11 **	-0.07
No of children (<15 yr old) in 94	-0.12 **	-0.05	-0.08
Change in no of children 94 to 00	-0.08	-0.06 **	-0.06
No of heirs in 94	-0.04	-0.04	-0.04
Female-to-male ratio in 94	0.25	-0.29 **	0.09
Household size in 94	0.06	0.09 **	0.02
Change in hh size 94 to 00	0.09 **	0.07 ***	0.05
No of economic activities in 94	0.07	0.17 ***	0.05
Change in no of econ activities 94 to 00	0.10	0.07	0.03
Household has debt in 94?	0.00	0.08	-0.05
Index of hh productive assets in 94	0.02	-0.57 ***	0.13 **
Index of hh consumer assets in 94	-0.07	-0.04	-0.11
Migrant-Nonremitter * Total hh asset index in 94	-0.22 **	-0.26 ***	0.19 **
Migrant-Remitter * Total hh asset index in 94	-0.26 ***	-0.04	0.18 ***
Migrant-Nonremitter * Hh size 94	0.05	-0.02	0.07
Migrant-Remitter * Hh size 94	-0.03	-0.03	0.00
Village Characteristics			
Gini of productive assets in village in 94	0.00	-0.04	-0.04
Gini of consumer assets in village in 94	0.19 ***	-0.05	0.19 ***
Months of water shortage in 94	-0.02	0.04 **	-0.03
% of households receiving remittances in 94	-0.02 ***	0.00	-0.01 **
Village remote to urban centers?	-0.16 *	-0.01	-0.11
Years since village is electrified in 94	0.00	0.01	0.02
Is there a school in village in 94?	0.10	0.05	0.10
Is there a temple in village in 94?	0.36 ***	-0.03	0.36 ***
Is there a newspaper reading room in village in 94?	0.21 **	-0.01	0.25 **
Amount of village land available for purchase in 94	0.04	0.10 ***	-0.02
Is there a nearby factory to village in 00?	-0.48 ***	0.21 *	-0.45 **
Intercept	1.31 ***	-0.75 **	1.07 *
N (# of Households)	937	937	937
R^2	0.18	0.55	0.13

***p<0.01, **p<0.05, *p<0.10 Standard errors are adjusted for 22 village clusters. The dependent variable, asset indices, and gini of these indices are standardized to mean 0 and standard deviation 1.

Table 5. Propensity Score-Adjusted Linear Regression Model Predicting Changes in Household Productive Assets from 1994 to 2000

	Poor Households	Medium-wealth Households	Rich Households
Household Migration-Remittance Strategy			
Migrant-Nonremitter	0.89 **	-0.31	-1.44 ***
Migrant-Remitter	0.53 *	-0.17	0.04
Household Characteristics			
No of dependents (>64 yr old) in 94	0.01	-0.27 ***	-0.16 *
Change in no of dependents 94 to 00	-0.07	-0.17 **	-0.02
No of children (<15 yr old) in 94	-0.01	-0.08	-0.03
Change in no of children 94 to 00	-0.08	0.00	-0.11
No of heirs in 94	0.01	-0.03	-0.10 **
Female-to-male ratio in 94	-0.79 ***	-0.08	0.43
Household size in 94	0.02	0.11	0.13 ***
Change in hh size 94 to 00	0.06 *	0.09 ***	0.07
No of economic activities in 94	0.21 ***	0.18 **	0.11
Change in no of econ activities 94 to 00	0.09	0.12 **	0.00
Household has debt in 94?	0.23 **	-0.04	0.06
Index of hh productive assets in 94	-0.59 ***	-0.56 ***	-0.58 ***
Index of hh consumer assets in 94		-0.51	-0.10 ***
Migrant-Nonremitter * Hh size 94	-0.11 *	-0.02	0.14 *
Migrant-Remitter * Hh size 94	-0.07 *	0.00	-0.03
Village Characteristics			
Gini of productive assets in village in 94	0.11	-0.12 **	-0.02
Gini of consumer assets in village in 94	0.11 *	-0.03	-0.15 ***
Months of water shortage in 94	0.05	0.01	0.15 ***
% of households receiving remittances in 94	0.00	0.00	0.00
Village remote to urban centers?	-0.09	0.06	0.09
Years since village is electrified in 94	0.04	0.01	-0.06 ***
Is there a school in village in 94?	-0.03	0.37 **	0.09
Is there a temple in village in 94?	-0.30 **	-0.07	0.16 **
Is there a newspaper reading room in village in 94?	0.00	0.18	-0.32 ***
Amount of village land available for purchase in 94	0.14 **	-0.03	0.19 ***
Is there a nearby factory to village in 00?	0.06	-0.05	0.70 ***
Intercept	-0.54	-0.79	-1.90 ***
N (# of Households)	307	314	316
R^2	0.49	0.47	0.62

***p<0.01, **p<0.05, *p<0.10 Standard errors are adjusted for 22 village clusters. 'Index of hh consumer assets in 94' is dropped from the model for poor households, since these households do not own any consumer assets.The dependent variable, asset indices, and gini of these indices, are standardized to mean 0 and standard deviation 1.

Table 6. Propensity Score-Adjusted Linear Regression Model Predicting Changes in Household Consumer Assets from 1994 to 2000

	Poor Households	Medium-wealth Households	Rich Households
Household Migration-Remittance Strategy			
Migrant-Nonremitter	0.04	0.31	-1.78 **
Migrant-Remitter	0.53	0.13	-0.10
Household Characteristics			
No of dependents (>64 yr old) in 94	-0.06	-0.11 **	-0.39 ***
Change in no of dependents 94 to 00	0.11	0.01	-0.31 **
No of children (<15 yr old) in 94	0.11 *	0.05	-0.44 ***
Change in no of children 94 to 00	0.08	0.00	-0.18
No of heirs in 94	0.02	-0.03	-0.17 **
Female-to-male ratio in 94	-0.03	0.63 *	-0.06
Household size in 94	-0.01	-0.03	0.17
Change in hh size 94 to 00	0.03	0.01	0.12
No of economic activities in 94	0.13	0.06	-0.05
Change in no of econ activities 94 to 00	0.13	0.06	-0.26 **
Household has debt in 94?	0.05	0.00	-0.12
Index of hh productive assets in 94	0.05	0.20 ***	0.06
Index of hh consumer assets in 94		0.77	-0.12
Migrant-Nonremitter * Hh size 94	-0.02	-0.05	0.28 **
Migrant-Remitter * Hh size 94	-0.07	-0.01	0.00
Village Characteristics			
Gini of productive assets in village in 94	-0.04	0.11	0.16
Gini of consumer assets in village in 94	0.09 *	-0.05	0.47 ***
Months of water shortage in 94	0.01	0.02	-0.13
% of households receiving remittances in 94	0.00	-0.03 ***	-0.02 *
Village remote to urban centers?	-0.10	-0.25	-0.27
Years since village is electrified in 94	-0.01	-0.04	0.01
Is there a school in village in 94?	0.09	-0.02	0.18
Is there a temple in village in 94?	0.27 **	0.48 ***	0.69 **
Is there a newspaper reading room in village in 94?	0.05	-0.18	0.28
Amount of village land available for purchase in 94	0.00	0.00	-0.07
Is there a nearby factory to village in 00?	-0.18	-0.10	-0.70 *
Intercept	-0.21	1.98 **	2.28 **
N (# of Households)	307	314	316
R^2	0.18	0.21	0.26

***p<0.01, **p<0.05, *p<0.10 Standard errors are adjusted for 22 village clusters. 'Index of hh consumer assets in 94' is dropped from the model for poor households, since these households do not own any consumer assets.The dependent variable, asset indices, and gini of these indices, are standardized to mean 0 and standard deviation 1.

Table 7. Changes in the Level and Distribution of Houehold Assets from 1994 to 2000

	Total Asset Index	Productive Asset Index	Consumer Asset Index
Mean in 1994	2.51	2.62	0.33
Mean in 2000	3.68	2.86	1.21
Gini in 1994	0.25	0.29	0.86
Gini in 2000	0.22	0.26	0.64

Table 8. Changes in Households' Wealth Category from 1994 to 2000

	All Households	Nonmigrant Households	Migrant-Nonremitter Households	Migrant-Remitter Households
All Households				
Climbers	24%	26%	19%	24%
Stable	51%	51%	57%	50%
Decliners	24%	23%	24%	25%
Poor Households				
Climbers	42%	40%	33%	46%
Stable	58%	60%	67%	54%
Decliners	-	-	-	-
Medium-wealth Households				
Climbers	31%	37%	19%	29%
Stable	40%	32%	40%	45%
Decliners	30%	30%	40%	26%
Rich Households				
Climbers	-	-	-	-
Stable	56%	59%	61%	53%
Decliners	44%	41%	39%	47%

Note - Results are presented as column percentages. Three equal frequency wealth categories (poor, middle, rich) are based on the values of the household asset index index in 1994 and 2000.

Table A1. Descriptive Statistics for Household Asset Indicators in 1994 and 2000 (N=937)

	1994		2000	
	Mean	(s.d.)	Mean	(s.d.)
Consumer Assets				
House has windows	0.09	(0.28)	0.18	(0.38)
Use gas or electricity in cooking	0.69	(0.46)	0.88	(0.33)
Water piped to house	0.09	(0.29)	0.42	(0.49)
Number of tvs	0.80	(0.45)	0.82	(0.48)
Number of vcrs	0.01	(0.08)	0.07	(0.27)
Number of refrigerators	0.17	(0.38)	0.52	(0.51)
Number of cars	0.03	(0.16)	0.07	(0.28)
Number of motorcycles	0.27	(0.44)	0.67	(0.71)
Number of sewing machines	0.10	(0.30)	0.09	(0.31)
Productive Assets				
Household land	23.83	(23.54)	18.28	(17.32)
Number of itans	0.04	(0.18)	0.18	(0.39)
Number of tractors	1.13	(1.06)	1.12	(0.87)
Number of rice threshers	1.13	(0.99)	1.54	(0.84)
Number of cows raised	1.78	(6.57)	1.30	(4.18)
Number of buffalos raised	1.90	(2.36)	0.71	(2.06)
Number of pigs raised	0.47	(1.84)	0.39	(2.30)

Table A2. Scoring Coefficients for Total, Productive and Consumer Asset Indices Generated by Filmer-Pritchett PCA

Variable		Total Asset Index	Productive Asset Index	Consumer Asset Index
House has windows		0.194		0.271
Use gas or electricity in cooking		0.257		0.310
Water piped to house		0.196		0.258
Number of tvs				
	1	0.169		0.155
	2	0.136		0.240
	3	0.062		0.138
	4	0.027		0.005
Number of vcrs				
	1	0.233		0.350
	3	0.007		0.021
Number of refrigerators				
	1	0.382		0.439
	2	0.097		0.176
Number of cars				
	1	0.226		0.331
	2	0.087		0.129
	3	0.015		0.032
Number of motorcycles				
	1	0.266		0.249
	2	0.191		0.221
	3	0.116		0.191
	4	0.033		0.063
Number of sewing machines				
	1	0.164		0.173
	2	0.081		0.094
Household land*		0.243	0.413	
Number of itans				
	1	0.269	0.433	
	2	0.033	0.059	
Number of tractors				
	1	0.331	0.569	
	2	-0.197	-0.337	
	3	0.084	0.129	
	4	0.035	0.011	
Number of rice threshers				
	1	0.077	0.043	
	2	0.152	0.290	
Number of cows raised*		0.162	0.281	
Number of buffalos raised*		-0.148	-0.097	
Number of pigs raised*		0.131	0.104	
Variance explained by 1st component		0.08	0.17	0.12

* Continuous variables are standardized to mean 0 and variance 1.

Table A3. Ordinary Least-Squares Regression Model Predicting Changes in Household Assets from 1994 to 2000

	All Assets	Productive Assets	Consumer Assets
Household Migration-Remittance Strategy			
Migrant-Nonremitter	-0.28	-0.40	-0.05
Migrant-Remitter	0.05	-0.11	0.05
Household Characteristics			
No of dependents (>64 yr old) in 94	-0.17 ***	-0.12 **	-0.15 ***
Change in no of dependents 94 to 00	-0.10 **	-0.12 ***	-0.09 *
No of children (<15 yr old) in 94	-0.04	-0	-0.06
Change in no of children 94 to 00	-0.05	-0.06 **	-0.02
No of heirs in 94	-0.05 *	-0.02	-0.05 *
Female-to-male ratio in 94	0.16	-0.14	0.14
Household size in 94	0.05	0.06	0.04
Change in hh size 94 to 00	0.08 ***	0.09 ***	0.03
No of economic activities in 94	0.12 *	0.19 ***	0.04
Change in no of econ activities 94 to 00	0.17 **	0.15 ***	0.10
Household has debt in 94?	0.03	0.11 **	0.04
Index of hh productive assets in 94	0.02	-0.59 ***	0.13 ***
Index of hh consumer assets in 94	-0.07	-0.09 *	-0.07
Migrant-Nonremitter * Total hh asset index in 94	-0.22 **	-0.13 *	0.14 *
Migrant-Remitter * Total hh asset index in 94	-0.27 ***	0.02	0.14 ***
Migrant-Nonremitter * Hh size 94	0.02	0.03	0.00
Migrant-Remitter * Hh size 94	-0.02	0.00	-0.01
Village Characteristics			
Gini of productive assets in village in 94	0.04	0.01	0.03
Gini of consumer assets in village in 94	0.19 ***	-0.07 *	0.15 ***
Months of water shortage in 94	-0.01	0.06 ***	-0.01
% of households receiving remittances in 94	-0.02 ***	0.00	-0.01 **
Village remote to urban centers?	-0.16 **	0.10 *	-0.12
Years since village is electrified in 94	0.02	-0.01	0.02
Is there a school in village in 94?	-0.07	0.12 **	0.04
Is there a temple in village in 94?	0.25 ***	-0.07	0.29 ***
Is there a newspaper reading room in village in 94?	0.12	-0.01	0.10
Amount of village land available for purchase in 94	0.03	0.05 **	-0.01
Is there a nearby factory to village in 00?	-0.38 **	0.08	-0.37 **
Intercept	0.88 **	-0.68 *	0.78 *
N (# of Households)	937	937	937
R^2	0.14	0.47	0.10

***p<0.01, **p<0.05, *p<0.10 Standard errors are adjusted for 22 village clusters. The dependent variable, asset indices, and gini coefficients are standardized to mean 0 and standard deviation 1.

Table A4. Instrumental Variables Second-Stage Regression Model Predicting Changes in Household Assets from 1994 to 2000

	All Assets	Productive Assets	Consumer Assets
First-Stage Selection			
Prob(migrate & not remit)	0.04	-1.62	0.62
Prob(migrate & remit)	-1.06	-0.64	-0.75
Household Characteristics			
No of dependents (>64 yr old) in 94	-0.17 ***	-0.12 **	-0.14 **
Change in no of dependents 94 to 00	-0.10 **	-0.11 ***	-0.07
No of children (<15 yr old) in 94	-0.11 *	-0.07	-0.10 *
Change in no of children 94 to 00	-0.05	-0.06 **	-0.03
No of heirs in 94	0.00	0.03	-0.01
Female-to-male ratio in 94	0.45 *	0.03	0.33
Household size in 94	0.02	0.04	0.01
Change in hh size 94 to 00	0.08 ***	0.09 ***	0.03
No of economic activities in 94	0.12 **	0.18 ***	0.02
Change in no of econ activities 94 to 00	0.19 ***	0.15 ***	0.09
Household has debt in 94?	0.04	0.11 *	0.06
Index of hh productive assets in 94	0.03	-0.63 ***	0.07
Index of hh consumer assets in 94	-0.04	-0.15 ***	-0.21 ***
Migrant-Nonremitter * Total hh asset index in 94	-0.15	0.06	0.95 **
Migrant-Remitter * Total hh asset index in 94	-0.43 ***	0.10 *	0.28 *
Migrant-Nonremitter * Hh size 94	-0.01	0.19	-0.06
Migrant-Remitter * Hh size 94	0.06	0.00	0.04
Village Characteristics			
Gini of productive assets in village in 94	0.03	0.00	0.04
Gini of consumer assets in village in 94	0.17 **	-0.06	0.14 *
Months of water shortage in 94	-0.01	0.06 ***	-0.01
% of households receiving remittances in 94	-0.01 *	0.01	-0.01
Village remote to urban centers?	-0.15 **	0.07	-0.11
Years since village is electrified in 94	0.02	0.00	0.00
Is there a school in village in 94?	-0.05	0.11	0.09
Is there a temple in village in 94?	0.24 ***	-0.05	0.28 ***
Is there a newspaper reading room in village in 94?	0.13	-0.03	0.07
Amount of village land available for purchase in 94	0.03	0.05 **	-0.02
Is there a nearby factory to village in 00?	-0.41 ***	0.11	-0.37 **
Intercept	0.88 **	-0.71	0.77
N (# of Households)	937	937	937
R^2	0.14	0.47	0.12

***p<0.01, **p<0.05, *p<0.10 Standard errors are adjusted for 22 village clusters. The dependent variable, asset indices, and gini coefficients are standardized to mean 0 and standard deviation 1.

FIGURES

Figure 1 Changes in the Distribution of Household Assets in 22 Villages

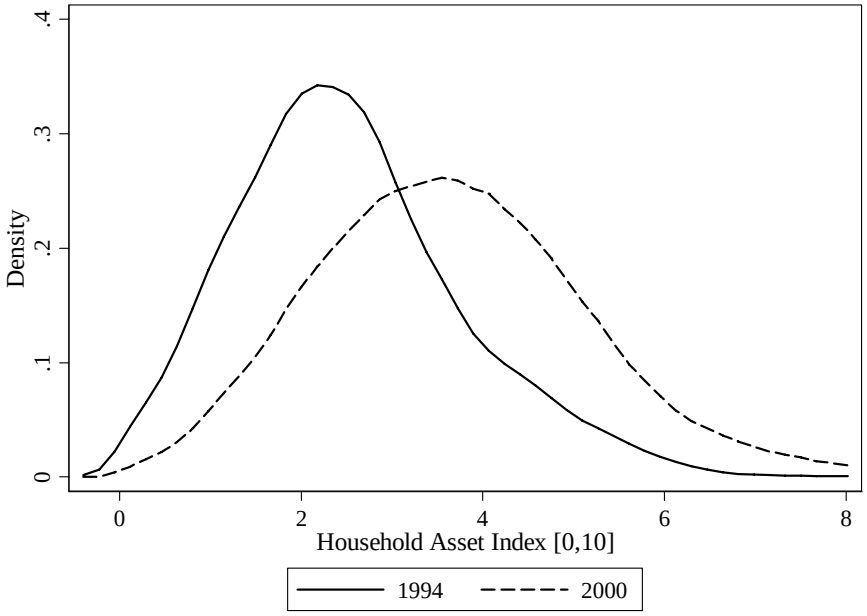

Figure 2 Changes in the Distribution of Productive Household Assets in 22 Villages

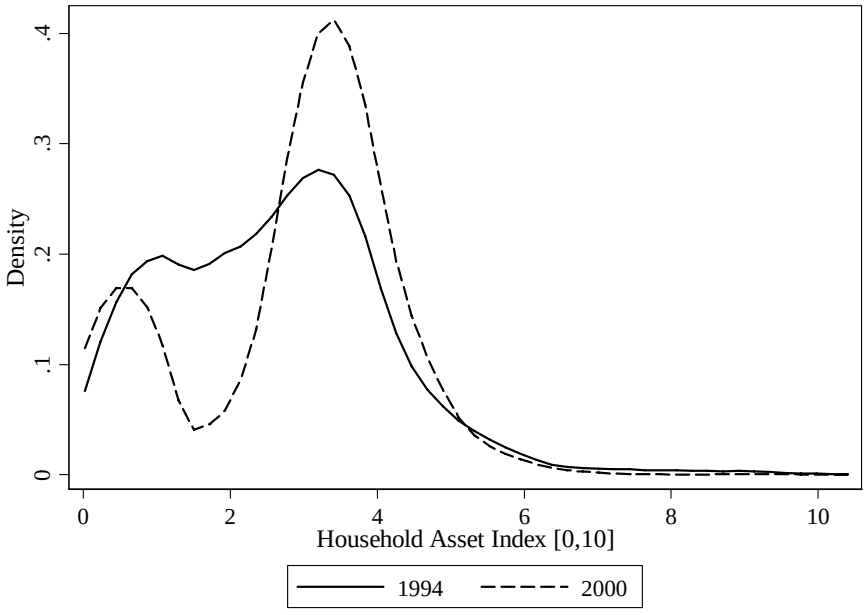

Figure 3 Changes in the Distribution of Consumer Household Assets in 22 Villages