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Migration and Household Investment in Rural China

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Abstract

In this paper, we demonstrate how household investment is affected by participation in migration in rural China. After describing investment patterns across different regions of rural China, we use a heuristic model to describe a relationship between migration and investment and to generate a set of testable hypotheses. We test the hypotheses using household data that we collected in rural China in 2000 and find that in poorer areas migration increases consumptive investment by nearly 20 percent. We find no evidence of a link between migration and productive investment.

JEL Codes: D1, J6, O1

Household Investment through Migration in Rural China

The role of migration in development is complex and much debated (Williamson, 1988; de Haan, 1999; Taylor and Martin, 2001). Traditionally much of the literature on migration has focused on whether or not migration has positive effects on the welfare of migrants or the economies of migrant destinations (e.g. Ghatak et al., 1996; Borjas, 2003). More recently, the New Economics of Labor Migration (NELM) literature has placed new emphasis on understanding the effects of migration on the development of source communities (e.g. Lucas, 1987; Adams, 1991; and Stark, 1991).

Like other institutions in rural areas that lack well-functioning markets, migration can play a complex role in asset accumulation. In the short term, households may use migrant remittances to supplement income in order to increase consumption. If households are credit constrained, they may send out migrants to gain access to working capital and facilitate expanded production. In the longer term, migration and the remittances of migrants can play a more fundamental role in the household's development strategy. If migrants plan to return, they could be interested in helping the household accumulate assets while they are away. However, migrants who plan on returning might be interested in two different types of investments. They might prefer investing in assets that improve their standard of living immediately, such as housing or consumer durables (which we will call *consumptive* investment). Alternatively, they might prefer investing in assets that improve the productive capacity of the household (which we will call *productive* investment).

The literature, albeit thin, has competing views on the role of migration in asset accumulation. A large literature exists studying the flow of Mexican migrants to the United States. Studies on the role of migration in asset accumulation in Mexico generally find that Mexican migrants are more likely to return and accumulate consumptive investments than make productive investments. While describing life in one Mexican village, Mines and de Janvry (1982) suggest that even though migrants do not invest their earnings in productive activities. Instead, they view the village as a place to raise children and as a place to rest. More recently, Durand et al. (1996) and Taylor et al. (1996) have shown that Mexican migrants are more likely to make investments in housing than in activities that increase household production. In contrast, Woodruff and Zenteno (2001) estimate

that 20 percent of capital invested in microenterprises in Mexico come from remittances. Outside Mexico, Dustmann and Kirchkamp (2001) study Turkish migrants returning home from Germany, and find that migrants are likely to become active entrepreneurs when returning home, primarily using savings from their German earnings to finance their businesses. Therefore, *ex ante* it is unclear whether or not migration leads to more investment, and conditional on increasing investment whether or not it encourages consumptive or productive investment.

To further understand the relationship between migration and investment, China makes a good case study. The rapid increase in migration from households in China is one of the strongest forces of change affecting the rural economy in the late 1990s (e.g. Knight and Song, 1999; Rozelle et al., 1999; Zhao, 1999). During the 1990s migration replaced other off-farm activities as the fastest growing share of the off-farm labor market (de Brauw et al., 2002). Remittances from migrants also rose with the outflow of labor from villages, reaching 9 percent of rural income in 2001 (Deininger et al., 2003). Although the flow of labor out of China's villages is accelerating, accompanying the rapid growth of migration has been an increasing reverse flow of labor, and with it resources, back into China's villages. A number of researchers (e.g., Murphy, 1999; Ma, 2001; Zhao, 2002) claim that remittances and the flow of migrants back to villages are considered new sources of energy upon which rural communities can depend on for development. Indeed policy makers concerned with rising incomes and bettering conditions in rural communities are intensely interested in how migration affects asset accumulation in source communities (MOA, 2001).

Despite the changes that migration can potentially bring to source communities, few researchers have attempted to identify the precise effects that migration have on investment by rural households in China. Murphy (1999) and Bai (2001) have described migrants as making productive investments after returning home. Although their work is rich, it is largely descriptive and does not account for other factors. In the first multivariate analysis of this issue in China, Zhao (2002) finds a positive relationship between migration and productive investment in the household. Unfortunately, her data are cross-sectional, and the analysis does not control for unobserved heterogeneity at the household or village level. If unobserved factors are correlated with migration at the household level, her results could be affected.

China's vast regional differences may complicate the observed relationship between migration and investment. China's development differs significantly across space in both levels of wealth and business opportunities (Nyberg and Rozelle, 1999), factors that may affect the relationship between migration and investment. For example, the severity of credit constraints may be expected to differ among China's regions. In rapidly developing coastal areas and suburban areas around rapidly growing cities, farm households have become increasingly wealthy from opportunities in their local areas. In these situations, households might not need to send away migrants to finance investments. They might be able to self-finance their investments or might have access to credit from financial institutions. Park et al. (2003), for example, found that banks in better-off regions have gradually begun to extend credit to rural enterprises. At the same time, some households in these areas may still need to turn to migration to finance investments. It could be that households in these areas have many opportunities for investment and their aggregate demand for credit may exceed local supply.

In contrast, farmers in poorer areas face different conditions. Poor households almost by definition cannot self-finance. Lending institutions in poor areas also have less available capita and often ration credit, leaving the poor with little access to formal lending. Without more formal sources of liquidity, households might turn to migration to create income that could be used to finance investments. The nature of business opportunities in poor areas, however, might dampen demand. There are fewer self employed businesses in poorer areas (Mohapatra, 2003), either because of a lack of capital or because there are few opportunities to invest. Even with investment opportunities, households may be so poor that they use remittances for more immediate needs, such as food, clothing and educational fees. If so, there would be less of a link between migration and investment.

The primary goal of our paper is to examine how participation in migration affects household investment in rural China. To meet this goal, we have three specific objectives. First, we will examine investment patterns across space and between households that participate in migration and those that do not. Second, we develop a heuristic model describing how a household decision to send out migrants could facilitate investment. We use the model as a basis for generating several

empirically testable hypotheses. Third, we empirically test the hypotheses, examining how and under what conditions migration leads to increases in household productive and/or consumptive investment. To account for differences in village economic conditions, we examine differences in investment responses to migration between what we define as non-poor and poor villages.

1 Data

The data for our study were collected by one of the authors in a randomly selected, nearly nationally representative sample of 60 villages in 6 provinces of rural China. The provinces are Hebei, Liaoning, Shaanxi, Zhejiang, Hubei and Sichuan. To ensure broad coverage within each province, one county was randomly selected from within each income quintile for the province, as measured by the gross value of industrial output. Two villages were randomly selected within each county. The survey teams used village rosters and a census of households not included in the village's list of households to randomly choose the twenty households, both households with their residency permits (*hukou*) in the village and those without. The household survey gathered detailed information on the demographics, wealth, agricultural production, non-farm activities, and investment over time. A total of 1199 households were surveyed.

Several sections of the household survey were designed to collect comprehensive information about investments. All of the households in the sample were asked a set of questions about investments they may have made over the past ten to twenty years. Investments were classified as either productive or consumptive, categories we define in more detail in the next section. Since we have data on all of the household's investments and purchases of durables made since 1995, we create a variable that measures total investment since 1995, which we call *cumulative* investment.

Another section of the survey focuses on the current and past migration experiences of household members and children of the household head. Enumerators questioned all household members about their participation in off-farm work, the location of their employment (local or not), their wages, and if identified as a migrant, any remittances sent back to the household by migrants in 2000.[1]

[1]For the survey year itself, 2000, migrants were identified as follows. All household members were first divided

In addition, enumerators completed a twenty-year employment history form for each household member and each child of the household head in roughly half of the households in each village (610 out of 1199). We further drop any households from our sample that were formed in the last five years, leaving us with 585 households. The households included in this part of the survey were randomly assigned. For each year between 1981 and 2000, the form gathered information on the main type of off-farm work performed (if any), the place of residence while working (at home or outside the village– i.e. local or migrant), the location of employment, whether or not the individual was self-employed, and the level of involvement in farming. We define migrants as any individual who had not formally left the household, worked off-farm, and lived outside of the household while working. We can then further identify *return migrants* as household members who had migrated in the past but subsequently returned to the household.[2]

2 Investment and Migration

2.1 Measuring Investments in Rural China

Regardless of the source of investment capital, households in rural China have been busy making investments during the 1990s. In this paper, we categorize their investments as either productive or consumptive investments. Productive investments can be characterized as investments in agricultural or non-agricultural activities that enhance the income-earning potential of the household.[3]

into two groups, those who lived outside the household three or more months and the children of the household head who had not formally left the household to set up their own (*fen jia*), but were not present for more than two months per year. Migrants were identified in the former group as people who held an off-farm job outside the village, and did not live at home while doing the job. In the latter group, migrants were identified as the children who left the household for employment, rather than to go to school or another reason not related to employment.

[2]When using these data, information on past migration and return migration activity, and any other time varying information, the paper will refer to the 585 households in the employment history sample that were not formed during the five years of the study period.

[3]We categorize productive investments as follows. Agricultural investments include improvements in agricultural land productivity, purchases of agricultural capital goods and commercial agricultural investments. Land-enhancing investments include land improvements meant to increase yields in grains and legumes. Agricultural capital goods include purchases of tractors, plows or bullocks used in agricultural production. Commercial agricultural investments include investments in orchards, fishponds, forests and others that lead to shifts in land use and allow farmers to produce higher-valued, specialty crops. All other enterprises in which households are engaged in running are considered non-farm businesses. In rural China such enterprises take on many forms, ranging from small village stores to relatively large manufacturing facilities. One difficulty when collecting data on household businesses is that some investments, such as houses, can be used for both consumptive and productive purposes. When households were found

Consumptive investments are investments that directly improve the quality of life for members of the household, by increasing the flow of services from their durable asset stock, rather than helping them raise their income through increased production. The investments included in this category are investments in housing and durable goods that cost more than 500 yuan. In the remainder of our paper, we mainly use the data we have on the amount invested by households since 1995.[4] We can then calculate *total* investment as the sum of productive and consumptive investment.

When we accumulate investments by households in the sample from 1995 to 2000, we find by 2000 a majority of households had invested in either productive or consumptive investments (Table 1, rows 4 and 8). As the share of households making productive and consumptive investments grows, so does the average and median size of investments (rows 1 and 3 for productive investments; rows 4 and 6 for consumptive). The average and median consumptive investment is much larger than the corresponding statistics for productive investments, indicating that households are largely choosing to making investments that improve their quality of life rather than attempt to increase future income streams. Since the value of consumptive investments is dominated by housing, this observation is consistent with a description of rural investment in the 1980s (Feder et al., 1992).[5]

By any measure, since 1995 *total* investment (the sum of productive and consumptive investment) has been pervasive and growing (Table 1; rows 9-12). Given investment has occurred, the median household in 2000 has invested about 8800 yuan over the past five years (column 6, row 11). If we assume that the income per capita of the median household with four members is 2000 yuan and constant (CNSB, 2000), the household would have had an investment rate of

to have a household business and made an investment in housing, enumerators asked asked households to estimate the share of the housing investment that would be used for production, and accounted for it in the non-farm business portion of survey.

[4]All nominal values in this paper have been normalized by the rural CPI to their value in 2000 (CNSB, 2000). The official exchange rate in 2000 was approximately 8.27 yuan to the dollar. Although we have data on some categories of investment over longer periods of time, we choose to aggregate investments since 1995 for two reasons. First, we believe when households are recalling their household's migration, other employment and investment histories, they make few mistakes when a five-year recall period is used. Second, over a shorter time horizon it is less necessary to deal with the complications of depreciation. Third, the data set includes other information about the household that varies since 1995 or 1996, so we can create a retrospective panel on migration activity, investment, and other economic and demographic aspects of the household.

[5]Of housing investments, 77 percent have been new houses; the other 23 percent are additions or renovations. Only renovations involving over 3000 yuan were enumerated.

roughly 16%. Furthermore, our data show that most rural households in China (83 percent) have undertaken some sort of investment. Hence, the rapid increase in assets for most households is consistent with the observed increasing standard of living in rural areas over the late 1990s.[6]

2.2 Investment Differences by Wealth Levels

While most households made investments during the 1990s, investments also differ significantly by village, particularly when we rank them by income or wealth levels (Table 2). To categorize villages by wealth level, we calculated the median income per capita in 2000 for each village. When the median was below twice China's official poverty line (1528 yuan per capita), we desginated the village as *poor*, and designated all other villages as *non-poor*.[7] We find that conditional on investment occurring, in non-poor villages average consumptive and productive investment levels are significantly higher than investment levels in poor villages (columns 1 and 2). The average consumptive investment is nearly twice as high in non-poor villages as in poor villages, and the average productive investment is more than three times as high. As a result, total investment levels are roughly two and a half times higher in non-poor villages as in poor villages (rows 2 and 3, column 3).

As discussed previously, these findings are not so surprising since relatively rich areas have more capital resources available to them. There are several reasons to believe that households in relatively rich villages have both more access to credit and more opportunities for investment. In some richer areas rural banks have been willing to make loans, providing households with opportunities for investment (Park et al., 2003). Even if banks are unwilling or unable to provide credit, in many areas households are able to borrow from informal credit sources, such as moneylenders or other informal financial intermediaries (Findlay, Watson, and Cheng, 2003). Households in richer areas are also more likely to be wealthy enough to invest primarily using their own funds.

Formal sources of credit are largely unavailable to meet the increasing demand for credit

[6]The CNSB (2000) estimates that per capita incomes were increasing roughly 5 percent on average.

[7]Both the descriptive statistics in Table 2 and the econometric results in this paper are robust to changes in the definition of poor areas or villages. For example, the results are robust to using the mean per capita income rather than the median, as well as the higher poverty line suggested by Ravallion and Chen (2004). The results are also robust to the removal of the two villages in *Yiwu* county, which are much richer than other villages in the sample.

in relatively poor areas of rural China. Poor households are also by definition less likely to self-finance investment. As in richer areas, when formal lending institutions do not exist, there are pressures to create informal lending institutions to alleviate constraints on investment (e.g. Aleem, 1990). In many parts of China households often obtain zero interest loans from relatives and close friends (Park and Wang, 1999). While such loans are common, they are almost exclusively made to meet needs created by unexpected shocks and are rarely used to finance investments. In some areas microcredit schemes have appeared and offer farmers a new source of investment credit, but these programs are not very widespread (e.g. Park and Ren, 2001). In poorer areas where formal sources of credit are absent, migration has been discussed as a potential source of capital for households in rural China (Rozelle et al., 1999; Murphy, 1999; Bai, 2001; Zhao, 2002).

Data from our sample demonstrate that in 2000 credit markets were still relatively underdeveloped, particularly in poor villages. Households in poor areas both had trouble accessing funds from credit markets, and when they received loans, the amounts were relatively small. Only 10 percent of households were able to borrow from formal sources. Moreover, the average amount borrowed in poor areas was less than half the average amount borrowed from banks in richer areas. The average size of loans for investments from informal sources, mostly relatives and friends, was also significantly higher in relatively rich areas.

Because households in non-poor and poor villages are likely to have different levels of access to funds, one might expect that households in areas with different wealth levels have different propensities to turn to alternative finance mechanisms. Therefore, in our subsequent analyses we will analyze the effects of migration on investment taking into account the wealth level of the village in which the household resides. In addition, the division of the sample into non-poor and poor areas might be useful when examining the types of investments. For example, it might be less likely for households to turn to migration to finance productive investments in poor areas, because the expected returns to such investments might be lower than returns in other villages.

2.3 Investment by Migrant Households

China is presently undergoing the largest movement of labor in world history. From less than four percent of the rural labor force in the early 1980s, our employment history data indicate that by 1995 about 10 percent of the rural labor force worked as migrants. By 2000 almost 20 percent of the rural workforce worked as migrants (Table 3, columns 1 and 2). The share of the workforce entering migration in rich areas is traditionally slightly higher than in poor areas (columns 3-6). Our data further show that as migration has grown rapidly in recent years, the movement of labor back to the village also has accelerated. In our sample, the average migrant returns to the village after approximately five years. In recent years, however, there is a perception among social scientists that migration is becoming more permanent for some households (CCICED, 2004). In sum, by the late 1990s migration and return migration is occurring with similar frequencies in both the non-poor and poor villages in our sample.

From the household's perspective, migration could affect investment either while the migrant is away or after the migrant returns. While there may be differences in the ways that migrants and return migrants affect investment, we do not try to explain the differences. In discussing our hypotheses in the next section, we focus on the way that migration, in general, affects investment. In doing so, we implicitly assume that the process of sending out migrants and their decision to return to the source community are parts of a single process and our hypotheses do not distinguish between the two phases of migration. In the descriptive work in this section and in the econometric analysis in section 4 we specify two variables, the number of household members in the migrant work force during each sample year (*number of migrants*) and the *number of return migrants*.

When we examine the cross-tabulations between migration and investment among all households, we find some evidence of a relationship (Table 4, column 1). Return migrant households consistently have higher investment levels than non-migrant households (column 1; rows 1 and 3). The average return migrant household has invested 39800 yuan, which is both higher and statistically different than that for non-migrant households, 22200 yuan. While this might seem to mean that migration could be leading to greater investments, there is no statistical difference between migrant households (row 2) and non-migrant households (row 3). Therefore, this evidence of a

relationship between migration and investment is not yet convincing.

When we divide the sample into poor and non-poor villages, we find that the relationship between migration and investment seems to be stronger in non-poor villages than in poor ones (Table 4, column 1). In poor villages, we find that return migrant households and non-migrant households have similar investment levels, and migrant households have significantly lower investment levels (rows 4 to 6). In non-poor villages, however, the descriptive data show that return migrant households and migrant households have higher total investment levels than non-migrant households. Hence, the point estimates seem to imply that if there is a relationship between migration and investment it is in non-poor areas. Caution should be exercised in interpreting these results, however, since whereas the difference between return migrant and non-migrant total investments is statistically significant, the difference between migrant and non-migrant households is not.

The division of investment into its components–consumptive and productive investments–shows that the total investment trends are being driven by consumptive investment (Table 4, columns 2 and 3). According to our data, among all households (column 2, rows 1 to 3) and among households in non-poor villages (column 2, rows 7 to 9), return migrant and migrant households have higher average consumptive investment levels than non-migrant households. In poor villages (column 2, rows 4 to 6), however, there is less difference between return migrant and non-migrant households and no difference between migrant and non-migrant ones. In fact, migrant households have the lowest average consumptive investment levels. In non-poor villages, the situation is similar to that for total investment; return migrant and migrant households both have higher levels of consumptive investment than poor ones. In contrast, for productive investment there is no consistent pattern across poor and non-poor villages (column 3, rows 1 to 9).

From the descriptive findings, it would appear that our data show a positive correlation between migration and investments, and least among some households. The positive relationship suggests that at least some households may be sending migrants out to finance investments. Cross-tabulation analysis shows a somewhat stronger relationship between migration and investment in non-poor villages. At first glance, this finding suggests that capital constraints are not the only factor inducing households to send out migrants, since households in non-poor villages are less

likely to be capital constrained than households in poor villages. Instead, it may be that returns to capital are higher in non-poor villages. However, the lack of a strong relationship between migration and productive investment contradicts the idea that higher expected returns to productive investment induce households to send out migrants in order to finance investments. Instead, the lack of a relationship between migration and productive investments in non-poor villages may mean that households believe that they will reap higher returns from consumptive investment. In poor villages, the absence of a clear relationship between migration and any type of investment is consistent with the idea that households in these areas are primarily using remittances received from migrants to supplement current consumption.

However, the descriptive analysis has several drawbacks. The standard errors of the point estimates are large for most categories. Furthermore, the averages are positively skewed by large investments made by a few households.[8] Most importantly, there are almost certainly a number of other factors that covary with migration and investment and might obscure the relationship.

3 Testable Hypotheses

Although the descriptive analysis and observations from the literature indicate that investment levels in rural China are generally higher in return migrant and migrant households, they cannot be used to make definitive statements about how migration affects household investment behavior. The relationship between migration and investment by households may be complex. Although households ultimately may achieve higher income from remittances or from migration-financed investments, they face tradeoffs when deciding whether or not to include migration in the household development strategy. Migration, by definition, means that the household has less labor available for local production, at least until the migrant returns. It also is possible that despite some of the correlations that we observe in the descriptive data, migration *per se* has little or no effect on investment. For example, it may be that migrant households were originally wealthier or inherently more capable, and therefore they are able to invest more. It also could be that migrant

[8] However, when we constructed Table 4 with medians rather than means, we found a similar pattern of differences between migrant and non-migrant households.

households are at different points in their life cycles than non-migrant households and are in better positions to finance investments. If we hold constant these other factors, the relationships found in the descriptive statistics may disappear.

The literature on migration and our descriptive data suggest that there are several testable hypotheses about the relationship between migration and investment. We test three such hypotheses in the next section. Because credit markets are not well developed in rural China and relatively poor households lack an inherent ability to self-finance, households that want to invest may turn to alternative means to generate the capital for investment. Migration is one such activity. Following these observations, our *first testable hypothesis* is: Households in rural China engage in migration in order to increase household investment. It should be noted, however, that if we do not find a correlation between migration and total investment, it does not necessarily mean that migration is irrational from the household perspective. Rather, households also may be sending out migrants to generate remittances in order to increase its current consumption.

In addition, it could also be that all households may not be the same in terms of their investment behavior. If households in non-poor villages are better able to self-finance investments or have better credit availability, they may not need to use migration to finance investment. Hence, households in non-poor villages may have to rely less on substitutes like migration to finance investments, since they live in areas that begun to develop better functioning credit markets. In contrast, in poor villages credit markets may be poorly developed and households less able to self-finance investments. Based on these considerations, our *second testable hypothesis* is: The relationship between migration and investment is stronger in poor villages than non-poor villages due to differences in underlying economic conditions.

While we can test the second hypothesis by examining the effect of migration on total investment in poor and non-poor areas, there are several factors that may complicate the analysis. For example, although it is more likely that households in non-poor villages face less binding credit constraints than households in poor villages, it does not follow that all households in non-poor areas have access to credit. According to Findlay et al. (2003), even households in relatively rich areas are affected by underdeveloped credit markets. Moreover, even when a formal finan-

cial sector exists, there is a lack of competition (CCICED, 2004). Therefore we might observe a link between migration and investment in both poor and non-poor villages. Moreover, because preferences for current consumption relative to future consumption may differ between poor and non-poor villages, households in poor villages might use migration to supplement current consumption, while households in non-poor villages prefer future consumption, and send out migrants to increase investments. If so, the relationship between migration and investment will be strongest for households in non-poor villages.

Beyond affecting the investment decision, we may find differences in the effect of migration on the type of investment. Beyond affecting the decision to invest or not, the wealth of an area also may affect the *type* of investment, whether financed through migration or not. If households face constraints on their investments and choose to only make one type of investment (productive or consumptive), the decision will depend on the relative marginal utility of each investment. Following this logic, our *third testable hypothesis* is: If villages have high returns to capital and lack complete financial markets, there will be a relationship between migration and productive investment. When considering the effect of migration on investment in poor and non-poor villages, we expect the rates of return to be higher in non-poor villages. Therefore, *ceteris paribus* we expect migration to facilitate productive investment in richer areas. If we do not find a relationship between migration and productive investment, it does not necessarily mean that returns to productive investment are low in general. Rather, it would simply mean that the returns to consumptive investment are higher.

4 Empirical Strategy and Results

To examine the three hypotheses, we specify an empirical model to estimate the effect of migration on investment:

$$W_{ht} = \alpha_h + \rho W_{h,t-1} + \beta_M M_{h,t-1} + \beta_R R_{h,t-1} + \beta_Z Z_{ht} + \varepsilon_{ht} \quad (1)$$

The dependent variable is cumulative total investment in the current period t, W_{ht}. We seek to measure the effect of migration on investment by including two household variables, one that

measures the number of migrants in the migrant labor force ($M_{h,t-1}$) and the other that is the number of returned migrants in the household workforce ($R_{h,t-1}$).[9] In order to account for the differential timing between migration and investment, in the basic model we lag the migration variables by one year.[10]

In explaining household cumulative investment in year t, we include several other control variables in equation (1).[11] First, we include a lagged dependent variable, $W_{h,t-1}$, to hold constant the effects of previous investments by households. We further control for a vector of other time varying variables, Z_{ht}. In most of our empirical specifications, Z_{ht} includes the demographic composition of the household workforce, the household land endowment, the experience level of the household head, and its square.[12] Finally, when a household considers financing investment by sending out migrants or bringing back return migrants, the decision may be affected by a number of observable or unobservable factors at the household level and above. For example, the household's income earning ability is only somewhat observable (e.g., through proxies such as education); although other dimensions of the household income earning ability cannot be measured, it certainly affects the households investment decisions. In order to account for all unobservable, supra-household effects that do not vary over time, in all of our specifications we either include a household dummy variable, α_h, or difference away any household specific effects.

Unfortunately, estimating equation (1) using a standard fixed effects estimator causes the estimate of ρ to be inconsistent with an asymptotic bias of the order $1/T$, since the model includes the lagged dependent variable on the right hand side (Hsiao, 2003).[13] When the estimate $\hat{\rho}$ is

[9] We also try defining our dependent variable as the total investment amount over the asset level in 1995. Our results were qualitatively similar using that definition.

[10] To test the robustness of our results to the length of the lag in the basic model, we performed sensitivity analysis, using zero, two and three lags. Our main results are robust to the inclusion of the contemporaneous variables and further lags.

[11] Descriptive statistics for all explanatory variables in the model can be found in Appendix Table 1.

[12] The land endowment is defined as the land allocated to the household by the village. It is measured in *mu*. One *mu* is equivalent to about $\frac{1}{15}$ of a hectare. The household workforce is decomposed into six variables: the number of men and women between 16 and 35, the number of men and women between 36 and 60, and men and women over 60. We define the experience level as the number of years since the household head finished his or her schooling. If the head of a household is illiterate, we use the head's age less six years, which corresponds with Mincer's (1974) definition.

[13] Because we are using recall data, we face one further difficulty. Households may recall information about past off-farm activity and past labor market activity with error. If the error is systematic, it could be correlated with migration or investment behavior, potentially biasing our results. If the error is measurement error, our coefficient estimates would

inconsistent, the estimated coefficients on the migration variables $\hat{\beta}$ are inconsistent as well, since they help determine the previous period's investment. To correct for this dynamic endogeneity, we use several methods. First, we instrument the lagged investment level, $W_{h,t-1}$, with a second lag of the variable, $W_{h,t-2}$, which we will call the *naïve IV* estimator. While this approach should help reduce the bias in the coefficients of interest, it has the drawback that the instrument, $W_{h,t-2}$ may still be correlated with the contemporaneous error term, ε_{ht}.

To attempt to solve the remaining endogeneity problem, we employ the Anderson-Hsiao (1981) technique of differencing equation (1) and instrumenting the differenced lagged investment with the second lag of investment:

$$\begin{aligned} W_{ht} - W_{h,t-1} &= \rho(W_{h,t-1} - W_{h,t-2}) + \beta_M(M_{h,t-1} - M_{h,t-2}) + \\ &\quad \beta_R(R_{h,t-1} - R_{h,t-2}) + \beta_Z(Z_{ht} - Z_{h,t-1}) + (\varepsilon_{ht} - \varepsilon_{h,t-1}) \end{aligned} \tag{2}$$

To estimate equation (2), we use two stage least squares and $W_{h,t-2}$ as an instrument, since it will be uncorrelated with $\varepsilon_{ht} - \varepsilon_{h,t-1}$ (Anderson and Hsiao, 1981).[14] We refer to this model as the *Anderson-Hsiao* estimator. Although this procedure leads to a theoretically consistent estimate of ρ, Monte Carlo simulations have shown it is inefficient when compared with other estimators for similar specifications (Kiviet, 1995).

Since the naïve IV estimator does not necessarily give unbiased estimates and the Anderson-Hsiao estimator is inefficient, we also use two more efficient, Generalized Method of Moments (GMM) estimators, developed in Arellano and Bond (1991) and Blundell and Bond (1998). The *Arellano-Bond or A-B* estimator is similar to the Anderson-Hsiao estimator in that it differences the data to remove household level unobservables. However, the A-B estimator treats the different time periods as a system of equations, using all possible lags of levels as instruments. So instead of using $W_{h,t-2}$ as an instrument for $W_{h,t-1}$ (as in the naïve IV estimator), the A-B estimator uses all

be attenuated and therefore could be taken as lower bounds. In the field, we attempted to limit any bias associated with recall as much as possible. We pre-tested our questionnaire extensively and carefully trained enumerators to obtain the recall information. In our analysis we primarily use data from the past 5 years, which should mean the recall bias is minimal

[14] When estimating equation (2), we drop the Z variables due to a lack of variability.

available instruments. The instruments used vary by time period; for example, for the last period ($t = 6$), the levels of wealth for $t = 1, 2, 3,$ and 4 are used as instruments.

The final estimator, the *Blundell-Bond or B-B* estimator extends the Arellano-Bond estimator by including equations for levels as well as differences, and using differences as instruments for the levels equations. Simulations have shown that the B-B estimator is more efficient than the A-B estimator (Hsiao, 2003), and provides a better estimate of ρ when ρ is close to 1.[15] If ρ is not close to 1, its large instrument set may cause the procedure to suffer from the weak instrument problem (e.g. Bound, Jaeger, and Baker, 1995). Therefore during estimation, we pay close attention to our estimates of ρ across estimators.

To test the three hypotheses about the effect of migration on investment, we estimate equations (1) and (2) using different definitions of investment and different subsamples of the data set. To test the first hypothesis, we use both total ans consumptive investment as the investment variable and use the whole sample in estimation. To test the second hypothesis, we divide the sample into households in poor and non-poor villages, and use the total investment variable. To test the third hypothesis, we continue to use the subsamples and replace total investment with consumptive and productive investments.

4.1 Results

We estimate equations (1) and (2) with a standard fixed effects estimator and all four estimation approaches described above. We do so to observe whether or not the estimated coefficients on the migration variables are robust to the estimation technique. If the coefficients are robust across estimation approaches, it will help confirm whether or not a relationship exists. When possible, we include tests for the presence of further autocorrelation or overidentification. If we find differences among the estimated coefficients of interest, we will use the B-B estimator since it uses the largest set of instruments for lagged investment. After selecting the best estimator, we test the first hypothesis by examining the effect of migration on investment for the whole sample, the second by examining the effect of migration on total investment in poor and non-poor villages, and the

[15] In this paper, we use the one-step versions of the A-B and B-B estimators. We report robust standard errors in our results.

third by exmaining the effect of migration on productive and consumptive investments in poor and non-poor villages, respectively.

Our descriptive results indicate that migration is more likely to affect consumptive than productive investment, so we use the equation that explains the effect of migration on consumptive investment (Table 5).[16] We also begin with the equation that explains consumptive investment since it helps us most clearly illustrate the reasoning behind our choice of estimators. Based on these considerations, we first proceed by estimating equation (1) using a standard fixed effects estimator (column 1) and the naïve IV estimator (column 2). As expected, the naïve IV estimator shows a higher coefficient on the lagged investment variable (0.78) than the standard fixed effects model (0.55); the presence of dynamic endogeneity is expected to bias the coefficient if it is not controlled for. Since the coefficient on the lagged dependent variable is biases in the standard IV estimator, we should expect that the coefficients on the investment variables also are. The t-ratio on the lagged dependent variable are both relatively high. In contrast, the Anderson-Hsiao estimator generates coefficients on the lagged dependent variable that have relatively low t-ratios (column 3). This finding was expected, as it is known to be inefficient.

As discussed in the previous section, we also use the relatively efficient GMM estimators. Like the results from the naïve IV and Anderson-Hsiao estimators, the A-B (column 4) and the B-B estimator (column 5) produce coefficient estimates on the lagged investment variable that are significantly different from zero. We believe these estimates are more reliable than the previous estimates, because they use expanded sets of more arguably exogenous instruments to estimate the coefficient on the lagged investment variable. When we use the two GMM estimators, we can test whether autocorrelation remains present in the residuals. In both cases, we cannot reject the null hypothesis that the error terms are not generated by an AR(2) process.[17] Therefore, it is likely that

[16] We also use the total investment variable for all four estimation approaches (Appendix Table 2). We find that there is little evidence of a relationship between migration and total investment; the only estimated coefficient of migration that is statistically significant is the Arellano-Bond estimate (column 4). However, all of the coefficient estimates are positive; given our results in Table 5, it is likely that the lack of a relationship between migration and productive investment causes the estimates to be statistically insignificant, rather than the lack of a relationship between migration and investment in general.

[17] Arellano and Bond (1991) show that error terms that are generated by an AR(1) process do not cause inconsistent parameter estimates or standard errors. Therefore, the relevant test is for an AR(2) process, because error terms generated by AR(2) would cause inconsistent parameter estimates.

any autocorrelation is controlled for through the inclusion of the instrumented lagged investment level. Moreover, when we use B-B estimator we can test for overidentification, since we use both levels and differences as instruments. When doing so, we cannot reject the null hypothesis of no overidentification. Based on these sets of observations and statistical tests, we prefer the Blundell-Bond approach, and use it as a benchmark.

Across estimation strategies, most of the coefficients on the control variables are statistically insignificant (Table 5). This finding is not surprising. Since the estimation approaches all use within household variation to estimate coefficients, the lack of variation within households for most of the variables over time means that the large standard errors on these coefficients is unsurprising. The experience of head variable, which changes every year, is statistically significant across all specifications when we only include the linear term (not reported here), but is not when we include both the experience and experience squared.

When comparing the results from different estimation approaches, we find that sending out an additional migrant has a positive, statistically significant effect on the next period's investment. Specifically, we find that when the household sends out an additional migrant, consumptive investment in the following period rises by between 1199 and 2619 yuan.[18] We find the coefficient estimate is significantly different than zero at the 10 percent level across all specifications. However, we do find that when we use the most complete set of instruments with the B-B estimator, we find that the estimate with the smallest magnitude, 1199 yuan. Such results may indicate that using an incomplete set of instruments may lead to upward bias in the coefficient estimate. Since the estimate for ρ is statistically no different than 1 when using the B-B estimator, we prefer it to the other strategies and continue to use it in the paper.

We find little evidence that return migration has any effect on consumptive investment. Al-

[18]We are still somewhat concerned that the current migration variable is biased due to endogeneity. even though we have differenced within household effects out of the model, there could be some variable at the household level that varies over time and causes an upward bias in our estimated coefficient for the migration variable. To address this concern, we constructed a village migration network variable to instrument the migration variable in our model (as suggested by Taylor and Martin, 2001). The variable was defined as the percentage of the village workforce that were migrating five years previous, as constructed from the *other* households in the village with data available. Whereas the coefficient in the instrumented regression done with the B-B estimator was not statistically significant for the entire sample, the point estimate was larger, and the coefficient was significant at the 10 percent level for the non-poor subsample.

though the estimated coefficients on return migration are all positive, the only evidence of statistical significance comes when using the A-B estimator, and it is only significant at the 10 percent level. While our analysis does not allow us to identify precisely the exact reason for the absence of a relationship, there are several plausible explanations. It could be that return migration is too rare to exhibit a relationship averaged over the entire sample; only 17 percent of the households in the sample include a returned migrant. It could be that remittances from their migration have already been used for investment prior to their return. Alternatively, migrants may not return to necessarily invest; they may have failed to find steady work, or they may have come back to care for a sick parent or relative. If any of these explanations are true, it is not surprising that the coefficient is not statistically different than zero.

4.2 Testing the Hypotheses

Taken as a whole, the analysis of the effect of migration on consumptive investment shows that migration has an effect on consumptive investment while the migrant is away, but not necessarily once they have returned. Hence, when assessing our first hypothesis, we believe there is a relationship between between migration and consumptive investment. When households send out migrants, they use remittances perhaps as a substitute for credit, and invest in housing or other durable goods. The savings brought back by return migrants, on the other hand, may not be invested but used but to do variety of other things.

When we divide our sample into households in non-poor and poor villages, our findings allow us to pass judgement on the second and third hypotheses (Table 6). Specifically, we find that neither the number of migrants nor return migration has a statistically significant effect on consumptive or productive investment in poor villages (column 2). The t-ratios on all of the coefficients are quite low and some of the signs are actually negative. As a result, we can immediately draw a conclusion about our second hypothesis: the relationship between migration and investment differs by underlying village economic conditions. While the result is robust to the estimation approach, the exact reason for the finding is not clear. It could be that households in poor villages do not have access to local investments that are of sufficiently high rates of return that they would invest

remittances, which might be their most liquid form of capital. Alternatively, it could be that even if there were investments with high returns, migrants use remittances from migrants mainly to increase current consumption.

In contrast, we find that when we use the sample of non-poor villages, we find that migrants have a positive effect on both consumptive and total investment that is significant at the 10 percent level or above in both cases (column 1). If a household in a non-poor village sends out an additional migrant, our estimated coefficients indicate that the household experiences a 1641 yuan increase in consumptive investment and a 1623 yuan increase in total investment. In non-poor villages, it appears that households find migration useful to increase investment, which may imply that households cannot borrow enough funds for investment using credit markets.

When we use the sample of non-poor villages, we find that migrants have a strong, statistically significant effect on consumptive investment and total investment (column 1). If a household in a non-poor village sends out an additional migrant, our estimated coefficients indicate that the household experiences a 1641 yuan increase in consumptive investment and a 1623 yuan increase in total investment. However, neither migrants nor return migrants have a statistically significant effect on productive investments in non-poor villages. This finding casts doubt on our third hypothesis, since migrant households seem not to invest in productive investments. There are several possible explanations for this finding. It could be that there are simply not enough good projects in these villages. Alternatively, it could be that these households consider the returns to consumptive investments higher than the expected returns to productive investment. Finally, it could be that households in in non-poor villages access to alternative sources of capital, makingmigration becomes a relatively expensive way to finance productive investments. Since the positive relationship between migration and consumptive investment suggests a lack of credit for such investments, a plausible explanation is that capital is more available through formal sources for productive investments than consumptive ones. This interpretation would be consistent with Park et al. (2003) who find that access to credit in China is relatively better for productive investments.

Considered as a whole, we find that migration seems to lead to consumptive investments in non-poor villages, but not poor ones. A plausible explanation for these findings is that migration

primarily finances current consumption in poor areas and in richer areas, where consumption levels are already relatively high, migration is used for consumptive investments. Households may be relying on other sources of financing to finance productive investments. Since these sources are not available when they want to make consumptive investments, they turn to migration.

Although our results are not surprising when compared to our descriptive statistics, they are not entirely consistent with other authors who have studied and commented on the relationship between migration and investment in rural China. We believe that the difference largely results from our ability, through the use of our data set, to control for more unobserved heterogeneity than other authors have. For example, Bai (2001) and Murphy (1999) relied on descriptive analyses to posit a link between migration and productive investment; they do not control for any of the other differences across households. Using a multivariate analysis, Zhao (2002) found that return migration has a significant effect on several types of productive investments. Although it is plausible that migration leads to increased productive investment, it also is possible that her result would have changed had she had information on the households over time. Unfortunately, Zhao only had cross-sectional data and was not able to control for unobserved heterogeneity at the household level. When we run a cross-sectional regression explaining cumulative productive investment in 2000 with the same control variables as in our model above, the return migration variable also has a coefficient of 5700 yuan and a t-ratio of 4.97. However, as shown in Table 6, this relationship disappears when controlling for unobservable effects across households. Therefore, we believe that our results highlight the importance of controlling for unobserved heterogeneity in analyzing migration behavior.

Although we do not want to place too much stock in the magnitude of our coefficient estimates, they do imply that the size of the effect on consumptive investment in non-poor areas is quite important. In gauging the size of the effects of migration on consumptive investment in non-poor villages, we believe that they are quantitatively important. At the median consumptive investment level in 2000 for the sample (7890 yuan), an additional migrant increases consumptive investment by around 20 percent.

5 Conclusions

In this paper, we set out to understand how migration might affect investment using a data set that covers much of rural China. Our first objective was to describe how investment differs by household migration status and location. In our descriptive statistics, we find that investment is rising, on average, at healthy rates throughout rural China. We also find that migrant and return migrant households have had higher investment levels between 1995 and 2000 than non-migrant households. However, rural households appear to prefer to invest in consumptive investments rather than productive ones, particularly in poorer areas.

The rest of the paper focused on understanding and testing for linkages between migration and investment. We developed a set of hypotheses positing a relationship between migration and investment and describing the way that the relationship between migration and investment might differ between poor and non-poor villages. The hypotheses covered the suggestion that the relationship could be stronger for households in poor areas, where there are fewer sources of formal credit, or in relatively rich areas, where there are better projects with higher rates of return.

We test the hypotheses with a series of estimators that account for heterogeneity among households using dummy variables as well as dynamic endogeneity, we find that an additional out migrant leads to an increase in consumptive investment of about 1200 yuan across all households. We find no relationship between migration and any type of investment in poor areas. We also find that migration has a stronger effect on consumptive investment in non-poor villages, where an additional migrant leads to an increase in consumptive investment of 1600 yuan. If households in China generally lack access to credit, households in non-poor villages are able to break the credit constraint through migration, which provides them with capital to invest. In poorer areas, people either do not observe investment opportunities, or they simply consume remittances sent home by migrants.

The results in this paper have strong implications for China's regulations that hinder population movement, especially the movement of migrants out of poor areas. Our paper provides evidence that households participating in migration are better able to invest in housing and consumer durables, and that the effects of migration are strongest in places that cannot be considered

well-off. Therefore, constraints that are placed on movement from rural areas may hinder household investment and decrease rural welfare.

Our findings also may provide backing for proposals that seek to expand the provision of credit in China. If households send out migrants primarily to gain access to investment funds, as we find in non-poor villages, it could be that providing them with credit would stem some of the flow of migrants out of rural areas. It could be that the social cost to providing such credit would be lower than the costs currently created through migration. Unfortunately, we are not able to quantify the costs that some households may have incurred when they sent out migrants to finance their investment. If we could measure these costs, it is possible or even likely that they would outweigh the costs associated with borrowing from a local financial institutions. Therefore, a more developed financial system could increase efficiency in rural economies.

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Table 1: Average Cumulative Household Investment, by Type and Year

	1995	1996	1997	1998	1999	2000
Productive Investment						
Mean	3627	6194	6627	7973	9222	11920
	(7360)	(26205)	(24980)	(26410)	(27520)	(40510)
Median	928	980	1590	1990	2580	3206
Percent Investing	18.7	28.5	35.9	45.2	52.1	61.5
Consumptive Investment						
Mean	16770	17690	17510	18830	20670	22600
	(47900)	(43410)	(39680)	(41570)	(46350)	(47580)
Median	3341	3700	4531	5132	6347	7893
Percent Investing	19.3	33.4	42.9	51.8	60	64.2
Total Investment						
Mean	12230	15560	16770	19480	22970	27420
	(38340)	(45310)	(45240)	(53470)	(61060)	(72720)
Median	2180	2820	4190	5130	7100	8800
Percent Investing	32.1	49.3	59.0	69.0	77.2	83.0

Notes: This table *only* includes households for which the migration history is available. All figures in year 2000 yuan. Figures in parentheses are standard deviations. Means are conditional on investment taking place, and exclude any agricultural assets or durables purchased for less than 500 yuan.
Source: Authors' survey.

Table 2: Average Cumulative Total Investment, by Type of County

Type of County	Total Investment	Consumptive Investment	Productive Investment
Non-Poor Villages	32090	24440	13750
	(82710)	(52000)	(46170)
Poor Villages	11930	13350	5880
	(30730)	(21990)	(18130)

Notes: Standard deviations in parentheses. All measures are the cumulative investment between 1995 and 2000, and are conditional on investment occurring.
Source: Authors' survey.

Table 3: Percent of Workforce that are Migrants or Return Migrants, by Rich and Poor Areas, 1995 and 2000

	All Households		Households in Non-Poor Areas		Households in Poor Areas	
	1995	2000	1995	2000	1995	2000
Migrants	9.2%	16.9%	10.0%	16.6%	7.2%	17.7%
	(0.19)	(0.23)	(0.20)	(0.23)	(0.17)	(0.22)
Return	5.0%	8.1%	5.3%	8.6%	4.1%	6.9%
Migrants	(0.15)	(0.18)	(0.16)	(0.19)	(0.14)	(0.17)

Notes: Calculations are based on all surveyed individuals that were members of the household and working in 1995 or 2000, respectively.

Source: Authors' survey.

Table 4: Investment Levels in Households, by Migration Status and by Non-Poor and Poor Areas, 2000

Category	Total Investment	Consumptive Investment	Productive Investment
All Households			
Return Migrant Households	39780.68	23557.79	16222.89
	(104055.2)	(64528.27)	(50297.81)
Migrant Households	19403.27	13759.13	5644.14
	(34839.96)	(29445.67)	(9118.14)
Non-Migrant Households	22189.3	10539.81	11649.49
	(72444.64)	(29445.67)	(46194.58)
Households in Poor Villages			
Return Migrant Households	13863.38	8108.74	5754.64
	(18450.55)	(12393.17)	(8568.33)
Migrant Households	5244.33	3162.57	2081.75
	(8449.39)	(9512.78)	(3790.05)
Non-Migrant Households	13125.96	6167.98	6957.98
	(40296.29)	(20345.68)	(23876.68)
Households in Non-Poor Villages			
Return Migrant Households	47386.85	28091.75	19295.09
	(73801.00)	(72552.45)	(56722.65)
Migrant Households	29848.03	17908.83	7039.19
	(39431.45)	(36350.48)	(10168.58)
Non-Migrant Households	25409.78	12093.25	13316.53
	(80691.94)	(31964.51)	(51814.18)

Notes: All figures are expressed in yuan and are unconditional means. The category "households with out migrants" does not include households that also have return migrants living in them. Standard deviations in parentheses. Poor villages are defined as villages with median incomes lower than twice the poverty line (1528 yuan per person per year).

Table 5: Effects of Previous Migration and Return Migration on Change in Cumulative Consumptive Investment

	Estimator				
	Fixed Effects	Naïve IV	Anderson-Hsiao	Arellano-Bond	Blundell-Bond
	(1)	(2)	(3)	(4)	(5)
Lagged	0.55	0.78	1.27	0.47	1.03
Investment	(31.10)**	(12.43)**	(2.59)**	(28.41)**	(38.19)**
Previous Out and Return Migration (lagged one period)					
Number of	1964	2130	2619	2316	1199
Migrants	(2.59)**	(2.35)**	(1.88)*	(1.85)*	(2.01)**
Number of	2095	915	2693	3384	1297
Return Migrants	(1.45)	(0.51)	(1.01)	(1.85)*	(0.84)
Other Controls					
Land	-41.2	-27.4		-101	-46.6
Endowment (mu)	(0.16)	(0.09)		(0.63)	(1.46)
Men, aged	403	-191		-205	454
16-35	(0.44)	(0.17)		(0.35)	(1.41)
Women, aged	-1327	-1394		-935	-744
16-35	(1.67)*	(1.35)		(1.72)	(1.27)
Men, aged	284	-391		-289	432
36-59	(0.19)	(0.22)		(0.34)	(0.89)
Women, aged	-839	836		341	-54.3
36-59	(0.65)	(0.53)		(0.18)	(0.11)
Men, aged	-733	-1047		276	482
60 and over	(0.35)	(0.40)		(0.30)	(0.91)
Women, aged	-1178	305		114	-573
60 and over	(0.59)	(0.12)		(0.06)	(1.57)
Experience of	745	367			94.3
Head	(1.77)*	(0.60)			(1.25)
Experience,	1.40	1.97		-0.86	-1.96
Squared	(0.22)	(0.22)		(0.19)	(1.86)*
Regression Statistics (p-values)					
Arellano-Bond, AR(2)				0.338	0.354
Sargan Overidentification test				0.555	
Hansen Overidentification Test					0.350

Notes: *- indicates significance at the 10 percent level; **- indicates significance at the 5 percent level. Household fixed effects are included in each equation. Specification (1) does not instrument the lagged investment variable, and includes household fixed effects. Specification (2) instruments the lagged investment variable with the second lag, and uses household fixed effects. Specification (3) uses a differenced estimator with the second lag as an instrument, as suggested by Anderson and Hsiao (1981). Specification (4) uses the differenced GMM estimator (Arellano and Bond, 1991), and specification (5) uses both levels and differences in a system GMM estimator (Blundell and Bond, 1998). Both GMM estimators are one step. Sample size in specification (1) and (5) is 2925 and in all others is 2340.

Table 6: Effects of Previous Migration and Return Migration on Change in Cumulative Investment, by type of investment and by Non-Poor and Poor Villages

Investment Type	Households in Non-Poor Areas	Households in Poor Areas
Effect of Migrants on:		
Consumptive	1641	-67
Investment	(2.10)**	(0.30)
Productive	-39	-179
Investment	(0.07)	(0.83)
Total	1623	-374
Investment	(1.65)*	(1.11)
Effect of Return Migrants on:		
Consumptive	1586	255
Investment	(0.80)	(0.68)
Productive	222	-135
Investment	(0.32)	(0.47)
Total	244	176
Investment	(0.18)	(0.34)

Notes: **- indicates significance at the 5 percent level, and *- indicates significance at the 10 percent level. All estimates are made using a one step system GMM estimator (Blundell and Bond, 1998). Sample size is 2925; 2160 observations in non-poor areas and 765 observations in poor villages.

A Appendix Tables

Appendix Table 1: Descriptive Statistics for Selected Variables, 1995 and 2000

Variable	1995	2000
Migration	0.28	0.58
	(0.56)	(0.82)
Return Migration	0.12	0.23
	(0.35)	(0.48)
Land Endowment	6.71	6.51
	(6.54)	(6.20)
Household Workforce	2.63	2.78
	(1.05)	(1.18)
Experience of Head	26.43	31.43
	(12.60)	(12.60)

Notes: Standard errors in parentheses.
Source: Authors' survey.

Appendix Table 2: Effects of Previous Migration and Return Migration on Change in Total Investment

	Estimator				
	Fixed Effects	Naïve IV	Anderson-Hsiao	Arellano-Bond	Blundell-Bond
	(1)	(2)	(3)	(4)	(5)
Lagged	0.59	1.24	1.27	0.85	1.13
Investment	(33.91)**	(20.07)**	(2.59)**	(4.53)**	(21.20)**
Previous Out and Return Migration (lagged one period)					
Number of	1717	1644	2619	2773	894
Migrants	(1.44)	(1.05)	(1.88)*	(1.99)*	(1.26)
Number of	190	−1598	2693	523	399
Return Migrants	(0.08)	(0.51)	(1.01)	(0.26)	(0.33)
Other Controls					
Land	68.4	157		−18.9	−71.3
Endowment (mu)	(0.17)	(0.28)		(0.09)	(1.63)
Men, aged	217	−595		−281	631
16-35	(0.15)	(0.30)		(0.31)	(1.67)*
Women, aged	−707	−2245		−722	−427
16-35	(0.56)	(1.25)		(0.25)	(0.46)
Men, aged	492	579		−354	420
36-59	(0.21)	(0.19)		(0.25)	(0.59)
Women, aged	27	1345		2516	535
36-59	(0.01)	(0.49)		(0.83)	(0.81)
Men, aged	−1528	−345		−81.1	381
60 and over	(0.46)	(0.08)		(0.04)	(0.62)
Women, aged	−885	−665		300	−978
60 and over	(0.28)	(0.16)		(0.10)	(2.06)**
Experience of	1234	−673			20.5
Head	(1.85)*	(0.31)			(0.23)
Experience,	6.64	4.73		10.9	−0.84
Squared	(0.67)	(0.31)		(0.79)	(0.66)
Regression Statistics (p-values)					
Arellano-Bond, AR(2)				0.338	0.354
Sargan Overidentification test				0.555	
Hansen Overidentification Test					0.350

Notes: *- indicates significance at the 10 percent level; **- indicates significance at the 5 percent level. Household fixed effects are included in each equation. Specification (1) does not instrument the lagged investment variable, and includes household fixed effects. Specification (2) instruments the lagged investment variable with the second lag, and uses household fixed effects. Specification (3) uses a differenced estimator with the second lag as an instrument, as suggested by Anderson and Hsiao (1981). Specification (4) uses the differenced GMM estimator (Arellano and Bond, 1991), and specification (5) uses both levels and differences in a system GMM estimator (Blundell and Bond, 1998). Both GMM estimators are one step. Sample size in specification (1) and (5) is 2925 and in all others is 2340.