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Household Investment through Migration in Rural China

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Abstract

In this paper, we strive to better understand how household investment is affected by participation in migration in rural China. After we describe investment patterns across different regions of rural China, we use a theoretical model to describe a relationship between migration and investment and to generate hypotheses about the relationship consistent with our descriptive findings. We test the hypotheses using household data 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

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As an important component in both the China's growth and poverty programs, leaders in China have demanded officials in rural areas increase investment (Nyberg and Rozelle, 1999). To pursue goals related to higher growth and investment, officials have recently shifted their attention to the private sector. Although early in reforms the government played the dominant role in investment, the private sector has risen in importance as the fiscal strength of government entities across China has deteriorated, particularly in poor areas (Feder et al., 1992). Indeed, China's poverty policy and many international poverty programs have begun to focus on helping poor families generate their own investments to raise their welfare levels and accelerate growth (World Bank, 2001).

Although China's leaders and outside donor agencies seem to agree that private investment is necessary in rural China, little research has focused on understanding the nature of private investments across China during the past decade. Research by Fan et al. (2002) and Park et al. (1998) carefully document investments and measures the consequences of investments, but their work focuses solely on public investments. Liu et al. (2002) examine the determinants of rural household investment, but only consider whether or not households made an investment, and focus on only one relatively well-off province, Jiangsu. Based on the available research, it is clear that there must be considerable private investment. However, little is known about the level of investments, where they are taking place, and what types of investments households are making.

Moreover, if little is known about the contours of private investment over time and across space, less is known about how households finance their investments, particularly in poor areas. In richer areas, rising wealth means farmers frequently are frequently in a position to self-finance their investments. As rural regions along the coast and around inland cities have prospered, banks gradually have begun to offer to credit to rural enterprises (Park et al., 2003). Entrepreneurs in these areas also have turned to informal sources of borrowing as sources of investment finance. In contrast, farmers in poorer areas have neither ready access to self-financing, by virtue of their relative poverty, nor do they have access to formal lending, because of credit rationing by lending institutions.

Without access to more traditional sources of credit, it is possible that farmers in poor areas could turn to migration as a way to finance new investments. In other parts of the world, researchers have studied the effect of migration and remittances on household investments in the source community (e.g. Durand et al., 1996; Dustmann and Kirchkamp, 2001). With the enormous increase in out migration from rural areas, a great deal of it coming from poorer areas (deBrauw et al., 2002), it seems a logical place to consider as a source of investment capital for poor, rural households. Zhao (2002), Bai (2001) and Murphy (1999) have all explored the link between migration and source community investment in rural China. Unfortunately, the works of Bai and Murphy are largely descriptive. Although Zhao's multivariate analysis finds a positive relationship between migration and investment, her data set has no time dimension, so she is unable to account for unobserved heterogeneity that could affect the results.

The overall goal of this paper is to better understand how household investment is affected by participation in migration in rural China. To meet this goal, we have three specific objectives. First, we will document investment patterns and identify the ways that migration is associated with private investment. Second, we identify the linkages by which the household's decision to migrate can facilitate investment. The theoretical model generates several empirically testable hypotheses; of these, we specifically examine the ones that explore how and under what conditions migration leads to increases of household investments. Third, we empirically test the hypotheses in order to identify if migration is one of the mechanisms by which rural households increase investment. To address concerns of possible endogeneity between migration and investment, we use retrospective panel data using household fixed effects and instrumental variables (IV) approaches.

To meet our objectives, the paper proceeds as follows. First, we introduce the data set that will be used for analysis. Next, we use our data to describe the investment behavior of rural households during the late 1990s, the nature of their participation in migration and the correlations between migration and investment. Since the need for rural households to rely on migration to finance their investments may depend on the level of wealth in the region and the presence or absence of alternative financial intermediaries, our discussion examines the relationships for households that live in rich and poor areas. In the third section, we develop a theoretical model

of migration and investment that takes into account institutional features of rural China, a model extending the framework established in the New Economics of Labor Migration (NELM) literature (Stark, 1991). In the final two sections, we empirically test the hypotheses generated by the model, report on the results and draw conclusions.

1 Data

The data for this 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 member 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 production- and consumption-oriented investments. All of the households in the sample were asked a comprehensive 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 the household's investments and purchases made since 1995, we can create both an annual investment variable and a variable that measures total investment since 1995, which we call *cumulative* investment.

Another section of the survey focused on current and past migration experiences of all 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] 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 (610 out of 1199). 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 split from the household, worked off-farm or 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

In this section, we primarily describe patterns of investment and migration and the linkages between them. However, investments are only one way that households spend money, and migration is only one way that households might finance investment. The characteristics of some parts of China might encourage investment, whereas the characteristics of other areas might discourage investment. Consequently, before we begin to examine migration's role in providing a substitute for credit, we should describe the environment in which rural households live in more detail.

As in other countries, economic growth in China's rural economy has led to a rapid increase in the demand for credit (Shen, 1999). 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 borrow from informal sources of credit, such as moneylenders or other informal financial intermediaries. In richer areas, households are sometimes wealthy enough to invest substantially using their own funds.

[1]For the survey year itself, 2000, migrants were identified as follows. All household members were first divided 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 610 households in the employment history sample.

Unfortunately, as in other less developed countries, in poor areas of China formal channels of investment funding are not available (Shen, 1999). When most households are poor, by definition households rarely have enough funds to self-finance and formal credit is almost impossible to obtain. As in richer areas, when formal institutions do not exist, there are pressures to create informal lending institutions to alleviate constraints on investment (e.g. Aleem, 1990). For example, in poorer parts of China households often rely on zero interest loans from relatives and close friends (Park and Wang, 1999). While these types of loans are common throughout poor areas of China, these types of loans almost exclusively are given to meet the needs of unexpected shocks and rarely are provided to finance investments. In some areas microcredit schemes have appeared and offer farmers a source of investment credit, but these programs are not very widespread (e.g. Park and Ren, 2001). Hence, it is within the type of a setting that is characterized by relative poverty and the absence of formal and informal sources of credit that migration has been discussed as a potential source of capital for households in rural China (Bai, 2001; Zhao, 2002; Murphy, 1999; Rozelle et al., 1999).

Data from our sample demonstrate that in 2000, credit markets were still relatively underdeveloped in parts of rural China, especially in poor areas.[3] Specifically, households in poor areas both had trouble accessing funds from credit markets, and when they received loans, the amounts were relatively small. For example, in poor areas, only 10 percent of households were able to borrow from formal financial intermediaries. Moreover, the average amount that they borrowed was less than half the average amount borrowed from banks in richer areas. When running small businesses, rural residents also had difficulties in gaining access to larger volumes of credit. Although households in richer areas did not always have much more success in gaining access to loans (the percentages did not vary that much, although the average size of the loan was higher in richer areas), their ability to self finance varied sharply. For example, when households relied solely on their own funds to start up businesses, the average amount of start-up capital was two and a half times higher in richer areas than poorer areas (10,000 versus 4,000 yuan).[4] The size of loans for investments from informal sources (mostly relatives and friends) was also significantly

[3] See subsection below for our definitions of rich and poor areas.

[4] Furthermore, more household businesses are located in rich areas than in poorer areas.

higher in richer areas.

Because rich and poor areas differ in their access to funds, through either financial intermediaries or self-financing, one might expect that households have different propensities to turn to alternative finance mechanisms in rich and poor areas. Therefore, in our subsequent analyses we will allow the interaction of migration and investment to differ by the level of wealth of the region in which the household resides. In addition, the division of the sample into rich and poor areas might be useful when examining the types of investments. For example, it is possible that the demand for loans for businesses are higher in richer areas than poorer ones, given the higher probability of a household being able to find business-oriented investments with sufficiently high returns.

2.1 Investments in Rural China

Regardless of the source of investment capital, households in rural China have been making investments in much more than just agriculture. In fact, they make a wide variety of investments that we categorize as *productive* or *consumptive* investments. Productive investments can be characterized as investments in agricultural or non-agricultural activities that enhance the income-earning enterprises of the household. 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.

We also measure household investment in consumption-side, or consumptive, activities. These investments directly improve the quality of life for members of the household, 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.[5] In the remainder of our paper, we mainly use the data we have on the amount invested by households since 1995.[6]

Although not all households invest every year, many households in our sample undertake some kind of productive investment between 1995 and 2000. The average total amount invested ranged from 3669 yuan in 1995 to 9229 yuan in 2000 (Table 1). The median investment also has been increasing, indicating that over time household investments have been getting larger. In any given year, between 17 and 26 percent of households made a productive investment. By taking the average size of investment and multiplying by the proportion of households that made investments we can roughly approximate the growth rate of productive investment in rural China during the 1990s. For example, between 1998 and 1999, investment grew at about 10 percent per year, which is slightly higher the investment growth rate reported in the Chinese National Statistical Yearbook for rural households (CNSB, 2000). While not every household made a productive investment during the 5 year study period, a majority of them (61.5 percent) did (Table 2; row 4). As the percentage of households making an investment grows, so does the cumulative productive investment measure, increasing from 3669 yuan in 1995 to 12030 yuan in 2000 (row 1).

Depending on the availability of investment opportunities, household resources and preferences, households making investments might not choose to invest in production-side activities, instead investing in housing or durable goods that improve their quality of life. Across all years, consumptive investments not only occur more frequently than productive ones, but the average

[5] 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.

[6] Although we have data on most categories of investment over longer periods of time, we choose to aggregate investments since 1995 for two reasons. First, over a shorter time horizon it is less necessary to deal with the complications of depreciation. Moreover, since we did not track asset disposal, if we use fewer years of data, our total asset base could contain more error. As it is, with only 5 years of investment data, we have evidence that our measurements should be relatively accurate. Less than one percent of agricultural capital goods were sold or discarded in 2000, indicating that if we are underestimating the amount of capital goods held by households in years prior to 2000, the magnitude of that underestimation due to ignoring asset sales or disposal is fairly small. Additionally, in the entire sample only *five* households have completely lost land on which they had made an investment since 1980. In other cases in which households lost land on which they had invested, they received some form of compensation. Second, and perhaps most importantly, 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.

amount invested each year in consumptive investments is also larger (Table 1). Our data also show that the size of consumptive investments in the late 1990s are driven by housing investments, which is consistent with a description of rural investment in the 1980s (Feder et al., 1992).[7]

By any measure, since 1995 *total* investment (the sum of productive and consumptive investment) in rural China has been pervasive and growing (Table 2; rows 9-12). Given investment has occurred, the median household in 2000 has invested over 8000 yuan in productive or consumptive investments 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), it would have had an investment rate of roughly 15%. 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 a most households is consistent with the observed increasing standard of living in rural areas over the late 1990s (about 5 percent per year annual increase in per capita rural incomes– CNSB, 2000). Some might find the increase in living standards described here surprising, given the Asian financial crisis of 1997 and claims of economic stagnation in China by some researchers (Rawski, 2001).

2.2 Investment Differences across Space

While most households made investments during the 1990s, the size of cumulative investments vary significantly across the sample provinces and across counties within the provinces (Table 3). We find that rural households in Zhejiang Province, which is adjacent to Shanghai, have invested more than households in other provinces. Total cumulative investment between 1995 and 2000 averaged around 50000 yuan in Zhejiang (column 2, row 1), almost double the average of the other provinces (row 1, columns 2 and 3). Given that Zhejiang has the highest rural per-capita income in China, the higher levels of investment in Zhejiang are not surprising (CNSB, 2000).

Within provinces, investments also differ significantly by county, especially when we rank them by wealth levels. To rank counties by wealth level, we used each county's average gross value of industrial output (GVIO), which was provided by China's National Statistical Bureau to help

[7] 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.

choose the sample. We then characterize the county in each province with the highest GVIO as *rich* and label the others as *poor*. Across all provinces, the rich counties have average investment levels that are roughly two and a half times higher than poorer counties (rows 2 and 3, column 1). The same patterns are found in Zhejiang and other sample provinces (columns 2 and 3). As discussed previously, we are not surprised that richer areas have higher levels of investment than poor areas. Households in richer areas may be better able to self-finance investment activities and when access to credit is available, they may be able to borrow more from banks than households in poor areas. We are interested, however, in knowing if migration affects household investment, so we may have to look for different patterns across rich and poor areas.

2.3 Migration and Investment by Migrant Households

The rise in migration and remittances by rural households in China is well documented in the literature and is one of the fundamental forces of change affecting the rural economy in the late 1990s (e.g. Knight and Song, 1999; Rozelle et al., 1999; Zhao, 1999). According to our employment history data, migration accounted for the fastest growing proportion of the off-farm labor market during the 1990s (de Brauw et al., 2002). From less than four percent of the rural labor force in the early 1980s, by 1995 about 10 percent of the rural labor force worked as migrants and by 2000 almost 20 percent did (Table 4, 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). Remittances from migrants also rose with the outflow of labor from villages, reaching 9 percent of rural income in 2001 (Deininger et al., 2003). In our data, remittances account for about 5 percent of household incomes across all households.

As migration has grown rapidly in recent years, the movement of labor back to the village also has accelerated. Noted by a number of researchers in recent years (e.g., Murphy, 1999; Ma, 2001; Zhao, 2002), the flow of migrants back to villages is thought to be a source of new energy upon which rural communities can depend on for development. In our sample, the average migrant returns to the village after approximately five years. While remittances are thought to be the main way the financial resources flow back into the villages, during our fieldwork we were told that in

many cases migrants save substantial amounts of cash in the city and bring it back to the home village only when they return to the village. Migration and return migration, at least in our sample, occur with relatively similar frequencies in both rich and poor areas.

Although there is little empirical evidence linking migration and investment in China, several researchers have investigated the relationship between migration and investment in other countries, with somewhat conflicting findings. Dustmann and Kirchkamp (2001) show that when about half of a sample of Turkish migrants to Germany returned home, they became active entrepreneurs and used savings earned abroad to finance their businesses. Durand et al. (1996) show that Mexican migrants still in the US channel send remittances back to their home communities to be used for investment, particularly for housing. In contrast, Taylor et al. (1996) and Mines and de Janvry (1982), also writing about Mexican migrants, show that not all migrants make productive investments into their source communities.

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 make such a distinction in this paper. In our theoretical model 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*, although we have no *a priori* expectation about which one will have a larger or smaller effect on investment.

When we examine the relationship between migration and cumulative investment in 2000 in rich and poor areas, we find that migrant households generally have higher average investment levels than non-migrant ones (Table 5, column 1). In rich areas both households with migrants and return migrants have total investment levels that are nearly 70 percent higher than non-migrant households. In poor areas migrants also have total investment levels more than 20 percent higher.

When looking at levels of investment among households groups by migration participation, we find a much different pattern for productive than consumptive investment (Table 5, column 2 and 3). On average, in both rich and poor areas migrant and return migrant households invest much more in housing and durables than non-migrant households. The pattern for consumptive investments is strikingly similar to the pattern for total investments. In contrast, there is no clear pattern for productive investments. Return migrants appear to have higher average productive investment levels than non-migrant ones in rich areas, and non-migrant households have the highest productive investment levels in poor areas. From the our descriptive findings, then, it would appear that if a positive relationship between migration and investment exists, it is between migration and consumptive, rather than productive, investments.

Therefore, after examining differences between the point estimates of the mean investment levels for migrant and non-migrant households, there is some reason to believe that households in rural China may send out migrants to finance investments, especially consumptive ones. However, the analysis has several drawbacks. The standard error of every point estimate is large, which calls into question the reliability of the differences.[8] We also do not precisely understand the relationship between migration and investment; in the next section, we pose a theoretical relationship between the two. Finally, and perhaps most importantly, there are several other factors that may covary with the migration and investment that obscure the relationship.

3 A Two Period Model of Migration and Investment

Although the descriptive analysis and observations from the literature indicate that investment levels in China's source communities are generally higher in migrant households than non-migrant households, it does not indicate *how* migration affects household investment behavior. In fact, the relationship between migration and investment may be complex. Although households ultimately may achieve higher income (from remittances or from their migration-financed investments), they also face tradeoffs when deciding whether or not to include migration in the household develop-

[8] On the other hand, had we constructed the Table 5 with medians rather than means, we find a similar pattern of differences between migrant and non-migrant households.

ment 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 the correlation 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 are inherently more capable) and so are able to invest more. It also may be that migrant households are at different points in their life cycles than non-migrant households and are in better positions to finance investments.

In this section, we present a theoretical model that illustrates a mechanism by which migration can increase household income through investment. The model tries to account for the costs of migration to the household and examine how the household's wealth (or access to alternative credit sources) affects the propensity of household's to migrate as a way to finance investment. At the end of the section, we generate empirically testable hypotheses regarding the linkages between migration and investment that will be tested in the next section.

To begin, we assume that a household with specific characteristics X, a labor endowment $\overline{L}$, and a capital endowment K produces one good with its capital and labor using the production technology $f(K, L; X)$ in two time periods. The household gains utility from consumption in each period according to it utility function, $U(C_1, C_2)$, where C_i is consumption in period i, $i = 1, 2$. The household is assumed to consume the same amount as it produces in value terms, so consumption is equivalent to income.

Since we initially assume that there are no alternative sources of credit, migration is the only mechanism the household can use to increase its consumption in period 2. Without access to credit (or self financing) the household can send out migrant labor, M, to produce remittances, R, in period 1 to either add to its period 1 consumption or to invest and add to its capital stock that will produce greater income (consumption) in period 2.[9] Remittances, R, are a function of migration, where $R = g(M; Z)$, and Z represent other household factors that affect remittance behavior. For simplicity, we assume that migration always produces remittances to the household. In period 1 the household can choose to either immediately consume the remittances or to invest a portion of

[9]Note that households also could save in period 1 in order to invest in period 2, or they could borrow and invest in period 1, paying back the loan in period 2. Adding savings to the model does not add to our understanding of the relationship between investment and migration, while it complicates the algebra significantly. Therefore, savings are not explicitly modeled. We relax the assumption by adding borrowing in a later part of this section.

them, $\phi;\ 0 \leq \phi \leq 1$, in capital goods that can be used in period 2.[10] The currency equivalent of capital in period 2, therefore, is $K + \phi R$ if the household has sent out a migrant, and is K if they have not. From the perspective of period 1, the relative output price in period 2 is expected to be p_2. Both functions, $f(\cdot)$ and $g(\cdot)$ are assumed to be concave, continuous, and twice differentiable.

The constraints faced by the household determine the key tradeoffs it faces in its maximization decision. Consumption in period 1 is equal to the sum of the amount produced in the household and the portion of remittances that are consumed, so $C_1 = f(K, \overline{L} - M; X) + (1 - \phi)g(M; Z)$. Consumption in period 2 is only the amount that the household produces, so $C_2 = p_2 f(K + \phi g(M; Z), \overline{L}; X)$. Therefore, if a migrant is sent out, the household's consumption or income may drop in period 1, due to the loss of labor in household production.[11] This loss, however, can be compensated for and possibly even entirely made up for by the immediate consumption of remittances. Households that send out migrants *and* invest a portion of remittances in period 1 in a productive (consumptive) investment will experience an increase in income (or consumption directly) in period 2 due to the increase in capital. Given these conditions, the household's problem is to maximize its utility by choosing the extent of its participation in migration, M, and the portion of remittances, ϕ, that it will invest:

$$\begin{aligned} \max_{M,\phi} \quad & U(f(K, \overline{L} - M; X) + (1 - \phi)g(M; Z), \\ & p_2 f(K + \phi g(M; Z), \overline{L}; X)) \\ \textbf{s.t.} \quad & 0 \leq \phi \leq 1 \end{aligned} \tag{1}$$

To ensure an optimum, two first-order conditions must be met. The household will send out mi-

[10] In our formulation, our capital good could be either used in production or for consumption. One could imagine that the household either uses its production technology to produce income, or uses it to provide consumption services, which could also be considered income. Essentially, we are assuming that the production technology is producing a conglomerate good that is a combination of a production-side output and a service from the consumption-side durables, which include housing. The assumption that housing or durables increases both consumption and income is commonly used (e.g. Benjamin and Brandt, 2001).

[11] Implicitly, we assume that the household cannot replace the migrant's labor by hiring labor. Although we return to this assumption and examine it briefly the empirical findings below, as stated in the paper's introduction, testing this proposition is beyond the scope of the paper.

grant labor until:

$$U_{C_1}(-f_L + (1-\phi^*)g_M) + U_{C_2}p_2\phi^* f_K g_M = 0 \tag{2}$$

where subscripts denote partial derivatives and arguments of functions have been suppressed. Migration decreases the amount of the good produced by the household in period 1, and can increase consumption in period 1 through remittances consumed, and consumption in period 2 through the investment of remittances. Therefore, equation (2) shows that the household equates, in marginal utility terms, the cost of migration in period 1 with the overall gain from migration in periods 1 and 2.[12]

Figure 1 illustrates the tradeoff between consumption in period 1 (C_1) and period 2 (C_2) is created by migration. If a household does not participate in migration, its budget constraint is B_n and the household can consume where its intertemporal indifference curve IC_n is tangent to the budget constraint. However, a household that participates in migration may be able to reach a higher indifference curve as follows. If the household receives remittances from the migrant and invests at least a portion of those remittances (e.g. $\phi > 0$), its budget constraint may shift to B_m, and may be able to reach indifference curve IC_m. In order to reach the indifference curve IC_m, however, the household has to give up the difference in consumption in period 1 ($C_1^n - C_1^m$) in order to realize a higher consumption level in period 2 ($C_2^m - C_2^n$).

The second first-order condition that characterizes the solution to (1) implies that the household maximizes utility with respect to the fraction of remittances invested in capital in period 2. Defining μ as the Lagrange multiplier on the constraint that the household consumes all of its remittances in period 1 (corresponding to $\phi^* = 0$), the first order condition for the optimal fraction ϕ of remittances invested is:[13]

$$-U_{C_1}g(M^*;Z) + U_{C_2}p_2 f_K g(M^*;Z) + \mu = 0 \tag{3}$$

[12]The model describes labor as a continuous variable, which likely it is not, since a migrant must leave the household for a specified period of time.

[13]In analyzing this first-order condition, we ignore the possibility that the household might still be capital constrained despite participation in migration ($\phi^* = 1$). Even if households are still capital constrained despite participation in migration, empirically we will observe an effect of migration on investment. In the context of this paper, which seeks to test whether migration affects investment, this possibility is not empirically interesting.

Equation (3) also equates a loss of consumption in period 1 and a gain in period 2. Given period 2's expected prices, the household equates the marginal utility of consuming remittances in period 1 with the marginal utility of those remittances in period 2, in terms of income or consumption its investment will produce in period 2. In terms of Figure 1, if $\phi^* > 0$ and the household invests some of its remittances, the budget constraint may shift down to B_m from B_n on the vertical axis (period 1), but it shifts out in period 2 so that the household can consume on the higher indifference curve IC_m.

However, if the household does not invest any of its remittances (e.g. $\phi^* = 0$), then the household is constrained to have a higher relative marginal utility of consumption in period 1 than in period 2 at the optimum, because μ is positive. In terms of Figure 1, the budget constraint would not shift down and right; it would shift up as the migrant left and investment was not planned. The migrant would have a higher marginal product *outside* the household in period 1, and production would revert back to the no migrant case in period 2. Even if the household did invest after migrating, it would not be able to reach a higher indifference curve than IC_N.

Equations (2) and (3) implicitly define optimal functions for migration (M^*) and the fraction of remittances invested (ϕ^*). To understand the mechanism by which migration can relax a constraint on investment, it is useful to rearrange equation (3) as a function of the marginal product of capital f_K. It can be rewritten as:

$$f_K = \frac{U_{C_1}}{U_{C_2}} \frac{1}{p_2} \left(1 - \frac{\mu}{g(M^*)}\right) \tag{4}$$

Equation (4) states that the household attempts to set the marginal product of capital f_K in period 2 equal to the product of the intertemporal marginal rate of substitution, U_{C_1}/U_{C_2}, and relative prices in period 1, $1/p_2$. If the household does not fully invest its remittances ($\phi^* < 1$), then the shadow price of capital is zero ($\mu = 0$) and the household is able to equate the marginal product of capital in period 2 with its relative utility value in period 1. In other words, these results show the manner in which it is possible that migration can act as a substitute for credit. In short, the migrant household that wants to finance an investment is able to trade labor in period 1 (in the form of migration) for capital in period 2.

Rearranging equation (2) as a function of the marginal product of labor yields:

$$f_L = \left((1-\phi^*) + \frac{U_{C_2}}{U_{C_1}} p_2 \phi^* f_K\right) g_M \tag{5}$$

Equation (5) suggests that in period one, the household equates the marginal product of labor within the household with some function of the marginal product of migrant labor.

3.1 Extending the Model: Adding a Financial Constraint

Until now, our model has assumed that there are no alternative sources of credit and that all households have the same access to capital. However, as seen in the descriptive section above, there are large regional differences in rural China regarding levels of wealth and access to credit. These characteristics may have an important effect on whether or not a migrant household decides to invest . For example, wealthy households are likely to have a high level of capital K, and if its marginal product is diminishing, then equation (5) implies that households with a lower marginal product of capital (f_K) will have less reason to invest remittances than households with higher marginal product of capital. If f_K is low, then the investment of remittances ϕ^* will be less attractive, so the household will be more likely to simply consume remittances if they participate in migration. Given the potential importance of the tradeoff between credit and migration for financing investments, it seems compelling that we should allow explicitly for differences in wealth and credit access among households.

To allow our model to relax the credit constraint on some households, we modify the model to allow households to borrow money in order to invest. Consider the possibility that households are able to borrow some amount B to invest in capital in period 1, and B plus interest (at rate i) must be paid back at the end of period 2.[14] If borrowing is included in the original model, it can be written as:

$$\max_{M,\phi} \quad U(f(K, \overline{L} - M; X) + (1-\phi)g(M; Z),$$

[14]Note, that we could also assume that borrowing also is the household's own liquid assets, which are used at the opportunity cost of the interest rate.

$$p_2 f(K + B + \phi g(M; Z), \overline{L}; X) - (1 + i)B)$$

$$\textbf{s.t.} \quad 0 \leq \phi \leq 1;\ B \geq 0 \tag{6}$$

Defining λ as the Lagrange multiplier on the borrowing non-negativity constraint, the first-order condition for borrowing can be written as:

$$i = \frac{1}{p}\frac{U_{C_1}}{U_{C_2}} f_K(K + B^*) + f_K(K + B^* + \phi^* g(M^*)) + \frac{\lambda}{U_{C_2} p} \tag{7}$$

where arguments are used for the marginal product of capital in order to differentiate periods 1 and 2. Equation (7) states that the household will borrow funds so long as sum of the marginal product of capital in period 1, weighted by discounting and the price level, and the marginal product of capital of period 2 are equal to the cost of capital i. If the cost of capital i is too high, then λ is positive and the household can only add to its capital level through migration. If the cost of capital is low and households can borrow, then they will be less likely to participate in migration to finance investment. However, they may still send out migrants *if* the marginal product of labor in period 1 is higher in migration than in household production. Therefore, in areas where borrowing is possible, households will be able to finance investment without migration. Since migration may still occur to reap higher consumption in period 1, we would expect to see a weaker link, or no link at all, between migration and investment in areas where capital markets exist.

3.2 Testable Hypotheses

Our theoretical model leads to several hypotheses, three of which we will test in the next section. However, we do not test one of the first predictions from our model, that households sending out migrants may suffer a loss in consumption or income when a migrant leaves (Figure 1). This hypothesis is tested using these data in de Brauw (2002), who finds no evidence of a lost-labor effect on income. It could be that households sending out migrants are able to substitute labor for capital, either in the form of remittances, as predicted by the model, or as rental factors in its agricultural production. Over time, rental factors have become increasingly available (Jacoby et al., 2002), which makes it less surprising that household income is not significantly affected by migration.

Above all, our model helps us formulate the main hypothesis of interest . Using the results of our theoretical analysis, our *first testable hypothesis* can be stated as: When there are no alternative sources of credit, households that send out migrants expect that migrants will send or bring back remittances to invest in the household's stock of assets. In terms of the model, we can see that if the optimal fraction of remittances invested (ϕ^*) is positive, migration should have a positive effect on investment (equations (2) and (3)).

However, when we add borrowing or savings to the model (equations (6) and (7)), several types of households may not need to use migration as a way finance investment. First, some households are inherently relatively rich. Second, areas that have robust, *local* off-farm labor markets tend to be wealthier (Mohapatra, 2001), and therefore households may not need to send out migrants to find off-farm employment. Finally, households that have access to alternative credit sources may have lower marginal values of capital. In summary, households that are richer, can find employment locally, or have access to credit may be able to finance their own investment without participation in migration. Since all three of these types of households tend to live in richer areas, a *second testable hypothesis* that we can examine is: In richer areas, households will be less inclined to participate in migration to finance investment. In contrast, we expect to see a stronger link between migration and investment in poorer areas.

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, we have a *third testable hypothesis*: If productive investments in poor areas have lower expected returns, we expect more consumptive investment.

4 Empirical Strategy and Results

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

$$W_{ht} = \alpha_h + \rho W_{h,t-1} + \zeta_M M_{h,t-1} + \zeta_R R_{h,t-1} + \zeta_Z Z_{ht} + \varepsilon_{ht} \tag{8}$$

We specify the dependent variable is specified as cumulative investment in the current period t, W_{ht}. We seek to measure the effect of migration 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 ($R_{h,t-1}$) In order to better pick up the timing between migration and investment, in the basic model we lag the migration variables by one year.[15]

In our attempt to explain household current cumulative investment, we also need to control for a number of other effects in equation (8). First, we include the lagged dependent variable, $W_{h,t-1}$, to hold constant the effects of previous investments by households. We also control for a vector of other time varying variables, Z_{ht}. In all of our empirical specifications, Z_{ht} includes the size of the household workforce, which is measured as all members of the household between the ages of 16 and 60, and the household land endowment.[16] In order to isolate any life cycle effects on cumulative investment, we also test using the experience level of the household head in some specifications of the model.[17] Finally, as discussed earlier we are concerned that when a household considers financing investment by sending out migrants or bringing back return migrants, the decision may be affected by a number of unobservable factors at the household level and above. In order to account for all non-time varying, supra-household effects, in all of our specifications we include a household fixed effect, α_h.[18]

Unfortunately, we cannot simply estimate equation (8), because eliminating the fixed effects causes the estimate of ρ to be inconsistent with an asymptotic bias of the order $1/T$ (Hsiao, 2003). When the ρ coefficient is inconsistent, the β coefficients on the migration variables are inconsistent as well, since they help determine the previous period's investment. To correct for the dynamic endogeneity problem, we take two alternative approaches. First, we instrument the lagged invest-

[15]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.

[16]The land endowment is defined as the land allocated to the household by the village, and it is measured in *mu*. One *mu* is equivalent to about $\frac{1}{15}$ of a hectare.

[17]We define the experience level as the number of years since the 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 the suggestion of Mincer (1974).

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

ment level, $W_{h,t-1}$, with a second lag of the variable, $W_{h,t-2}$. While this approach should help reduce the bias in the coefficients of interest, it has the drawback that the instrument may still be correlated with the contemporaneous error term ε_{ht}. Second, we employ the Anderson-Hsiao (1981) technique of differencing equation (8) and instrumenting the differenced lagged investment with the second lag of investment:

$$\begin{aligned} W_{ht} - W_{h,t-1} &= \rho(W_{h,t-1} - W_{h,t-2}) + \zeta_M(M_{h,t-1} - M_{h,t-2}) + \\ &\quad \zeta_R(R_{h,t-1} - R_{h,t-2}) + \zeta_Z(Z_{ht} - Z_{h,t-1}) + (\varepsilon_{ht} - \varepsilon_{h,t-1}) \end{aligned} \tag{9}$$

To estimate equation (9), we use two stage least squares, using $W_{h,t-2}$ as an instrument, since according to Anderson and Hsiao it will be uncorrelated with $(\varepsilon_{ht} - \varepsilon_{h,t-1})$. Although this procedure theoretically leads to a consistent estimate of ρ, estimates from the procedure have been shown to be noisy relative to other estimators for similar specifications through Monte Carlo simulations (Kiviet, 1995). Considering the strength and shortcomings of the two approaches, in our empirical work below, we first use both of the approaches and present the results. Since the estimated coefficients for our variables of interest do not vary when using alternative estimators, in the rest of the paper we use the former approach, or the model that uses the level of investments.

4.1 Results

Since our descriptive results indicate that migration is more likely to affect consumptive than productive investment, we begin our analysis by examining the effect of migration on consumptive investment (Table 6). When we estimate equations (8) and (9) using the alternative estimation approaches, our model performs fairly well. The overall R^2 of the first model exceeds 0.80 (column 1). As expected, the signs on the coefficients of the lagged dependent variables are all positive and the t-ratios are large (row 1). Although the signs on the coefficients of other control variables, household workforce and land endowment, are not significantly different than zero, it is possible that these variables have complicated relationships with investment and so the result is not surprising.

When we use the standard fixed effects estimator (Table 6, column 1), we find evidence in support of our first hypothesis. Specifically, we find that when the household sends out an additional migrant, consumptive investment in the following period rises by 3004 yuan; when migrant returns to the household investment increases by 4024 yuan. Both coefficients are statistically significant at the 5 percent level. As discussed above, though, the coefficients on the migration variable may be asymptotically biased because of dynamic endogeneity.

To counter the endogeneity problem, we instrument the lagged investment variable with its second lag and recompute the fixed effects estimator (henceforth called the IV estimator; column 2). The results change somewhat, but there is still support of the hypothesis that migration affects consumptive investment. The coefficient on the number of migrants variable decreases to 2647, but it is still statistically significant. Hence, the results provide evidence that on average, across all households in the sample migration appears to add to household consumptive investment. However, the effect of return migrants on investment disappears. The estimated coefficient on the return migrants variable both decreases and is no longer significantly different from zero. Although the descriptive statistics indicated that return migrant households had higher cumulative consumptive investments than nonmigrant ones, when we attempt to control for dynamic endogeneity as well as fixed effects, the differences disappear and return migration does not appear to lead to higher consumptive investment.

We perform two further checks on the robustness of the IV estimator. First, we use the Anderson-Hsiao estimator in equation (9) (column 3). Although the t-ratios on the estimated coefficients of the migration variables are smaller, the estimated coefficient on the number of migrants variable (2646) is almost *exactly* the same as the estimate using the IV estimator (2647). As the results are consistent across estimators, we prefer the IV estimator for the statistical reasons discussed above. Second, we add additional control variables to the basic IV specification to hold constant possible life cycle effects on investment (columns 4 and 5). We are concerned that a household might systematically change its investment behavior over its life cycle, and the life cycle might be correlated with opportunities for migration. The inclusion of life cycle variables further reduces the magnitude of the estimated coefficients on the migration variables, but overall

the general result is consistent across specifications.

Taken as a whole, our results show that there is a positive relationship between migration and consumptive investment that is consistent with the patterns suggested by the descriptive statistics. Using the estimated effect of migration on investment in column 5, a household at the mean level of consumptive investment in 2000 (14520 yuan), sending out a migrant would increase its consumptive investment by 14.2 percent. Households that send out migrants seem to take advantage of remittances and other intangibles sent home by migrants to improve their quality of life in the source community.

Unlike consumptive investment, our analysis shows that migration has no effect on productive investment (Table 7). Using the IV estimator and same the specification that we used in specification 5 in Table 6, we find that the coefficients on the number of migrant and return migrant variables are not significantly different from zero (column 1; rows 2 and 5). The results are not surprising, since they are consistent with the descriptive statistics. As a whole, the results, when compared to those for consumptive investments, provide evidence for our third hypothesis: for some reason (e.g., the investment climate for business is less attractive in rural areas), when households use migration to help finance investments, they decide to investment in housing and consumer durables, and not in productive investments. Perhaps influenced heavily by the results for productive investment, our analysis also shows that migration has no statistically significant effect on total investment.

When we divide our sample into households in rich and poor areas, our findings also provide evidence in support of the second hypothesis (Table 7). Specifically, we find that neither migration nor return migration has a statistically significant effect on either consumptive or productive investment in rich areas (column 2). Given that households in richer areas can more easily self-finance and that financial intermediation is better developed in the richer areas, our results are reasonable.[19]

In contrast, in poor areas the number of migrants have positive and statistically significant effects on consumptive and total investment (column 3). If a household sends out an additional migrant, the household experiences a 2374 yuan increase in consumptive investment and a 1605 yuan

[19]To examine the robustness of our results, we also estimated the models using alternative definitions of "rich" and "poor" areas. The results were largely similar.

increase in total investment. Return migrants, however, do not affect consumptive investments in poor areas. Moreover, neither the number of migrants or the number of return migrants have a statistically significant effect on productive investment.

In gauging the size of the effects of migration on consumptive investment in poor areas, we find that they quantitatively important, since aggregate wealth levels are comparatively low in poor areas. At the mean consumptive investment level in 2000 for poor areas (12420 yuan), an additional migrant increases consumptive investment by 19 percent. More fundamentally, these results also imply that households in poor areas, unlike those in rich areas, depend upon migrants to finance investment. They also imply that although the business environment in or around the source community is poor, households still want to invest and do so by using migration to invest in housing or consumer durables to improve their living standards.

Our results differ with conclusions drawn by other authors who have studied the relationship between migration and investment in rural China. Bai (2001) and Murphy (1999) use descriptive analysis to posit a link between migration and investment. We find that when we control for other factors through the use of household fixed effects, some of the dramatic differences between mean investment levels in migrant and non-migrant households disappear. Zhao (2002) uses an ordinary least squares estimator and a cross-sectional data to posit a positive relationship between return migration and productive investment. However, due to the nature of her data she was unable to hold unobservable heterogeneity at the household level constant. When we do so with household fixed effects, we find no evidence of such a relationship.

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.

To understand and test for linkages between migration and investment, we first present a theoretical model. It generates a set of hypotheses that posit that households that participate in migration will have higher investments, and that the relationships will be stronger for consumptive investment and in poor areas. Accounting for heterogeneity among households by using an estimator that includes controls for household level fixed effects and dynamic endogeneity, we find that an additional out migrant leads to an increase in consumptive investment of about 2000 yuan. We also find that migration has a stronger effect on investment in poor areas than in rich areas. The results are consistent with the idea that households in richer areas are better able to self-finance investments or have better access to credit. In lieu of credit access, households in poorer areas must turn to their labor to provide themselves with capital to invest. Furthermore, since households in poor areas may lack productive investment opportunities, so they use money earned by migrants to build houses or to purchase consumer durables.

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.

Our findings may also provide backing for proposals that seek to expand the provision of credit to rural households in poorer areas. 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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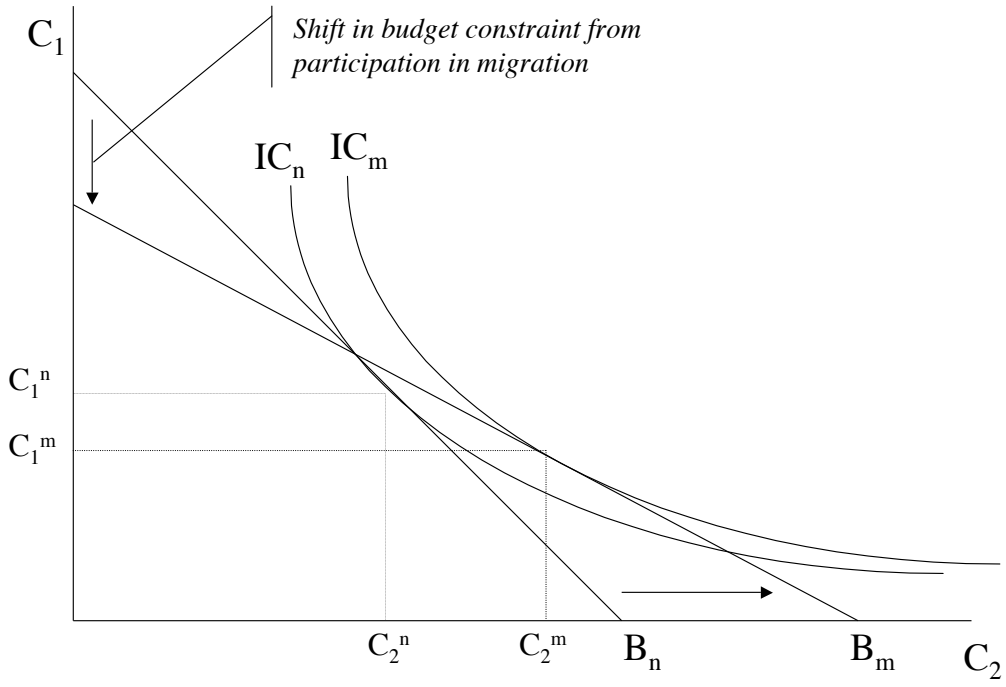

Figure 1: Intertemporal Tradeoff in Consumption Facilitated by Migration

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

	1995	1996	1997	1998	1999	2000
Productive Investment						
Mean	3669	8069	3887	5248	4667	9229
	(7315)	(32790)	(6680)	(18610)	(13240)	(43800)
Median	997	1334	1540	1219	1300	1500
Percent Investing	18.7	17.3	18.2	22.0	21.3	26.6
Consumptive Investment						
Mean	16760	14300	9810	11330	11000	13170
	(47900)	(32170)	(16580)	(26930)	(32800)	(27100)
Median	3340	3003	3438	3048	2620	4525
Percent Investing	19.3	18.7	16.4	19.7	24.1	16.1
Total Investment						
Mean	12227	12877	7890	9552	9117	12008
	(38240)	(37480)	(13900)	(25650)	(27450)	(40520)
Median	2250	2200	2925	2083	2300	2827
Percent Investing	32.1	31.6	29.3	35.4	40.0	38.0

Notes: This table includes the *whole* sample. 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 Household Investment, by Type and Year

	1995	1996	1997	1998	1999	2000
Productive Investment						
Mean	3669	7319	7786	8726	9482	12030
	(7315)	(26270)	(24110)	(25150)	(25790)	(37340)
Median	998	1578	2134	2467	2852	3302
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	3340	3700	4530	5130	6350	7890
Percent Investing	19.3	33.4	42.9	51.8	60	64.2
Total Investment						
Mean	12230	16210	17480	19850	22470	26410
	(38240)	(42680)	(42650)	(49630)	(55690)	(66410)
Median	2250	3604	5132	6159	7691	8394
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.

Table 3: Average Cumulative Total Investment in Rich and Poor Counties in China, 2000

Category	All Provinces	*Zhejiang*	All Other Provinces
All Counties	25300	50400	20300
	(70000)	(115100)	(56100)
Richest Counties	48900	130100	30740
	(128230)	(223100)	(87610)
All Other Counties	20600	30820	18030
	(34100)	(42000)	(31950)

Notes: Standard deviations in parentheses. All measures are the cumulative investment between 1995 and 2000, and exclude households that did not invest.
Source: Authors' survey.

Table 4: Percent of Workforce that are Migrants or Return Migrants, by Rich and Poor Areas, 1995 and 2000

	All Households		**Households in Rich Areas**		**Households in Poor Areas**	
	1995	2000	1995	2000	1995	2000
Migrants	9.7	19.0	13.0	20.9	9.0	18.5
Return Migrants	4.9	9.1	7.9	11.9	4.1	8.4

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 5: Income and Investment Levels in Households, by Migration Status and by Rich and Poor Areas

Category	Per-Capita Investment	Consumptive Investment	Productive Investment
Households in Rich Areas			
Return Migrant	24360	15660	8685
Households	(32280)	(28220)	(15290)
Migrant	24120	22340	1780
Households	(45770)	(45330)	(5440)
Non-Migrant	14380	7480	6900
Households	(25610)	(12162)	(22070)
Households in Poor Areas			
Return Migrant	17510	12420	5096
Households	(22890)	(18560)	(10360)
Migrant	16658	14880	3022
Households	(29640)	(31970)	(7530)
Non-Migrant	13910	8870	5560
Households	(23090)	(16590)	(15650)

Notes: All figures are expressed in yuan, and households above 200,000 yuan have been eliminated as outliers. The category "households with out migrants" does not include households that also have return migrants living in them. Standard deviations in parentheses. "Rich areas" include the richest county in all provinces.

Table 6: Effects of Previous Migration and Return Migration on Change in Cumulative Consumptive Investment

	Specification				
	(1)	(2)	(3)	(4)	(5)
Lagged	0.57	0.80	1.29	0.76	0.76
Investment	(33.95)**	(14.07)**	(2.50)**	(12.29)**	(12.27)**
Previous Out and Return Migration (lagged one period)					
Number of	3056	2647	2646	2065	2073
Migrants	(4.21)**	(2.97)**	(1.87)*	(2.29)**	(2.29)**
Number of	3950	1909	2408	774	784
Return Migrants	(2.86)**	(1.08)	(0.91)	(0.43)	(0.44)
Other Controls					
Household	-169	-280	-392	-371	-390
Workforce	(0.31)	(0.41)	(0.37)	(0.54)	(0.56)
Land	-79.5	-108	-76.1	-61.9	-67.0
Endowment (mu)	(0.36)	(0.39)	(0.18)	(0.22)	(0.24)
Experience of				587	662
Head				(2.30)**	(1.17)
Experience,					-1.23
Squared					(0.15)

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; specifications (2), (4), and (5) use the second lag of investment as an instrument for the first lag; and specification (3) uses a differenced estimator with the second lag of investment as an instrument for the differenced first lag, as suggested by Anderson and Hsiao (1981). Sample size in specification (1) is 3050 and in all others is 2440.

Table 7: Effects of Previous Migration and Return Migration on Change in Cumulative Investment, by type of investment and by rich and poor

Investment Type	All Households	Households in Rich Areas	Households in Poor Areas
Effect of Migrants on:			
Consumptive	2073	3468	2374
Investment	(2.04)**	(1.22)	(3.18)**
Productive	-133	1096	-178
Investment	(0.13)	(0.18)	(0.50)
Total	1215	3795	1731
Investment	(0.81)	(0.48)	(1.95)*
Effect of Return Migrants on:			
Consumptive	784	333	1605
Investment	(0.44)	(0.04)	(1.09)
Productive	-2450	-1869	-746
Investment	(0.21)	(0.16)	(1.01)
Total	-2172	-1749	-269
Investment	(0.72)	(0.11)	(0.15)

Notes: **- indicates significance at the 5 percent level. The same specification is used as in column 5 of Table 6. Household fixed effects are included in each equation, and the lagged investment is instrumented with the second lag of investment. Sample size is 2440; 488 observations are in rich areas and 1952 households are in poor areas.

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.