

## MIGRATION AND INVESTMENT IN RURAL CHINA

American Agricultural Economics Association Meeting, August 5-8, 2001, Chicago, Illinois –  
Selected Paper

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May 15, 2001

## **Migration and Investment in Rural China**

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### **Abstract**

China's recent economic expansion has unleashed the largest flow of population from rural to urban areas in world history. This paper considers the long-term effects of migration on the households of origin. It models participation in migration as a conduit to an intertemporal tradeoff between present consumption and future opportunities.

# 1 Introduction

Since economic and political reforms began in China just over twenty years ago, it has experienced extremely rapid economic growth. This growth has been accompanied by extensive market development in many areas. In particular, labor markets have changed dramatically over the past twenty years. Prior to the beginning of reforms, most rural residents were only involved in agricultural production on the farm. As off-farm labor markets have developed, rural residents in increasing numbers have found employment in both local and distant markets (Rozelle et al., 1999).

Many aspects of the rural labor flow are not well understood. Recent research done on China's migration has focused on migrant demographics and macroeconomic implications of increased migration (e.g. Zhao, 1999; Yang, 1999; 1997). However, these studies have not controlled for time; they have just considered the determinants of migration at one point in time. Moreover, few studies have focused on understanding the effects of migration on the households that migrants leave (exceptions include Rozelle, Taylor, and de Brauw, 1999; de Brauw, Taylor, and Rozelle, 2001). Therefore, the role of migration in the Chinese rural household's overall development strategy is not well understood (Nyberg and Rozelle, 1999). Policy makers, though, are not only concerned about the increase in migration, but also about the effects on source communities (MOA, 1999).

There are several reasons that migration might be expected to have strong effects on the households and the communities in rural China that migrants leave. First, markets and other modern economic institutions are still relatively undeveloped in rural China, so

migration may play a pivotal role in helping households overcome constraints on production caused by the lack of well-developed markets (Benjamin and Brandt, 2000). Second, the urban household registration system constrains migrants from settling permanently in cities. Migrants in China, in fact, must return to their home village to receive social benefits, such as education for their children. As a result, they are found to plan to spend a specific amount of time— on average, four years— away from home before returning (Wang and Zuo, 1999).

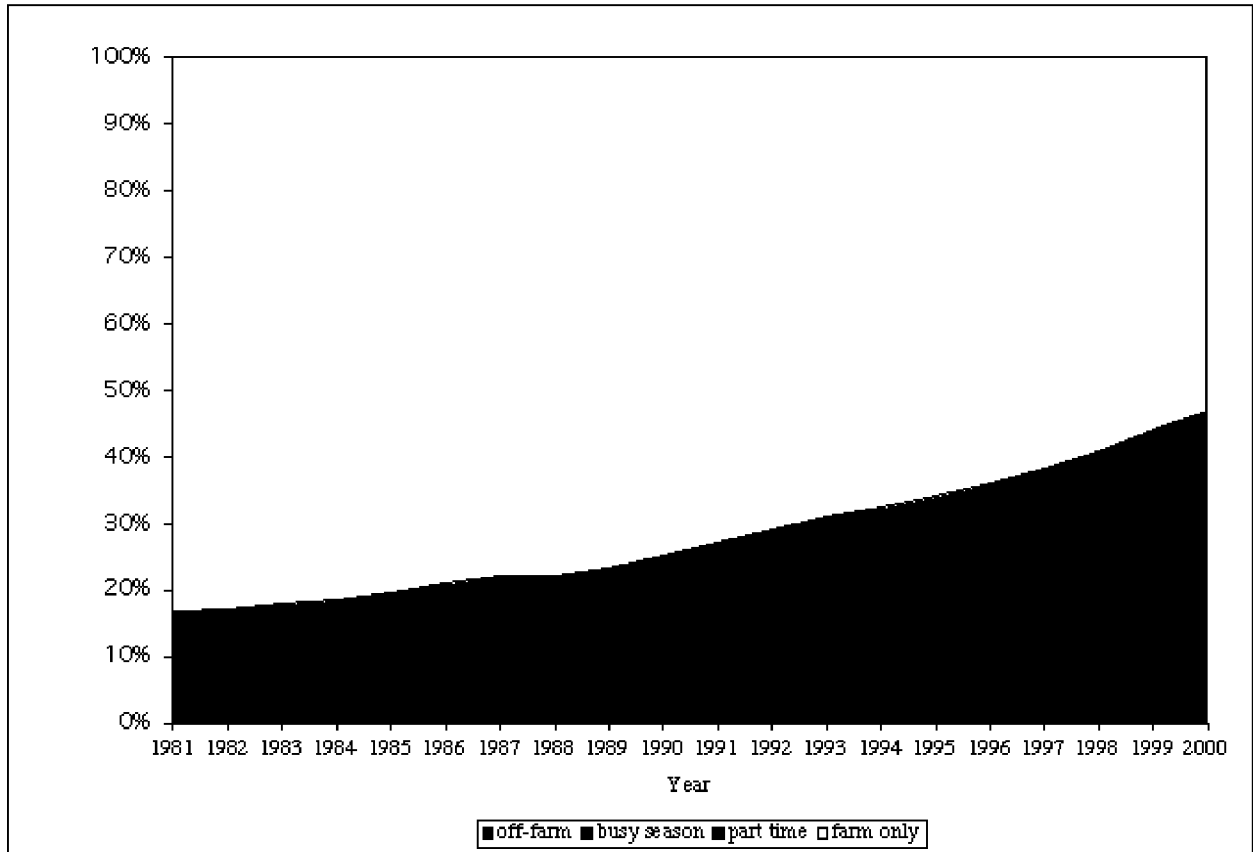
This paper has three objectives. First, it will try to further our understanding about the intertemporal tradeoffs that households face when they decide whether or not to send out migrants. Second, using recently collected household level data from rural China, it will attempt to determine some intertemporal determinants of migration in rural China. Finally, it will consider the empirical link between migration and investment in the sample households.

To accomplish these objectives, the paper will first develop a theoretical model of migration that takes into account institutional features of rural China. The model treats migration as a household decision, in the tradition of Stark (1991). Second, using recently collected household-level data from rural China, it will investigate individual and household level determinants of migration within a time-dependent regression framework. Finally, it will use a simple correlation analysis to discuss the links between migration and long-term investment decisions made by households in different types of production.

## 2 Off-Farm Work and Migration

China's rural labor force was engaged almost solely in agriculture when reforms began in 1979, and as the economy has grown, the rural labor force has rapidly begun to find other types of work. Figure 1 depicts the change in labor market participation for the sample of households used in this paper over the past twenty years. In 1981, less than 20% of the aggregate household labor force worked off-farm. Of those, less than 10% worked full-time off the farm. More than 80% of the workforce had no off-farm employment at all. By 1990, labor participation had not changed much. A slightly larger total percentage of the labor force, around 25%, worked off-farm by 1990. However, a significant uptrend began around 1990, and by 2000 just over half of the workforce from these households was working at least part-time off-farm. The portion of the rural laborers working totally off-farm grew quite rapidly after 1990 as well, surpassing 20% of laborers by 2000.

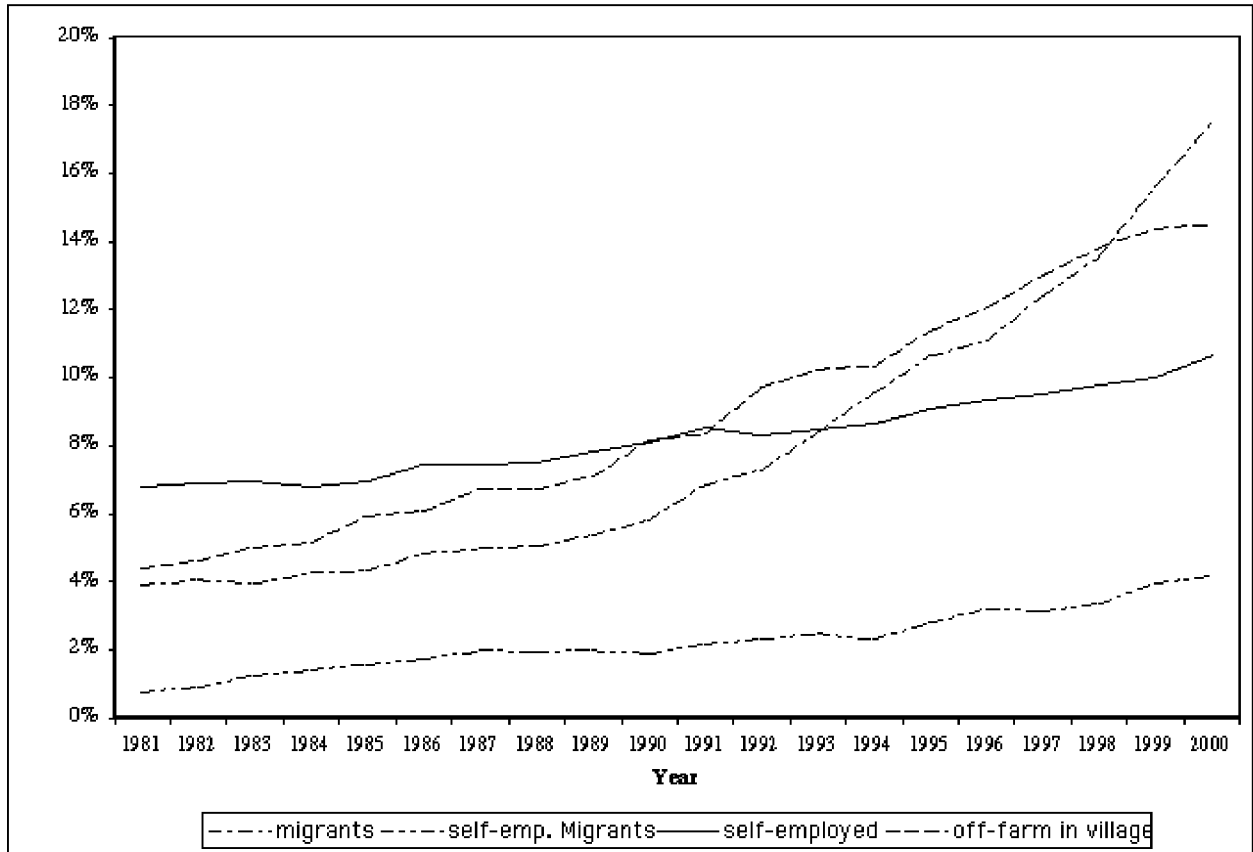
The largest component of the off-farm labor force is now migrants, but it has not always been so. When the whole off-farm labor force (both full and part-time) is divided into four groups, representing migrants, self-employed, self-employed migrants, and the village off-farm labor force, I find that over the past twenty years the largest component of off-farm workers has changed twice (Figure 2). In 1981, when there were relatively few off-farm workers, the largest component of the off-farm labor force was the self-employed. Off-farm workers in the villages surpassed the self-employed in 1990, which then composed slightly less than 8% of the total workforce. After 1990, as the proportion of rural laborers from the sample households grew, the growth was fueled by people finding jobs working for others,



**Figure 1. Type of Labor Participation in Rural China**

both in or near the village or in distant markets. Migrants and off-farm workers were the two components of the labor force that grew most rapidly, with the number of migrants growing faster. Though self-employment grew over the period as well, it did not grow nearly as rapidly as the other two components.

Though Figures 1 and 2 demonstrate that migration and off-farm employment are on the rise, they do not indicate which factors lead some workers to work off-farm, and others to stay on the farm or work part-time. Different human capital levels, household characteristics, or attributes of villages would be expected to have significant effects on whether or not people have opportunities to work in off-farm labor markets. Furthermore, choices regarding off-



**Figure 2. Off-farm Work Type**

farm labor market entry depend upon the household's development strategy. If households see their main opportunities as being constrained in the long-term to the village, they might participate in migration to facilitate investment in the household's production activities, in order to increase household production in the long term.

## 2.1 Links between Migration, Household Income, and Investment

When a household operating in a world of imperfect markets decides to send out a migrant, the decision can either exacerbate or alleviate constraints on production. The household's family labor endowment becomes more constrained while the migrant is away. Therefore, it

must allocate less labor to its production activities. Due to land scarcity and moral hazard problems, agricultural labor markets are thin in China (Li, 1999), and furthermore, grain production tends not to be very profitable at times when grain prices are low.<sup>1</sup> Therefore crop production may fall when a migrant leaves, if the household does not put as much labor (or equivalent substitutes) into cropping, or it may become even less profitable, if other factors (such as mechanical harvesters) are rented and substituted for labor. For similar reasons, self-employment output and income may also decrease, not only because of the loss of labor but also because the migrant is often one of the household members with the most human capital. Migrant remittances, however, can help households alleviate cash or credit constraints on production. In the short run, households may use remittances to expand their production possibilities or to alleviate constraints on production (such as liquidity constraints on renting production factors).

Participation in migration can also have positive effects, through both physical and human capital improvements, on the long-run productivity of the household. Evidence from other less developed countries suggests that rural households tend to use remittances or other forms of transitory income for savings or investment rather than for consumption (e.g. Adams, 1998). By generating remittances, migration can lead to higher investment and help households expand their production possibilities. In fact, migrants that plan to return home often do save to invest in businesses in their home villages (Brown, 1997). Migrants in China gain skills, contacts, and entrepreneurial know-how useful for starting businesses

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<sup>1</sup>Grain prices have been dropping since 1996 and were very low, in historical terms, at the time the survey upon which this paper is based was conducted, in late 2000.



or managing family enterprises (Davin, 1999). The potential effects of these skills and contacts are enhanced when they belong to migrants, who tend to be young, well-educated members of the household (Rozelle *et al.*, 1999). In the long run, then, migration can have several positive effects on the household's production possibilities, through greater potential to finance production or through better utilization of the migrant's increased human capital.

de Brauw, Taylor, and Rozelle (2001) analyze the links between *migration* and different sources of *household income* in rural China. They find that migration has multiple, competing effects on household income sources. Specifically, the number of migrants from a household negatively affects its crop income. Presumably, when the migrant leaves the village the household's stock of family labor falls, leading to a decrease in crop income. However, remittances that are sent back by migrants positively affect crop income, and add to household income themselves. One explanation is that remittances are loosening credit or liquidity constraints faced by the household on its various production activities. Overall, the total effect of migration on total household income seems to be slightly positive, in per-capita terms.

However, that research fails to answer several questions. Due to the nature of the data, it was limited to analyzing the link between *migration* and *income* from a *static* perspective. However, if migrants in China plan to return to the household in the relatively near future, migration would also have important *dynamic*, or longer term, effects on household income. In fact, evidence from other studies suggest that rural migration in China is circular. Through institutional constraints such as the *hukou* or urban registration system,

migrants are generally discouraged from settling permanently in urban areas. Most migrants must return to their home village for social services, such as education for their children. Therefore, it seems likely that households plan to invest in a self-employment activity or cash crop production when their migrants return.

### 3 A Simple, Two Period Migration Model

Harris and Todaro (1970) hypothesize that an individual will leave a rural household to find urban wage work if the marginal product of labor in the household is less than the expected wage that can be earned away from the household. To test the NELM theory that migration is used to substitute for missing capital or liquidity markets against the Harris-Todaro theory of migration, the theoretical model for this paper needs to incorporate two important details. First, it must allow the household, or members thereof, to participate in migration if the marginal product of labor for one or more individuals in the household is higher in migration than in other income activities. Second, it must allow migration in one period, through remittances, to add to the household's productive capital in the second period.

Consider a household with specific characteristics  $X$ , a labor endowment  $\bar{L}$ , and a capital endowment  $K$ , that produces one good with its capital and labor, by a well-behaved production technology  $f(K, L; X)$  in two time periods. It gains utility from consumption in the two periods according to a general 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 in value as they produce. To add either to its consumption in the first period or to increase its capital

(to increase production in the second period), the household can send out migrant labor,  $M$ , to produce remittances,  $R$ , in the first period. Remittances  $R$  are a function of migration, where  $R = g(M; Z)$ , and  $Z$  represent household factors that shape remittance behavior. For simplicity, I assume that migration always produces remittances to the household. In period one, the household can choose to invest a portion  $\phi$ , where  $0 < \phi < 1$ , of its remittances in productive capital that is used in period two. The currency equivalent of capital in period two, 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 one, relative output prices in period two are expected to be  $p_2$ . Both functions,  $f(\cdot)$  and  $g(\cdot)$  are assumed to be concave, continuous, and twice differentiable. Implicitly, I assume that the household is credit constrained, and therefore it cannot borrow money in period one to finance greater production in period two (through investment in its productive capital). Furthermore, I assume that the household must send out a migrant to break its liquidity constraint in household production.<sup>2</sup>

Consumption in period one is equal to the sum of the amount produced in the household and the portion of remittances that are consumed, so  $C_1 = f(K, \bar{L} - M; X) + (1 - \phi)g(M; Z)$ . Consumption in period 2 is simply the amount that the household produces, so  $C_2 = p_2 f(K + \phi g(M; Z), \bar{L}; X)$ . The household's problem is maximize its utility by choosing an amount of migration,  $M$ , and a portion of remittances,  $\phi$ , to invest in later production:

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<sup>2</sup>Of these two assumptions, the former is fairly realistic, whereas the latter is not. Households in rural China are rarely able to borrow money from formal sources. Therefore, only informal credit is available to them, which is often scarce across family networks (the traditional source of informal credit in rural China). Although the latter assumption is not so realistic, the model also works for off-farm labor, and using this data set one can test whether or not households consider off-farm labor to be different than migrant labor.

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

To ensure an optimum, two first-order conditions must be met. First, the household should gain no more utility from sending out more migrant labor.<sup>3</sup> The household will send out migrant labor until:

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

where subscripts denote partial derivatives and arguments of functions have been suppressed. Since sending migrants out will decrease the amount the household will consume in period 1 (if  $0 < \phi^* < 1$ ) and increase the amount it can consume in period 2, equation (2) shows that the household simply equates, in marginal utility terms, the cost of migration in period 1 with the gain from migration in period 2.

Second, the household maximizes utility with respect to the fraction of remittances invested in productive capital. To analyze this first-order condition, for the moment I ignore the possibility that the household might consume all of its remittances in period one ( $\phi^* = 0$ ), and I define  $\mu$  as the Lagrange multiplier on the constraint that the household fully invests its remittances ( $\phi^* = 1$ ).  $\mu$  represents the shadow value of capital in period 2, if the household is still capital constrained despite participation in migration. The first-order condition for

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<sup>3</sup>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.

the optimal fraction  $\phi$  of remittances invested is:

$$-U_{C_1}g(M^*; Z) + U_{C_2}p_2f_Kg(M^*; Z) - \mu = 0 \quad (3)$$

Equation (3), like equation (2), equates a tradeoff between a loss of consumption in period 1 and a gain in period 2. Given prices expected in period 2, 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 productive capital. However, if  $\phi^* = 1$ , then the household is constrained to have a higher relative marginal utility of consumption in period 2 than in period 1 at the optimum, because  $\mu$  is positive.

To further interpret equations (2) and (3), it is useful to rearrange them as functions of the marginal product of labor and capital in periods 1 and 2, respectively. Beginning with the marginal product of capital  $f_K$ , equation (3) can be rewritten as:

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

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 relative utility in period 1 and relative prices in period 1. If the household less than fully invests 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 this case, the household is able to substitute labor in period 1 (in the form of migration) for capital in period 2, and in period 2 it is not credit constrained. The household is still credit constrained, however, if the shadow price of capital is positive ( $\mu > 0$ ) and the household lacks enough capital, despite the inflow

of remittances, to equate the marginal product of capital in period 2 with its relative utility value in period 1.

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

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

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. In fact, if  $\phi^* < 1$ , then substituting equation (4) into equation (5) simplifies to:

$$f_L = g_M \quad (6)$$

Equation (6) is essentially the Harris-Todaro result; the household will allocate labor to migration until the marginal product of within-household labor equals the off-farm wage.

If the household is capital constrained despite its participation in migration, it invests all of its remittances in productive capital. The optimal amount of migration occurs where the marginal product of labor is constrained to be higher than the marginal product in migration. This relationship can be illustrated by substituting equation (4) into equation (5), given that  $\mu > 0$ :

$$f_L = g_M \left( 1 + \frac{\mu}{g(M)} \right) \quad (7)$$

The household is constrained to give up returns to labor in period one in order to reap returns to capital in period two. Since the household has a higher marginal product of labor when it is constrained than when it is not (the optimal marginal product of labor in equation

(7) is higher than that in equation (6)), had it more labor to give up, it would still be willing to give up labor in household production in order to reap higher returns in period 2.

Equations (6) and (7) do not cover the possibility that the household does not want to invest remittances in productive capital for future consumption ( $\phi^* = 0$ ). If  $\phi^* = 0$ , then the household either will not participate in migration, because the marginal product of labor is always higher in the household than outside of the household, or because it values present consumption by a great deal more than future consumption (e.g. the discount rate is high). If the household chooses  $\phi^* = 0$ , then there is no link between the two periods. One can assume that the household simply equates the marginal product of labor within the household in period 1,  $f_L$ , with the marginal remittance,  $g_M$ , as in equation (6). This result is implicitly the Harris-Todaro result; the household myopically chooses to equate the marginal product of labor within the household with the off-farm opportunity (the marginal remittance).<sup>4</sup> In this case, as in the Harris-Todaro model, there is no rationale for remittances (or migration) having an effect on the rest of household income or on investments (Taylor and Martin, 2001).

## 4 Data

The data for this study was collected in 60 villages in 6 provinces from all across rural China.<sup>5</sup> To accurately reflect varying income distributions within each province, one county

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<sup>4</sup>Note that according to this model, if households in parts of rural China are relatively well-endowed with productive capital, they might not participate in migration in order to invest more capital in productive activities, because their capital endowment makes their labor endowment more productive within the household than it could be outside of the household.

<sup>5</sup>The provinces are Hebei, Liaoning, Shaanxi, Zhejiang, Hubei, and Sichuan. The data collection effort involved students from the Center for Chinese Agricultural Policy, Renmin University, and China Agricultural

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, and twenty households were surveyed per village. A total of 1199 households were surveyed.

The survey gathered detailed information on household demographic characteristics, wealth, agricultural production, non-farm activities, and investment. Several parts of the household survey were designed to learn about migration from the household across time. For roughly half of the households (610 out of 1199), a twenty-year employment history form was completed for each household member and each child of the household head, some of whom were no longer considered household members. This form included information on the main type of work performed, the place of residence while working (inside or outside the village), the location, whether each individual was self-employed or not, and the level of involvement in farming. All households were asked a detailed set of questions about their present participation in off-farm work and migration in particular, wages, and remittances back to the household. Households were also asked a comprehensive set of questions about both productive and consumptive investments they may have made over the past ten to twenty years (depending upon the type of investment). Potential productive investments in cropping, orchards, greenhouses or fish ponds, and self-employment activities were enumerated, as were consumptive investments in marriages, housing, and durables.

Migrants were identified two different ways, using data on off-farm work and the employment history sample. Using the whole sample, migrants were either initially coded as such if they were children of the household head, or they were identified as workers who

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University. It was led by Loren Brandt, Scott Rozelle, and Linxiu Zhang.



left the household and did not live at home while working. For the households that were also asked the employment history form, migrants were re-identified as household members who worked off-farm and lived outside of the household while working. As the employment history form also asked about children of the household head who are no longer members of the household, more labor migrants were identified in the latter sample.

To begin to measure the effect of migration on household-level investment, households that have made *productive* investments over the past twenty years were also identified. These investments can largely be categorized as cropping investments (e.g. wells to deliver water or land improvements), cash crop investments (e.g. orchards or fish ponds), and non-farm investments (e.g. starting a village store). The analysis of the effect of migration on investment levels is beyond the scope of this paper.

## 5 Estimating Participation in Migration

Four strategies were used to investigate individual and household level participation in migration. First, the whole sample (all 1199 households) was used to predict the probability that individual workers participated in migration in 2000. Second, participation in migration in 2000 was predicted for the sample of households for which an employment history was available. This sample differs slightly from the first, as all children of the household head are accounted for— including those that have permanently left the household. So household level variables may not be as important for the second sample as for the first. Third, for the workers for which employment history was available, the probability of migration was again predicted, now considering each year for which each worker was in the sample. All

three of these regressions will be done using a conditional fixed-effects logit estimator, to hold differences across villages constant and to allow for correlation between the fixed effect term and other regressors in the model.<sup>6</sup> Finally, I estimate the amount of participation at the household level, again for the whole sample, using a count regression technique as in de Brauw et al. (2001).

Human capital measures seem to exert the most influence on individual migration in both samples (Table 1). The results are corroborate well with each other and with other evidence on migration from China (e.g. de Brauw et al., 2001; Liang and White, 1997). However, they also add some significant understanding regarding who participates in migration in China. For example, an individual's age an extremely strong, negative effect on an individual's probability of migrating. As individuals get older, they become less and less likely to be a migrant in 2000, fairly rapidly. Education has a strong, positive effect on migration participation, particularly in the second sample, when all of the children of the household head are included. People who have had an apprenticeship or training are 35-40% more likely to migrate (row 4, columns 1-2) than those who do not. Finally, men are more than twice as likely as women to be migrants, when all children of the household head are considered (row 3, column 2).

Household demographics and other characteristics have less of an effect on migration, with the exception of the presence of children. Wealthier households, as measured by the

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<sup>6</sup>Because of the choice of estimator, one village was dropped from the sample as it never had a migrant, over the entire employment history. The estimation results were largely the same when a random-effects estimator was used, which allows the full sample to be used but does not allow for correlation between the random effects and the explanatory variables.

value of their durable or non-productive assets, have only a slightly higher probability of migrating than poorer households, and the effect is only significant in the employment history data. The amount of land a household farms has a small, negative effect on the probability of migration by any given individual (row 6). This result is quite intuitive; households with more land undoubtedly have to put more labor into farming, and therefore they would be less likely to decide to give up labor to migration. The presence of children has a much larger, negative effect on migration; households with children have to devote time to child care as well as to income-producing labor, so they should be less likely to migrate. The number of adults in a household has a positive, significant effect on migration when only household members are considered (row 1), which reflects that the household has less of a constraint on its labor and can “give up” labor to migration. The coefficient is insignificant when children of the head are included (row 2) because migration by that subsample of people is not affected by household traits.

When all data on migration participation between 1981 and 2000 is considered (column 3), most of the odds ratios do not change in magnitude, indicating that many of the individual characteristics of migrants, and the traits of households that send them, have stayed relatively constant over time. Therefore, the same types of people are migrating towards the end of the sample as at the beginning, but they are far more likely to migrate at the end than they are at the beginning. Age and education have the same effects across time as they do for the two sets of data from 2000, whereas the effect of a person’s gender becomes much larger. Men are more than three times as likely to have been a migrant between 1981

and 2000 as women, holding everything else equal. Training also has a much stronger effect on migration over time; individuals who have received training are more than 90% as likely to have migrated in any given year as those who have not. Household characteristics also have similar effects on migration as in the present, except for the number of adults, which decreases the probability of migration in the entire sample.<sup>7</sup> Finally, as one would expect, time has a strong effect on migration participation. Each year, every worker becomes 13% more likely to migrate out of the household to work, *ceteris paribus*.

Finally, I consider the determinants of migration at the household level, using a Poisson estimator with village fixed effects (Table 2).<sup>8</sup> Two specifications of the model are reported; one with a simple demographic breakdown (row 1) and one with more demographic categories (row 2), as the demographic variables have the strongest effects in the first specification. Taken together, the two specifications indicate that demographic characteristics of households swamp out any human capital effects at the household level. Though both human capital indicators, mean education and experience for the household workforce, are of the expected sign, neither of them are statistically significant in the second specification, when the estimation controls for the demographic *composition* of the household.<sup>9</sup> Each group of adults in the second specification leads to nearly the same amount of expected migration, except for the elderly, who have no statistically significant effect on migration. Wealth and

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<sup>7</sup>The number of children and adults in the household are defined by the 2000 data, so they probably should not be included in the regressions on the entire sample. This problem will be corrected in a later version of the paper.

<sup>8</sup>A justification for modeling migration as a Poisson process appears in de Brauw et al. (2001).

<sup>9</sup>Experience is measured by the formula proposed by Mincer; where experience,  $Exp$  is equal to  $Exp = Age - Educ - 6$ , where  $Educ$  denotes years of education. Because of the nature of the data set, this variable can be remeasured as off-farm experience for the households with an employment history, and this variable will be used in a later version of the paper.

land have no significant effect on expected migration from households, when human capital and household demographic structures are held constant.

In summary, at the individual level human capital characteristics have strong effects on migration, but when aggregated to the household level, certain demographic components of the household become more important than aggregate measures of human capital. Younger individuals with more education are far more likely to participate in migration than older, less educated people. Households with greater numbers of productive-aged adults are expected to participate more in migration than households with several children, or the elderly. Human capital and demographics appear to be more important in determining migration than other household characteristics, such as wealth or land, when village-level variation is held constant.

## **6 Correlations between Migration and Investment**

To take a preliminary look at the link between migration and investment, the employment history data was used to create indicator variables for households participating in migration in 1990, 1995, and 2000. According to the theoretical model presented earlier in the paper, households that have previously sent out migrants should be more likely to have undertaken productive investments, if they are capital constrained. Productive investments were separated into three categories: cropping investments, which includes land improvements and wells for water delivery; agricultural sideline investments, which include investments in orchards, forests, greenhouses, and fish ponds; and non-agricultural investments, which include any *initial* investments made in self-employment enterprises households may have. Indicator variables were then created to indicate whether or not households— within the sub-

sample of households for which employment history data is available– undertook each type of investment.

The migration indicator variables were then cross-tabulated with the investment indicator variables to describe, broadly, whether households participating in migration at certain points in time were more or less likely, as measured by percentages, to invest in household production (Table 3). Overall, the investment behavior of migrant and non-migrant households did not differ very much over time, which neither lends support to the earlier theoretical model nor denies it. However, if the model were not true, we might expect to see households with migrants investing less over the study period in home production, because they would both be labor scarce and might also expect to leave the farm in the relatively near future. On the other hand, households that send out migrants seem to invest in production nearly as frequently as those that do not, which does not lend credence to the idea that there are credit constraints that households face, preventing them from investing.

## 7 Conclusions

In this paper, I have theoretically and empirically explored the determinants of migration and the interactions between migration and household-level investment in rural China. Theoretically, if households are capital constrained, they may participate in migration to alleviate the constraint. Using a data set covering much of rural China, I have shown that migration is determined on the individual level by human capital characteristics such as age and the level of education, but at the household level demographics are much more important in determining the number of migrants from each household. Finally, participation in migration,

either historically or in the present, does not seem to affect household investment in on- or off-farm production.

In the future, I plan to extend this analysis to determine whether migration has an effect on the *level* of productive or consumptive investment (in goods such as housing). Migration would help households alleviate constraints on investment if migration itself or migrant remittances help alleviate constraints on investment. In exploring this linkage, it will be important to identify households that have had migrants return over the course of the study period.

However, even these simple results can help guide policy makers who might worry about the ever-increasing flow of labor off of the farms. Investment participation is virtually the same across households that participate and do not participate in migration, indicating that migration does *not* affect the probability that a household invests in the home village. Such results indicate that there is a more complex relationship between the migrant and the source household that is must be left for further research.

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**Table 1. Effects of Individual and Household Characteristics on Migration**

Explanatory Variables	All Households (1)	Sample History Data, 2000 (2)	All History Data (3)
<b>Individual Characteristics</b>			
Age	0.91 (16.61)**	0.92 (12.03)**	0.94 (28.66)**
Years of Education	1.08 (3.93)**	1.16 (6.46)**	1.18 (24.45)**
Sex (Male=1)	1.59 (3.98)**	2.26 (6.01)**	3.16 (24.44)**
Training (Yes=1)	1.41 (2.62)**	1.36 (2.04)**	1.92 (14.00)**
<b>Household Demographics and Capital</b>			
Value, Non-Productive Assets (yuan)	1.00 (1.27)	1.00 (2.34)**	1.00 (2.22)**
Total Land (mu)	0.98 (2.11)**	0.99 (0.58)	0.99 (3.52)**
Number of Children	0.77 (3.35)**	0.67 (4.69)**	0.69 (13.83)**
Number of Adults	1.13 (2.47)**	1.03 (0.45)	0.95 (2.63)**
Year			1.13 (28.95)**
<b>Regression Statistics</b>			
Observations	3328	2176	33264
Log-Likelihood	-948.9	-682.9	-8131.6

Notes: Coefficients are reported as odds ratios; asymptotic z-ratios in parentheses. \* denotes significance at the 10 percent level; \*\* denotes significance at the 5 percent level. Village fixed effects are included and not reported.

**Table 2. Determinants of Household-Level Migration**

Explanatory Variables	(1)	(2)
<b>Human Capital and Demographic Characteristics</b>		
Average	0.03	0.02
Education	(1.26)	(0.91)
Average	−0.03	−0.01
Experience	(4.70)**	(1.06)
Number of	−0.35	−0.25
Children	(5.10)**	(2.65)**
Number of	0.43	
Adults	(11.63)**	
Adults,		0.47
16-25		(6.39)**
Adults,		0.49
26-35		(6.23)**
Adults,		0.47
36-45		(5.30)**
Adults,		0.47
46-60		(4.67)**
Adults,		0.15
over 60		(1.04)
<b>Capital Levels</b>		
Value, Non-Productive	0.0006	0.0005
Assets (1000 yuan)	(0.54)	(0.44)
Total Land	−0.008	−0.008
(mu)	(1.49)	(1.53)
<b>Regression Statistics</b>		
Observations	1167	1167
Log-Likelihood	−767.7	−763.9

Notes: Asymptotic z-ratios are reported in parenthesis. \* denotes significance at the 10 percent level; \*\* denotes significance at the 5 percent level. Village fixed effects are included and not reported.

**Table 3. Cross-tabulations of Migration and Investment**

Migration in:		Investment in:					
		Cropping		Ag. Sidelines		Self-Employment	
		No	Yes	No	Yes	No	Yes
1990	No	87%	13%	71%	29%	73%	27%
	Yes	92%	8%	70%	30%	74%	26%
1995	No	87%	13%	71%	29%	73%	27%
	Yes	90%	10%	70%	30%	76%	24%
2000	No	88%	12%	71%	29%	68%	32%
	Yes	87%	13%	71%	29%	80%	20%