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Labor Migration Choice and Its Impacts on Households in Rural China

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Abstract

Cross-sectional analysis is problematic when examining the determinants of migration as well as its impacts. Panel data may potentially solve the problem by tracking households over different time periods. Using panel data from household surveys in six provinces in rural China over 1986 to 1999, this paper examines the determinants of rural-to-urban migration and its impacts on rural households. We find that number of laborers, income, education level and village migrating network increase the likelihood of migration for households with no migration experience as well as households with experience. By estimating the dynamic difference on migration impacts, at the household level we find that grain output declines by less than 2 percent while net income increases by 16 percent upon migration.

***Keywords**:* internal migration; grain output; labor migration; rural China

***JEL classification**:* O15; J61; Q12

Economists believe that disparities in regional economic opportunities and geographic amenities are the most important determinants of migration (Todaro 1969, 1976; Massey et al. 1993; Borjas 1999)[1]. Since economic reforms began in 1978, China has experienced rapid structural change and remarkable transformations, marked by reduced state control over labor mobility. As a result, it was followed by a steady flow of labor from agriculture to industry and from rural areas to urban areas (Cai, Park and Zhao 2008; Chang, Dong and Macphail 2011). The stock of migrants has increased from about 30 million in the late 1980s, to between 150 and 180 million in recent years (Fan 2009; Liang and Ma 2004).

There have been an array of papers on rural to urban migration in China (Cai, Park and Zhao 2008; Chang, Dong and Macphail 2011; Fan 2009; Liang and Ma 2004; Zhao 1999, etc.). Due to data limitations, most previous research is based on cross sectional analysis[2]. Generally speaking, it is difficult and unconvincing to make inferences about dynamics of change from cross-sectional evidence (Hsiao 2003). Take income effects on migration for example. Income may influence migration in a couple of ways. On the one hand, a poor household may be more likely to migrate due to larger wage differentials given equal job opportunities at the destination. On the other hand, the poor may not be able to fund the migration process due to the financial constraint, thus have to postpone their migration. Therefore, the gross income effects on migration is ambiguous. The estimation of lagged income on the migration likelihood at the household level based on cross-sectional data has trouble in identifying this gross income effect. Even if the estimated coefficient on lagged income is significantly positive, it may be simply because migration in the previous year raises household income, and an experienced migrant is

[1] A number of studies on internal migration in the United States have examined the relationship between migration and distance traveled, wage rates, employment prospects and a variety of personal characteristics that might bear on the migration decision (Greenwood 1975). Research on cross-border migration has concentrated on how relative skill differentials affect labor supply and wage rates in the host country (Lucas 1987; Borjas 1999). In less developed countries, research on labor migration has examined both the absolute income gain of the relevant migration unit (the individual or the household) and the relative gain from migration.

[2] Admittedly, some effects can hardly be identified except by examining the variation across regions.

more likely to migrate compared to those with no migration experience. Though this alternative explanation can be partially controlled by including the migration status in the previous year, the problem of reverse causality remains. A former migrant is more likely to migrate if his/her income from migration is higher. This effect should also be measured by household lagged income.

Cross sectional analyses also have a hard time to identify the migration effect on income. The identification based on the income differences between migrant households and non-migrant households is problematic, since the detected income difference for migrant households may only reflect the fact that higher income households are more likely to migrate.

One reason that cross-sectional analysis is commonly used in the migration literature is because most studies are on permanent migration. Panel data are generally not available since it is extremely difficult to track and observe repeated migration decisions of the same person/household over time. In contrast, the situation in China is different[3]. Due to China's *hukou* (registered permanent residence) system, it is almost impossible to get permanent residence in urban areas, thus most of the rural-to-urban migrants are temporary. Rural households usually do not relocate to and reside in urban areas; only migrant workers travel back and forth (Cai, Park and Zhao 2008). Therefore, it seems inappropriate to use cross sectional analysis when repeated migrations are investigated. For the very same reason, no matter what method is used, one should be cautious to extend China's migration experiences to countries where permanent migration dominates.

Taking advantage of the panel data in China at the household level, this paper re-examines the determinants of rural-to-urban migration and quantify the migration effects on income and grain output using the dynamic difference model. For the first part, we are able to release an implicit assumption that has to be made where cross-sectional analysis is conducted,

[3] Mexican migration to the United States may be an exception.

that is, first-time migrants share the same decision schemes with repeated migrants. These two should be different because repeated migrants have more access to the job markets and have been more integrated in the destination (Farre and Fasani 2011). We do so by examining these two types of households separately. Additionally, with control for household fixed effects, we are able to control for the time-invariant migration propensity at the household level. This should mostly solve the problem of reversal causality. For the second part, when panel data are used, one can overcome the difficulty mentioned above by examining the income change upon migration status change for the same household.

The dataset used in this paper is a panel data of rural household survey from six provinces in China, covering the period from 1986 to 1999 with the interruptions of 1992 and 1994. Making this period more interesting, it is when scaled migration started and more and more labors move from rural to urban areas. The study on the behaviors of first-time migrants in this period should shed some lights to other developing countries who are at the early stage of their economic transition.

By applying a linear probability (LP) fixed-effect model, we find that 1) household size and number of household labors have a positive and substantive effect on migration probability. 2) For first-time migrants, the income effect is significantly positive, and its magnitude is similar across households with different income levels whereas this effect is smaller for repeated migrants. 3) The effects of households' average schooling is positive for both groups. 4) Network plays an important role in facilitating migration for both groups. Furthermore, we find contemporaneous clustering in migration for first-time migrants, but not for repeated migratnts.

A key issue on migration is whether rural-to-urban migration disrupts agricultural production. Government officials who favor curbing migration argue that outflow of rural migrants will lead to substantial reductions in agricultural outputs. This paper presents evidence to refute this argument. By estimating the production function, we find that grain output

decreases by less than 2 percent upon migration,[4] while household net income increases by 16 percent with migration.

To determine the source of income gain from rural-to-urban migration, we compare the marginal product of labor (MP_L) in farming and the wage rate received by migrants in urban areas. The estimated MP_L in grain production is only 1 yuan per labor-day during the sample period, while the migrant wage rate is 17 yuan per labor-day. It is this large gap in MP_L that drives agricultural labors to migrate.

The rest of the paper is constructed as follows. In section 2, we describe the data and define a migrant household. In section 3, summary statistics of our variables are presented. Section 4 concludes the paper and provides policy implications.

SURVEY DATA

The dataset used in this paper is the largest data release available from the annual Rural Households Survey undertaken by the Office of Rural Social and Economic Survey, and co-sponsored by Ministry of Agriculture of China and China Policy Research Institute. It covers 31 Chinese provinces and municipalities over the period of 1986 to 1999, with interruption of 1992 and 1994. Due to lack of information on actual migrant labor days in the 1993 survey, we only use eleven years' panel data: 1986 to 1991 and 1995 to 1999. Each year, about 60 villages are surveyed, and the actual number of villages is determined by the size of the provinces. Our sample includes six provinces, i.e., Guangdong, Zhejiang, Hunan, Jilin, Sichuan and Gansu. The total number of households surveyed each year varies from about 3,000 to 4,000. A large proportion of the sample households remain in the survey for the entire eleven years.

[4] A previous study based on a smaller sample (household survey data from two provinces in years 1994 and 1995) also finds that migration does not have significant disruptions on agriculture production (Bai 2000).

In this study, a migrant household refers to a household with total migrant labor supply over 180 labor-days (approximately six months).[5] For total migrant labor days equal to or below 180 labor-days, the household is considered to be a non-migrant household[6].

EMPIRICAL ANALYSIS

Rural Households in China

This section provides an overview of the sample households in rural China. We first report the demographic, income and expenditure, and production statistics of households and then highlight the key differences between migrant and nonmigrant households.

(Figure 1 here)

Figure 1 shows an increasing likelihood of migration over time. Table 1 summarizes the characteristics of rural households based on the panel data. On average, 18 percent of households are migrant households over the period 1986 to 1999.

(Table 1 here)

One important measure of household human capital is the education level of household head. In the dataset, education status of household head can take four different values. Level 1 corresponds to illiterate or semi-illiterate, level 2 to primary school, level 3 to junior high school and level 4 to senior high school and above. Using the terminology of China's education system, illiterate or semi-literate corresponds to 0 years in school, primary school to 6 years in school, junior high school to 9 years in school. Because the data do not release education levels above senior high school, all education levels of senior high school and above are coded as 12 years in school. The mean of schooling of the household head is somewhere between primary school and

[5] We repeat the regressions using a lower threshold (90 labor-day) of migrant households. The major results persist.

[6] The survey itself does not provide a consistent definition of migrant household over the survey period. From 1986 to 1991, a migrant household is defined as one that has at least one migrant worker, but no information about number of migrant workers per household is provided after 1991. For years when number of migrants is recorded, the average migrant labor supply of households with one migrant worker is close to six months.

junior high school. To better capture the overall human capital of a household, average schooling is defined as the average of school years of all adult household members.

The average household size is 4.6, with 2.7 labors. The average plot that a household cultivates is 9.8 *mu* (1 *mu*= .07 hectare or .16 acre), most of which is used for grain production. Mean gross household income is 14,808 yuan with mean farm income of only 2,688 yuan, resulting in a weighted share of farm income of only 19.4 percent. In contrast, the unweighted average of farm share is 33.8 percent, indicating that higher-income households tend to have a lower share of farm income. Mean net household income is 9,013 yuan. Total household grain income exceeds revenue from grain sales by a factor of three, suggesting that two thirds of the grain yield is kept for the household's own use[7].

Taxes paid per unit of landholding are 128.9 yuan/mu. The real burden of taxes imposed upon a rural household could be much heavier. Hidden taxes may take forms as compulsory grain sales to the government at below-market prices and free labor provision for public construction projects. Nevertheless, this measure provides a lower bound for taxes paid by an average rural household.

The average product (AP) of labor in farming or in grain production is defined as output value of farming or grain production per labor-day. Similarly, the AP of a migrant labor is defined as the average earnings of a migrant labor per labor-day. The AP in farming and the AP in grain production are virtually the same, the former being 12.7 yuan per labor-day and the latter being 12.6 yuan per labor-day. The AP of migrants is 17 yuan per labor-day, higher than both the AP in farming and in grain production. The real difference should be even larger, given the fact that the calculation of the AP in farming or in grain production does not count for capital inputs.

(Table 2 here)

[7] Mean hired labor input is 31 labor-days for all households. For households whose main business is farming, hired labor is less than 2 percent of the labor input into grain production. Therefore, the role of hired labor is neglected for simplicity.

Table 2 presents the basic characteristics of migrant households and nonmigrant households, respectively over the sample period. Per capita net income of migrant households is higher by 1,050 yuan. The farming income is similar between these two types of households. For migrant households, farming income represents a significantly smaller share of gross income. Migrant households attain 6 years' more schooling in total than nonmigrant households. The difference of total schooling can not entirely explained by the fact that migrant households are larger and have more labors.

Determinants of migration[8]

We choose the household as the decision-making unit for two reasons. First, rural economic structures in China exhibit strong family ties (Wang and Zuo 1999). Second, evidence show that in rural China most economic decisions, including the migration decision, are undertaken to maximize the welfare of the entire family (Zhao 1999).

A household might be engaged in many agricultural activities, but we abstract from that to focus on the tradeoff between grain production and migration. Assume a rural household allocates its total labor supply between grain production and migration activities to maximize its total income.[9] The reduced-form equation of the net gain from migration is described as[10]

$$(1) \qquad dY_{it} = Y_{it}^{1} - Y_{it}^{0} = \alpha + X_{it}\beta + f_i + U_{it}^{1} - U_{it}^{0}$$

[8] We follow a generalized Todaro paradigm (Todaro 1976). The model is flexible enough to cover the ideas in the recent migration literature. It postulates that individuals make rational choices; they choose to migrate when its expected earnings or welfare are higher than staying at home.

[9] One way to describe the underlying maximization model is: $\max f(l, k, n, \mu) - rk - tn + w(\bar{L}-l)$ where l, k, n stand for labor input, capital inputs and land input into grain production. The marginal products of all inputs are assumed to be positive and complementary to each other. μ is a transformation variable which affects the marginal returns to grain production, for instance, tax rates or technology innovation. The price of grain is normalized to one. r is rental rate of capital and t is rental rate of land. Capital inputs include household's expenditure on machinery, seeds, and fertilizer. w is the wage rate faced by migrant workers in urban areas, which has been discounted by the probability of receiving that wage. L-l is the migrant labor supply, where L is the maximum amount of labor the household can supply.

[10] This model does not include leisure and is silent about the tradeoff between income and substitution effects. We choose to abstract from leisure for two reasons. First, there is no good measure of quantity and quality of leisure. Second, it makes sense to assume that the income effect dominates the substitution effect for a representative rural household in a low-income country such as China.

$$dY_{it} > 0 \quad iff \quad d_{it} = 1$$

$$dY_{it} \leq 0 \quad iff \quad d_{it} = 0$$

Here *i* denotes household and *t* denotes year. Y_{it}^{1} denotes household total income (net of migration cost) in the presence of migrant members and Y_{it}^{0} denotes household total income in the absence of migrant members. dY_{it} is a latent variable denoting the net gain from migration. d_{it} is an observable discrete choice variable indicating whether household *i* contains migrant workers at time *t*. $d_{it} = 1$ implies that it is profitable to become a migrant household and $d_{it} = 0$ implies that it is profitable to employ all labors in grain production. X_{it} is a vector of observed time-varying household characteristics affecting the probability of migration. Assume that households make their migration choice at the beginning of the year based on information acquired from both the previous and current year. One-year lags for per capita net income, landholding, taxes, village fees, village migrant network, and current information for average schooling and number of labors are used. We especially focus on income and network effects. f_i captures the unobserved time-invariant household characteristics, e.g. a household's time-invariant propensity to migrate. Using the fixed-effect method explores the advantage of panel data to obtain consistent estimates of β even when X_{it} are correlated with unobserved time-invariant effects f_i.

To quantify the effects of these variables on the likelihood of migration, we use the following specification

$$(2) \qquad P\left(d_{it} = 1\right) = P\left(X_{it}\beta + f_i + U_{it}^{1} - U_{it}^{0} > 0\right) = F\left(U_{it}^{0} - U_{it}^{1} < X_{it}\beta + f_i\right),$$

If $U_{it}^{0} - U_{it}^{1}$ is uniformly distributed, equation (2) implies a fixed-effect LP model. The fixed-effect LP model will be used as a benchmark model through Tables 3 to 4. If $U_{it}^{0} - U_{it}^{1}$ is

normally distributed and X_{it} is not correlated with f_i, equation (2) implies a probit model. One well-known fact about rural-to-urban migration in China is that the residence of households usually does not change from rural to urban areas; only migrant workers travel back and forth. Therefore, village dummies are irrelevant since they are already controlled by the inclusions of household dummies in the fixed-effect model.

(Table 3 here)

Column (1) in table 3 presents the fixed-effect LP estimates of the household migration model based on 9 years of full sample. Observations in 1986 and 1995 are suppressed because of the lag specification. All the coefficients correspond to the marginal effects of independent variables on the probability of migration. Overall, our estimation yields similar results when compared to previous literature.

However, as we have mentioned, the above results may be biased due to the failure of controlling for the previous migration status of a household. We have discussed this based on income effects. Given that a household is more likely to migrate if it migrates in the previous year, the income effect may be overestimated because of its positive correlation with the omitted variable, the lagged migration status or different migration propensities. The same logic also applies to network effects. A household's migration status in the previous year has been counted in the calculation of the lagged migration network. Therefore, we cannot identify whether the estimated network effect is because of its correlation with a household's lagged migration status or because there are indeed network effects on migration. One way to solve the problem is to include the lagged migration status in the regression. However, it may lead to other identification problems. By construction, household fixed effects are correlated with lagged dependent variable, i.e., migration status in the previous year; therefore, the inclusion of lagged migration status may

yield biased and inconsistent estimates[11]. In this paper, we deal with this issue by separating the sample into two groups, those households with the lagged migration status equal to zero (inexperienced households) and those with the status equal to one (experienced households) and rerun the regression for each group. It is reasonable to do so because first-time migration decisions are hardly the same to repeated migration decisions.

Column (2) reports the estimation result for inexperienced households. Lagged per capita net income has a significantly positive effect on the probability of migration. The effect of average schooling of household members is significantly positive. The effect of number of labors is significantly positive. Increasing the number of labors by one raises the probability of migration by 4.5 percent. The effect of lagged landholding is insignificant, indicating that landholding plays a negligible role in rural-to-urban migration, probably due to the lack of variation in land areas or ultimately the absence of a land market during the sample period in China[12]. Although the income effect is positive, it is no longer significant even at 10 percent level.

As to the village-level characteristics, the effect of lagged taxes is negative and the sign is marginally significant, contrary to the prediction that lagged taxes drive rural households to migrate. One possible explanation is that tax burden may be a proxy for local government control. When local government control is higher, there is more obstruction to labor migration and thus lower likelihood of migration[13].

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[11] There are certainly ways to account for and solve the endogeneity of lagged dependent variables, for example, by including two-period-lagged variables; or use General Methods of Moments (GMM) methodology that have dealt with endogeneity problems. We do not choose to do so either due to the loss of observations in the data or avoid complications of GMM estimations.

[12] Zhao (1999) finds landholding has a negative impact on the likelihood of migration based on household survey data from Sichuan province in years 1994 and 1995. Since the sample in her study is from only one province, it can hardly represent the whole country.

[13] Despite recent relaxations of restrictions in some provinces, the restrictions on migration remain tight. Migrants may still have to pay taxes to their home village for services they may not consume and on land left fallow (Cai 2000). They may have to pay a license fee to work outside the hometown. At the migration destination they may also have to pay fees for city management, construction, temporary residence, etc. (Au and Anderson 2006). For most sample households, taxes paid take the form of land taxes. For a small percentage of the households who ran sizeable family business, taxes paid are levied upon the business profits. When we exclude households which paid taxes higher than 148 yuan/mu, the tax effect turns insignificant. It seems that the

The effect of lagged village fees is statistically insignificant. The existence of collective firms in the village has little influence, which is against the previous finding that local opportunities of non-rural jobs should reduce the migration likelihood (Guang and Zheng 2005). This difference may come from the fact there is little over-time variation in this variable within a village, which makes it hard to detect this effect. Examining variations across villages may, but this is not our major purpose in this paper.

The fixed-effect estimation suggests that village migrant network have substantially positive effects on the likelihood of migration. A number of authors have noted the importance of chain migration patterns in China. Rozelle et al. (1999) find that an established network in the destination leads to new migration of the same magnitude as the existing network size. Giles (2006) finds that having access to village migrant networks significantly increases household incomes and improves the ability of rural households to smooth consumption.

The estimated coefficients on year dummies reveal a general trend of higher probability of migration over time. The reference group is year 1999. Therefore, the negative sign of the coefficients on year dummies indicates that the probability of migration is the highest in 1999, *ceteris paribus*. This is driven by the combination of different forces, e.g., more information available to the rural households making the migration decision and a more accommodating government policy toward rural migrants. The coefficients on year dummies indicate that an inexperienced household in 1999 is 10% more likely to migrate than one in 1987.

For completeness, we also report the estimated result with the sample restricted to experienced households in column (4). Similar to inexperienced households, the effects of income, schooling and number of labors are significantly positive. However, the income effect should be interpreted differently here. We have included migration income in the calculation of

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negative relationship between taxes and migration likelihood is driven by those households that remain in the countryside and pay a lot of taxes. The change in sample size should not be a concern. All three regressions in Table 3 have 21208 observations. Excluding households paying taxes higher than 148 yuan/mu leaves 20,633 observations.

the total income. Therefore, the lagged income also measures migrant's wage level. It is understandable that a higher wage rate should induce repeated migration.[14] The chain effect persists among experienced households and the magnitude is comparable to inexperienced households. This clustering effect varnishes, indicating experienced household do not benefit much from the supply side efforts on providing job information. The time trend vanishes, but it is unclear why the propensity to migrate is much higher in 1987, 1988 and 1996. This indicates the over-time increase of migration capacity mainly comes from the increases in first-time migrants with the propensity of repeated migration remaining stable. This further rationalizes our choice of focusing on first-time migration.

It has been previously pointed out that networks are crucial to individual migration decisions by reducing information asymmetry created by the segregation between the village of origin and the destination[15]. More specifically, the network provides information to potential migrants on the migration process, facilitates the access to the job market and helps integration upon arrival (Farre and Fasani 2011; Hanson and McIntosh 2008; Munshi 2003; McKenzie and Rapoport 2007 2010; Winters et al. 2001).

From the perspective of inexperienced households, they could learn about job opportunities either from returned migrants or from the information dispersed to local villages by firms in the destination. If the latter is equally important, we should expect contemporaneous clustering of migration, i.e., many inexperienced households in the same village start to migrate in the same year. This clustering effect can be identified with the help of panel data. In column 3, we also include the contemporaneous hazard rate of migration at the village level. The calculation is based on the sample of inexperienced households, but the examined household is

[14] To identify this effect, we segregate income into two parts, the non-migration income and the migration income, and repeat the regression. The effect of migration income is significantly positive as expected.

[15] The long distance between them may be the reason behind. According to population surveys and censuses, the overwhelming trend is that rural labors migrate increasingly to coastal areas, regardless of their original locations (Cai, Park and Zhao 2008).

excluded. While the chain effect persists, the clustering effect is significantly positive as expected.

There may be an alternative explanation of clustering. One way to deal with the uncertainty associated with migration is to go out in company. This may rather explain the chain effect than the clustering effect. The reason is that inexperienced households are supposed to benefit more from following experienced migrants than inexperienced ones. For this reason, with control for the chain effect, the detected clustering is most likely to capture the supply side's effort to solve the information problem. Among others, one way to alleviate the information problem is to have returned migrants bring back the job opening information. There have been anecdotes that in the years when hiring becomes tough, firms offer bonus to their employees if they bring in new labors. Another is through the help of local governments. Local officials may like to do so not only because it will bring higher employment but also because they earn agent fees from offering this help.

One concern on the above estimation is that the definition of inexperienced households is not precise because households who do not migrate in the previous year but migrate two years ago are classified as inexperience households by the definition. A refined way is to examine the probability of migration among households with no previous migration experience at all. Thus, we exclude those household-year for which the same household has at least one previous observation with the migration status equal to one. With this refinery, we rerun the regression in column (3). The estimation result is similar to column (2) except for the following two points. First, the effect of village fees turns to significantly negative. Second, the time trend becomes stronger. An inexperienced household in 1999 is 18% more likely to migrate than one in 1987.

One might be concerned that the fixed-effect LP model may fail to meet the condition that probability should fall between zero and one. In our estimation, 97 percent of the observations have predicted probabilities between zero and one. The estimated probability from

the fixed-effect LP model has a correlation of 0.93 with that from the probit model. This implies that the LP model is a good approximation even if $U_{it}^{0} - U_{it}^{1}$ is normally distributed.[16]

One might expect that positive income effects be stronger among lower-income households because poor households are more likely to have financial constraints. Some studies find that the poor are most likely to become migrants (Solinger 1996; Hare and Zhao 1996); some suggest that the rich with skills are most likely to migrate (Xiang 1996); others claim migrants are mainly composed of those who are neither too rich or too poor (Zhang, Zhao and Chen 1995).

In Table 4, we further investigate whether the income effect on the likelihood of first-time migration is monotonous at different income levels of the inexperienced households[17]. We stratify household-year observations into quintiles based on lagged net income per capita. Then we include additional interaction terms of the lagged net income and quintile dummies to examine whether the income effect vary across groups. The estimated coefficient on lagged net income shows that income alone has a positive effect on the likelihood of migration. The interaction effect of lagged net income and the fifth quintile are significantly negative. Compared to the lowest quintile (the default), the income effect among the richest drops by 0.40 percent in magnitude. A different setting as in column (2) sees the same major results. Therefore, our estimation result is consistent with the financial constraint hypothesis though the variation in income effects is minor.

(Table 4 here)

[16] Technically, the probit regression would have trouble to converge with too many household dummies.
[17] First-time migration decisions are more meaningful; most discussions in the literature implicitly target first entry, though not clearly stated.

Impacts of Rural-to-urban Migration

In this section we examine the economic consequences of rural-to-urban migration. First, we estimate the impact of migration on output. Second, we distinguish among household incomes from different sources and estimate the impacts of migrant labor input on each of them. Third, we extend the model to study the dynamic effects caused by change of migration status[18].

Assume output is determined by a Cobb-Douglas production function, i.e., $q = e^{\mu} l^{\beta_1} k^{\beta_2} n^{\beta_3}$, where q denotes grain output; l, k and n are labor input, capital inputs and land input; μ denotes the effects of all other factors affecting grain production, e.g., migration status. Rewriting the production function in logarithmic form, we have

$$\ln q = \beta_1 \ln l + \beta_2 \ln k + \beta_3 \ln n + \mu . \tag{3}$$

The restricted form of equation (3) can be specified as

$$\ln q_{it} = \beta_1 \ln l_{it} + \beta_2 \ln k_{it} + \beta_3 \ln n_{it} + \beta_4 d_{it} + \beta_5 HS_{it} + \beta_6 S_{it} + \beta_7 T_t + f_i + \varepsilon_{it} , \tag{4}$$

where the dummy variable for migration, d_{it}, has a scaled effect on the overall output. The unrestricted form of equation (3) can be specified as

$$\begin{aligned} \ln q_{it} = {} & \beta_1 \ln l_{it} + \beta_2 \ln k_{it} + \beta_3 \ln n_{it} + \gamma_1 \ln l_{it} * d_{it} + \gamma_2 \ln k_{it} * d_{it} + \gamma_3 \ln n_{it} * d_{it} \\ & + \beta_4 HS_{it} + \beta_5 S_{it} + \beta_6 T_t + f_i + \varepsilon_{it} \end{aligned} , \tag{5}$$

where migrant households and nonmigrant households are allowed to have different production parameters.

In equations (4) and (5), d_{it} is a dummy that indicates the migration decision of household i in year t, HS_{it} is the schooling of the household head, S_{it} is the average schooling of household i in year t, and T is a vector of year dummies. As the benchmark case in equation (2), regression equations (3) to (5) include household fixed-effects f_i.

[18] Inputs, outputs, technology and incomes refer to those of grain production unless otherwise labeled. The same applies to Tables 5 to 7.

(Table 5 here)

Table 5 reports fixed-effect estimates of the impact of migration on grain output. The estimation of the equation (4), with the whole sample in columns (1) and (2), shows that while migration has a significantly negative effect on grain production, the economic impact is negligible: there is only a 1.4 percent decline in grain output upon migration. The unrestricted model (equation 5) allows for the possibility of different shares of land, labor and capital. The result suggests that the share of labor, land and capital inputs is the same for migrant and nonmigrant households. We further estimate the two equations within first-time migrant households and experienced migrant households respectively and the results are reported in columns (3) through (6) in Table 5. It seems that there are no decrease in grain production for first-time migrant households but it is significantly negative for experienced households. For repeated migrant households, the grain production decreases by 4.3 percent; however, the share of land, capital and labor are not significant different between repeated and first-time migrant households. It could be that repeated migrant households adjust their inputs in labor, capital and land proportionately after their migration decisions.

Equations (4) and (5) can also be used to estimate the elasticities of grain production with respect to the factors of production[19]. Estimates from the restricted model indicate that for all households in the sample, the elasticity with respect to land input is 0.64; with respect to labor it is 0.08, and with respect to capital 0.15.[20] in comparison, the elasticities with respect to land input, labor and capital inputs are 0.61, 0.08 and 0.15 for inexperienced migrants and 0.70, 0.09

[19] In analyzing the agricultural production function, the convention is to identify four inputs: land, labor, capital (e.g. purchase of fixed assets) and current inputs (e.g., fertilizer, pesticides etc.). In our data, expenditures on grain production include both capital and the value of current inputs.

[20] Previous studies of Chinese agricultural production functions yield a wide range of estimates (see review paper of Putterman and Chiacu 1994). Many of the differences come from disparities in the underlying data sets. The estimates in this study are closest to those of Kim (1990) who conducted the household-level studies using data from Dahe, a township in Hebei province over the period 1970 to 1985. He identifies the elasticity of output with respect to land, labor and capital as .66, .08 and .23, respectively; and the elasticity to current inputs is -.01 and insignificant. It is believed that capital inputs are not so accurately measured as other inputs. Therefore, the elasticity to capital inputs is likely to be underestimated.

and 0.12 for repeated migrants. Note that labor in this context is raw labor without any adjustment for quality. Education plays a negligible role in grain production.

Recall that the grain production function has Cobb-Douglas technology: $q = e^{\mu} l^{\beta_1} k^{\beta_2} n^{\beta_3}$. The marginal product of labor (MP_L) can be expressed as $\frac{\partial q}{\partial l} = \beta_1 e^{\mu} l^{\beta_1 - 1} k^{\beta_2} n^{\beta_3} = \beta_1 \frac{q}{l}$. In nominal form, $p\frac{\partial q}{\partial l} = \beta_1 \frac{pq}{l}$ where p denotes price of grain. By using the estimated value of β_1 as 0.08 and using the values of total grain income (pq) and total labor inputs (l), we calculate the MP_L, as 1.0 yuan/labor-day. Compared with the migrant wage rate received in urban areas (17.1 yuan/labor-day), the MP_L in grain production is almost negligible[21]. This should come as no surprise given the small value of β_1 and the enormous rural labor input into China's agricultural production. It is this differential between the low MP_L in agriculture and the high urban wage rate that drives rural labors to migrate into towns and cities for jobs once it is allowed.

(Table 6 here)

Due to the unknown impacts of migration on liquidity, risk and labor constraints, the overall impact of migration on total household income is ambiguous (Taylor and Feldman 2007). Rozelle et al. (1999) and Taylor et al. (2003) find that migration results in both negative lost-labor and positive remittance effects on production in migrant households in rural China. Table 6 presents the results from estimating the impacts of migration on household incomes. In the first three columns, the dependent variables are not adjusted for the reduction in total number of household members who remain in the rural area as a consequence of migration. In column 4 the adjustment is made.

[21] The estimated marginal product of labor in grain production varies with assumptions about the functional form, and it can be affected by capital substitution. The estimation here should be taken only as an illustration of how low the marginal product of labor in rural China can be.

Column 1 in Table 6 shows estimates of the contribution of land, capital, labor and migrant labor to household grain income. The elasticity of grain income with respect to land, capital and labor inputs is 0.62, 0.19, and 0.08, respectively, which follows from the production function estimated in equation (4). Migrant labor input has a small negative impact on grain income, which is consistent with the results in Table 5.

Column 2 estimates the impact of migration on the sum of grain income and migrant labor income[22]. The elasticity of total income with respect to land, capital and labor inputs is 0.20, 0.12, and 0.01 respectively, and the elasticity of total income with respect to migrant labor supply is 0.23. Migrant labor supply has a larger marginal effect than the first three production factors in terms of contribution to household total income. Increasing migrant labor supply by 10 percent will lead to a 2.3 percent increase of household total income.

In column 3 we estimate the impact of migration on the sum of grain income and remittances[23]. Records of remittances are fragmented in the data. Regressions in columns 3 and 4 only include those observations with valid remittances records. The results in column 3 show that migrant labor has no impact on the total of grain income and remittances. The problem with this income measure lies in not taking into account the reduced population in the origin of migrants. As migrant workers go to urban areas, the number of household members who stay in rural areas decreases and the relevant number of people who share the sum of grain income and remittance also decreases.

In column 4, this issue is addressed by correcting the diminution based on the household size in the rural area[24]. The dependent variable is defined as per capita income received by

[22] Because we do not have information on migration costs, this total is simply an approximation to gross household income.

[23] Migrant labor income is the earnings of migrant workers. Remittances are the amount of money that migrant workers send back home.

[24] The number of people who stay was calculated by subtracting number of migrants from total number of people in a household. Data prior to 1995 report the exact number of migrants for every household. For data from 1995 to 1999, the number of migrants is constructed by making extrapolations based on information linking migrant labor supply and number of migrants from the data prior to 1995.

household members who stay in the rural area. It measures more accurately the welfare of rural members, compared with the measure used in column 3. Compared with column 3, migrant labor now shows a strong positive impact on the incomes of household members who stay behind. Increasing migrant labor supply by 10 percent will lead to a 1.0 percent increase of per capita income of people who stay. In sum, migration enhances household income as a whole and the relevant proceeds of household members who remain in rural areas as well.

(Table 7 here)

Table 7 estimates the impacts of dynamic migration status change on rural households. In addition to the migration dummy in the current year *t*, we introduce a second dummy indicating migration status in the prior year, $t-1$. It helps to pick up additional impacts of dynamic migration decisions having migration dummies for two consecutive years. The dependent variables are the percentage change in net income, nonmigrant income, grain output, labor input, and capital inputs between year *t* and year $t-1$, respectively. Explanatory variables include two migration dummies, first-differences in schooling and in household size, year dummies and a constant.

A household that migrates in a certain year but does not migrate the prior year increases its net income from the prior year by 16.4 percent on average. A household that migrates in both years experiences less income rise—its net income increases from the prior year by 3.5 percent (0.164 plus -0.129). A household that migrates in the prior year but decides to withdraw experiences a 12.9 percent decrease in net income. Schooling and household size have positive impacts on net income.

A household that migrates in a certain year but does not migrate the prior year experiences a 25.4 percent drop in nonmigrant income on average; for a household that migrates in two consecutive years, its nonmigrant income declines from the prior year by only 1.0 percent

(-0.254 plus 0.244). Similarly, a household that withdraws experiences a 24.4 percent increase in nonmigrant income.

Grain production declines by 1.4 percent upon migration. Whether a household migrates the prior year has little impact on grain production in the current year. Labor input declines by 1.4 percent if a household migrates only in the current year and labor input remains the same if it migrates in two consecutive years. The change in capital inputs is not significantly different from zero upon migration. Overall, our results suggest that migrant households respond to migration by having household members who stay work longer hours rather than by substituting labor with capital. This indicates that rural labors were not fully employed before the Chinese government lifted the ban on rural-to-urban migration; in other words, the upper bound of labor supply was not binding due to policy distortion during our examination period.

CONCLUSIONS

Using panel data from household surveys in six provinces in rural China over the period 1986 to 1999, we analyze the migration choice made by rural households. This study explores two questions: first, what are the factors determining migration; second, what are the impacts of migration on rural households.

In finding the determinants for migration, we literally separate the households into two groups by their former migration experience: inexperienced households and experienced households. We find that households with higher average schooling and larger number of labors are more likely to migrate for both groups. Land availability plays a negligible role in migration. Household net income stimulates migration for both groups, but probabily for different reasons.. In addition, with control for network effects, we found contemporaneous clustering of migration at the village level, which might be attributed to the effort made by hiring firms to solve information problem.

For the impact of migration, we find that migrant households produce less grain than nonmigrant households due to a decline in the number of labors. Households respond to migration, however, by having members who stay behind work longer. Therefore, the negative impact of migration on grain production is only 0.4 percent of the previous grain output. Not only does household income rise upon migration but also per capita proceeds received by household members who stay. In addition, migrant households on average enjoy higher growth of per capita income than nonmigrant households.

Migrating for jobs in urban areas offers new opportunities to rural households. This study verifies that migration is a rational choice by comparing marginal returns to labor in farming with marginal returns from urban employment. The MP_L in grain production is estimated at only 1 yuan per labor-day, whereas migrants receive 17 yuan per labor-day in urban jobs. This large differential motivates rural-to-urban migration, and consequently migration raises total income of migrant households. Migration appears to be an effective approach to reduce income disparity between rural and urban households in China. Further research can be done to estimate the "true" welfare effect of migration if information on migration costs is available.

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Table 1. Characteristics of Household-Year Observations in 1986-1999

Variables	Unit	Mean	Standard Deviation
Migrant household dummy		0.18	0.38
Schooling of household head [1]		2.43	0.81
Average schooling of all members	years	17.17	9.94
Household size	number of people	4.56	1.82
Number of labors	number of people	2.69	1.24
Landholding[2]	mu	10.37	10.04
Grain area	mu	8.10	7.08
Grain production	kg	2394.09	4346.60
Grain sales	kg	743.49	1785.50
Farm labor input	labor-day	211.58	176.63
Grain labor input	labor-day	148.67	130.90
Hired labor input	labor-day	31.41	488.11
Gross income	yuan	14808.36	34392.20
Net income[1]	yuan	9013.11	16463.47
Farm income	yuan	2687.65	3334.52
Farm income/Gross income		0.34	0.26
Grain income	yuan	1881.81	2270.93
Gross expenditure	yuan	13312.64	32202.66
Farm expenditure	yuan	792.70	1126.85
Grain expenditure	yuan	598.74	888.78
Migrant income[2]	yuan	1832.68	7721.59
Migrant labor input[2]	labor-day	82.27	165.17
Remittances	yuan	163.47	3170.55
Taxes	yuan	287.59	1495.15
Village fees	yuan	183.06	546.00
Per capita net income	yuan	2055.59	3883.72
Per capita landholding	mu/person	2.21	2.31
Taxes paid of landholding	yuan/mu	128.87	4383.87
Ave. product of farming	yuan/labor-day	12.7	20.03
Ave. product of grain production	yuan/labor-day	12.6	19.50
Ave. product of migrant[2]	yuan/labor-day	17.0	29.70

Notes: 1. Net income = gross income -(household business expenditure + purchase of fixed capital + taxes + village fees).
2. Means are calculated for households whose migrant labor input exceeds zero.

Table 2. Selected Characteristics of Households by Migration Status

Variable	Nonmigrant HH	Migrant HH	t-statistic
Per capita net income (yuan/person)	1863.20	2913.04	-18.86***
Schooling of household head	6.92	7.04	-2.98***
Average schooling of members (years)	6.42	6.79	-10.62***
Household size (number of people)	4.47	5.03	-23.06***
Number of labors (number of people)	2.56	3.32	-47.03***
Farm income (yuan)	2690.07	2676.67	0.28
Farm income/Gross income (%)	0.36	0.23	38.10***
Landholding (mu)	10.70	8.81	12.56***
Grain production (kg)	2467.15	2063.24	6.51***

Notes: Columns 1 and 2 report the mean of the variables for nonmigrant households and migrant households over the entire sample period (1986-1999 with interruption of 1992, 1993 and 1994). Column 3 reports the two-sample t-statistic with unequal variances. * indicates that the difference is non zero at the one percent significance level.

Table 3. Determinants of Migration Choice in Rural China

	(1)	(2)	(3)	(4)
Lagged per capita net income	0.018***	0.004	0.009**	0.052*
	(0.005)	(0.005)	(0.004)	(0.028)
Schooling of household head	-0.002	-0.002	-0.002	-0.000
	(0.002)	(0.002)	(0.002)	(0.009)
Average schooling of all members	0.012***	0.007***	0.004**	0.029***
	(0.002)	(0.002)	(0.002)	(0.011)
Number of labors	0.068***	0.045***	0.035***	0.058***
	(0.003)	(0.003)	(0.003)	(0.015)
Lagged landholding	0.011	0.012	-0.002	0.049
	(0.008)	(0.008)	(0.007)	(0.036)
Lagged taxes	-0.012***	-0.006	-0.004	0.017
	(0.004)	(0.004)	(0.003)	(0.021)
Lagged village fees	-0.002	-0.000	-0.007**	0.004
	(0.004)	(0.004)	(0.004)	(0.017)
Lagged village migrant network	0.459***	0.217***	0.248***	0.243**
	(0.026)	(0.027)	(0.026)	(0.096)
Lagged village collectives	0.006	-0.002	-0.000	-0.036
	(0.013)	(0.012)	(0.011)	(0.061)
Entry Rate	0.465***	0.613***	0.476***	-0.019
	(0.032)	(0.033)	(0.032)	(0.092)
Year dummy: 1987	-0.079***	-0.076***	-0.181***	0.246***
	(0.017)	(0.015)	(0.015)	(0.087)
Year dummy: 1988	-0.074***	-0.065***	-0.135***	0.205***
	(0.016)	(0.015)	(0.014)	(0.078)
Year dummy: 1989	-0.078***	-0.057***	-0.108***	0.121*
	(0.015)	(0.014)	(0.014)	(0.073)
Year dummy: 1990	-0.070***	-0.056***	-0.096***	0.060
	(0.014)	(0.013)	(0.012)	(0.067)
Year dummy: 1991	-0.067***	-0.045***	-0.087***	0.028
	(0.013)	(0.012)	(0.012)	(0.063)
Year dummy: 1996	-0.038***	-0.061***	-0.087***	0.155***
	(0.010)	(0.010)	(0.009)	(0.035)
Year dummy: 1997	-0.017*	-0.034***	-0.056***	0.040
	(0.010)	(0.009)	(0.009)	(0.030)
Year dummy: 1998	-0.011	-0.030***	-0.036***	0.041
	(0.010)	(0.009)	(0.009)	(0.029)
Constant	-0.223***	-0.121**	-0.020	-0.468*
	(0.052)	(0.047)	(0.043)	(0.281)
N	18,941	15,914	13,592	3,027

Notes: The dependent variable is the migration dummy. It is equal to one if the migrant labor input of a household is greater than 180 labor-day, zero otherwise. All columns reports estimates of coefficients from fixed-effect regressions. Column 1 reports the estimation of the full sample. Column 2 reports the estimation where the lagged migration status equal to 0. Column 3 reports the estimation where the lagged migration status equal to 1. Column 4 reports the estimation of first-time migrants. Standard errors in parentheses. * denotes p<0.1, ** p<0.05, and *** p<0.01

Table 4. Determinants of Migration Choice Conditional on Income Groups

	(1)	(2)
Lagged pc net income	0.016***	0.014***
	(0.005)	(0.004)
Lagged pc net income * 1st quintile dummy		0.002
		(0.001)
Lagged pc net income * 2nd quintile dummy	-0.002*	
	(0.001)	
Lagged pc net income * 3rd quintile dummy	-0.001	
	(0.002)	
Lagged pc net income * 4th quintile dummy	-0.002	
	(0.002)	
Lagged pc net income * 5th quintile dummy	-0.004*	-0.002*
	(0.002)	(0.001)
Schooling of household head	-0.002	-0.002
	(0.002)	(0.002)
Average schooling of all members	0.004**	0.004**
	(0.002)	(0.002)
Number of labors	0.035***	0.035***
	(0.005)	(0.005)
Lagged landholding	-0.002	-0.002
	(0.007)	(0.007)
Lagged taxes	-0.004	-0.004
	(0.003)	(0.003)
Lagged village fees	-0.007**	-0.007**
	(0.003)	(0.003)
Lagged village migrant network	0.251***	0.251***
	(0.038)	(0.038)
Lagged village collectives	-0.001	-0.000
	(0.010)	(0.010)
Entry rate	0.478***	0.478***
	(0.048)	(0.048)
Year dummy: 1987	-0.184***	-0.184***
	(0.015)	(0.015)
Year dummy: 1988	-0.138***	-0.138***
	(0.015)	(0.015)
Year dummy: 1989	-0.111***	-0.111***
	(0.015)	(0.014)
Year dummy: 1990	-0.099***	-0.099***
	(0.014)	(0.013)
Year dummy: 1991	-0.090***	-0.090***
	(0.013)	(0.013)
Year dummy: 1996	-0.087***	-0.086***
	(0.011)	(0.011)
Year dummy: 1997	-0.055***	-0.055***
	(0.011)	(0.011)
Year dummy: 1998	-0.035***	-0.035***
	(0.011)	(0.011)
Constant	-0.056	-0.057
	(0.046)	(0.043)
N	13,592	13,592

Notes: All columns report estimates of coefficients from fixed-effect regressions for 1st-time migrants. Standard errors are in parentheses. * denotes p<.1, ** p<0.05, *** p<0.01.

Table 5. Impact of Migration on Grain Production

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Log land input	0.640***	0.642***	0.614***	0.615***	0.689***	0.696***
	(0.013)	(0.013)	(0.015)	(0.015)	(0.042)	(0.041)
Log labor input	0.079***	0.081***	0.090***	0.090***	0.080***	0.088***
	(0.008)	(0.008)	(0.010)	(0.010)	(0.027)	(0.029)
Log capital input	0.149***	0.148***	0.152***	0.152***	0.119***	0.115***
	(0.007)	(0.007)	(0.008)	(0.008)	(0.020)	(0.022)
Schooling of household head	-0.001	-0.001	0.000	0.000	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.006)
Average schooling of all members	0.003*	0.003*	0.002	0.002	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.006)
Migration dummy	-0.014**		-0.007		-0.043***	
	(0.006)		(0.009)		(0.014)	
Log land input * migration dummy		-0.014		-0.013		-0.010
		(0.014)		(0.018)		(0.031)
Log labor input * migration dummy		-0.009		-0.003		-0.011
		(0.008)		(0.012)		(0.016)
Log capital input * migration dummy		0.008		0.005		0.005
		(0.005)		(0.010)		(0.013)
Constant	5.110***	5.105***	5.103***	5.103***	5.246***	5.218***
	(0.051)	(0.051)	(0.062)	(0.062)	(0.151)	(0.151)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	27,857	27,857	19,914	19,914	4,511	4,511

Notes: The dependent variable is logged household grain production. Columns 1,3 and 5 estimates the scaled effect of the migration dummy. In columns 2,4 and 6 the migration dummy interacts with three production factors. Columns (1) and (2) are estimated for the whole sample. Columns (3) and (4) are for the first-time migrating households and columns (5) and (6) are for the repeated migrating households. Year dummies are suppressed. Standard errors are in parentheses. * denotes p<.1, ** p<0.05, *** p<0.01.

Table 6. Impacts of Labor Supply on Household Incomes

	Income	Income + Migrant Labor Income	Income + Remittances	Income + Remittances (Adjusted)
	(1)	(2)	(3)	(4)
Land input	0.612***	0.201***	0.130	0.310
	(0.014)	(0.018)	(0.148)	(0.197)
Capital input	0.186***	0.118***	0.229***	0.281***
	(0.009)	(0.011)	(0.076)	(0.098)
Labor input	0.082***	0.012	-0.419***	-0.478***
	(0.010)	(0.014)	(0.127)	(0.165)
Migrant labor input	-0.005	0.230***	-0.004	0.101**
	(0.004)	(0.005)	(0.035)	(0.044)
Schooling of household head	-0.002	0.004	0.007	0.037
	(0.002)	(0.003)	(0.021)	(0.026)
Average schooling of all members	0.612***	0.201***	0.130	0.310
	(0.014)	(0.018)	(0.148)	(0.197)
Year dummies	Yes	Yes	Yes	Yes

Notes: All variables are in logarithmic forms. In column 1, the dependent variable is household income from grain production. In column 2, the dependent variable is the sum of grain income and migrant labor income. In column 3, the dependent variable is the sum of grain income and remittances from migrant labors. In column 4, the dependent variable is the sum of grain income and remittances divided by number of household members who stay. All four regressions are fixed-effect regressions. Standard errors are in parentheses.

Table 7. Impacts of Dynamic Migration Status Change

	Net income	Nonmigrant income	Grain production	Grain labor input	Grain capital input
Migration dummy this year	0.164***	-0.254***	-0.004	-0.014	-0.016
	(0.012)	(0.012)	(0.009)	(0.008)	(0.011)
Migration dummy last year	-0.129***	0.244***	0.004	0.022**	0.007
	(0.012)	(0.012)	(0.010)	(0.009)	(0.011)
Difference in average schooling	0.014***	0.012***	0.003	0.002	0.005*
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Difference in HH size	0.044***	0.045***	0.029***	0.033***	0.021***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Year dummy: 1987	0.247***	0.277***	0.013	0.082***	0.216***
	(0.042)	(0.042)	(0.035)	(0.031)	(0.040)
Year dummy: 1988	0.167***	0.237***	-0.098***	-0.015	0.190***
	(0.016)	(0.016)	(0.013)	(0.011)	(0.014)
Year dummy: 1989	0.045***	0.100***	0.048***	-0.022**	0.126***
	(0.015)	(0.015)	(0.012)	(0.011)	(0.014)
Year dummy: 1990	0.086***	0.132***	0.054***	0.033***	0.087***
	(0.015)	(0.015)	(0.012)	(0.011)	(0.014)
Year dummy: 1991	0.037**	0.109***	-0.074***	-0.018*	0.001
	(0.015)	(0.015)	(0.012)	(0.011)	(0.014)
Year dummy: 1996	0.056***	0.143***	0.015	-0.039***	0.084***
	(0.017)	(0.017)	(0.014)	(0.013)	(0.016)
Year dummy: 1997	-0.052***	-0.024	-0.154***	-0.023**	-0.102***
	(0.016)	(0.016)	(0.013)	(0.012)	(0.015)
Year dummy: 1998	-0.051***	-0.028*	-0.002	-0.040***	-0.124***
	(0.016)	(0.016)	(0.013)	(0.012)	(0.015)
Constant	-0.003	-0.059***	0.019**	-0.011	0.005
	(0.012)	(0.012)	(0.010)	(0.009)	(0.011)

Notes: All dependent variables are first differencing of logarithm forms, which approximates the percentage change between year *t* and *t*-1. Standard errors are in parentheses.

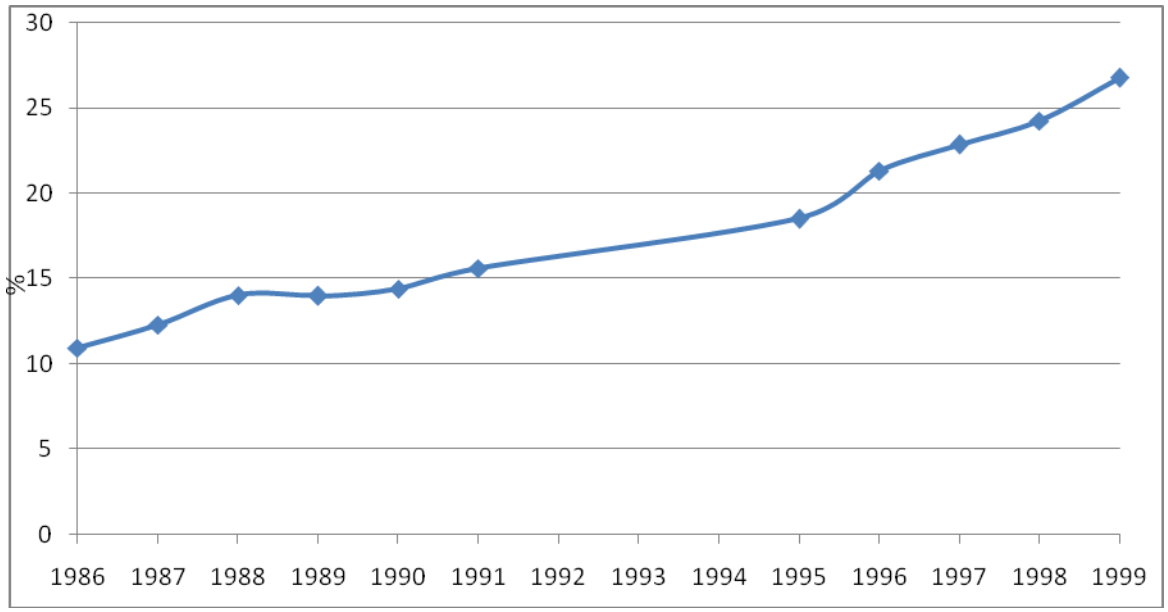

Figure 1. Proportion of Migrant Households, 1986 - 1999

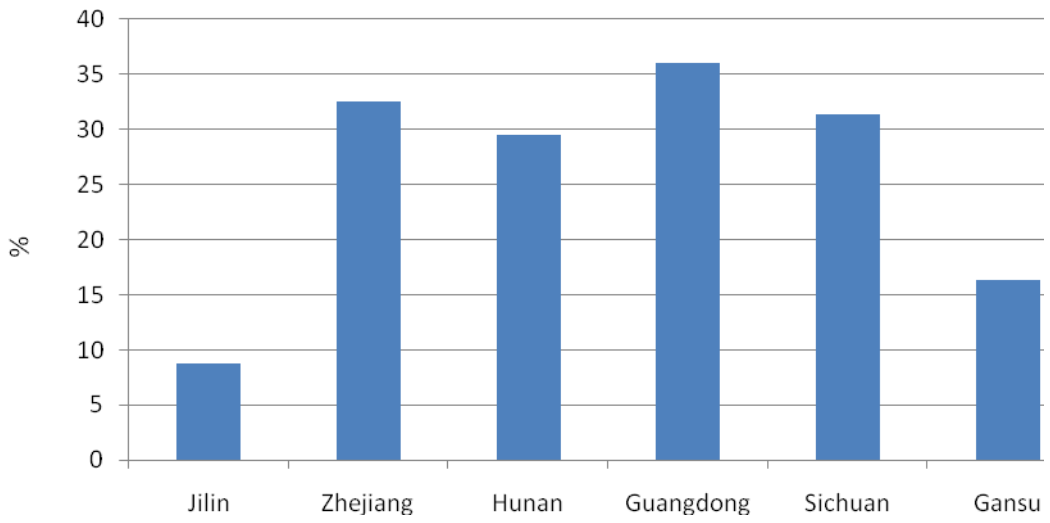

Figure 2. Proportion of Migrant Households by Province, 1999