Variations in Village Migration Profiles in Rural China：An Analysis Based on the Second National Agricultural Census Data

This paper published in *Asian and Pacific Migration Journal*, Vol. 24, No.2, 2015

Bin Wu[1*], Bernadette Robinson[1] and Wenjin Long[2]

1. Centre for Chinese Migration Studies, School of Contemporary Chinese Studies, University of Nottingham, Jubilee Campus, Nottingham, NG8 1BB, UK, Email: bin.wu@nottingham.ac.uk; bernadette.robinson@nottingham.ac.uk;
2. School of Agricultural Economics and Rural Development, Renmin University, No. 59 Zhongguancun Street, Haidian District, Beijing, China 100872; Email: Long.Wenjin@gmail.com

Acknowledgement:

This paper results from a recently completed ESPA (Ecosystem Services and Poverty Alleviation) project which was jointly funded by UK NERC, ESRC and DFID (Funding reference: NE/G008280/1). We are grateful to the Department of Rural Surveys, National Bureau of Statistics (NBS) which provided access and technical support for us in using the Second National Agricultural Census data. Special thanks are given to Mr. Zhang Yi and Mr. Wang Chuanjing, both from the NBS, whose participation and advice were crucial for us in preparing this paper. We would like to express our sincere thanks to the editor and two anonymous reviewers for their encouragement and constructive comments on this paper.

* Correspondent author

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Abstract:

Relatively little attention is paid to variations in rural migration at the village level even though labor supplying villages present considerable diversity in economic and development profiles. This paper examines the relationships between labor and household migration at the village level and the factors associated with different migration patterns through an analysis of data from China's Second National Agricultural Census. The study identified four types of village migration profiles based on labor and household migration data from 4,482 villages in 10 counties across five provinces. Typical characteristics of each type villages are highlighted and implications for rural researchers and policy makers are discussed.

Keywords: Village Migration Profile (VMP), Labor and household migration, Rural China, Second National Agricultural Census (SNRC)

Introduction

The unprecedented growth of rural-urban migration in China over the last two decades has had a profound impact on both rural and urban society in the country. The urbanization rate increased from 36.2 percent in 2000 to 53.7 percent in 2013, according to the National Bureau of Statistics (2013, 2014a, 2014b). The total number of 'rural migrant workers,' defined as those who are employed outside their county of origin for six months or more, reached 166.10 million in 2013. Of these, 35.25 million were accompanied by their families from their home villages. Rural China is not homogeneous though often it is considered so. In reality, the villages and regions where labor migrants

come from vary greatly in their environment and levels of economic development. In what ways then do the villages differ in terms of the scale and extent people involve migration and how can we measure such difference?

This paper examines various patterns of rural labor migration at the village or meso level. There are three reasons for adopting this approach. First, decisions to migrate are influenced by the resources and the economic and social environments of villages, which can differ greatly. Second, studies at the village level reflect policy implementation and impact at the local level because the village is the basic administrative unit in rural China. Third, studies at the village level have received less attention from scholars than macro-level studies, often because of the unavailability of data and interest for other levels of analysis.

The variety of rural-urban migration at the village level can be explored either through individual or household migration but it is likely that they are related (Yang, 2000). From a dynamic perspective, individual labor migration may also lead to household migration (Shields and Shields, 1993), each of which has different effects on villages. Thus in order to get a fuller picture of rural-urban migration at the village level, we needed to combine analyses of labor and household migration.

Previous research has studied different aspects of rural migration as it relates to resource endowment and ecological environment (Castles, 2002; Li and Zahniser, 2002; EACH-FOR, 2009), infrastructure development (Murphy, 2002), rural poverty (Du et al., 2005), social networks (Massey, 1990; de Haan et al., 2002; de Haan and Rogaly, 2002), and rural livelihood systems (Wu, 2003). Based on existing research, it can be seen that the variety of rural environments and village development levels across China determines

the role of migration in the rural livelihood system and occurs through geographical diversity. Another factor at play is the finding that rural-urban migration may not necessarily be the best choice for all rural residents (Guang and Zheng, 2005).

The variety of rural migration contexts in China is supported by both quantitative differences, e.g., the percentage of migrant laborers in the total rural labor force (Rozelle et al., 1999a), and qualitative differences, e.g., the social structure of migrant laborers in rural economy and society (Rozelle et al., 1999b; Brauw and Giles, 2008). The main focus of attention over the last two decades has centered on the social structure, that is, the labor migration of individuals (Zhao, 1999), and its consequences, such as the feminization of the rural labor force (Zhang et al., 2004; Mu and van de Walle, 2011), elderly laborers (Giles and Mu, 2007), children left behind in villages (Biao, 2007; Chang et al., 2011) and urban labor markets (Knight et al., 1999; Meng and Zhang, 2001; Fan, 2002). The focus on labor migration without considering household participation has come under increasing scrutiny (Zhao, 2005; Fan and Wang, 2008). Household migration (the migration or resettlement of whole families outside of their home villages) contributed about 21 percent of rural labor migration by 2013 (NBS, 2014a). It is likely that more households will join in rural-urban migration in the near future, given China's trend to urbanize. This type of rural migration has raised many questions about the relationship between labor and household migration and the correlation or causality between them.

In trying to understand the factors that may be at work in rural-urban migration, our research examines the variety of rural-urban migration at the village level, constructing village migration profiles (VMP) in combined analyses of labor and household migration.

To our knowledge, it is the first paper to use aggregate data at the village level from the Second National Agricultural Census (SNAC). The paper is organized into five parts. Following this introduction, the next section introduces the VMP analysis and the SNAC. Section 3 provides background information on five selected provinces, counties and villages. Section 4 summarizes the research findings based on the analysis of 4,482 villages drawn from 10 counties in five provinces. Section 5 provides our conclusions and some policy implications.

Village migration profiles (VMP): Methodology and sources

Given the great variety of factors (resource availability, environments and economic development levels) affecting rural migration, an appropriate sample frame and unit of analysis are an essential basis for any empirical study in rural China. The conventional rural survey, based on household questionnaires, can be considered inappropriate for this purpose as it does not deal with the sample frame issue of missing resettled households. Also, official data, based upon information on labor and household movement collected from village administrations may lack detailed information about local environments, employment and workers' destinations. An extensive village case study would provide a deeper understanding of the history, process and key factors contributing to household migration but such a research methodology can be expensive, time consuming and not representative where generalization is needed.

As a way forward, this paper constructs village migration profiles (VMP) for analysis and comparison in terms of resources, environment, infrastructure and, more importantly, labor and household migration information. The profiles have information

on village characteristics including population, labor resources, infrastructure, and socioeconomic factors (e.g., income, education, poverty). The analysis of these characteristics then leads to the construction of a typology of village migration status according to similarities and differences in economic and social conditions, household and individual labor migration. The categorization of villages (VMP) shows their distribution and differing contexts and points towards factors which may influence household decisions to migrate as well as the implications for future village development.

The above approach stems from a pilot project using group observations of more than 20 villages in five counties across the Loess Plateau in 2009, resulting in an analysis of village profiles in North Shaanxi (Wu and Yao, 2010). The feasibility of VMP analysis is largely dependent upon the source of data and the reliability and breadth of information at the village level. In our study, resources from the National Bureau of Statistics(NBS) were used, analyzing a dataset extracted from the Second National Agricultural Census (SNAC) conducted in 2007. This database contains comprehensive information on all laborers, households and administrative villages in China at the end of 2006[1].

The SNAC[2]

[1]This is the second national survey conducted in 2007 (the first in 1997) organised by central government and coordinated by the National Bureau of Statistics. Leading by a vice premier, all provincial and county governments in China were responsible for mobilising all villages and households in rural China to participate in the SNAC and provide accurate information as possible as they can.

[2] A technical note about SNAC is available at http://www.fao.org/fileadmin/templates/ess/ess_test_folder/World_Census_Agriculture/Country_info_2010/Explanatory_notes/Validated/China_2007.pdf
SNAC Questionnaires are available at http://www.fao.org/fileadmin/templates/ess/ess_test_folder/World_Census_Agriculture/Country_info_2010/Questionnaires/Questionnaire_5/CHN_ENG_QUE_2007.zip

For the purposes of this paper, two SNAC questionnaires were selected: the Village and the Residential household questionnaires. The Village questionnaire, completed by village leaders, covers ten areas of information:

- basic information: whether the village is designated as a ‘poor village' by the government;[3] access to electricity, telephone and TV;
- geographic information: topography (plains, hills or mountains); distance to main road; presence of schools, hospital and township government;
- population and migration: registered and migrated population and households;
- infrastructure conditions: drinking water security; conditions of village road; sanitation and garbage collection;
- agricultural resources: land area for farming, forestry, grassland and fishing; irrigation and farmland transfer;
- economic conditions: government aid for poverty alleviation and development projects; collective assets and financing status.

The Household questionnaire has two parts: household basic information and household agricultural production information. The basic information questionnaire has two sections: information on individual household members, and household livelihood and living conditions. The individual member information covered:

- personal information: age, gender and years of schooling;

[3]The term “poor villages” is used by county governments for the purpose of the distribution of government poverty alleviation funding or development projects such as road building, government subsidy loan, or agricultural technical extension. There is no a single but many factors which determine whether a village is entitled as poor village.

- duration (months) of living within the village and working in agriculture and non-agricultural employment during 2006;
- duration (months) and location of living outside of the township in 2006, as well as in the industrial sector, if employed during the period.

The second section on Household basic information consisted of 19 parts and 52 items relating to household social security status, housing and living conditions, farmland and agricultural resources, household income structure and financial status. Besides the basic information, the Household questionnaire was used to collect household agricultural production information through more than 100 items on production conditions, inputs to products and revenues.

For the purpose of this paper, we created a dataset by extracting relevant information from the SNAC database in three steps. First, with a process of consultation and discussion with collaborators from NBS (National Bureau of Statistics), provinces and counties were selected according to region, level of economic development, its status as a supplier of labor. Then all village questionnaire information in the selected counties was assembled to reflect the variety of household migration across sampled villages and counties. Finally, labor migration information was derived from an aggregation of all household member information in the sampled villages, collected from the Household questionnaire. This included the following questions:

'How many registered households does the village have?' (C38);

'How many registered residents does the village have?'(C39)

'How many migrant households does the village have?' (C40);

'How many individuals have left the village as members of migrant household?'(C41)

Labor migration was probed by the question,

'For how long (months) did the person work outside of the local township?' (R15).

In this paper, those who worked outside of the local township for more than six months are defined as migrant labor. Labor migration rate refers to the proportion of migrant labor to the total number of workers. Household migration rate is the proportion of migrant households to the total number of registered households.

The next section outlines the sampling process and background information used to determine the representativeness of the dataset.

Sampling process and background information

By consulting to the NBS, we selected five out of 31provinces, Shandong, Anhui, Henan, Sichuan and Gansu, to represent Eastern, Central and Western regions and allow for comparisons between typical regions. These five provinces account for 30 percent of China's rural population; three (Shandong, Henan and Sichuan) are the most populous (over 50 million) and Gansu is the smallest. All these provinces, except for Shandong, have lower urbanization rates than the national average of 44 percent (for example, Gansu had 31 percent and Anhui 37 percent).

The profiles of the five provinces vary in terms of economic development, farmer's income and rural labor distribution (*see* Table 1). Four of them are below the national average in terms of GDP and net income per capita for rural people. Gansu is the lowest,

with a GDP of 54 percent and rural per capita income of 59 percent of the national average. Anhui, Henan and Sichuan are more representative of rural China in terms of the rural economy and peasant income. Our calculation of the contribution of rural resident labor (those who stayed in the village for more than six months in 2006) to the non-agricultural sector (a major source of rural income growth) showed Shandong (32.8 percent) to be slightly higher than the national average (29.2 percent) in this respect. The other four provinces were lower than the national average (*see* Table 1).

Table 1. Background information about sample provinces (2006).

Province	GDP per capita	Rural income	Rural laborers	Non-agricultural employment	Broadly defined labor migration rate[4]	Urbanization rate
	China Yuan Renminbi or CNY/person	CNY/person	million	%	%	%
Shandong	23,716	4,368	47.56	32.84	16.00	46.10
Anhui	10,063	2,969	30.64	25.99	36.52	37.10
Henan	13,305	3,261	50.05	23.70	22.94	32.47
Sichuan	10,574	3,002	40.51	14.15	31.71	34.30
Gansu	8,736	2,134	12.57	10.41	19.72	31.08
National	*16,042*	*3,587*	*555.11*	*29.22*	*23.75*	43.90

Note: Non-agriculture employment covers those working in this non-agriculture sector, whether in their home province or elsewhere..

Source*:* The National Bureau of Statistics (2008)

Local non-agricultural employment is, however, only one of several sources of rural income growth. Another is labor migration, which accounted for about 24 percent of the rural registered labor force nation-wide in 2006(NBS, 2008). The labor migration rate varies greatly among provinces. It was higher than the national average in Anhui and Sichuan whereas it was lower in Shandong and Gansu. However, the low labor migration rate may have different causes and consequences. For example, in Shandong the higher urbanization rate and greater non-agricultural employment opportunities may discourage labor migration whereas Gansu has weaker economic development and people have less access to work opportunities in the coastal region as well as few non-agricultural employment opportunities in the local labor market.

[4] Labor migration rate here is broadly defined as the share of migrant laborers who worked outside of their township for at least one month in 2006 in the total registered labor force. The rest of this paper will use a strictly defined labor migration rate referring to those who worker outside at least 6 months.

The influence of contextual factors on the sending communities can be further illustrated through analysis of data on demography, resource availability, environment, and levels of economic and social development at the village level. For this purpose, we chose two medium-sized counties in each selected province: one officially designated as a national-level poor county (in the case of Shandong, a provincial-level poor county was chosen)[5] and the other without such designation, that is ten counties in total. This allowed us to compare the incidence of rural poverty for labor and household migration. Within each selected county, all villages were included in order to capture the variety of village populations, resources, environments, and economic development in relation to labor and household migration. As a result, our dataset consisted of 4,482 villages in 10 selected counties in five provinces.

Sample village profiles and research findings

In this section, we describe the village migration profiles in general and examine village migration status and distribution in relation to the key factors of topography, resource availability and rural poverty.

Overview of village migration profiles

Basic information about the rural population and migration in the 4,482 villages is given in Table 2. As can be seen, the numbers of *hukou* (officially registered) households and population (items 2 and 3) obtained from village questionnaires are higher than those compiled through census counted households and populations (items 4 and 5). This is

[5]From the perspective of the source of government poverty alleviation funding, 'poor counties' in China can be divided into two categories: national-poor-counties which are entitled to access to central government anti-poverty funding, and provincial-poor counties which are entitled to access to provincial government funding against rural poverty.

because the census data are based on the Household questionnaire whereas the Village questionnaire data concern all households recorded in local authority documents. Further details about census laborers (item 6) can be obtained from the Household questionnaire, including the duration of their stay outside of their township either at least one month ('broadly defined' labor migration in item 7) or six months or more ('strictly defined' labor migration in item 8) during 2006.

Table 2. Basic information on sample villages.

Item	N	Mean	SD
(1) Number of villages	4,482		
(2) *Hukou* households	1,561,888	348	292
(3) *Hukou* population	5,941,889	1,326	1173
(4) *Census* households	1,412,779	315	245
(5) *Census* population	5,375,600	1,199	988
(6) *Census* laborers	3,813,947	851	686
(7) Broadly defined migrant labor (>=1 month)	1,026,898	229	313
(8) Strictly defined migrant labor (>=6 months)	824,720	184	269
(9) Outmigration of *Hukou* households	143,225	32	64
(10) Outmigration of *Hukou* population	497,458	111	255
(11) Household migration rate: (9)/(2) x 100%		9.17	10.29
(12) Broadly defined labor migration rate: (7)/(6) x 100%		26.92	17.09
(13) Strictly defined labor migration rate: (8)/(6) x 100%		21.62	15.47

Source: Derived by authors from SNAC data

Table 2 provides a basis for the analysis of both household and labor migration at the village level. For household migration, although there is no detailed information about who, where, or why household migration happened, we know at least how many registered (*hukou*) households and people were involved in migration or resettlement in the past (items 9 and 10). By comparing registered households (item 2), we can estimate

the household migration rate for villages.[6] We found this to be less than 10 percent among sample villages and similar to the national average (NBS, 2008). For labor migration, there are two calculations relating to the two categories of rural migrant laborers (the broad and strict categories based on the duration of migrant work) resulting in labor migration rates of 26.9 percent for broadly defined labor migration (3.1 percent higher than national average, as shown in Table 1) and 21.6 percent for strictly defined labor migration. For the purpose of this paper, we focus on the category of the strictly defined labor migration (that is, those working away for six months or more in a year).

Information on rural resources, environments and development conditions is given in Table 3 which indicates the variety of village migration profiles by province and county.

Table 3. Village migration profiles by province, county and poverty designation.

Province	County	Poor County?	No. of villages	% of sample	Household migration (%)	Labor migration (strictly defined) (%)
Shandong	Qihe	No	1,013	22.6	1.07	9.66
	Pingyi	Yes	725	16.18	4.92	13.06
Anhui	Shexian	No	418	9.33	7.48	33.60
	Yingshang	Yes	304	6.78	18.88	36.47
Henan	Jiyuan	No	478	10.66	3.85	0.02
	Ningling	Yes	356	7.94	6.42	15.71
Sichuan	Qionglai	No	212	4.73	3.72	26.38
	Nanjiang	Yes	517	11.54	20.69	32.11
Gansu	Minqin	No	244	5.44	8.23	1.30
	Longxi	Yes	215	4.80	2.78	10.87
Total			*4482*	*100.00*	*9.17*	*21.62*

[6] This assumes that there are no immigrant households and that the past in-migration of households from outside the village can be ignored.

At least two conclusions can be drawn from Table 3. First, labor migration rates in the villages of Anhui and Sichuan are around 30 percent or more, much higher than their counterparts in the neighboring provinces of Shandong, Henan and Gansu. Second, the difference between sample counties in terms of labor migration rate ranges from almost zero (Jiquan in Henan and Minqin in Gansu) to 36 percent (Yinshan in Anhui). In general, the labor migration rate in poor counties is higher than in non-poor counties.

The relationship between labor and household migration is complicated. In general, the labor migration rate is higher than the household migration rate, and it might be expected that the household migration rate rises with increases in labor migration. This, however, is not confirmed by our analysis which shows that a higher labor migration rate is not necessarily associated with a high household migration rate (e.g., Shexian in Anhui and Qionglai in Sichuan) and there are cases where the household migration rate is higher than labor migration rate (e.g., Minqin in Gansu and Jiyaun in Henan). The variety of the relationship between labor and household migration will be discussed in the rest of the paper.

Village migration status

The relationship between labor and household migration can be better understood by an analysis of the village migration status using a combination of labor and household migration rates. As a result, variation in village migration profiles can be analyzed from the geographic or spatial dispersal of labor and household migration rates, respectively (*see* Figure 1), and from a combination of labor and household migration rates.

As Figure 1 shows, about 11 percent of villages had almost no labor migration and nearly a third (31 percent) had almost no household migration. Furthermore, about one-quarter (26 percent) of villages had low labor migration rates of less than 10 percent and 42 percent of villages had similarly low household migration rates. Nearly two-thirds of villages (63 percent) had a labor migration rate of 10 percent or more, while only 27 percent of villages had a comparable household migration rate.

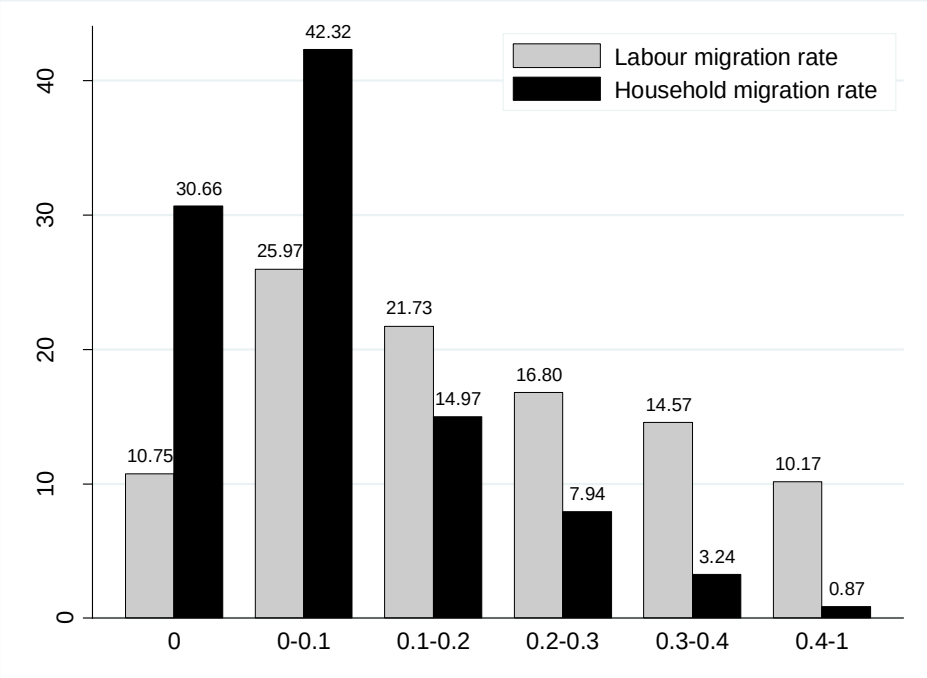

Figure 1. Distribution of labor migration rate and household migration rate

Relationship between labor and household migration

The distinction between labor and household migration rates leads us to further question the relationship between these two types of migration. We used linear regression to establish the relationship between household migration rate and labor migration. Control variables included location (topography, distance to nearest station, primary school, and hospital), infrastructure (type of road), agricultural resource (arable land, irrigation water), non-farming opportunity (non-farming rate among surveyed laborers), and economic status (poor village). We added labor migration rate squared in the independent variables just in case the relationship between household and labor migration rate was not linear. To capture the difference between poor counties and non-poor counties, we divided the

sample into two groups (whether the village is located in a poor county or not). From the regressions,[7] we can predict the household migration rate using different values of labor migration rate, as shown in Figure 2.

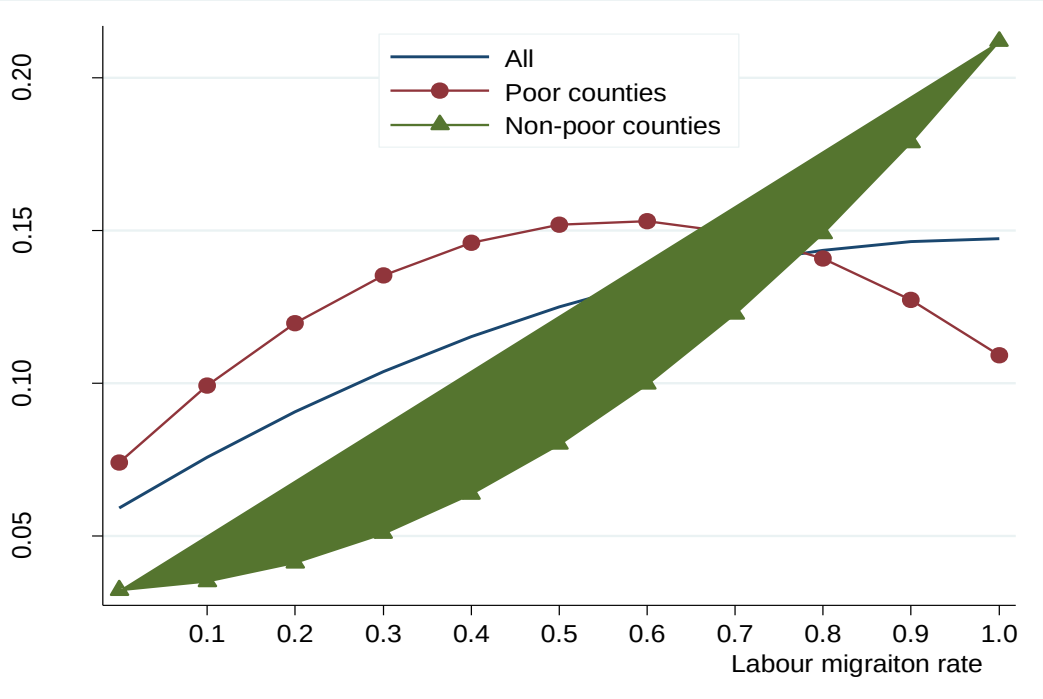

Figure 2. Predicted household migration rate from regressions.

As can be seen, the relationship between labor and household migration varies across different groups. The curve for all villages is mid-way between the curve for villages in poor counties and that for villages in non-poor counties. The curve for all villages is smoother than the two other curves. For villages in non-poor counties, there is an accelerating tendency of the effect of labor migration on household migration. Household

[7]Appendix Tables A1 and A2 provide bivariate statistical tests for labor migration, household migration and other variables used in the linear regression. Appendix Table A3 gives the coefficients and robust standard errors from the linear regression.

migration appears to increase as labor migration grows, then to speed up as labor migration continues to increase. For villages in poor counties, household migration appears to rise when labor migration increases. However, the growth rate of household migration is lower than that of labor migration. After the turning point, household migration drops while labor migration continues to increase and the rate of decrease is higher than the rate of growth of labor migration.

In sum, Figure 2 illustrates the complexity of rural labor migration, in general, together with the different patterns of relationships between labor and household migration according to county development conditions.

Typology of village migration profiles

Since labor migration has a complex relationship with household migration, we combined labor migration and household migration to construct village migration profiles. In Figure 3, we bring these two forms of migration together to determine the position of each village in our sample.

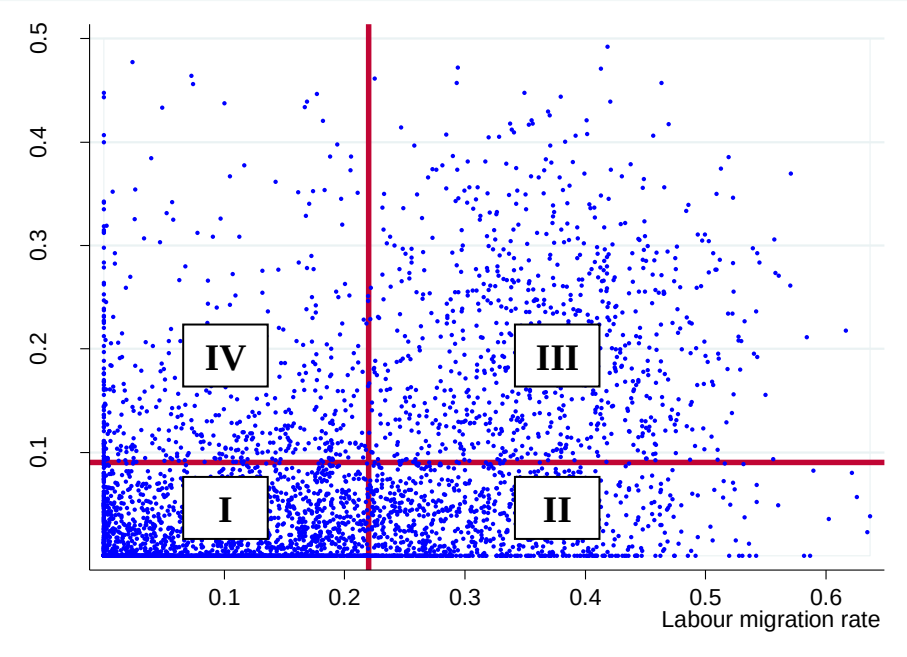

Figure 3. Distribution of villages by labor and household migration rates.

Although Figure 3 can illustrate the status of individual villages in terms of combined labor and household migration, more information is needed (on rural resources, environments and economic development conditions) to elicit common features among villages with similar migration status. For this purpose, we inserted two lines into the graphs: one the mean labor migration rate (vertical) and the other, the mean household migration rate (horizontal). This allowed all the villages to be sorted into four zones (*see* Table 4), offering the basis for a four-part typology in terms of similarities and differences in village migration.

Table4. Distribution of villages by type of migration.

Category	No.	%	Labor migration (%)	Household migration (%)
I	2,298	51.27	8.75	2.12
II	861	19.21	33.25	3.27
III	847	18.90	38.13	21.41
IV	476	10.62	10.78	16.63
Total	*4,482*	*100.00*	*21.62*	*9.17*

From Table 4, it can be seen that Type I villages are both low in labor migration (less than 10 percent of village laborers) and low in household migration (just about 2 percent of *hukou* households). This contrasts with Type III villages which have characteristics of both high labor migration (38 percent of surveyed laborers) and high household migration (over 20 percent of *hukou* households). By contrast, Type II villages are high in labor migration rates (33 percent) but low in household migration rates (3 percent) whereas Type IV villages are high in household migration rates (17 percent) but low in labor migration rates (11 percent). As to distribution, Table 4 shows that Type 1 villages account for just over a half of the total while Type IV villages for just over 10 percent. The remainder is shared equally between Types II and III, each with just under 20 percent of the total.

Features of different types of villages

Although it can be considered a rough tool, the use of a typology for village migration profiles provides us with a means of comparison, based on different factors affecting villages and taking variables such as resources, infrastructure, topography and poverty status into consideration. It enables us to organize a large amount of data more

meaningfully and to distinguish difference and dispersal. The features of the different types of villages and our statistical test results are summarized in Table 5. For categorical variables, we used Pearson's chi-squared test; for continuous variables, we used the Wald test. The results are as follows.

Location (topography) is a significant variable in determining the village typology. Table 5 shows that about 60 percent of Type I villages are located in the plains, while the rest are in hilly and mountain areas. This contrasts with the Type III category in which more than half the villages are in mountainous terrain, 35 percent in plains and 10 percent in hilly areas. Villages in Type II and IV categories are similar in their distribution among mountains, hills and plains.

Physical and service infrastructures also influence the village typology. The remoteness of villages is measured by distance to the nearest bus stop on a main road, and to the nearest primary school and hospital. The data show that the mean distance to the nearest bus stop ranges from 3 to 5 km, suggesting that the distance to the main road is not great between villages and is unlikely to be a barrier to rural/household migration. However, access to public services, a factor which may influence labor and household migration decisions indirectly, showed more variation. As Table 5 shows, there are significant differences between Types I/II and III/IV villages as well as similarities among all four categories. This shows that villages in Types III and IV are more remote or face more difficulty in accessing public services than Types I and II villages.

A village's development status and potential is indicated in part by the local infrastructure, such as the type of road to and through the village. In the Village questionnaire for instance, there are three levels of village road conditions:

concrete/asphalt (high quality), road surfaced with sand or stone (middle quality) and other roads (low quality). Table 5 shows that nearly 80 percent of Types I and II villages can be accessed through high quality road (concrete/asphalt), more than twice as many as Type III villages, where over a quarter of villages are served by unsurfaced roads (i.e., unusable by any motor vehicle during the rainy or snowy seasons) and have three times as much poor roads as villages in Type I and II categories.

In terms of agricultural resources, perhaps the most important feature is arable land area and quality of farmland. Though lacking information about the quality of farmland, Table 5 indicates the difference between villages in terms of area of arable land. On average, the area of arable land in villages in Types I and IV is over 6 *mu*[8] per household, much higher than Type II (3.4 *mu*) and Type III (4.7 *mu*) villages. Given the high labor migration rates in Type II and III villages, it seems that the shortage of arable land may be an important factor driving labor migration. The large area of farmland for Types I and IV may not be of equivalent quality for agricultural production. Taking into account the differences in topographic features between the two types of villages, it is reasonable to assume that the quality of farmland in Type I is likely to be higher than that in Type IV. Such an assumption is supported by the data on water security for agricultural production. Table 5 shows that Types I and II villages are high in water security in normal years, about 10 percent points higher than Type III and IV villages.

One very important feature relating to labor migration is the poverty status of a village (whether it is one of the government-designated poor villages). As can be seen in Table 5, the number of poverty-designated villages ranges from just over 10 percent in Type I villages to 29 percent in Type IV villages. As Table 4 has already shown, most

[8] *mu* is a Chinese unit of area, 1 mu = 666.67 m^2

migration, individual and household, occurs in Types III and IV villages, each category having nearly 30 percent of poor villages.

Table 5. Distribution of villages by environmental conditions.

Variable	Item	I	II	III	IV	P value of Chi-square or Wald test
Topography (%)	Plains	59.49	42.62	35.06	44.33	0.000
	Hills	18.54	20.09	10.39	17.86	
	Mountains	21.98	37.28	54.55	37.82	
Distance to amenities (km)	Bus stop	3.03	3.56	4.72	4.36	0.000
	Primary school	1.50	1.39	1.42	1.84	0.022
	Hospital	4.38	4.01	5.21	5.06	0.000
Type of road (%)	Concrete/asphalt	79.42	77.12	35.89	61.97	0.000
	Sand or stone	12.23	15.10	37.54	25.00	
	Others	8.36	7.78	26.56	13.03	
Arable land (mu/household)		6.02	3.71	4.66	6.41	0.000
Water security (%)	No	15.36	14.4	26.8	24.58	0.000
	Yes	84.64	85.6	73.2	75.42	
Non-farming rate among surveyed laborers (%)		24.56	47.12	47.00	22.12	0.000
Poor village? (%)	No	89.38	82.46	72.02	70.59	0.000
	Yes	10.62	17.54	27.98	29.41	

Villages are differently distributed also within counties (Table 6). Type 1 villages were the most common in five out of the 10 sample counties, with 60 to 85 percent of villages having both low labor migration and low household migration. Furthermore, this pattern was most frequent in Shandong, Henan and Gansu, low in Anhui but greatly diversified in Sichuan. By contrast, over half the villages in the counties of Anhui and Sichuan fell into either Type II (high labor, low household migration) or Type III (high labor, high household migration) categories. Type IV villages were less common, except for Minqin

in Gansu, which suffer from severe desertification, prompting a large scale 'ecological migration' organized by the Chinese government in recent years.[9]

Table 6. Village migration profiles by province, county and poverty status.

Province	County	Poor County?	I	II	III	IV	Total
Shandong	Qihe	No	84.5	12.34	1.28	1.88	100
	Pingyi	Yes	61.1	15.72	7.03	16.14	100
Anhui	Shexian	No	10.77	52.15	34.21	2.87	100
	Yingshang	Yes	5.59	11.51	74.67	8.22	100
Henan	Jiyuan	No	64.44	19.25	3.77	12.55	100
	Ningling	Yes	49.16	25.84	8.71	16.29	100
Sichuan	Qionglai	No	7.93	12.38	65.18	14.51	100
	Nanjiang	Yes	35.38	49.53	12.26	2.83	100
Gansu	Minqin	No	63.11	0.82	0	36.07	100
	Longxi	Yes	85.58	6.51	0.47	7.44	100
Poor county		No	60.80	22.92	8.46	7.82	100
		Yes	40.62	15.07	30.56	13.75	100
Total			51.27	19.21	18.9	10.62	100

To what extent is rural poverty associated with particular categories? The data show that Types III and IV villages in government-designated poor counties are in a double (for Type IV) or triple (for Type III) proportion of villages than in non-poor counties. This is in contrast to the predominance of Type 1 (60 percent) in non-poor counties, 20 percent higher than in the poor counties.

Multinomial logistic model of village migration patterns

[9] For background information on 'ecological migration' in Minqin county, *see* http://blog.sina.com.cn/s/blog_70ba2e8d01014q4b.html (in Chinese).

In order to explore further the relationship between village migration profiles, we used a multinomial logistic model with the four village migration types as the dependent variable. Independent variables included location (typography, distance to nearest station, primary school, and hospital), infrastructure (type of road), agricultural resource (arable land, irrigation water), non-farming opportunity (non-farming rate among surveyed laborers), and economic status (poor village). The marginal effects (probability) of each dependent variable on each village migration type are given in Table 7.[10]

Table 7.Marginal effects from multinomial model of village migration type.

	I	II	III	IV
Topography: Base group=Plains				
Hills	0.0202	0.0033	-0.0074	-0.0161
Mountains	-0.0389	0.0076	0.0222	0.0091
Distance to nearest bus stop	0.0022**	0.0026***	-0.0043***	-0.0006
to primary school	-0.0016	-0.0060*	0.0023	0.0054***
to hospital	-0.0052***	0.0022	0.0030***	0.0001
Type of road: Base group= Concrete/asphalt				
Sand or stone	-0.0748***	0.0016	0.0698***	0.0035
Others	-0.0398	-0.0492**	0.0875***	0.0015
Arable land	-0.0115***	0.0041	0.0111***	-0.0037***
Water security	0.0041	0.0357**	-0.0225*	-0.0173
Non-farming rate among survey laborers	-0.6679***	0.5254***	0.4326***	-0.2901***
Poor village	-0.0706***	-0.0087	0.0275**	0.0518***
N	4482	4482	4482	4482

Note: County dummies controlled; * p<0.10, ** p<0.05, *** p<0.01.

As Table 7 shows, topography is not significantly associated with village type after controlling for other conditions. In other words, the regression analysis does not support

[10]Appendix Table A4 gives the coefficients and standard errors from the multinomial logistic regression.

the claim that the type of village migration is related to the topographic feature of villages suggested in Table 5.

In terms of village location, Table 7 confirms that distance to amenities (the nearest bus stop, the nearest primary school and hospital) contributes to the distinction between village types. Furthermore, the increase of the distance to the bus stop is likely to be associated with more Type II villages but fewer Type III. An increase in the distance to primary school may also be associated with the fewer villages in Type II, in contrast to the larger number of villages in Type IV. Villages in Type I are more likely to have shorter distances to local hospitals in contrast to Type III villages.

With regard to infrastructure, Table 7 confirms the impact of road conditions on Types I, II and III villages, but not on Type IV. In other words, the assumption about the relationship between Type IV villages and road condition is not supported by the regression model. Our data in Table 5 showed that about 80 percent of Type 1 villages have good quality (concrete/asphalt) roads, more than twice as many as those in Type III. However, Table 7 shows the following results: Type 1 villages are negatively related to the mid-level road quality (sand and stone surface) while Type III villages are positively, even strongly, related to an increased proportion of poor road surfaces (mid and low quality).

In terms of agricultural resources, Table 7 confirms that Types I and IV villages are negatively associated with the area of arable land whilst Type III is positively associated. Taking into account the large area of arable land, over 6 *mu* per household in Types I and IV, one can infer that Types I and IV villages are also affected negatively by the quality

of farmland. Compared with the area of arable land, it seems that water security does not strongly contribute to the assignment of village type.

Among all other factors, perhaps, the most significant one is the non-farming opportunity which is significantly related to the categorization of villages of all types according to Table 7. Taking into account the lower level of non-farming employment rates in Types I and IV villages (Table 5), Table 7 confirms that the decrease of non-farming employment opportunity is associated with the increase of Types I and IV villages, in contrast to Types II and III villages.

Table 7 also confirms that the probability of villages appearing in the different categories of VMP is significantly associated with whether a village is a government-designated poor village or not. The exception is Type II villages where there is no clear relationship with rural poverty.

Summary of village migration profile

By bringing together the results from Tables 5, 6 and 7, we are able to provide a description of the different types of village migration patterns (*see* Table 8). While Type I villages can be found in all the provinces and counties, they are more likely to be found near or close to a main road and public services (e.g., primary schools and hospitals), in non-poor counties and with good infrastructure. Furthermore, with adequate agricultural resources and production conditions (e.g., quantity and quality of farmland, water security), local livelihood systems are less dependent on non-farming employment.

Table 8. Summary of distributive features of different types of villages.

Village type	Definition	Features
I	Low in both labor and household migration	• in all regions and counties but distribution varies greatly; • good infrastructure and access to public services; • more agricultural resources both in quantity and quality; • less dependent on non-farming employment in local livelihood systems; and • more likely to be in non-poor counties, less likely to be in poor villages.
II	High in labor migration, low in household migration	• varies widely with county regardless of whether or not it is poverty-designated; • better in infrastructure and access to public services; and • heavily dependent upon non-farming employment.
III	High in both labor and household migration	• more common in only a few counties; particularly in government-designated poor counties; • more likely to be in remote areas; • poor infrastructure and limited access to public services; • limited agricultural resources in both quantity and quality; and • heavily dependent upon non-farming employment.
IV	High in household migration, low in labor migration	• found in all counties, especially poor counties and villages; • more likely to be remote with long distance to local primary school; • more farmland area of low quality; and • low dependence on non-farming employment.

Type II villages are similar to Type I in terms of their distribution, good infrastructure and access to public services but unlike Type I, Type II villages are heavily dependent on non-farming employment (accounting for nearly half of rural laborers). It is irrelevant whether villages in this category are officially designated as poor.

In contrast to the other Types, Type III villages are found in only a few counties, in particular the poor ones. Type III villages are more likely to be remote and poor, with limited infrastructure, difficulty in accessing public services and with poor agricultural resources and production conditions. Like Type II villages, Type III villages are also heavily dependent on non-farming employment.

Type IV villages can be found in all counties but are more likely to be found in poorer ones. Similar to Type III villages, Type IV villages are more likely to be in remote areas with poor infrastructure and difficulty in accessing public services, particularly primary schools. However, they also differ from Type III villages in having large but of low quality farmland areas and are also less engaged in non-farming employment due to various factors.

Conclusion and implications

In reflecting on the increasing trend of household migration in rural China, this paper has focused its research on the variation in rural migration patterns at the village level and the factors associated with it. Based on our analysis of information from 4,482 villages in 10 counties and five provinces from the SNAC, we have categorized the sample villages into four types, constructing village migration profiles (VMP). To do this we identified features of villages in terms of various aspects: geographic, infrastructural, access to public services, agricultural resources and production conditions, share of non-farming employment in rural labor, and poverty status of village (whether government-designated poor or not). Our rationale for using such categorization was to identify meaningful

patterns in the data which we also analyzed statistically in order to answer our initial research question: 'In what ways does rural migration vary and how can we measure this variation?'

From our results, we are able to draw several conclusions and implications.

China's accelerating trend of urbanization, increasingly involving household migration, calls for research on the relationship between labor and household migration, and its implications for sending communities. The results from our data analysis show the complexity of this relationship and variety related to rural resources, environments and development factors.

From combining labor and household migration rates and other contextual data, four village migration types or profiles (VMP) of labor and household migration emerged: Type I, low in both labor and household migration; Type II, high in labor migration, low in household migration; Type III, high in both labor and household migration; Type IV, high in household migration, low in labor migration. This typology offers a useful framework for examining and describing similarities and differences in rural migration at village levels.

The typology of villages provide an effective means for us to explore, analysis and confirm a number of factors which may influence village migration patterns, which include: geographic location, infrastructure and access to public services, agricultural resources, poverty status; non-farming employment, and economic development conditions.

Constructing VMPs in this way offers a stepping stone towards examining the different strategies used by rural residents at the village level to achieve livelihood security. The VMPs can also contribute to policy formation in achieving a better balance between labor migration and household agricultural production and in evaluating the likely future development of villages.

Some policy implications can be drawn from our findings. First, given the variety of village migration profiles and the influence of local contexts, rural development planning and policy (e.g., *hukou* or land reform) need to be sufficiently flexible and responsive to accommodate these differences; in other words, policy development cannot be a 'one size fits all' approach. Second, migration cannot be fully understood unless it is put into the context of local livelihood systems in which migration is an alternative to agricultural production and local non-farming employment opportunities. Third, the knowledge base on the relationship between labor and household migration at the village level needs to be strengthened if it is to support informed policy-making and strategic planning.

From the perspective of research methodology, this paper illustrates the potential of utilizing the National Agricultural Census data (NAC) for the study of rural migration in China. In particular, this paper sheds new light on the value of NAC data in understanding the complexity and diversity of rural migration patterns across China.

Finally, our research highlights the need for more research on the interface between NAC data and village investigation on the one hand, and between village profiles and county policies on the other. This could contribute to a more informed understanding of the variety of rural development, agricultural innovation and migration contexts in China.

The VMP typology raises further research questions about possible transitions between village types. The SNAC data set has the potential to enable further research on these if only easier access to and better engagement with scholars is provided.

REFERENCES

Biao X(2007) How far are the left-behind left behind? A preliminary study in rural China". *Population, Space and Place, 13*(3): 179-191.

Brauw A and Giles J (2008) Migrant labor markets and the welfare of rural households in the developing world: Evidence from China". *The World Bank Policy Research Working Paper 4585*.

Castles S (2002) Environmental change and forced migration: Making sense of the debate". *New Issues in Refugee Research Working Paper No. 70*: UNHCR.

Chang HQ, Dong XY and MacPhail F (2011) Labor migration and time use patterns of the left-behind children and elderly in rural China. *World Development, 39*(12): 2199-2210.

de Haan A, Brock K and Coulibaly N (2002) Migration, livelihoods and institutions: Contrasting patterns of migration in Mali, *Journal of Development Studies, 38*(5): 37-58.

de Haan, A and Rogaly B (2002) Introduction: migrant workers and their role in rural change. *Journal of Development Studies, 38*(5): 1-14.

Du Y, Park A and Wang SG (2005) Migration and rural poverty in China. *Journal of Comparative Economics, 33*(4): 688-709.

EACH-FOR (2009) *Environmental Change and Forced Migration Scenarios Project Synthesis Report*. Available at http://cordis.europa.eu/documents/documentlibrary/126792421EN6.pdf, accessed on 10 November 2014.

Fan, CC(2002) The Elite, the natives, and the outsiders: Migration and labor market segmentation in urban China. *Annals of the Association of American Geographers, 92*(1): 103-124.

Fan CC and Wang WW (2008) The household as security: Strategies of rural-urban migrants in China. In Nielsen I andSmyth R (eds) *Migration and Social Protection in China*, Singapore: World Scientific, 205-243.

Giles J and Mu R (2007) Elderly parent health and the migration decisions of adult children: Evidence from rural China. *Demography, 44*(2): 265-288.

Guang Land Zheng L (2005) Migration as the second-best option: Local power and off-farm employment. *The China Quarterly, 181*: 22-45.

Knight J, Lina S and Jia HB (1999) Chinese rural migrants in urban enterprises: Three perspectives. *Journal of Development Studies, 35*(3): 73-104.

Li HZ and Zahniser S (2002) The determinants of temporary rural-to-urban migration in China. *Urban Studies, 39*(12): 2219-2235.

Massey, DS(1990) Social structure, household strategies, and the cumulative causation of migration. *Population Index, 56*(1): 3-26.

Meng X and Zhang JS (2001) The two-tier labor market in urban China: Occupational segregation and wage differentials between urban residents and rural migrants in Shanghai. *Journal of Comparative Economics, 29*(3): 485-504.

Mu R and van de Walle D (2011) Left behind to farm? Women's labor re-allocation in rural China. *Labour Economics, 18, Supplement 1*(0): S83-S97.

Murphy R (2002) *How Migrant Labor Is Changing Rural China*. Cambridge: Cambridge University Press.

National Bureau of Statistics of China (NBS) (2008) *Summary of the Second National Agricultural Census*. Beijing: China Statistical Press.

_____(2013). *China Statistical Yearbook 2013*. Beijing: China Statistics Press.

_____(2014a.) *2013 National Migrant Workers Monitoring Survey Report*. Available at http://www.stats.gov.cn/tjsj/zxfb/201405/t20140512_551585.html, accessed on 10 November 2014.

_____(2014b) *Statistical Communiqué of the People's Republic of China on the 2013 National Economic and Social Development*. Available at http://www.stats.gov.cn/english/PressRelease/201402/t20140224_515103.html, accessed on 10 November 2014.

Rozelle S, Li G, Shen MG, et al. (1999a) Leaving China's farms: Survey results of new paths and remaining hurdles to rural migration". *The China Quarterly, 158*: 367-393.

Rozelle S, Taylor JE and deBrauw A (1999b) Migration, remittances, and agricultural productivity in China. *American Economic Review, 89*(2): 287-291.

Shields MP and Shields GM (1993) A theoretical and empirical analysis of family migration and household production: U. S. 1980-1985. *Southern Economic Journal, 59*(4): 768-782.

Wu B (2003) *Sustainable Development in Rural China: Farmer Innovation and Self-Organisation in Marginal Areas*. London: Routledge.

WuB and Yao SJ (2010). 'Empty villages' in poor areas of China: A case study of rural migration in north Shaanxi, *China Policy Institute Discussion Papers,* No. 56, The Univeristy of Nottingham.

Yang XS (2000) Determinants of migration intentions in Hubei Province, China: Individual versus family migration. *Environment and Planning, 32*(5): 769-787.

Zhang LX, de Brauw A and Rozelle S (2004) China's rural labor market development and its gender implications". *China Economic Review, 15*(2): 230-247.

Zhao YH (1999) Labor migration and earnings differences: The case of rural China. *Economic Development and Cultural Change, 47*(4): 767-782.

Zhao Z (2005) Migration, labor market flexibility, and wage determination in China: a review". *The Developing Economies, 43*(2): 285-312.

APPENDICES

Table A1. Bivariate statistical tests for labor migration, household migration and village profiles.

Variable	Item	% of total samples	Household migration rate	P value of Wald test	Labor migration rate	P value of Wald test
Topography	Plains	50.02	10.15		22.38	
	Hills	17.22	5.36	0.000	17.55	0.000
	Mountains	32.75	9.76	0.000	22.75	0.000
Water security	No	18.32	10.05		21.27	
	Yes	81.68	9.00	0.000	21.69	0.000
Type of road	Concrete/asphalt	68.90	6.60		19.30	
	Sand or stone	18.92	14.52	0.000	27.62	0.000
	Others	12.18	14.90	0.000	24.68	0.000
Poor village	No	82.78	8.74		21.14	
	Yes	17.22	11.20	0.000	23.94	0.000

Table A2. Correlation coefficients of labor migration, household migration and village profiles

	Household migration rate	Labor migration rate
Distance to nearest bus station	0.1318	0.0809
Distance to nearest primary school	0.0344	-0.0267
Distance to nearest hospital	0.1169	0.0316
Arable land(mu/household))	-0.0614	-0.2979
Non-farming rate among survey laborers	0.187	0.6617

Table A3. Linear regression of household migration.

	All sample	Sub-samples by poor county	
		Poor county	Non-poor county
Labor migration rate	0.1755***	0.2767***	0.0114
	[0.0323]	[0.0484]	[0.0318]
Labor migration rate	-0.0874	-0.2415**	0.1683**
squared	[0.0767]	[0.1109]	[0.0717]
Topography: Base group=Plains			
Hills	-0.0062	0.0008	-0.0145***
	[0.0044]	[0.0074]	[0.0048]
Mountains	0.0018	-0.0037	-0.0005
	[0.0047]	[0.0081]	[0.0052]
Distance to nearest	-0.0010***	-0.0012***	-0.0005
bus station	[0.0003]	[0.0004]	[0.0004]
Distance to primary	0.0030***	0.0026*	0.0033***
school	[0.0009]	[0.0016]	[0.0011]
Distance to hospital	0.0006	0.0006	0.0004
	[0.0004]	[0.0006]	[0.0004]
Type of road: Base group=Concrete/asphalt			
Sand or stone	0.0097*	0.0080	0.0079
	[0.0057]	[0.0080]	[0.0052]
Others	0.0220***	0.0208**	0.0176*
	[0.0069]	[0.0092]	[0.0092]
Water security	-0.0053	0.0053	-0.0178***
	[0.0043]	[0.0069]	[0.0042]
Arable land	0.0008*	0.0025***	-0.0010**
	[0.0005]	[0.0007]	[0.0005]
Non-farming rate	-0.0308***	-0.0529***	0.0086
among survey	[0.0110]	[0.0172]	[0.0092]
laborers			
Poor village	0.0050	-0.0006	0.0160***
	[0.0042]	[0.0055]	[0.0054]
County dummies controlled			
Constant	-0.0061	-0.0236*	0.0218***
	[0.0060]	[0.0128]	[0.0059]
N	4,482	2,117	2,365
Adjusted R squared	0.4904	0.4545	0.2514

Note: Coefficients in first row; Robust standard errors in brackets;
* p<0.10, ** p<0.05, *** p<0.01.

Table A4. Multinomial regression of village migration types: base group= Type I

	Type II	TypeIII	TypeIV
Topography: Base group=Plains			
Hills	-0.0535	-0.1676	-0.2417
	[0.2014]	[0.2935]	[0.2637]
Mountains	0.2582	0.4595	0.2202
	[0.2216]	[0.3106]	[0.2710]
Distance to nearest	-0.0011	-0.0587***	-0.0172*
bus station	[0.0100]	[0.0122]	[0.0100]
Distance to primary	-0.0387	0.0190	0.0644**
school	[0.0328]	[0.0333]	[0.0253]
Distance to hospital	0.0453***	0.0668***	0.0184
	[0.0165]	[0.0181]	[0.0153]
Type of road: Base group=Concrete/asphalt			
Sand or stone	0.4910***	1.1196***	0.3129*
	[0.1757]	[0.1887]	[0.1686]
Others	0.0128	1.0263***	0.2110
	[0.2225]	[0.2340]	[0.2368]
Water security	0.2203	-0.2021	-0.2122
	[0.1645]	[0.1762]	[0.1521]
Arable land	0.1131***	0.2061***	0.0055
	[0.0214]	[0.0389]	[0.0155]
Non-farming rate	8.1912***	9.9784***	-0.7626*
among survey	[0.3784]	[0.5153]	[0.4072]
laborers			
Poor village	0.2264	0.6010***	0.7070***
	[0.1515]	[0.1633]	[0.1364]
County dummies controlled			
Constant	-5.0196***	-8.4012***	-3.7182***
	[0.2862	[0.4933]	[0.3037]
N		4482	
Log likelihood		-3371	
Pseudo R squared		0.3796	

Note: Coefficients in first row; Robust standard errors in brackets;
* p<0.10, ** p<0.05, *** p<0.01.