Migrate for Education? Primary School Relocation and Migration of Rural Households

Chunbing Xing
Beijing Normal University
xingchb@bnu.edu.cn

Abstract: The number of primary schools in rural China decreased dramatically in the last two decades, and after the central government issued a *decision* aiming to optimize the educational resources in 2001, an increasing number of small village schools were merged into the large scaled ones that located in more populous regions. This paper studies the impact of the relocation of primary schools on the migration decisions of rural residents. First, using two nationally representative micro datasets, we find that the decline in the number of primary schools per capita between 2000 and 2004 increased the probability of migration for rural residents in 2005. This result may suffers from endogeneity problem as the decrease in the number of rural primary schools is greatly influenced by the out-migration of rural residents. To alleviate this concern, we control for a rich set of variables, including those reflecting the region specific trend of migration. By exploring the heterogeneous effects, we find that the migration of households with primary-school-age children are more sensitive to the relocation of primary schools, and that the effect is stronger for families with boys than those with girls. Second, using a longitudinal household survey that contains information on community characteristics, we find that both the disappearance of village primary school and the increased distance to nearby primary school increased the migration probability of village residents. Finally, we find a discontinuous drop in primary school enrollment rate between 2001 and 2002, a time when the number of rural primary schools dropped sharply. All these results suggest that human capital investment motive and regional education policy play an important role in China's urbanization process.

Key Words: Education, Migration, Rural China, Primary Education

JEL classification: O15, I25, I28

1. Introduction

Between 1990 and 2005 more than 100 million individuals migrated from rural to urban areas within China (MGI, 2009) and the stock of internal migrants was estimated at 150 million in 2009 (Meng and Zhang, 2010). Despite a number of social problems it caused, there is little doubt that the phenomenal internal migration has fueled China's high economic growth. From around 2003 concerns have been growing that China is running out of surplus labor, which will threat the competitiveness of its export sector and the sustainability of high growth (Knight et al., 2011; Zhang et al., 2011). Thus, understanding the factors that influence the migration flow becomes of utmost importance. The literature identifies the widening rural-urban income gap (mainly caused by the booming export-led economy in coastal areas) and the easing of migration restrictions as major reasons for China's increasing number of internal migrants (Wang, 2005; Cai, 2000): rural-urban migration is largely portrayed as millions of rural residents leaving countryside to seek better paid jobs in coastal cities.

There also are huge regional gaps in public services including education and health care (Li and Luo, 2007). But little has been done to study how these have affected the migration behavior of rural residents. This paper links the rural-to-urban migration to an important but largely neglected aspect: rural-urban gap in education opportunities. With rapid technological change and economic upgrading, the return to education increased dramatically in urban China in last two decades (Zhang et al., 2005; Chi et al., 2012), and education also has become increasingly important for rural residents to enhance their earning capacity and to increase the chances of employment in modern urban sectors (Chen and Xing, 2007; Xing, 2014). In this paper, we look at how relatively disadvantaged educational condition in rural China has affected the migration behavior of rural residents.

We focus on one aspect of the rural educational development: the accessibility of primary schools. The number of primary schools decreased dramatically in rural China in the last two decades, and the decrease was sharper after China entered the new century. Between 1999 and 2009, the number of rural primary schools decreased from 469 to 234 thousands (see Figure 1). The central and local governments played an important role in this process. In particular, the central government issued a *Decision* to encourage local government to merge small rural primary schools into larger ones in 2001, aiming to realize scaled economy and to improve school quality.[1] Local governments embraced this policy partly because such changes would alleviate fiscal burden, and enable them to put resources into the retained large scaled schools. However, these retained schools are generally far away from home for those living in villages, where the primary schools (or teaching spots) have been closed. The longer commuting distances or the needs to board in school caused extra financial and psychological costs for the children and their families, which may overwhelm the benefits of better quality schooling (Sun et al., 2009).

The major contribution of this paper is to establish the causal relationship that the closing of village primary schools pushes rural residents to move. The negative correlation between the (decreasing) number of primary schools and the (increasing) number of migrants is easily observed. To establish the causal relationship, however, we need to overcome endogeneity issues. First, the causality may run in the opposite direction, the location adjustment of the primary schools being a reaction to the decreased number of rural students rather than an exogenous shock that encouraged people to move. Given the large scaled out-migration in rural China, causality in this (opposite) direction is expected, and we do not intend to deny it. Instead, we want to show that the causality we claimed also exist and is important for rural residents' migration decision. Second, the causality may be contaminated by confounding factors such as location specific time trend and community characteristics, which are correlated both

[1] See *Decisions on the Reform and Development of Primary Education*, the State Council, 2001.

with school location and with rural resident's migration behavior. In addition, many pre-schools are managed by primary schools in villages, and the adjustment in the pre-school systems often concurred with the adjustment in primary schools. There also might be adjustment in the middle school system around the time of primary school relocation. Therefore, additional information and efforts are needed to tease out the effects of different changes.

In the first exercise, we combine information on the number of rural primary schools at the prefecture level and micro data from the 2000 census and 2005 mini census. We explore the regional variation to investigate how the reduced number of primary schools has affected the migration decision of rural households. After controlling for a rich set of variables to deal with the omitted variable issue, we find that the decrease in primary schools in rural areas increased the probability of migration for rural households. In particular, we calculate the share of migrants in the 2000 census data and use it to control for migration trend.

The (mini) census data, which contain detailed demographic information, allow us to uncover heterogeneous effects of the decreased number in primary schools on migration. We find that (1) the effect only exist for long term migration, (2) middle aged individuals are more sensitive to the relocation of primary schools, (3) the effect is stronger for women who have school aged children, (4) households with school age boys are more likely to migrate after the school number reduced. These results are consistent with our hypothesis that the relocation of rural primary schools has contributed to the increased number of rural to urban migrants.

In the second set exercises, we use another dataset (China Health and Nutrition Survey, CHNS) that has detailed information on the accessibility of public primary schools for each village. Being a longitudinal survey, CHNS allows us to follow communities and individuals to see the effect of the presence (or disappearance) of primary school on migration behavior of village residents. This dataset contains rich information on village characteristics. Importantly, it collects information on the availability of village pre-schools and near-by middle schools as well. By running fixed effects models we find that the closing of village primary school and longer distance to the nearby primary school increased the probability of rural residents migrating out significantly. This relationship still holds after we control for community specific time trend and a rich set of community characteristics. The presence of pre-school and middle school does not change our results, and they themselves do not have significant effects on migration.

Finally, we treat the changes following the 2001 *decision* as a natural experiment. In particular, we find that there was a sharp drop in enrollment rate of the primary school age children in rural China after the number of primary schools decreased promptly.

Equally difficult is to explain why relocation of primary schools increased the propensity of migration for rural residents. Several candidate mechanisms exist. First, closing village primary school increased the costs of schooling (in form of longer travelling distances which may require companion of other family member, and boarding costs). Depending on the availability of education opportunities elsewhere, rising costs will increase the propensity to migrate through drastically different channels. (1) Rural households migrate to cities or towns to seek education opportunity for children, which has become easier with the increasing number of schools for migrant children and with more local public schools open to migrant children. (2) Rising schooling costs force school aged children to drop out of school. This can increase migration probability, either because there is no more need to take care of a school aged child or because more input into the household production function allows some family member(s) to migrate. (3) The school relocation policy force rural households to migrate for higher income to finance rising schooling costs of the left-behind children.

Second, there also exists possibility that the school relocation realized the scaled economy, improved schooling quality, and reduced the need for rural households' input into the human capital production process. Some new arrangements during this process (for example, more students choosing to board in school) can potentially reduce family input in form of time allocated to child care. Finally, the presence of a village primary school itself creates employment within village, and/or also has cultural values (external effects) that attract village residents to stay. This channel might be of minor importance, because there is no significant drop in the number of primary school teachers and it does not predict the heterogeneous effects we found (<u>both need to be confirmed</u>).

Further exercises are needed to evaluate the relevance of different mechanisms. For example, we can examine whether adults are more likely to move with children in primary school closing areas, and whether migrant children have enrolled in school in urban areas, ect.

These results have strong implications for China's education policy, rural development, and the reform on the household registration system (that is, the hukou system, which restricts population mobility)[2]. First, the relocation of primary schools should consider the extra costs for rural households for whom the new school is far and costly. Second, in the process of reducing the number of primary schools, other services like free school bus or boarding subsidies should be provided. To make our analysis more focused, we do not analyze the education opportunities for migrant children in urban areas. But our results do have implications for policies in urban areas. From the urban side, local government should provide equal opportunity for rural migrant workers' children, which is closely related to the hukou system reform. Last but not least, the central government should shoulder the responsibility of providing basic education service.

[2] A more detailed discussion of the Hukou system is given in the next section.

need to discuss the results' implications for migration

This paper is organized as followed. Section 2 briefly summarizes the related literature. Section 3 introduces the data and gives more information on the primary school relocation process. Section 4 presents the empirical model and results. Section 5 concludes.

2. Literature Review

The large scaled rural-to-urban migration has been one of the major contributors to China's high economic growth. There is a growing literature that studies both the causes and consequences of this phenomenal migration. One group of studies investigates various factors that influence the migration behavior of rural residents, including rural-urban income gap, growing demand for labor in coastal regions, and conditions in rural areas. The other group investigates the consequences of rural migration, among which the well-being of the left-behind children and migrant children has attracted a lot of attention.

Most of these migration studies need to consider (explicitly or implicitly) the hukou system, which was originally designed to control rural to urban migration in the 1950s by registering household members in designated rural or urban locations. One's hukou status is categorized by both socio-economic eligibility (*agricultural* and *non-agricultural*) and registered residential location (*local* and *non-local*) (Chan and Buckingham, 2008).[3] Hukou status in registered location confers specific local benefits including access to public education. To migrate permanently one needs to change registration location.[4] Both the process and the number of such moves were tightly controlled by the government.

[3] The first classification determined entitlement to state-subsidized food grain and other prerogatives. The second defined rights for many activities in a specific locality. Hukou status is usually inherited from parents.

[4] Due to differences in employment opportunities and welfare and benefit entitlements, there is a strong incentive for rural residents to

Temporary migrants who cannot change registration location also needed official approval (like a "visa"). Public education for children were inaccessible to migrants without local hukou.

With many local governments receiving full power to determine their own hukou policies since the 1980s, the numbers of permanent hukou and temporary residence permits granted have been growing, and it became possible for rural residents to migrate without a valid permit. For those without a local hukou, sending their children to city public schools has become increasingly viable, despite high fees involved sometimes. The number of privately run schools for migrant children also increased. Before these changes, rural migrants have to leave their children in rural areas under the custody of elders or relatives. Recently, there is a significant share of children accompanying their migrant parents. Ren and Treiman (2013) find that 7.3 percent of the children aged 10 to 15 is migrant children in a nationally representative survey conducted in 2010.

The well-being of both the left-behind and migrant children has attracted the attention of many researchers. Xu and Xie (2013) studied the health and education conditions of those left-behind children. Chen and Feng (2013) point out that a significant proportion of migrant children in China cannot access public schools for lack of local hukou, and turn to privately-operated migrant schools. These studies, among many others, regarded the education of either the left-behind or migrant children as the consequences of their parents migrating for reasons of employment. The possibility that rural residents migrate for their children to have better or relatively cheaper education is ignored.

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change their Hukou registration from rural to urban areas. Prior to the late 1990s, such changes required approval from the state to convert Hukou status from agricultural to non-agricultural. This change can only be made through certain channels, and these channels generally favor individuals with skills and/or special achievements. Going to college has been a major channel that increases the probability of a favorable Hukou status. Other channels include serving in the military, being recruited by SOEs or the government (Wu and Treiman, 2004; Fan, 2008), rural residents' lands being occupied by urban construction projects (Wong and Huen, 1998), and rural households purchasing urban housing (Deng and Gustafsson, 2006).

This might happen if rural education became more expensive. There is little research that has been done to investigate whether rural education has become expensive. However, there is anecdotal evidence indicating that the financial burden increased after the nearby primary school was closed. Meanwhile, no evidence shows that the educational output has increased after moving the students from small to large scaled schools (see Dong et al., 2008 and Lu and Du, 2010). Using data from Guangxi (a less developed autonomous region in China), Lu and Du (2010) find that merging small primary schools into large ones actually lowered the performance of the students. The rising education cost and the ambiguous effect on students' performance provide an incentive for rural residents to migrate to other in particular the urban areas. While there is a growing literature showing that the Chinese households in urban areas may choose to migrate (or purchase housing) to regions with better schools (Zhou and Lu, 2009; Feng and Lu, 2010), the empirical evidence on this migration motive of the rural residents is limited.

3. Data and Summary Statistics

We first use the prefecture level data from China City Statistical Yearbook 2001/2005 to construct a variable that reflects the school relocation policy in rural China. We calculate the number of rural primary schools for each prefecture (the total number in each prefecture city minus the number of schools in urban areas) and its change between 2000 and 2004, a period matching our census data (also when the policy was implemented). Figure 2-a shows that the numbers of primary schools decreased in over 90 per cent of the cities, and in many cases the decrease was large. To take into consideration of the decreased population, Figure 2-b shows the changes in the number of primary schools per 100 students. The relative number of primary schools increased in around one-fourth of the regions, and the majority of the cities experienced decreased number of primary schools. There is a large regional variation, which will be used to identify the effect of primary school closings.

We use the 2005 one percent population survey to study the migration decisions of rural households, which covers 31 provinces within Mainland China. The survey drew sample of households based on current location of residence. Personal and employment information, including age, gender, education, occupation, and working time on each individual within a household is collected. A useful feature is that it also contains information on an individual's hukou registration place. This helps us identify a representative sample of rural migrants (individuals with rural hukou but currently residing in a place other than his/her registered location) and their migration pattern. In the following analysis, we keep observations aged 18 to 40, who are not in school and with an agricultural hukou. These observations are then merged with the prefecture level data using their hukou registration information.

To measure the policy using the changes in the number of primary schools at the prefecture level has limitation. There is large variation within a city or even within a county or a town. Households living in different regions may face different situations. In particular, those living in populous regions may benefit rather than suffer from a policy that merged small schools to large scaled ones because the school quality improves and they do not need to bear extra commuting or boarding costs. Being unable to explore this variation within cities, our study can be seen as estimating the average effect of the reduction in the number of primary schools. Using aggregate data has an advantage also: there is less micro-level heterogeneity that is correlated with rural households' migration decisions.

Using another dataset, the China Health and Nutrition Survey (CHNS), we have direct measures for the changes in primary school locations. The survey follows households (and individuals within) in more than 100 villages in 9 provinces for over 20 years. Only those villages appear in all seven surveys in 1991, 1993, 1997, 2000, 2004, 2004, and 2009 are retained in our analysis. For each village, the survey asked about the availability of a public primary school. For those without a primary school, it asked about the distance to the nearest one. Table 8 reports on the availability of public primary schools. The proportion of villages with primary schools increased through the period between 1991 and 2000. The following period of 2000-2009, however, experienced a sharp decrease from 90 to 65 percent. Accordingly, the distance to nearest primary schools first decrease from 0.4 to 0.11 kilometers between 1991 and 2000, then increased sharply to 0.7 kilometers in 2009.[5]

The migration behavior of village residents is also recorded. We define migrants to be those who have lived outside village for over 6 months in the year before the survey. We restrict our sample to individuals aged 16 to 69. One advantage of using CHNS for our analysis is that it contains rich information on village characteristics, including whether a village has pre-school and middle school, has telephone service, postal service, and farmland, whether a village has a bus stop, is close to a train station, or an open trade area (or special economic zone), the percentages of work force engaged in agricultural activity, work outside of town for more than six months, employed in enterprises with over 20 employees, employed in enterprises with less than 20 employees, and the log of monthly wage for an ordinary construction worker in the village. Controlling for these alleviates our concern about the endogeneity issue caused by omitted confounding factors. Finally, a longitudinal data over a long period not only enable us to control for individual (or household) level time invariant unobservables, but also allows us to control for region specific time trend relatively accurately.

4. Empirical Analysis

In this section, we first present our methodology and results using the census data and then present results using the CHNS data.

4.1 The Model and Identification Strategy

[5] The distance is assumed to be zero for villages with a public primary school.

To investigate whether the reduced number of primary schools has affected the migration decisions of rural residents, we estimate the following linear probability model (LPM):

$$y_{ij} = \beta_0 + \beta_1 primchng_j + \gamma X_{ij} + \varepsilon_{ij} \qquad (1)$$

where y_{ij} is a dummy indicating whether an individual i from (hukou registration) region j is a migrants (1=yes/0=no). In this paper, we consider those who have left hukou registration place for more than six months and less than 4 years as migrants. We narrow our definition to this range because short-term (less than six months) migrants are less likely to have migrated for educational reasons. For those who have migrated for more than four years, their initial migration decisions are less likely to be affected by the school closings between 2000 and 2004. However, their migration decisions may depend on educational policies during this period when they consider whether to return to their hukou registration place (we will come back to this possibility shortly). $primchng_j$ represents the change in the number of primary schools per 100 students in region j between 2000 and 2004. Vector X includes a rich set of control variables including personal characteristics like education, age, age squared, marital status, and regional characteristics. Regional characteristics, such as fiscal capacity, may influence both the number of primary schools and the rural residents' migration decisions. A region with lower fiscal capacity may have an incentive to close more primary schools, it may also have less employment opportunities and therefore its residents are more likely to migrate. To take such factors into account, we control for provincial dummies and the proportion of migrants in its population for each prefecture level city. The proportion of migrants is calculated using a random sample of the 2000 census. Therefore, our following analysis relies on the assumption that the error term (ε_{ij}) is uncorrelated with the policy of adjusting the number of primary schools after we control for the vector X.

Although the above assumption is strong, the heterogeneous effects we explore will give us more confidence that the effects are causal. First, we consider the interaction effect of age and school closings. Households with school age children should be more sensitive to the availability of nearby primary school. However, if an individual is identified as a migrant without children accompanying him/her, we cannot tell whether he/she do not have children or he/she just leave them at hukou registration location. We use age as a proximate measure to indicate whether an individual is likely to have school age children, and we expect the policy effect to be larger for older rather than younger individuals. Second, we also know whether a woman has given birth to children and (if yes) how many, and we expect those having child(ren) are more sensitive to the primary school closing policy. Finally, different patterns of migration may be affected by this policy differently. For example, short-term migration should be less sensitive to the closing of primary schools. All these heterogeneous effects are estimated using LPM similar to model (1), interaction terms being added to capture the heterogeneous effects.

4.2 Empirical Results

Table 1 reports the benchmark results of this paper. The coefficients on the variable *primchng* are significantly negative, confirming that the reduction in the number of primary schools increased the probability of migration. Taking the baseline result for males for example (column 1), the probability of migration increased by 4.5 percent if the number of primary schools for each 100 students decreased by one. This effect is large considering the facts that many primary schools in villages accommodated only a small number of students and that this is an average effect with some households actually benefitting from the school relocation policy. In column 2, we control for the migrant share of the population in each region in 2000. Instead of becoming smaller the effect becomes larger, with the coefficient becoming -0.068. Another source for calculating the historical migration trend for each region is the 2005 one percent population survey. We calculate the share of migrants who migrated out before the change happened (those who have migrated for more than five years in 2005) for each region. Controlling for both shares has a significant effect on the coefficient on *primchng*, which becomes -0.038. The change in this effect may be due to the fact that the latter variable comes from the same dataset, capturing the migration trend better. Another reason is that the decision of the longer-term migration may also be affected by policy change in the origin regions. Columns 4 to 6 report the results for females, and the pattern is similar to that of males.

It is also of interest to see how the other factors influence the migration behavior of rural residents. At the individual level, educated residents are more likely to migrate; there is a nonlinear relationship between the probability of migration and age, and the relationship is different for males and for females: the latter is less likely to migrate when getting older even at the early stage of the life cycle. At the prefecture level, higher relative numbers of primary schools are associated with lower propensity to migrate; residents from high population density regions are less likely to migrate.

Before we turn to the heterogeneous effect of the change in primary schools, we do robustness checks by constructing the policy variable in two different ways. First, instead of using the change in the number of primary schools per 100 students, we use the change in the total number of primary schools. Table 3 shows that this variable has a significantly negative effect on the probability of migration for both males and females, even after controlling for variables representing the trend in migration. Second, we use the change in the number of primary schools per 100 students in a shorter period of time between 2000 and 2002, and consider the probability of migration for a time period of half to 3 years. Compared to Table 1, Table 4 shows that the effects do not change much for males, and the effects become smaller for females but still are significantly negative.

Finally, we return to the former measure of primary school closing policy and look at its effect on the probability of migration of other types (see Table 2). Here, different types of migration are defined by the duration of migration. When estimating the effect of school closings on each type of migration, we delete migrants of other types. As for the effect on short-term migration less than 6 months (columns 1 and 2 for males and females), the changes in the number of primary schools are positively rather than negatively correlated with the probability of migration, indicating this type of migration is influenced by other forces. On the contrary, the probability of having migrated for more than five years increased with the decreased number of primary schools. This result is not unexpected because the school closing policy can affect the return decisions of those who have already migrated out before the policy was implemented. Also we find that the relative number of primary schools in 2000 has a significantly negative effect on the probability of the longer-term migration, and the effect is smaller and only marginally significant for the short-term migration.

4.3 Heterogeneous Effects of the Relocation of Primary Schools

We first look at the effect of the school relocation on the migration decision of individuals of different ages by estimating the following model:

$$y_{ji} = \beta_0 + \beta_1 primchng_j + \beta_a \sum_{a=19}^{40} primchng_j * D_a + \gamma X_{ij} + \varepsilon_{ij} \qquad (2)$$

where D_a are dummy variables indicating age, and other variables have the same meaning as model (1).

The coefficients for the interactions between school change and different ages are reported in Figure 5. The left panels (a and c) are for males and the right ones (b and d) for females. For males, the effect is not significant for younger individuals, but become significant or marginally significant for individuals older than 25. This pattern is more obvious for females, and the effect is larger (in absolute terms) for individuals older than 24. Panel b and d report the results after we control for historical migration trend. The overall effects become smaller, but still significant for most age groups. Importantly, a U-shaped pattern emerges: the effect is larger and more significant for middle-aged individuals, a group that is more likely to have children and therefore more sensitive to the availability of nearby primary schools.

The results for migration of other duration types are reported in Figure 6, where panel a and b are for migration less than 6 months and panel c and d for migration more than 5 years (a and c for male, b and d for female). The results indicate that there is no age differential in the effect of the school closings on migration, with the effect fluctuating around zero.

A more direct approach is to see the differential effect for households with and without school age children. Unfortunately, this is impossible because we cannot tell whether a household has school age children if it is a migrant household without children. In the following, we confine our sample to females aged 22-40 and use the information on whether they have given births to boys or girls. The model we estimate is as follows:

$$y_{ji} = \beta_0 + \beta_1 primchng_j + \beta_c primchng_j * C + \gamma X_{ij} + \varepsilon_{ij} \qquad (3)$$

where C is a dummy variable indicating whether a female has given birth to any children. We estimate this model for two cases separately: having boys and having girls. The results are reported in panel A of Table 5. For the short-term migration, there is no significant interaction effect. But for migration with duration of half to four years, the interaction term is significantly negative. Taking into consideration of the significantly positive coefficient on *primchng*, this means that while an increase in the number of primary schools increased the probability of migration for females without children, it has a significantly negative effect on the probability of migration for females with children. The interaction term is also negatively significant for migration with longer than 5 years of duration, but the effect is much smaller considering the large positive effect of school numbers on the propensity to migrate. The result is similar for the case of whether giving birth to girls (columns 4 to 6), but the effect is smaller and significant only for migration with duration between half to four years.

In panel B, we use the information on the number of children. The coefficients on the interactions between the number of children and *primchng* are negative in most cases. For the boy case, the migration with duration longer than 6 months is significantly affected by the interaction term; and for the girl case, only the migration with duration between half and four years have significantly negative coefficients on the interaction terms. It seems that school relocation policy has a larger effect on the migration decision of females with more children. But as the number of observations with three children is small, the coefficients show more inconsistencies. Panels C and D further confine the observations to females aged between 26 and 35, who are more likely to have school age children. The pattern we have observed stilled exists. When we consider whether a female has given birth to boys or girls, only giving birth to boys has significantly strengthened the policy effect on the probability of migration for more than 6 months. When the number of births is considered, only the interaction of having two children and *primchng* has significant coefficients. All these are consistent with our hypothesis that the policy affected the migration decision of households with school age children. Our results also suggest son preference of rural households.

There is also large heterogeneous effect across regions. In populous regions, the decrease in the number of primary schools may not cause significant increase in the educational cost. For regions of low population density on the contrary, the same amount of decrease in the number of primary schools per 100 students may increase the cost to a larger extent. Therefore, we expect the treatment effect of this policy to vary with the regional population density. To take this into account, we estimate an LPM including an interaction term of the policy (*primchng*) and population density (*density*). The results are reported in Table 6. While the coefficients on *primchng* are still significantly negative, the coefficients on the interaction term are significantly positive. Taking both into consideration, the effect of the reduced number of primary schools will be smaller in regions with higher density. On the other hand, rural residents in regions with low density are more responsive to the change in the number of primary schools. Taking the result in column (1) for example, a unitary decrease in the relative number of primary schools will increase the probability of migration by 10 percent for male residents in a region with density at the 10^{th} percentile (0.008), and the effect will become close to zero for male residents in a region with density at the 90^{th} percentile (0.064). Controlling for migration trend will reduce the treatment effect, but the differential pattern remains. The results for females are similar.

The reduced number of primary schools may also have differential impacts on the choice of destination location of different types. To investigate this aspect, we estimate two multinomial logit models. In the first model, the dependent variable has four values representing non-migrant, migrant within the city of hukou registration, migrant out of his registration city but within his registration province, and migrant out of his hukou registration province. Non-migrants are used as the reference group, and the results are reported in columns 1 to 3 of Table 7. The coefficient on *primchng* for the option of within city migration is significantly positive, indicating that the reduction in the number of schools within a region discourages rural residents to migrate within this city. Accordingly, the relative probability of migrating to other provinces will increase accompanying this reduction in primary schools. The probability of migrating within province but out of the registration city is not affected significantly. These results, however, do not necessarily rule out the possibility that the school relocation policy increased the probability of a village household migrating to nearby towns within a city. Unfortunately, we are unable to identify this possibility.

In the second model, the dependent variable has four values representing non-migrants, migrating to other village areas, to towns, and to urban areas (city proper). The non-migrants are used as the reference group, and the results are reported in columns 4 to 6 of Table 7. The coefficient on *primchng* for the option of migrating to other village areas is insignificant, but is significant for the option of migrating to town regions, indicating that the reduction in the number of schools within a region discourages rural residents to migrate to towns or villages. The relative probability of migrating to cities will increase accompanying this reduction in primary schools.

As the variable *primchng* measures the changes at the aggregate level, we cannot investigate whether the closing of nearby primary schools increased the probability of moving to nearby towns. Our results show that the probability of moving to urban areas of other provinces is significantly affected by the policy change, which has major implications for hukou reform.

4.4 Results Using the CHNS Data

Using CHNS, which contains detailed information on community and individual characteristics, we estimate fixed effects models of the following form to investigate the effect of school closings on migration in a more direct way:

$$y_{ipvt} = \beta_0 + \beta_1 primchng_{pvt} + \gamma_1 \mathrm{X1}_{ipvt} + \gamma_2 \mathrm{X2}_{pvt} + \delta_p + \delta_v + \delta_i + trend_{p/v} + \varepsilon_{ipvt},$$

where y_{ipvt} is a dummy indicating whether an individual i from village v in province p had been working outside for more than 6 months in year t. *primchng* denotes whether there is a public primary school in village or the distance to the nearest primary school. X1 controls for individual time varying characteristics (age and age squared), X2 controls for community level time varying characteristics. δ_p, δ_v, and δ_i are time invariant effects at the provincial, village, and individual (or household) levels that can be controlled for in fixed effects models. *trend* represents community or provincial level time trend, which could be linear or nonlinear depending on model specification. ε_{ipvt} are individual level idiosyncratic error term.

The basic results are reported in Table 9. The results suggest that closing the village primary school significantly increased the probability of migration for village individuals by 1 to 2 percent. Controlling for province specific quadratic time trend, the presence of primary school decreased the probability of migration by around 1.2 percent (column 1). Results in columns 2 to 4 show that the presence of pre-school and middle school does not have significant effect on migration, and the coefficients on primary school do not change significantly after these variables are added (see columns 2 to 4). We control for community specific time trend in columns 5 to 8. Primary school has a significant effect on migration, with the effect becoming larger than those in columns 1 to 4.

It is of interest to see the effects of other community level characteristics, which mostly are consistent with the theoretical predictions about the migration behavior. Among the factors we control for, postal service has significantly positive effect on migration; both the availability of nearby job opportunities (reflected by the presence of nearby open trade areas, special economic zones, and the percentage of workforce working in local enterprises) and higher local wages increased the opportunity costs and therefore reduce migration. The share of labor force engaged in agriculture within village is negatively related to an individual's migration probability, possibly because of lesser information on outside job opportunities. The effect of labor force share working outside of village has positive effect on migration when province time trend is controlled for. Unexpectedly, the effect turns to be negative when the time trend is community specific.

When we treat household as unit of analysis and use the total number of migrants within household as dependent variable, we find a slightly stronger effect of primary school on migration (see panel A of Table 10). When community level time trend is controlled for (a specification we prefer), closing village primary school increased the number of migrants within one household by 0.07-0.08. On average, there will be 7 to 8 more residents working outside after the primary school closed in a village with one hundred households. The effects are smaller when province time trend is controlled for.

Panels B and C of Table 10 consider the effect of the distance to the nearby primary school on migration. The results show that the increased distance to primary school increased the probability of migration. We get similar patterns either when we consider individual decision (panel C) or when we consider the number of migrants within households (panel D). In all these exercises, whether a village has pre-school managed by village primary school or whether it has a lower middle school do not have significant effects on migration.

We also perform similar exercises using data of different periods. In particular, we separate our sample into two periods: 1991 to 2000 and 2000 to 2009. The results are reported in Table 11 and Table 12. The results indicate that the effect of primary school on migration is larger in the first than in the second period, especially when we consider the effect of the presence of a primary school rather than that of the distance to the nearest primary school. Still, the presence of pre-school and lower middle school seldom has a significant effect on migration.

4.5 Natural Experiment Evidence: Primary School Relocation and Dropout Decisions

Dropping out of school is another possible consequence of the increased educational cost, which we consider in this section. Due to data limitation, we use aggregate data only. Figure 4 reports a discontinuous change in the enrollment rate of rural school age children. We first regress the total enrollment on a linear time trend, and then we use the predicted residuals to get this figure. It shows a sharp decrease the total enrollment rate between 2001 and 2002, corresponding to the sharp decrease in the number of primary schools during the same time as shown in Figure 3. These discontinuities that appeared around the time when the school closing policy was announced suggest a causal relationship between the decreased number of primary schools and the drop out decision of rural households.

One caveat we should keep in mind is that this decreased enrollment rate in rural China may also due to statistical reasons: School age children that migrate with their children may be counted as dropout students in their hukou registration location. But this possibility is consistent with our conclusion that the school closing policy encouraged rural residents to migrate.

5. Mechanisms and Policy Implications

to be added

6. Concluding Remarks

When the hukou system just relaxed, public schools at the destination were largely inaccessible to rural migrants, discouraging people to move. In cases people choose to move, they have little choice but to leave their children at home for education. The education arrangement both in rural and urban areas will affect migration behavior. Arrangement that require more household input will discourage migration. Further relaxation of hukou system and increasing availability of education opportunities will facilitate rural to urban migration and make migration more responsive to the education conditions in rural areas.

This paper investigates how the decrease in the number of primary schools has affected the migration decision of rural households. We explore the regional variation in the changes of the number of rural primary schools. By combining the information on the number of rural primary schools at the prefecture level and micro data from a large nationally representative household surveys, we find that the decrease in primary schools in rural areas increased the probability of migration for rural households. This result still holds after we have addressed endogeneity problems due to omitted variable or reverse causality.

We also do a set of exercises that explore the heterogeneous effects. We find that (1) this relationship only exist for long term migration, (2) middle aged individuals are more sensitive to the relocation of primary schools, (3) the effect is stronger for women who have school aged children, (4) households with school age boys are more likely to migrate after the schools are closed, and (5) there was a sharp drop in gross enrollment rate after the number of primary schools decreased promptly. These results are consistent with our hypothesis that the relocation of rural primary schools has contributed to the increased number of rural to urban migrants.

One important aspect we do not consider in this paper is the education opportunities for migrant children in the destination urban areas.

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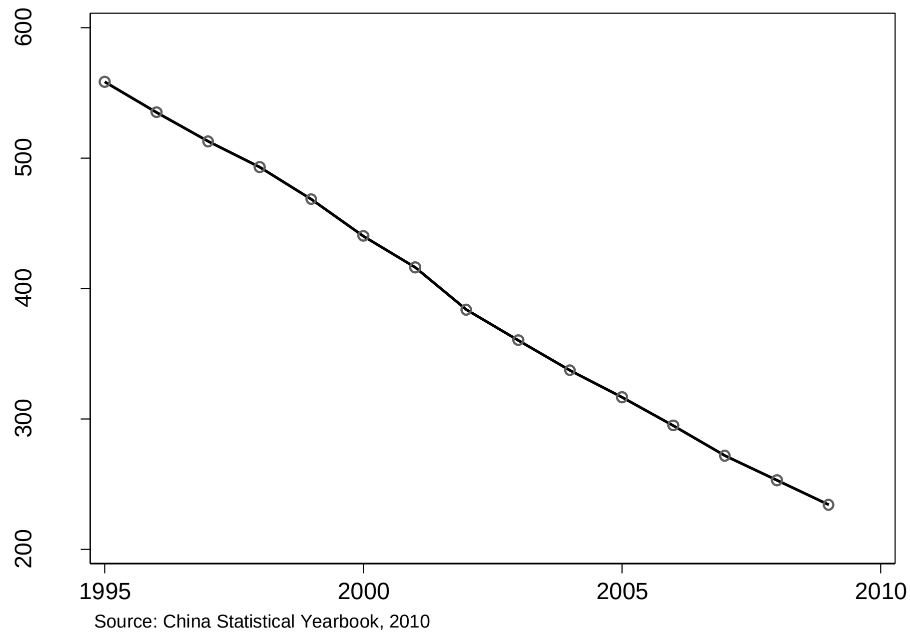


Figure 1 The Number of Primary Schools in Rural China, 1995-2009

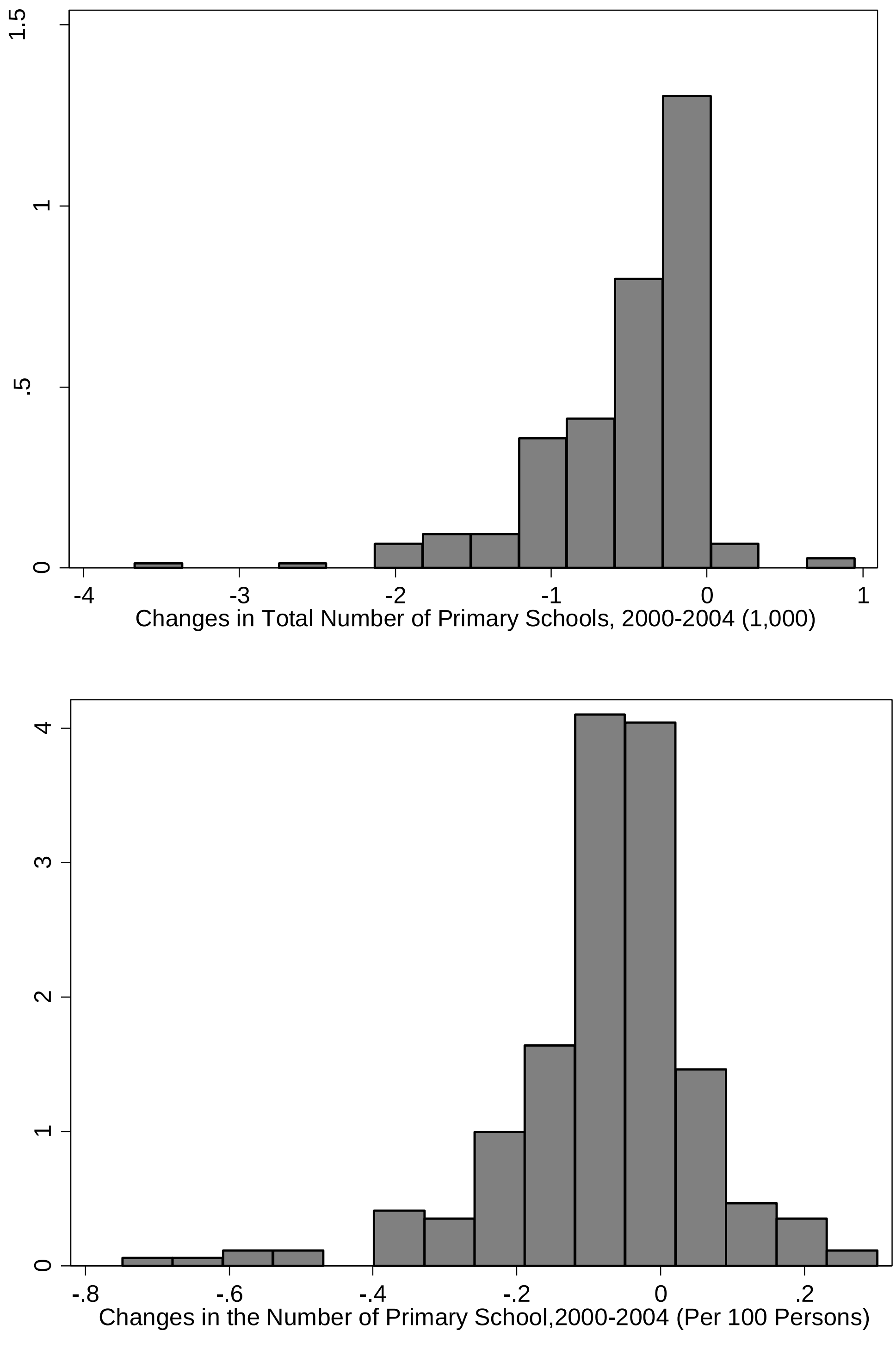
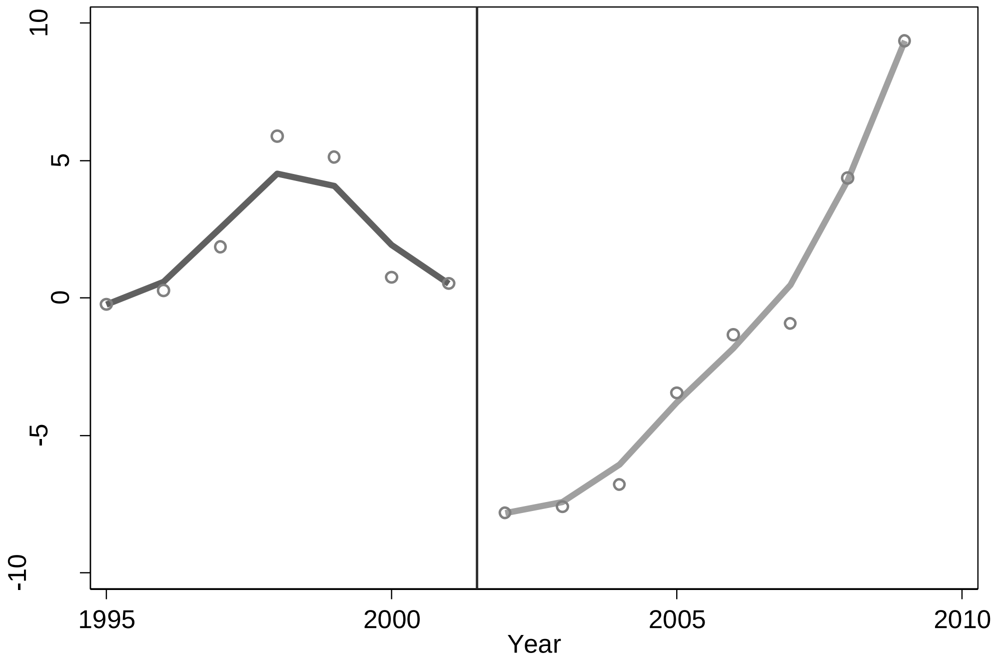
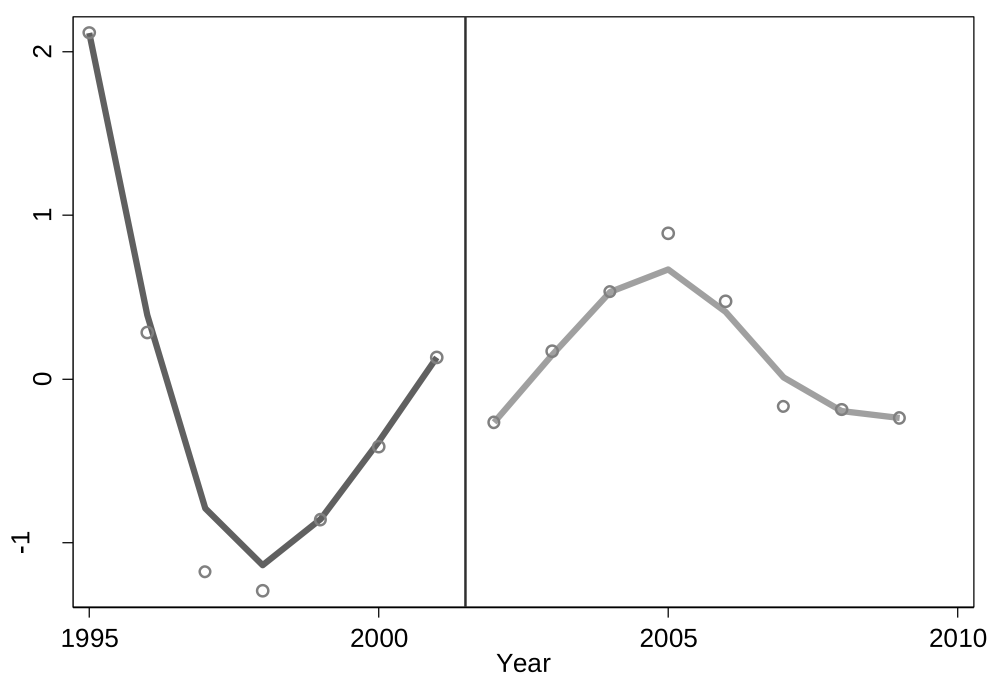


Figure 2 The Distribution of Changes in the Number of Rural Primary Schools between 2000 and 2004

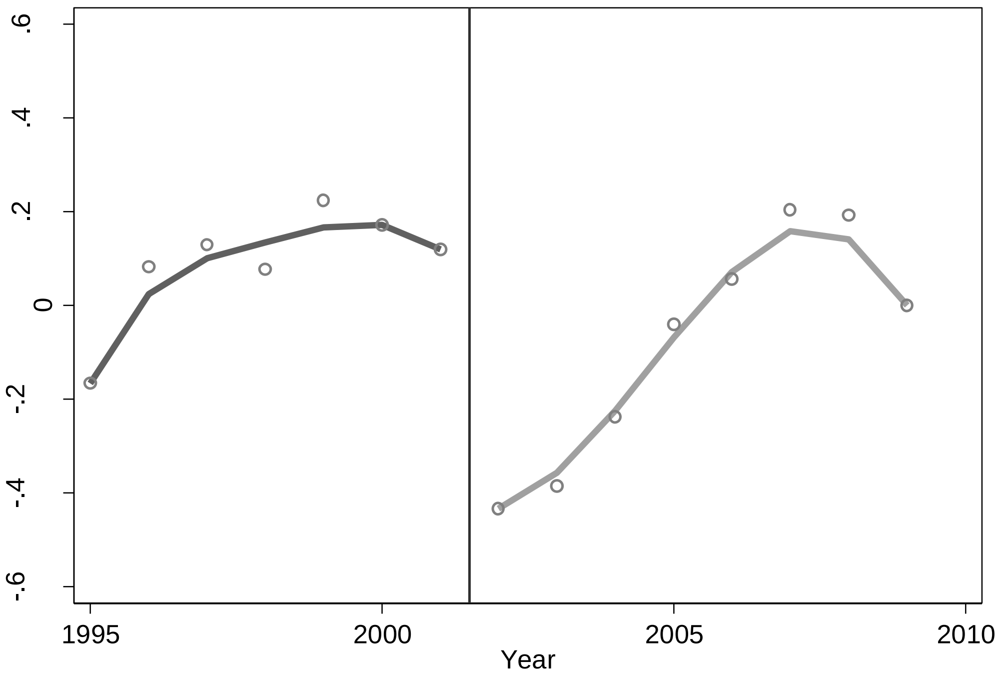


Source: China Statistical Yearbook, 2010



Source: China Statistical Yearbook, 2010

Figure 3 Discontinuities of the Changes in the Number of Rural Primary Schools



Source: China Statistical Yearbook, 2010

Figure 4 Discontinuity of the Change in the Enrollment Rate of Primary Schools in Rural China

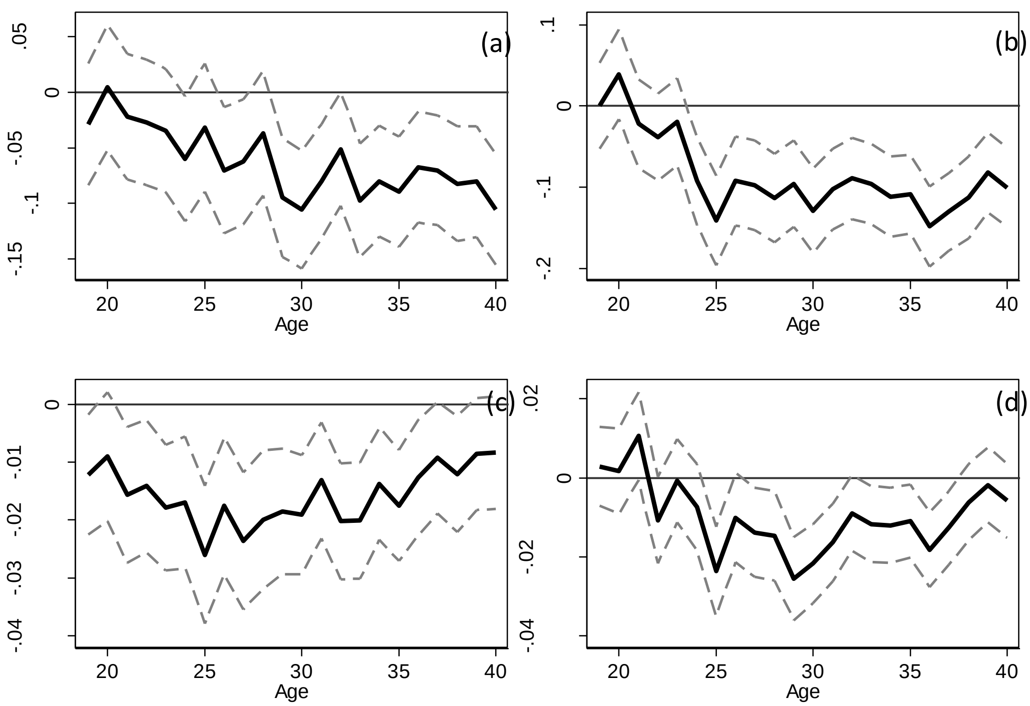


Figure 5 The Heterogeneous Effects of School Closings on Migration (0.5-4 years) by Age

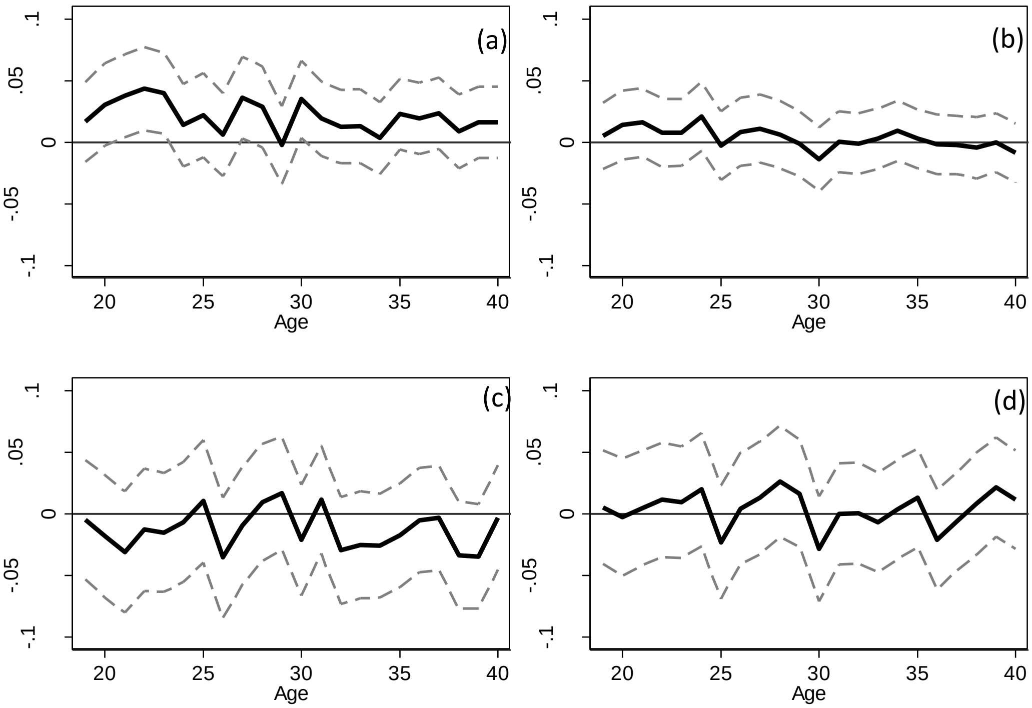


Figure 6 The Heterogeneous Effects of School Closings on Migration by Age

Table 1 The Effect of Changes in the Number of Primary Schools on the Likelihood of Migrating

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
primchng	-0.045***	-0.068***	-0.038***	-0.033***	-0.060***	-0.035***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
(primary schools/100 students)_ 2000	0.006	-0.021***	0.008	-0.004	-0.033***	-0.007
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)
Middle school	0.037***	0.038***	0.040***	0.038***	0.039***	0.042***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
High school	0.117***	0.117***	0.120***	0.084***	0.085***	0.089***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
College and above	0.214***	0.215***	0.218***	0.165***	0.166***	0.171***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
age	0.013***	0.013***	0.013***	-0.004***	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
agesquared	-0.032***	-0.032***	-0.032***	-0.007***	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
married	-0.020***	-0.019***	-0.018***	-0.049***	-0.049***	-0.047***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
density	-0.541***	-0.542***	-0.185***	-0.806***	-0.810***	-0.480***
	(0.057)	(0.057)	(0.058)	(0.054)	(0.054)	(0.055)
Share of migrants in 2000		0.195***	0.017*		0.196***	0.031***
		(0.008)	(0.009)		(0.008)	(0.009)
Share of migrants w/ 5+ yrs duration in 2005			2.623***			2.355***
			(0.056)			(0.053)
_cons	-0.069***	-0.195***	-0.175***	0.304***	0.176***	0.196***
	(0.020)	(0.021)	(0.020)	(0.020)	(0.021)	(0.021)
R2_adj	0.082	0.084	0.094	0.095	0.097	0.105
N	221312	221312	221312	242784	242784	242784

Note: *, **, and *** are significance levels at 10%, 5%, and 1% respectively. Standard errors are in parenthesis.

Table 2 The Effect of Changes in the Number of Primary Schools on the Likelihood of Migrating for Shorter/Longer Terms

	Less than 6 mths		5 yrs +	
	Male	Female	Male	Female
	(1)	(2)	(3)	(4)
primchng	0.023***	0.011**	-0.056***	-0.025***
	(0.006)	(0.005)	(0.008)	(0.008)
(primary schools/100 students)_ 2000	-0.001	-0.005*	-0.027***	-0.029***
	(0.004)	(0.003)	(0.006)	(0.005)
Middle school	0.004***	0.006***	0.020***	0.018***
	(0.001)	(0.001)	(0.002)	(0.001)
High school	0.019***	0.026***	0.093***	0.082***
	(0.002)	(0.002)	(0.002)	(0.002)
College and above	0.134***	0.137***	0.172***	0.119***
	(0.004)	(0.004)	(0.006)	(0.006)
age	-0.005***	-0.011***	0.039***	0.044***
	(0.001)	(0.001)	(0.001)	(0.001)
agesquared	0.005***	0.014***	-0.064***	-0.072***
	(0.001)	(0.001)	(0.002)	(0.002)
married	-0.008***	-0.004**	0.018***	-0.018***
	(0.001)	(0.001)	(0.002)	(0.002)
density	-0.160***	-0.136***	-0.325***	-0.526***
	(0.035)	(0.028)	(0.048)	(0.044)
Share of migrants in 2000	0.031***	0.026***	0.192***	0.160***
	(0.005)	(0.004)	(0.007)	(0.007)
_cons	0.133***	0.208***	-0.693***	-0.691***
	(0.012)	(0.011)	(0.017)	(0.017)
Adj R2	0.040	0.044	0.057	0.038
N	194703	210364	205881	222912

Note: *, **, and *** are significance levels at 10%, 5%, and 1% respectively. Standard errors are in parenthesis.

Table 3 The Effect of Changes in the Total Number of Primary Schools

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
Primchng1	-0.016***	-0.029***	-0.010***	-0.008***	-0.022***	-0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
(primary schools/100 students)_ 2000	0.010*	-0.019***	0.013**	0.001	-0.029***	0.001
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Middle school	0.038***	0.038***	0.040***	0.038***	0.039***	0.042***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
High school	0.116***	0.116***	0.119***	0.084***	0.085***	0.090***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
College and above	0.212***	0.212***	0.216***	0.163***	0.164***	0.170***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
age	0.013***	0.013***	0.013***	-0.005***	-0.005***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
agesquared	-0.032***	-0.032***	-0.032***	-0.007***	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
married	-0.020***	-0.019***	-0.018***	-0.048***	-0.048***	-0.046***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
density	-0.580***	-0.588***	-0.205***	-0.812***	-0.819***	-0.465***
	(0.056)	(0.056)	(0.056)	(0.053)	(0.053)	(0.054)
Share of mignts in 2000		0.216***	0.024**		0.212***	0.032***
		(0.009)	(0.010)		(0.008)	(0.009)
Share of mignts w/ 5+ yrs duration in 2005			2.606***			2.345***
			(0.056)			(0.053)
_cons	-0.070***	-0.212***	-0.180***	0.305***	0.165***	0.197***
	(0.020)	(0.021)	(0.020)	(0.020)	(0.021)	(0.021)
R2_adj	0.082	0.085	0.093	0.095	0.097	0.104
N	222640	222640	222640	244266	244266	244266

Note: *, **, and *** are significance levels at 10%, 5%, and 1% respectively. Standard errors are in parenthesis.

Table 4 Robustness Check Using Changes Between 2000 and 2002

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
Primchng2000-02	-0.043***	-0.054***	-0.038***	-0.019***	-0.031***	-0.014*
	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)
(primary schools/100 stds)_ 2000	0.016***	-0.003	0.017***	0.012**	-0.006	0.008
	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)
Middle school	0.033***	0.033***	0.040***	0.034***	0.035***	0.041***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
High school	0.101***	0.102***	0.118***	0.072***	0.072***	0.088***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
College and above	0.188***	0.189***	0.219***	0.144***	0.145***	0.171***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
age	0.008***	0.008***	0.014***	-0.011***	-0.011***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
agesquared	-0.023***	-0.023***	-0.033***	0.004**	0.004**	-0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
married	-0.021***	-0.019***	-0.017***	-0.043***	-0.042***	-0.045***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
density	-0.446***	-0.469***	-0.143***	-0.597***	-0.617***	-0.355***
	(0.038)	(0.038)	(0.040)	(0.036)	(0.036)	(0.038)
Share of mignts in 2000		0.177***	0.017*		0.170***	0.028***
		(0.008)	(0.009)		(0.008)	(0.009)
Share of mignts w/ 5+ yrs duration in 2005			2.680***			2.387***
			(0.054)			(0.051)
_cons	-0.005	-0.119***	-0.185***	0.364***	0.254***	0.188***
	(0.019)	(0.019)	(0.020)	(0.019)	(0.020)	(0.021)
R2_adj	0.078	0.080	0.097	0.092	0.094	0.106
N	220849	220849	225964	242291	242291	247979

Note: *, **, and *** are significance levels at 10%, 5%, and 1% respectively. Standard errors are in parenthesis.

Table 5 The Interaction Effects with Having Children

	(1)	(2)	(3)	(4)	(5)	(6)
	Boy			Girl		
	<6 months	0.5 -4 yrs	5 yrs+	<6 months	0.5 -4 yrs	5 yrs+
A:	Aged 22-40					
children	-0.001	-0.037***	-0.028***	-0.002*	-0.036***	-0.020***
	(0.001)	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)
primchng	0.010*	0.036**	0.064***	0.011*	0.020	0.033**
	(0.006)	(0.016)	(0.015)	(0.006)	(0.015)	(0.014)
*Children*primchng*	0.001	-0.067***	-0.050***	-0.001	-0.057***	-0.013
	(0.005)	(0.014)	(0.013)	(0.005)	(0.013)	(0.011)
R2_adj	0.017	0.141	0.073	0.018	0.141	0.073
N	122784	138423	134118	122784	138423	134118
B：	Aged 22-40					
primchng	0.009	0.013	0.051***	0.011*	0.008	0.027**
	(0.006)	(0.016)	(0.015)	(0.006)	(0.014)	(0.014)
primchngXone	0.004	-0.030**	-0.030**	-0.001	-0.029**	0.003
	(0.005)	(0.015)	(0.013)	(0.005)	(0.013)	(0.012)
primchngXtwo	-0.005	-0.051***	-0.040**	0.000	-0.052***	-0.013
	(0.007)	(0.019)	(0.017)	(0.006)	(0.016)	(0.015)
primchngXthree	-0.036	-0.015	-0.194**	-0.020	-0.084*	-0.029
	(0.024)	(0.047)	(0.081)	(0.025)	(0.046)	(0.047)
R2_adj	0.017	0.109	0.063	0.017	0.110	0.063
N	122571	136808	133329	122305	136538	133052
C：	Aged 26-35					
children	-0.001	-0.031***	-0.027***	-0.003**	-0.037***	-0.021***
	(0.001)	(0.004)	(0.003)	(0.001)	(0.003)	(0.003)
primchng	0.018**	0.021	0.049**	0.021**	0.004	0.027
	(0.008)	(0.024)	(0.022)	(0.008)	(0.021)	(0.020)
*Children*primchng*	-0.000	-0.043**	-0.032*	-0.006	-0.029	-0.005
	(0.007)	(0.020)	(0.018)	(0.006)	(0.018)	(0.017)
R2_adj	0.018	0.091	0.078	0.018	0.092	0.078
N	61093	70076	68147	61093	70076	68147
D：	Aged 26-35					
primchng	0.016**	0.009	0.039*	0.020**	-0.002	0.022
	(0.008)	(0.023)	(0.022)	(0.008)	(0.021)	(0.020)
primchngXone	0.003	-0.019	-0.021	-0.007	-0.007	0.009
	(0.007)	(0.021)	(0.019)	(0.007)	(0.019)	(0.017)
primchngXtwo	-0.007	-0.072**	-0.003	0.004	-0.069***	-0.013
	(0.010)	(0.030)	(0.025)	(0.008)	(0.025)	(0.024)
primchngXthree	-0.080	-0.098	-0.427**	-0.015	-0.010	-0.089
	(0.104)	(0.086)	(0.203)	(0.024)	(0.089)	(0.113)
R2_adj	0.018	0.085	0.072	0.018	0.086	0.073
N	61034	69698	67863	60977	69639	67803

Note: *, **, and *** are significance levels at 10%, 5%, and 1% respectively. Standard errors are in parenthesis.

Table 6 Heterogeneous Effects Across Regions

	Male		Female	
	(1)	(2)	(3)	(4)
primchng	-0.117***	-0.068***	-0.116***	-0.072***
	(0.015)	(0.015)	(0.015)	(0.015)
density	-0.437***	-0.122*	-0.692***	-0.402***
	(0.063)	(0.063)	(0.060)	(0.060)
*primchng*Xdensity	1.928***	1.173**	2.179***	1.450***
	(0.484)	(0.482)	(0.463)	(0.461)
(primary schools/100 students)_ 2000	-0.024***	0.006	-0.036***	-0.009
	(0.007)	(0.007)	(0.006)	(0.006)
Middle school	0.038***	0.040***	0.039***	0.042***
	(0.002)	(0.002)	(0.002)	(0.002)
High school	0.117***	0.120***	0.085***	0.089***
	(0.003)	(0.003)	(0.003)	(0.003)
College and above	0.215***	0.218***	0.166***	0.171***
	(0.006)	(0.006)	(0.007)	(0.007)
age	0.013***	0.013***	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
agesquared	-0.032***	-0.032***	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)	(0.002)
married	-0.019***	-0.018***	-0.049***	-0.047***
	(0.002)	(0.002)	(0.003)	(0.003)
Share of mignts in 2000	0.196***	0.018*	0.197***	0.032***
	(0.008)	(0.009)	(0.008)	(0.009)
Share of mignts w/ 5+ yrs duration in 2005		2.618***		2.349***
		(0.056)		(0.053)
_cons	-0.199***	-0.178***	0.171***	0.193***
	(0.021)	(0.020)	(0.021)	(0.021)
R2_adj	0.085	0.094	0.097	0.105
N	221312	221312	242784	242784

Note: *, **, and *** are significance levels at 10%, 5%, and 1% respectively. Standard errors are in parenthesis.

Table 7 The Effects of Schools Closings on Destination Choice

	Destination (non-migrants as reference group)			Destination (non-migrants as reference group)		
	Within city	Other city within prov	Out prov	Other village	Town	City
	(1)	(2)	(3)	(4)	(5)	(6)
primchng	0.277**	0.231	-0.252***	0.106	0.226**	-0.323***
	(0.112)	(0.179)	(0.063)	(0.113)	(0.106)	(0.067)
(primary schools/100 students)_ 2000	0.301***	0.427***	0.098	0.466***	0.619***	-0.173***
	(0.077)	(0.128)	(0.062)	(0.094)	(0.087)	(0.059)
Share of mignts in 2000	0.471***	1.250***	0.161*	0.590***	0.303**	0.550***
	(0.117)	(0.176)	(0.088)	(0.140)	(0.136)	(0.083)
Share of mignts w/ 5+ yrs duration in 2005	10.203***	13.133***	18.726***	14.947***	16.176***	15.993***
	(0.646)	(0.899)	(0.382)	(0.662)	(0.642)	(0.384)
Middle school	0.490***	0.449***	0.329***	0.084***	0.368***	0.508***
	(0.025)	(0.034)	(0.015)	(0.025)	(0.026)	(0.016)
High school	1.268***	0.755***	0.579***	0.023	0.695***	1.006***
	(0.031)	(0.042)	(0.022)	(0.039)	(0.035)	(0.021)
College and above	1.598***	1.740***	0.869***	-0.002	0.621***	1.583***
	(0.057)	(0.062)	(0.045)	(0.102)	(0.082)	(0.036)
age	-0.043***	0.067***	0.135***	-0.043**	-0.000	0.140***
	(0.015)	(0.018)	(0.009)	(0.017)	(0.016)	(0.009)
agesquared	-0.052**	-0.245***	-0.352***	-0.097***	-0.122***	-0.348***
	(0.025)	(0.031)	(0.016)	(0.029)	(0.027)	(0.015)
married	0.666***	-0.218***	-0.459***	0.438***	0.083***	-0.410***
	(0.029)	(0.033)	(0.017)	(0.032)	(0.030)	(0.017)
density	-9.282***	-1.922***	1.387***	-1.603**	-4.946***	-1.924***
	(0.712)	(0.694)	(0.474)	(0.778)	(0.744)	(0.416)
_cons	-2.915***	-24.23	-7.446***	-3.825***	-5.160***	-5.308***
	(0.238)	(1577)	(0.382)	(0.320)	(0.329)	(0.168)
	453533			453533		

Note: *, **, and *** are significance levels at 10%, 5%, and 1% respectively. Standard errors are in parenthesis.

Table 8 Primary school reallocation between 1991 and 2009

	1991	1993	1997	2000	2004	2006	2009
village has a public primary school (%)	73.0	84.5	83.5	89.8	81.3	70.4	64.6
Village has pre-school managed by primary school (%)	54.5	62.1	62.4	64.7	51.3	45.5	45.5
Public lower middle school in village (%)	27.3	32.3	26.8	26.5	35.8	30.6	33.3
Distance to nearest primary school (kilos)	0.372	0.258	0.136	0.108	0.272	0.444	0.721

Notes: Distance to the primary school is assumed to be zero if there is a public primary school in the village.
Date source: CHNS.

Table 9 Availability of village primary school and migration decision of village individuals, fixed effects model

	Dependent variable: migrate for employment outside for more than six months (yes=1/no=0)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
village primary school	-0.012**	-0.011	-0.013**	-0.012*	-0.017**	-0.013	-0.017**	-0.016*
	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)	(0.009)	(0.008)	(0.009)
telephone service	-0.002	-0.001	-0.003	-0.002	-0.001	-0.004	-0.001	-0.005
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.008)	(0.007)	(0.008)
postal service	0.029***	0.028***	0.029***	0.028***	0.033***	0.026***	0.033***	0.026***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.008)	(0.007)	(0.008)
village have farmland	0.002	-0.005	0.003	-0.005	0.016*	0.006	0.016*	0.006
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.010)	(0.008)	(0.010)
bus stop	-0.011**	-0.008	-0.011**	-0.008	-0.008	-0.005	-0.009	-0.006
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.007)	(0.006)	(0.007)
train station	-0.002	-0.002	-0.002	-0.002	-0.009	-0.003	-0.009	-0.004
	(0.007)	(0.008)	(0.007)	(0.008)	(0.008)	(0.009)	(0.008)	(0.010)
near open trade area/sez	-0.017***	-0.015***	-0.018***	-0.016***	-0.018***	-0.016**	-0.019***	-0.018**
	(0.005)	(0.006)	(0.005)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)
% in ag activity	-0.027**	-0.025**	-0.027**	-0.024**	-0.021*	-0.022	-0.021	-0.022
	(0.011)	(0.011)	(0.011)	(0.011)	(0.013)	(0.014)	(0.013)	(0.014)
% out of town 6+ mnth	0.014	0.031***	0.013	0.028**	-0.022*	-0.017	-0.023*	-0.018
	(0.010)	(0.012)	(0.010)	(0.012)	(0.012)	(0.015)	(0.012)	(0.015)
% in 20+ pp enterprise	0.002	-0.002	0.002	-0.002	0.003	-0.007	0.004	-0.006
	(0.009)	(0.011)	(0.009)	(0.011)	(0.011)	(0.014)	(0.011)	(0.014)
% in 20- pp enterprise	-0.004	-0.018	-0.003	-0.016	-0.022	-0.033**	-0.022	-0.033**
	(0.012)	(0.013)	(0.012)	(0.014)	(0.014)	(0.016)	(0.014)	(0.016)
wage/day for constructn wkr	-0.028***	-0.032***	-0.028***	-0.032***	-0.048***	-0.056***	-0.048***	-0.056***
	(0.005)	(0.006)	(0.005)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)
sub/vill: pre-school		-0.003		-0.003		-0.001		-0.000
		(0.005)		(0.005)		(0.007)		(0.007)
public lower-mid sch			0.000	0.004			0.002	0.011
			(0.006)	(0.006)			(0.007)	(0.008)
Province time trend	yes	yes	yes	yes	no	no	no	no
Community time trend	no	no	no	no	yes	yes	yes	yes
R2_wthin	0.051	0.050	0.051	0.051	0.076	0.077	0.077	0.077
R2_between	0.002	0.001	0.002	0.002	0.000	0.001	0.000	0.000
R2_overall	0.002	0.001	0.002	0.002	0.000	0.001	0.000	0.001
No. of individuals	35268	31343	35117	31192	35268	31343	35117	31192

Notes: *, **, and *** are significance levels at 10%, 5%, and 1% respectively. Standard errors are in parenthesis.
Date source: CHNS.

Table 10 Effects of the presence of village primary school and the distance to nearest school on migration, fixed effects model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Number of migrants in household							
village primary school	-0.042*	-0.029	-0.044*	-0.032	-0.077***	-0.072*	-0.084***	-0.084**
	(0.022)	(0.026)	(0.023)	(0.027)	(0.029)	(0.037)	(0.031)	(0.038)
sub/vill: pre-school		-0.024		-0.023		-0.003		-0.002
		(0.021)		(0.022)		(0.027)		(0.027)
public lower-mid sch			0.003	0.004			0.019	0.043
			(0.023)	(0.026)			(0.029)	(0.033)
No. of households	13198	11632	13138	11572	13198	11632	13138	11572
	Dependent variable: migrate for employment outside for more than six months (yes=1/no=0)							
Distance to primary school	0.012***	0.011***	0.012***	0.011***	0.015***	0.012**	0.014***	0.012**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.005)	(0.004)	(0.005)
sub/vill: pre-school		-0.002		-0.002		0.002		0.002
		(0.005)		(0.005)		(0.007)		(0.007)
public lower-mid sch			-0.001	0.001			-0.001	0.007
			(0.006)	(0.006)			(0.007)	(0.008)
No. of individuals	34213	30402	34062	30251	34213	30402	34062	30251
	Dependent variable: Number of migrants in household							
Distance to primary school	0.023**	0.015	0.023**	0.015	0.036**	0.030	0.037**	0.031
	(0.011)	(0.013)	(0.011)	(0.013)	(0.017)	(0.022)	(0.017)	(0.022)
sub/vill: pre-school		-0.030		-0.030		0.001		0.001
		(0.021)		(0.021)		(0.027)		(0.027)
public lower-mid sch			-0.001	-0.004			0.009	0.032
			(0.023)	(0.026)			(0.029)	(0.034)
No. of households	12809	11286	12749	11226	12809	11286	12749	11226
Province time trend	yes	yes	yes	yes	no	no	no	no
Community time trend	no	no	no	no	yes	yes	yes	yes

Notes: migrants are those migrate for employment outside for more than six months. We control for whether a village has telephone service, postal service, and farmland (three separate dummies), whether a village has bus stop (a dummy), is close to a train station, or an open trade area (or special economic zone) (two dummies), the percentages of work force engaged in agricultural activity, work outside of town for more than six months, employed in enterprises with over 20 employees, employed in enterprises with less than 20 employees, and the log of monthly wage for an ordinary construction worker in the village. *, **, and *** are significance levels at 10%, 5%, and 1% respectively. Standard errors are in parenthesis.
Date source: CHNS.

Table 11 Village primary school and migration, fixed effects model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: migrate for employment outside for more than six months (yes=1/no=0)							
	1991-2000							
village primary school	-0.034***	-0.033***	-0.035***	-0.034***	-0.039***	-0.037***	-0.038***	-0.037***
	(0.008)	(0.009)	(0.008)	(0.009)	(0.010)	(0.012)	(0.011)	(0.012)
sub/vill: pre-school		-0.001		-0.002		-0.001		-0.002
		(0.007)		(0.007)		(0.010)		(0.010)
public lower-mid sch			0.006	0.005			-0.003	-0.001
			(0.008)	(0.009)			(0.010)	(0.012)
No. of individuals	19178	17055	19081	16958	19178	17055	19081	16958
	2000-2009							
village primary school	-0.000	0.004	0.007	0.007	0.007	0.018	0.009	0.016
	(0.009)	(0.011)	(0.009)	(0.011)	(0.011)	(0.014)	(0.011)	(0.015)
sub/vill: pre-school		0.008		0.008		-0.010		-0.010
		(0.008)		(0.008)		(0.010)		(0.010)
public lower-mid sch			-0.018**	-0.007			-0.006	0.006
			(0.008)	(0.009)			(0.010)	(0.012)
No. of individuals	20918	18651	20864	18597	20918	18651	20864	18597
	Dependent variable: Number of migrants in household							
	1991-2000							
village primary school	-0.069**	-0.072**	-0.073**	-0.075**	-0.069*	-0.068	-0.066	-0.067
	(0.030)	(0.034)	(0.031)	(0.035)	(0.039)	(0.047)	(0.042)	(0.048)
sub/vill: pre-school		-0.000		-0.004		0.000		-0.005
		(0.027)		(0.027)		(0.036)		(0.037)
public lower-mid sch			0.013	0.014			-0.003	0.014
			(0.030)	(0.034)			(0.040)	(0.047)
No. of households	7410	6576	7370	6536	7410	6576	7370	6536
	2000-2009							
village primary school	-0.043	-0.032	-0.040	-0.042	-0.042	-0.042	-0.043	-0.053
	(0.034)	(0.043)	(0.036)	(0.045)	(0.041)	(0.058)	(0.044)	(0.060)
sub/vill: pre-school		0.014		0.014		-0.053		-0.050
		(0.031)		(0.031)		(0.041)		(0.041)
public lower-mid sch			-0.008	0.034			0.009	0.046
			(0.034)	(0.038)			(0.042)	(0.048)
No. of households	7626	6690	7606	6670	7626	6690	7606	6670
Province time trend	yes	yes	yes	yes	no	no	no	no
Community time trend	no	no	no	no	yes	yes	yes	yes

Notes: migrants are those migrate for employment outside for more than six months. We control for whether a village has telephone service, postal service, and farmland (three separate dummies), whether a village has bus stop (a dummy), is close to a train station, or an open trade area (or special economic zone) (two dummies), the percentages of work force engaged in agricultural activity, work outside of town for more than six months, employed in enterprises with over 20 employees, employed in enterprises with less than 20 employees, and the log of monthly wage for an ordinary construction worker in the village. *, **, and *** are significance levels at 10%, 5%, and 1% respectively. Standard errors are in parenthesis.
Date source: CHNS.

Table 12 The distance to primary school and migration, fixed effects model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: migrate for employment outside for more than six months (yes=1/no=0)							
	1991-2000							
Distance to primary school	0.017***	0.017***	0.017***	0.017***	0.020***	0.020***	0.020***	0.020***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)
sub/vill: pre-school		0.004		0.005		-0.001		0.000
		(0.006)		(0.006)		(0.009)		(0.009)
public lower-mid sch			0.002	-0.000			-0.005	-0.008
			(0.007)	(0.008)			(0.011)	(0.012)
No. of individuals	21436	20693	21361	20618	21436	20693	21361	20618
	2000-2009							
Distance to primary school	0.010**	0.011**	0.009**	0.010**	0.012*	0.014*	0.012*	0.014*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)	(0.007)
sub/vill: pre-school		0.016**		0.015*		0.014		0.014
		(0.008)		(0.008)		(0.011)		(0.012)
public lower-mid sch			-0.020**	-0.011			0.008	0.008
			(0.010)	(0.010)			(0.014)	(0.014)
No. of individuals	18958	18248	18885	18175	18958	18248	18885	18175
	Dependent variable: Number of migrants in household							
	1991-2000							
Distance to primary school	0.024	0.035*	0.024	0.035*	0.046**	0.041	0.046*	0.040
	(0.016)	(0.021)	(0.017)	(0.021)	(0.023)	(0.031)	(0.023)	(0.032)
sub/vill: pre-school		0.003		0.000		0.012		0.008
		(0.027)		(0.028)		(0.038)		(0.038)
public lower-mid sch			0.008	0.011			-0.012	0.018
			(0.029)	(0.033)			(0.039)	(0.049)
No. of households	7228	6416	7188	6376	7228	6416	7188	6376
	2000-2009							
Distance to primary school	0.044**	0.047**	0.042**	0.048**	0.045*	0.049	0.044*	0.050
	(0.017)	(0.019)	(0.017)	(0.019)	(0.027)	(0.031)	(0.027)	(0.031)
sub/vill: pre-school		0.022		0.022		-0.033		-0.031
		(0.032)		(0.032)		(0.043)		(0.043)
public lower-mid sch			-0.013	0.022			0.012	0.048
			(0.033)	(0.038)			(0.041)	(0.049)
No. of households	7373	6458	7353	6438	7373	6458	7353	6438
Province time trend	yes	yes	yes	yes	no	no	no	no
Community time trend	no	no	no	no	yes	yes	yes	yes

Notes: migrants are those migrate for employment outside for more than six months. We control for whether a village has telephone service, postal service, and farmland (three separate dummies), whether a village has bus stop (a dummy), is close to a train station, or an open trade area (or special economic zone) (two dummies), the percentages of work force engaged in agricultural activity, work outside of town for more than six months, employed in enterprises with over 20 employees, employed in enterprises with less than 20 employees, and the log of monthly wage for an ordinary construction worker in the village. *, **, and *** are significance levels at 10%, 5%, and 1% respectively. Standard errors are in parenthesis.

Date source: CHNS.