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Child Education-Induced Migration and Its Impact on the Economic Behaviors of Migrated Households in China

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ABSTRACT

Child Education-Induced Migration and Its Impact on the Economic Behaviors of Migrated Households in China

Using the 2011-2013 China Migrants Dynamic Survey, this paper utilizes the quarter of the year in which a child was born as an instrumental variable to measure child education shock and explores its impact on migrated households. We only find significant education-induced migration among boys, which we attribute to son preference in China. Due to child education-induced migration, the per capita household consumption increases by 56.7%, the savings rate decreases by 40.3%, and remittances sent home decline by about 1.3 monthly household incomes, however, there are no effects on income, food consumption, and house rent. After exploring the mechanisms underlying child education-induced migration, we find that children migrate with their parents for a better education in urban areas. Because of the closure and consolidation of rural primary schools, children are forced to migrate due to their education needs. The accessibility of primary schools in urban areas is also responsible for migration decisions regarding children. This paper facilitates understanding of how *Hukou* influences gender inequality in China. We also provide evidence to show that the segregation of the education system through *Hukou* is a possible explanation for the low consumption rate of migrants.

JEL Classification: O15, I28, D14

Keywords: education-induced migration, *Hukou*, son preference, economic behaviors

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1. Introduction

China has undergone substantial internal rural-urban migration since the mid-1980s. In 2019, there were 236 million migrants, whose registration type differed from that of their current place of residence, accounting for 17% of China's total population¹. About 100 million children are directly or indirectly associated with migrated households. Although a large body of literature has studied migrated children and “left-behind children”, the evidence on children's migration arrangement remains quite limited. Will parents migrate with their school-age children? What are the potential impacts of child migration on migrated households?

Using the 2011-2013 China Migrants Dynamic Survey (CMDS), this paper investigates the existence of education-induced migration and explores how such migration affects the economic behaviors of migrated households in China. We provide new evidence on whether school age children will migrate with their parents. In China, the minimum age at which a child is permitted to enter primary school is 6 years, which is determined in part by which quarter of the year they were born in. As a result, referring to Angrist and Krueger (1991), the quarter of the year in which a child was born can be utilized as an instrumental variable (IV) of the child education demand shock within households. We find that parents are more likely to migrate with boys rather than with girls once their children require elementary education. We attribute the gender difference in child migration to the son preference in China. As the *Hukou* system restricts migrant children's accessibility to education in urban areas, it may

¹ <http://www.nhc.gov.cn/wjw/xwdt/201812/a32a43b225a740c4bff8f2168b0e9688.shtml>.

exacerbate the gender disparity of children in migrant households. We further find that due to this education-induced migration, households that migrate with children consume more, save less, and send fewer remittances home.

We begin by exploring the existence of child education-induced migration. In Figure 1, we show the probability of children's attending primary school and migrating with their parents in relation to both the children's age and the quarter of the year in which they were born. Children begin attending primary school at age 5 and most children attend primary school between the ages of 5-7. At each age, those born in the last quarter of the year are less likely to attend primary school, which validates the first stage of the IV estimates. Figure 1 also shows the migration decisions regarding children in relation to the quarter of the year in which they were born. Between the ages of 5-7, children born in the last quarter of the year are less likely to migrate with their parents compared to those born in the first three quarters. We only find significant education-induced migration among boys.

We then explore whether parental migration status will change due to the child education requirement. We find that parents who migrate with children are less likely to migrate across cities or provinces. This cannot be explained as causality since those who migrate within cities are more likely to migrate with their children. As the local government in each city in China is responsible for the public subsidization of primary schools (Chan and Buckingham, 2008), this indicates that parents will avoid migrating across cities to mitigate barriers to their children's school entrance. In addition, we investigate the impacts of child education-induced migration on migrated households.

For households that “complied” with child education-induced migration, the per capita household consumption increases by 56.7%, the savings rate decreases by 40.3%, and remittances sent home decrease by 1.3 monthly household incomes. However, there are no effects on food consumption and house rent.

Our baseline results may suffer from several limitations. First, children born in the first three quarters of the year may be more likely to migrate for reasons other than education. To address this concern, we examine the impact of the quarter of the year in which a child was born on migration for children of 2-3 years old and 8-9 years old and find insignificant effects. Second, we examine the exclusion assumption of the IV when estimating the effects of child education-induced migration on households. To confirm whether the increase in household consumption is driven by education expenditures or migration, we compare the impacts of attending primary school on consumption among households that migrate with children, households that leave their children behind, and households of girls. We find marginal effects only on consumption within households that migrate with children. The main cost of migrating with children comes from the cost of living in urban areas rather than education expenditures.

This paper contributes to the literature in three ways. First, we shed light on the migration decisions of households with children and provide causal evidence for child education-induced migration. The relationship between the migration decisions and human capital investments of both parents and children has been intensively studied in the context of international migration (see Dustmann and Glitz, 2011, for a review). We show that households are more likely to migrate with children due to their children’s

education requirements. Although our setting is based on how the child education requirement affects China's internal rural-urban migration, child education-induced migration is also suggestive for international migration. Second, our study contributes to understanding son preference in China as shown by the *Hukou* system. We confirm that the *Hukou* system may have the unintended consequence of fostering gender disparity among children. Although the *Hukou* system itself has no gender discrimination in regards to migrant children, it exacerbates gender inequality in a patriarchal society where boys are preferred over girls. This paper facilitates understanding of how a gender-neutral policy of labor flow restriction affects gender inequality. Finally, we further the understanding of the consumption and saving behaviors of migrants. Some studies have explored the puzzle of the high savings rate in China (Modigliani and Cao, 2004; Wei and Zhang, 2011; Chen et al., 2015). For instance, Chen et al. (2015) show that migrants' consumption is 16-20% lower than that of local urban residents. Due to the *Hukou* system, precautionary savings, lower expectation of permanent income, and high mobility are responsible for this consumption gap. Our results show that the segregation of the education system is another possible explanation for the low consumption rate of migrants.

The remainder of the paper is structured as follows. Section 2 documents China's *Hukou* system, internal rural-urban migration, and related literature. Section 3 describes data and methods. Section 4 presents the results. Section 5 explores underlying mechanisms of education-induced migration. Section 6 concludes.

2. Institutional Background and Related Literature

2.1 China's Hukou System and Migration

Internal rural-urban migrants and the plights of their children are closely related to the *Hukou* system in China, which was established by the central government in 1958. To extract the agricultural surplus in support of heavy industries in cities, the *Hukou* system restricts free migration by classifying each citizen into a *Hukou* type that operates as a residential permit. Within each city, a person is labeled a rural or urban *Hukou*. Only residents with local *Hukou* are entitled to claim some public benefits such as school entrance permission for their children, medical care, pension, and permission to buy a house. In the mid-1980s, rural residents began to migrate to some pilot regions that were transiting to a market-oriented economy. With the process of economic transition being staggered, large-scale rural-urban migration did not become prevalent until the mid-1990s. Though population migration is allowed due to the demands for labor forces in cities, the *Hukou* system, rather than having been abolished, is contingent on the local government (Chan and Buckingham, 2008). As a result of several reforms, the rural-urban migration barrier of the *Hukou* system has been relaxed within some cities, however, China's migration characteristic is from the Middle and West to the East and Coastal regions with better job opportunities, and it is still difficult for less-educated migrants to acquire the local *Hukou* where they work.

2.2 Related Literature

As the *Hukou* system constrains migrant children's equal access to education, adult

migrants¹ face a dilemma in coping with their children's education requirements. On the one hand, if they migrate with their children, their children are only admitted to some private schools characterized as having poor teaching staff and facilities (Chen and Feng, 2013; Han, 2004; Liu et al., 1998; Zhang et al., 2015). Existing studies show that migrated students have a lower enrollment rate (Liang and Chen, 2010), higher mobility rate, and worse school performance compared to their local urban counterparts or even the "left-behind children" (Chen and Feng, 2013; Han, 2004; Lai et al., 2014). On the other hand, if children are left behind, they usually stay with their grandparents or other relatives. Although remittances from migrant parents may alleviate the financial constraints of raising such children and thus result in higher investment in education, left-behind children lack careful parenting, which is of the essence in child development. Without parental affection and care-giving, the left-behind children have poor school performance (Cortes, 2015; McKenzie and Rapoport, 2011) and health (Gao, 2010; Lee, 2011; Li et al., 2015; Qin and Albin, 2012), as well as misconduct problems (Hu et al., 2014; Ye and Lu, 2011). As highlighted by Dustmann and Glitz (2011), migration and educational decisions are strongly intertwined. Though existing literature has stated some characteristics are possibly correlated with the migration decisions regarding children (Fang and Shi, 2018), causal evidence for education-induced migration is scarce.

This paper also considers some possible reasons for the low consumption rate of migrants in China. Chen et al. (2015) emphasize that the consumption rate of migrants

¹ Due to the strict criteria for acquiring the local *Hukou* in big cities, migrants will return to rural or county areas when they are aged.

is lower than that of local urban residents. One possible explanation is that migrants are not entitled to public benefits and have shorter residence expectations. Migrants thus have stronger motivations for precautionary savings. In addition, remittances sent by migrants have a significant effect on the school attendance and retention of children (Edwards and Ureta, 2003). Therefore, if the migration decisions are affected by child education shock, household consumption and other economic behaviors are also possibly influenced.

3. Data and Methods

3.1 Study Design and Sample

Our study uses the data from the 2011-2013 China Migrants Dynamic Survey (CMDS)¹, which is annually conducted by the National Health Commission of the People's Republic of China since 2010. The survey employs a stratified, multi-stage, probability proportionate to size (PPS) sampling method. The sample is first stratified at the province (autonomous regions and municipalities) and township/subdistrict level. During the multi-stage process, townships/subdistricts, village/community, and individual participants are randomly sampled proportionally. The CMDS is a nationally representative sample for migrants aged 15-59. In the CMDS, migrants are defined as those who are not registered in the local area (city or county) for one month or more. Since the 2011-2013 waves encompass detailed school information on children, we adopt this three-wave pooled cross-sectional sample, with 370,151 households in total,

¹ The data is available on the official website: <http://www.chinaldrk.org.cn/wjw/#/home>.

128,000 for 2011, 158,556 for 2012, and 198,795 for 2013.

Since children of different ages have different parenting needs, we exploit the compulsory primary-school entrance age (6 years old in China) to construct the child education shock. The specific procedures are as follows: First, due to the implementation since 1979 of the One-Child Policy (OCP), each couple is compulsorily assigned a “one-birth” quota¹. In our sample, the proportions of households with 0, 1, 2, 3, and more than 3 children account for 6.77%, 53.97%, 34.05%, 4.48%, and 0.72%, respectively. We only keep households with 1-3 children to avoid unobservable variables in households with more than 3 children. Second, prior literature shows that the OCP leads to gender selection in China, which is not as usual in the first child (Ebenstein, 2010; Li et al., 2011). In addition, in China, the senior siblings are responsible for taking care of their junior siblings. Thus, we only take the child education shock of the first child into account and control for the number of children within a household. Finally, given our research aim, we focus on education-induced migration and thus construct child education shock using the compulsory education age of 6. For robustness checks, we also relax the threshold to 5 and 7 years old in case the compulsory education age is not strictly complied with. A detailed construction of child education shock is presented in Table 1.

Following Angrist and Krueger (1991), we divide children into four groups based on the quarter of the year in which they were born. Given that the school year

¹ Some rural households can have a “One-and-a-Half-Birth” or “Two-Birth” quota, which depends on the provinces they live in. And minority groups face less restriction of the fertility policy. For expositional ease, we still call the fertility policy OCP.

generally begins on September 1 of each calendar year, those born in the last quarter of the year are less likely to be admitted into primary school. Taking the 2012 CMDS as an example, as the survey was conducted in May 2012, those born between September and November 2005 will not be admitted into primary school as they were only 5 years old on September 1 in 2011. If the threshold is relaxed to 5 years old, for those born between December 2003 and November 2006, all the children except for those born in the last quarter of 2006 will be admitted into primary school. If the threshold extends to 7 years old, only those born in the first three quarters of 2004 will be admitted into primary school. Regarding the threshold of the school entrance age, children are restricted in a narrow range such that children's other characteristics should be homogenous except for child education requirement. Households with a child born in the fourth quarter are less likely to suffer from child education shock compared with their inframarginal counterparts. These restrictions leave us with a final sample of 45,308 observations, 11,022 for 2011, 14,847 for 2012, and 19,439 for 2013.

Table 1

3.2 Variables

Our dependent variables include two parts. First, we focus on the migration status of both parents and children due to child education shock. The CMDS includes the place of residence of each member of the household. For the first child less than 18 years old in the total sample, 69.7% migrate with their parents, 29.1% are left behind, 1.1%

stay in other places, and 0.1% died. We drop the deceased children and treat children as migrant children if they migrate with their parents. In our study sample, 98.6% of fathers and 96.8% of mothers migrate (see Table 2). And 74.2% of children migrate with their parents, which is in accordance with the fact that the new generation of migrated couples prefer to migrate together with their children (Zhao et al., 2018). In regards to migration distance, provinces are higher than cities in the administrative hierarchy. Migration across provinces is of greater geographical and institutional distance than migration within provinces. In our sample, 52.3% of fathers and 50.6% of mothers migrate across provinces, and 81.6% of fathers and 79.9% of mothers migrate across cities (see Table 2). Second, we focus on economic behaviors of migrated households, including income, consumption, saving, and remittances sent home. We also explore the consumption structure, focusing on food consumption and house rent due to data availability.

Dummy variables of parental education, the first child's age, number of children in the household, ethnicity, and father's *Hukou* status are included as covariates. To capture China's co-residence pattern in extended families, we also add two separate dummies of whether grandparents more than/less than 65 years old live in the household. The younger and elder grandparents may have opposite effects on households: While younger grandparents can take care of grandchildren, elder grandparents need elderly care themselves. Detailed summary statistics of variables are shown in Table 2.

Table 2

3.3 Identification Strategy

When analyzing the relationship between child education and migration status, the endogeneity of child education should be taken into account. Specifically, the correlation between child education and migration may suffer from the inverse causality problem. Migration is likely to affect child education. In addition, omitted factors may affect child education and migration status simultaneously. For instance, children who migrate with their parents may be well prepared for education. Then the observed positive relationship between child education and migration could be spurious.

Our main identification strategy is the standard IV reminiscent of Angrist and Krueger (1991). We use the quarter of the year in which a child was born as the IV for child education shock. The specific two-stage least squared (2SLS) models are as follows:

$$Primary_i = \lambda + \pi Z_i + X_i' \beta_1 + \eta_i \quad (1)$$

$$y_i = \alpha + \gamma \widehat{Primary}_i + X_i' \beta_2 + u_i \quad (2)$$

where, in equation (1), $Primary_i$ denotes a dummy indicating whether the child attends primary school, Z_i is a dummy variable indicating whether the child was born in the fourth quarter (September, October, and November), which operates as the IV for child education shock. X_i is a vector of covariates, including parental migration status, parental education, age of children, dummies of the co-residing grandparents more

than/less than 65 years old, ethnicity, father's *Hukou* status, and number of children in the household. We also control the year and province fixed effect. y_i are the dependent variables, including the migration status of household members and household economic behaviors.

4. Results

4.1 Visualizing the Data for the First-stage Results of IV

Before turning to the estimation results, we visualize the patterns of primary school attendance and the probability by gender of children's migration for the different quarters of the year in which the children were born. Figure 1 illustrates the probabilities of attending primary school and migrating with parents in relation to the quarter of the year in which the children were born. We plot the figures of boys and girls separately (see Figure 1a and 1b). In Figure 1a, most boys begin primary school between 5-7 years of age. For boys aged 5-7 years, there is a significant decline in the likelihood of primary school attendance for those born in the fourth quarter of the birth year for boys of the same age. Nearly all boys are attending primary school when they are 8 years old. Boys complete their primary school after they are 11 years old. The relationship between primary-school retention and the quarter of the year in which a child was born reverses when boys are more than 11 years old. Relative to boys born in the first three quarters of the year, those born in the fourth quarter attend primary school later. Thus, they will naturally finish their primary education later. Figure 1 suggests that the threshold of admittance into primary school seems to be strictly implemented in China. Graphically,

there are clear first-stage results of using the quarter of the year in which a child was born as an IV for child education shock. We will quantitatively check the first-stage results in the latter estimates.

To overview the relationship between the quarter of the year in which a child was born and the probability of migration, we plot the probability of migrating with parents by the quarter of the year in which a child was born. There is *prima facie* evidence that boys born in the fourth quarter are less likely to migrate with their parents between the ages of 5-7 years, indicating education-induced migration among boys. Figure 1b illustrates that, for girls, the likelihood of those born over different quarters of the year of attending primary school is almost identical to Figure 1a. Additionally, we compare the probability of children's migrating with their parents by the quarter of the year in which the children were born and by gender (see Figure 2). Among those between 5-7 years old, boys born in the last quarter of the year are less likely to migrate with their parents than girls.

Figure 1

Figure 2

4.2 Education-induced Migration among Children

Table 3 presents the IV estimates of the effect of primary-school attendance on child

migration. The results of children aged 5, 6, 7, and 5-7 are presented in Panels A-D, respectively. Columns 1, 3, and 5 present the first-stage results and columns 2, 4, and 6 present the reduced form and the 2SLS estimates. In particular, columns 3-4 are for boys and 5-6 for girls. The first-stage results show that children in the three different ages born in the fourth quarter of the year are 1.9%, 6.0%, and 24.1%, respectively, less likely to attend primary school (Column 1, Panel A-C). For children aged 5-7, those born in the fourth quarter of the year are 8.2% less likely to attend primary school (Column 1, Panel D). The coefficients of the first-stage estimates are almost identical to the unconditional results in Figure 1. We also find that child education shock significantly increases the migration of children at 5 and 6 years old, but not those aged 7 years old. In Panel D, child education shock leads to a 19.6% increase in the probability of migration among children aged 5-7 years old. For the “compliers”, those who should have attended primary school had it not been for the threshold of the primary school entrance age, attending primary school increases their migration probability by 26.6% ($0.196/0.747$) compared to their inframarginal counterparts. For split analyses by gender, we find significant heterogeneities. For boys, child education shock increases the likelihood of migration by 86.6%, 50.7%, and 11.2% among children aged 5, 6, 7 years old, respectively. On average, the local average treatment effect (LATE) is 28.3% for boys, translating into a 37.7% ($0.283/0.75$) increase in the likelihood of migration among those born in the first three quarters of the year. However, we consistently observe insignificant effects among girls (Column 6, Panels A-D).

Such gender heterogeneity might be attributable to son preference. Several studies

have confirmed that girls are more likely to suffer from gender selection due to China's patriarchal culture and the OCP (Sen, 1990; Qian, 2008; Ebenstein, 2010; Li et al., 2011). Our findings here also reveal the unintended consequence of gender inequality due to the *Hukou* system, which restricts the free migration of children by segregating the education system in rural and urban areas. Given the binding constraint of the *Hukou* system on the free migration of children, girls are also more prone to be left behind.

Table 3

4.3 Robustness Checks

In Figure 1, a small proportion of children aged 4 begin their primary school, possibly due to the misreporting of attending kindergarten. To validate the exclusion assumption of our IV, we attempt to confirm that the quarter of the year in which a child was born affects the parental migration decisions via the education shock rather than other confounders correlated with the quarter of the year in which a child was born. We conduct several placebo tests on children at other ages (see Table 4). In Figure 1, we show that no children aged 2-3 years old attend primary school and almost all the children aged 8-9 years old are at primary school. And there is no variation in attending primary school based on the quarter of the year in which a child was born. We conduct the reduced form of Equation (2) for children aged 2-3 and 8-9 years old, respectively (Panels A and B of Table 4). There is no significant effect of the quarter of the year in which a child was born on the parents' migration decisions, confirming that the

significant effect on children aged 5-7 indeed emanates from child education shock. In addition, Figure 1 also reveals that children older than 10 complete their primary school successfully. The IV results for children aged 11-13 years old are presented in Panel C of Table 4. The first-stage results demonstrate that being born in the fourth quarter of the year is linked with a 4.2% increase in the probability of staying in primary school compared to being born in the first three quarters. Nonetheless, the IV estimates are negative and insignificant. We observe similar patterns for boys and girls, which provides supportive evidence for the validity of our overall empirical strategy.

Table 4

4.4 The Impacts of Education-induced Migration on Households

After confirming the existence of education-induced migration among boys, we further investigate its impacts on households. Since we find insignificant education-induced migration among girls, we now restrict our analyses to boys aged 5-7. We replace the key endogenous variable as the migration status in Equation (3). The dependent variables in Equation (4) include household income, consumption, savings, food consumption, house rent, and remittances sent home. In addition, we control an indicator of whether children attend primary school to rule out the direct effect of attending primary school.

$$Migration_i = \lambda' + \pi'Z_i + X_i'\beta'_1 + \eta'_i \quad (3)$$

$$y_i = \alpha' + \gamma'\widehat{Migration}_i + X_i'\beta'_2 + u'_i \quad (4)$$

In Table 5, the first-stage estimates show that children born in the last quarter of the year are 2.8% less likely to migrate with their parents (Column 1). As shown in the results in Panel D of Table 3, those born in the fourth quarter of the year are 8.1% less likely to attend primary school, and attending primary school increases the probability of migration by 28.3%. Hence, children born in the last quarter of the year are 2.3% ($8.1\% \times 28.3\%$) less likely to migrate due to being unaffected by child education shock. The results in Table 3 are quantitatively similar to the first-stage results in Table 5. In column 2, the IV estimates show that the effect of child migration on household income is insignificant. However, education-induced migration increases household consumption by 56.7% and decreases the savings rate by 40.3%. We also find that the effects of migration on food consumption and house rent are both positive but insignificant. Finally, we show that child migration will reduce the remittances sent home by approximately 1.3 monthly household incomes, though significant at the 10% level.

Table 5

Several limitations are worth highlighting: First, although the effect on household income is insignificant but positive, the results may be driven by household income instead of child migration. Regarding the effect of migration on consumption, we have controlled household income and the coefficient of migration remains significant. Also, other outcomes are all adjusted by household income. If our results are mainly driven

by household income, the effect on food consumption and house rent should also be significant, which is, however, not the case for our results. The above results are consistent with the explanation that households consume more, save less, and send fewer remittances home after migrating with children. Since the food consumption and house rent of an additional pupil can be ignored, the effects of migration on them are insignificant. Secondly, since the quarter of the year in which a child was born is associated with attending primary school, the exclusion assumption of our IV might be violated. As we have controlled a dummy for whether a child is attending primary school in each equation, the direct effect of attending primary school can be alleviated. To further disentangle the direct effect of attending primary school, we detect the effect of child education shock among the migrated boys between 5-7 years old. The results in Appendix Table A1 indicate that attending primary school increases household consumption by 13.6%. Other household outcomes are insignificant. In Appendix Tables A2-A3, we rerun the same estimates for boys not migrated and all girls, respectively. Among boys left-behind at home, attending primary school does not increase household consumption. Regarding all girls, since there is no education-induced migration, no household outcomes are affected.

In a nutshell, attending primary school marginally increases household consumption. The effects on household outcomes mainly result from education-induced migration among boys. Our results indicate that in addition to the direct costs of attending primary school in cities where migrant parents live, other costs are also higher for children who migrate with their parents.

5. Mechanisms of Education-induced Migration

After confirming the existence of education-induced migration and examining its impacts on households. We further explore potential mechanisms of education-induced migration in three major ways: (i) children migrate with their parents for a better elementary education in urban areas; (ii) children are forced to migrate due to the policy of rural school closure and consolidation; and (iii) the availability of primary schools in urban areas.

5.1 Migrating for Better Education

Given the rural-urban gap in the quality of Chinese education, it is possible that children migrate with their parents to acquire a better education. To examine this mechanism, we employ the type of primary school (i.e. public school and private school) as a crude indicator of the quality of the primary school. Public schools are generally subsidized by the local government and are of higher quality than private schools catering to migrant children (Han, 2004; Chen and Feng, 2013). Migrant children are not able to attend public schools due to the lack of local *Hukou*. If migrant parents are qualified such that their children are eligible for local public schools, children may migrate for a better education than they would be able to receive by attending primary school in rural areas. However, we find that migrant children are 9.6% more likely to attend private schools if they migrate with their parents (see Table 6). Furthermore, migrant children are more likely to pay a sponsorship fee than are the left-behind children. This is the case for both boys and girls. The results provide suggestive evidence that children may

not migrate for better elementary education in urban areas.

Table 6

5.2 Forced to Migrate

Another drastic transformation of the education system in China that has been occurring since 2001 is the policy of rural school closure and consolidation (Ding et al., 2016). The ultra-large-scale rural school closure and consolidation policy was followed by an official document, “*The Decisions about the Reform and Development of the Basic Education*”¹, released by the central government. The document states that the local government should optimize the distribution of schools to make fuller use of educational resources, which is in accordance with local governments’ motivation. Triggered by budget deficits, some regions close primary schools in rural areas on a large scale (Ding et al., 2016). The policy was not ceased until 2010, when the central government realized that local governments had blindly closed too many primary schools in rural areas.

Figure 3 plots the trend of numbers of pupils and primary schools by different geographical regions. Figure 3a reveals that the number of primary-school students decreased considerably during 2001-2010, while the number of pupils in county/town areas increased. Figure 3b illustrates that a large number of rural primary schools disappeared during the same period. In contrast, primary schools in county/town (urban)

¹ http://old.moe.gov.cn/publicfiles/business/htmlfiles/moe/moe_406/200412/4730.html

areas are relatively stable. Figure 4 displays the trend of the school-pupil ratio by different regions. From 2000 to 2010, the school-pupil ratio decreased from about 7/1000 to 5/1000 in rural areas. During the same period, the ratio in county/town (urban) areas declined from approximately 3.6/1000 (2/1000) to 1.2/1000 (1.0/1000). It is worth noting that rural children are more affected by the disappearance of primary schools mainly because rural areas are more dispersed than urban areas. After 2010, there was a slight rise in the school-pupil ratio mainly because the central government stopped the closure of primary schools.

Figure 3

Figure 4

We collect data of schools and pupils of the origin province for migrants and divide the full sample into high school-pupil ratio and low school-pupil ratio groups by the median of annual school-pupil ratio. For those whose origin province has a higher school-pupil ratio, Panel A of Table 7 indicates that boys' primary-school requirement is responsible for a 23.3% increase in the likelihood of migrating with their parents. In panel B in Table 7, children whose origin province has a lower school-pupil ratio are 33% more likely to migrate with their parents. The results suggest that education-induced migration is mediated by the disappearance of primary schools in rural areas. It should be noted that since we compare children within the same province, the school-

pupil ratio is not required to be exogeneous.

Table 7

5.3 The Pull Force in Cities

The availability of primary schools in cities is another determinant of child education-induced migration. Unfortunately, there is no detailed information on the accessibility of primary schools catering to migrant children at the city level. We employ the parental migration destination as a proxy variable for the availability of primary schools for the migrated children since the *Hukou* system serves as a barrier between cities after several recent reformations. The rural-urban barrier is not strict within each city; therefore, migrant children in the same city are more likely to be eligible for local schools. We estimate the effect of attending primary school on parental migration status. Panel B of Table 8 shows that child education shock reduces parental migration across cities. One possible explanation is that parents who migrate within a city are more likely to support their children in the workplace. The results confirm that the effect of the availability of primary school is one possible mechanism for child education-induced migration. The effect of education shock is insignificant for girls.

Table 8

6. Discussion and conclusions

In this paper, we exploit the quarter of the year in which a child was born as an IV to estimate child education shock and its impact on the economic behaviors of migrated households in China. Three key findings are worth mentioning: First, we confirm the existence of education-induced migration among boys rather than girls, which might be attributable to son preference in China. Second, due to education-induced migration, household consumption increases by 56.7%, whilst the savings rate decreases by 40.3%. Furthermore, remittances sent home decrease by about 1.3 monthly household incomes. But there is no effect on income, food consumption, and house rent. Third, we have attempted to provide possible explanations for education-induced migration. We find that children are unlikely to migrate for better education in their parental migration destination. In addition, because of the closure and consolidation of rural primary schools, children's education requirements force them to migrate with their parents. The accessibility of primary schools in urban areas is another possible determinant in the migration decisions within a household.

Our findings have several policy implications: First, although there is no gender preference of the *Hukou* system itself, it results in the unintended consequence of gender disparity. Given the higher costs of attending primary school and living in urban areas, parents are more likely to migrate with male children rather than female ones. Consequently, the *Hukou* system may aggravate the gender gap in elementary education and parenting. The rationale here is quite similar to the OCP: If the government restricts fertility, girls will suffer from more abortions (Ebenstein, 2010). Second, we provide new insights in explaining the puzzle of the high savings rate of migrants through the

lens of child education requirement. Taking the direct costs of primary-school attendance into account, households with migrated children will consume more and save less. If migrant parents decide not to migrate with their children, they have greater mobility and less migration expectancy (Zhang, 2010), which leads to less consumption. Besides the barrier of the school entrance, we can also attribute the extra consumption to the higher cost of living in cities. Finally, the disappearance of schools in rural areas and the availability of urban primary schools serve as push and pull forces for the migration decisions. The missing of rural primary schools intensifies the intention of parents to migrate with their school age children. As a result, the availability of primary schools for migrant children has been exploited as an efficient tool for controlling the scale of cities in China. However, the segregation of the education system not only reduces the consumption of migrated households, but also causes many problems for the migrant children. The provision of primary school may alter parental migration decisions. To support their children in cities, parents may have to reduce migration across cities, thereby distorting the free migration of labor forces.

This paper is merely a starting point that provides tentative evidence supporting child education-induced migration and exploring its potential mechanisms and consequences. As we focus on migrated households, it is possible that parents do not migrate or return home in response to their children's educational requirements. Our results should be taken as an upper bound of child education-induced migration.

Declarations of Interest

The authors declare that they have no competing interests.

Data Availability Statement

The data that support the findings of this study are openly available at <http://www.chinaldrk.org.cn/wjw/#/home>.

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References

- Angrist, Joshua D., and Alan B. Krueger. 1991. "Does compulsory school attendance affect schooling and earnings?" *The Quarterly Journal of Economics* 106 (4): 979-1014.
- Chan, Kam Wing, and Will Buckingham. 2008. "Is China abolishing the hukou system?" *The China Quarterly* 195: 582-606.
- Chen, Binkai, Ming Lu, and Ninghua Zhong. 2015. "How urban segregation distorts Chinese migrants' consumption?" *World Development* 70: 133-146.

- Chen, Yuanyuan, and Shuaizhang Feng. 2013. "Access to public schools and the education of migrant children in China." *China Economic Review* 26: 75-88.
- Cortes, Patricia. 2015. "The feminization of international migration and its effects on the children left behind: Evidence from the Philippines." *World Development* 65: 62-78.
- Connelly, Rachel, and Zhenzhen Zheng. 2003. "Determinants of school enrollment and completion of 10 to 18 years old in China." *Economics of Education Review* 22 (4): 379-388.
- Ding, Yanqing, Shaoda Wang, and Xiaoyang Ye. 2016. "Why have some local governments closed more rural schools than others?" *China Economics of Education Review* 1 (4): 3-34. (in Chinese)
- Dustmann, Christian. 2008. "Return migration, investment in children, and intergenerational mobility comparing sons of foreign-and native-born fathers." *Journal of Human Resources* 43 (2): 299-324.
- Dustmann, Christian, and Albrecht Glitz. 2011. "Migration and education." In *Handbook of the Economics of Education. Volume 4*, edited by Eric A. Hanushek, Stephen Machin, and Ludger Woessmann, 327-439. North-Holland: Elsevier.
- Ebenstein, Avraham. 2010. "The "missing girls" of China and the unintended consequences of the one child policy." *Journal of Human Resources* 45 (1): 87-115.
- Edwards, Alejandra Cox, and Manuelita Ureta. 2003. "International migration, remittances, and schooling: evidence from El Salvador." *Journal of Development Economics* 72 (2): 429-461.
- Fang, Yiping, and Zhilei Shi. 2018. "Children of migrant parents: Migrating together or left behind." *Habitat International* 76: 62-68.
- Gao, Yang, Liping Li, Jean Hee Kim, Nathan Congdon, Joseph Lau, and Sian Griffiths. 2010. "The impact of parental migration on health status and health behaviours among left behind adolescent school children in China." *BMC Public Health* 10 (1): 56.
- Han, Jialing. 2004. "Survey report on the state of compulsory education among migrant children in Beijing." *Chinese Education & Society* 37 (5): 29-55.
- Hu, Hongwei, Shuang Lu, and Chien-Chung Huang. 2014. "The psychological and behavioral outcomes of migrant and left-behind children in China." *Children and Youth Services Review* 46: 1-10.
- Lai, Fang, Chengfang Liu, Renfu Luo, Linxiu Zhang, Xiaochen Ma, Yujie Bai, Sharbono Brian, and Scott Rozelle. 2014. "The education of China's migrant children: The missing link in China's education system." *International Journal of Educational Development*, 37, 68-77.
- Lee, Ming-Hsuan. 2011. "Migration and children's welfare in China: The schooling and health of children left behind." *The Journal of Developing Areas*: 44(2): 165-182.
- Li, Qiang, Gordon Liu, and Wenbin Zang. 2015. "The health of left-behind children in rural China." *China Economic Review* 36: 367-376.
- Liang, Zai, and Yiu Por Chen. 2010. "The educational consequences of migration for children in China." *Investing in Human Capital for Economic Development in*

- China* 36(1): 159-179.
- Liu, Cuilian, Li Taibin, and Li Jun. 1998. "A case study of migrant sponsored schools in western Shanghai." *The Floating Population in Shanghai: Current Situation and Future Prospects*: 162-181.
- McKenzie, David, and Hillel Rapoport. 2011. "Can migration reduce educational attainment? Evidence from Mexico." *Journal of Population Economics* 24 (4): 1331-1358.
- Modigliani, Franco, and Shi Larry Cao. 2004. "The Chinese saving puzzle and the life-cycle hypothesis." *Journal of Economic Literature* 42 (1): 145-170.
- Qian, Nancy. 2008. "Missing women and the price of tea in China: The effect of sex-specific earnings on sex imbalance." *The Quarterly Journal of Economics* 123 (3): 1251-1285.
- Qin, Jiang, and Björn Albin. 2010. "The mental health of children left behind in rural China by migrating parents: A literature review." *Journal of Public Mental Health* 9 (3): 4.
- Sen, Amartya. 1990. "More than 100 Million Women are Missing." *New York Review of Books* 37(20):61-66.
- Wei, Shang-Jin, and Xiaobo Zhang. 2011, "The competitive saving motive: Evidence from rising sex ratios and savings rates in China." *Journal of Political Economy* 119 (3): 511-564.
- Ye, Jingzhong and Pan Lu. 2011. "Differentiated childhoods: Impacts of rural labor migration on left-behind children in China." *The Journal of Peasant Studies* 38 (2): 355-377.
- Zhang, Dandan, Xin Li, and Jinjun Xue. 2015. "Education inequality between rural and urban areas of the People's Republic of China, migrants' children education, and some implications." *Asian Development Review* 32 (1): 196-224.
- Zhang, Huafeng. 2010. "The Hukou system's constraints on migrant workers' job mobility in Chinese cities." *China Economic Review* 21 (1): 51-64.
- Zhao, Liqui, Shouying Liu, and Wei Zhang. 2018. "New trends in internal migration in China: Profiles of the new-generation migrants." *China & World Economy* 26 (1): 18-41.

Tables and Figures

Table 1 The Construction of Child Education Demand Shock

Birth year/month	2005 9.1	2006 9.1	2007 9.1	2008 9.1	2009 9.1	2010 9.1	2011 9.1	2012.5 at school?	2012 9.1	2013.5 at school?
2003.12-2004.2	1	2	3	4	5	6	7	✓ ✓ ✓		
2004.3-2004.5	1	2	3	4	5	6	7	✓ ✓ ✓		
2004.6-2004.8	1	2	3	4	5	6	7	✓ ✓ ✓		
2004.9-2004.11	0	1	2	3	4	5	6	✓ ✓ ×		
2004.12-2005.2	0	1	2	3	4	5	6	✓ ✓ ×	7	✓ ✓ ✓
2005.3-2005.5	0	1	2	3	4	5	6	✓ ✓ ×	7	✓ ✓ ✓
2005.6-2005.8	0	1	2	3	4	5	6	✓ ✓ ×	7	✓ ✓ ✓
2005.9-2005.11	0	0	1	2	3	4	5	✓ × ×	6	✓ ✓ ×
2005.12-2006.2	0	0	1	2	3	4	5	✓ × ×	6	✓ ✓ ×
2006.3-2006.5	0	0	1	2	3	4	5	✓ × ×	6	✓ ✓ ×
2006.6-2006.8	0	0	1	2	3	4	5	✓ × ×	6	✓ ✓ ×
2006.9-2006.11	0	0	0	1	2	3	4	× × ×	5	✓ × ×
2006.12-2007.2	0	0	0	1	2	3	4		5	✓ × ×
2007.3-2007.5	0	0	0	1	2	3	4		5	✓ × ×
2007.6-2007.8	0	0	0	1	2	3	4		5	✓ × ×
2007.9-2007.11	0	0	0	0	1	2	3		4	× × ×

Notes: The CMDS 2012 was conducted in May 2012. Children born between December 2003 and November 2011 are included in the CMDS 2012. If the compulsory school entrance age is 6 years old, the probability of being at primary school in May 2012 is 1/3 (2/3) for those born in the last quarter (first three quarters). If the compulsory school entrance age is 7 years old, the probability of being at primary school in May 2012 is 0 (1/3) for those born in the last quarter (first three quarters). If the compulsory school entrance age is 5 years old, the probability of being at primary school in May 2012 is 2/3 (1) for those born in the last quarter (first three quarters). The CMDS 2011 and 2013 are similarly restricted.

Table 2 Summary Statistics: CMDS 2011-2013

Variables	N	Mean	S.D.	Min.	Max.
Children's migration status (yes=1)	45,308	0.742	0.438	0	1
Attending primary school between 5-7 (yes=1)	45,308	0.380	0.485	0	1
Quarter of child birth (1-4)	45,308	1 (25.4%) 2 (22.2%) 3 (24.2%) 4 (28.3%)			
Log (Household monthly income per capita)	45,187	7.110	0.574	5.601	8.987
Log (Household monthly consumption per capita)	45,225	6.403	0.568	4.900	8.001
Savings: Log (Household monthly income/consumption)	45,138	0.708	0.426	-0.140	2.169
Monthly food consumption/monthly income	44,684	0.262	0.141	0.033	0.750
Remittances sent home last year/monthly income	25,470	0.862	1.352	0	7.895
House rent/monthly income	41,823	0.111	0.108	0	0.533
Mother migrates together with father (yes=1)	45,308	0.968	0.176	0	1
Number of children	45,308	1.319	0.496	1	3
Father migrates (yes=1)	45,309	0.986	0.118	0	1
Father migrates across provinces (yes=1)	45,309	0.523	0.499	0	1
Father migrates across cities (yes=1)	45,309	0.816	0.388	0	1
Mother migrates (yes=1)	45,450	0.968	0.176	0	1
Mother migrates across provinces (yes=1)	45,450	0.506	0.500	0	1
Mother migrates across cities (yes=1)	45,450	0.799	0.401	0	1
Co-residence with 1 grandparent ≥ 65	45,308	0.005	0.072	0	1
Co-residence with 2 grandparents ≥ 65	45,308	0.001	0.037	0	1
Co-residence with 1 grandparent < 65	45,308	0.015	0.121	0	1
Co-residence with 2 grandparents < 65	45,308	0.018	0.132	0	1
Ethnicity (Han=1, minority=0)	45,308	0.932	0.252	0	1
Hukou (urban=1, rural=0)	45,308	0.129	0.336	0	1
School type (private=1, public=0)	17,168	0.137	0.344	0	1
Whether sponsorship fee needed for school (yes=1)	8,850	0.161	0.367	0	1
Parental education level (1-8)	45,308	No school (0.57%, 1.13%) Primary school (7.30%, 10.14%) Junior high school (61.4%, 63.34%) Senior high school (20.1%, 17.24%) Technical high school (5.75%, 5.04%) Occupational college (3.59%, 2.46%) College (1.16%, 0.60%) Post graduate (0.11%, 0.04%)			

Notes: Data of remittances sent home are only unavailable in 2013.

Source: CMDS 2011-2013.

Table 3 IV Estimates of the Effect of Attending Primary School on Child Migration

Samples Variables	All		Boys		Girls	
	Primary	Migration	Primary	Migration	Primary	Migration
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: 5 years old						
IV results		1.033** (0.424)		0.866* (0.451)		1.196 (0.744)
First stage and reduced form	-0.019*** (0.005)	-0.020*** (0.007)	-0.022*** (0.006)	-0.019** (0.009)	-0.016** (0.006)	-0.019* (0.010)
F value	18.7		15.9		12.0	
Control mean	0.081	0.744	0.083	0.744	0.079	0.745
N	15,429	15,429	8,117	8,117	7,312	7,312
Panel B: 6 years old						
IV results		0.316** (0.141)		0.507** (0.230)		0.135 (0.202)
First stage and reduced form	-0.060*** (0.008)	-0.019** (0.008)	-0.052*** (0.011)	-0.026*** (0.010)	-0.068*** (0.010)	-0.009 (0.014)
F value	37.9		22.2		28.2	
Control mean	0.305	0.753	0.299	0.754	0.312	0.752
N	15,168	15,168	7,997	7,997	7,171	7,171
Panel C: 7 years old						
IV results		0.045 (0.039)		0.112** (0.052)		-0.035 (0.043)
First stage and reduced form	-0.241*** (0.016)	-0.011 (0.009)	-0.242*** (0.016)	-0.027** (0.013)	-0.239*** (0.021)	0.008 (0.010)
F value	30.6		23.8		18.3	
Control mean	0.882	0.744	0.874	0.754	0.890	0.734
N	14,711	14,711	7,938	7,938	6,773	6,773
Panel D: 5-7 years old						
IV results		0.196*** (0.054)		0.283*** (0.072)		0.100 (0.076)
First stage and reduced form	-0.082*** (0.005)	-0.016*** (0.004)	-0.081*** (0.006)	-0.023*** (0.005)	-0.082*** (0.008)	-0.008 (0.006)
F value	526.4		351.9		367.0	
Control mean	0.416	0.747	0.415	0.750	0.418	0.744
N	45,308	45,308	24,052	24,052	21,256	21,256

Notes: The IV used in the first stage is whether the child is born in the fourth quarter. Controls include parental migration status, parental education, dummy variables of the number of co-residing grandparents more than/less than 65 years old, age of the child, ethnicity, *Hukou* status, number of children in the household, province, and year fixed effects. Robust standard errors are clustered at the city level in brackets. * $p < 10\%$, ** $p < 5\%$, *** $p < 1\%$.

Table 4 IV Estimates of the Effect of Attending Primary School on Child Migration

Samples Variables	All		Boys		Girls	
	Primary	Migration	Primary	Migration	Primary	Migration
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: 2-3 years old						
Reduced form		-0.002 (0.005)		0.000 (0.008)		-0.005 (0.007)
<i>N</i>		31,832		16,693		15,139
Panel B: 8-9 years old						
Reduced form		-0.009 (0.006)		-0.007 (0.008)		-0.010 (0.008)
<i>N</i>		26,830		14,219		12,611
Panel C: 11-13 years old						
IV results		-0.154 (0.121)		-0.170 (0.156)		-0.140 (0.172)
First stage and reduced form	0.042*** (0.005)	-0.006 (0.005)	0.043*** (0.006)	-0.007 (0.006)	0.041*** (0.007)	-0.006 (0.007)
<i>F</i> value	122.4		80.8		93.9	
Control mean	0.765	0.697	0.771	0.703	0.757	0.689
<i>N</i>	37,105	37,105	20,091	20,091	17,014	17,014

Notes: The IV used in the first stage is whether the child is born in the fourth quarter. Controls include parental migration status, parental education, dummy variables of the number of co-residing grandparents more than/less than 65 years old, age of the child, ethnicity, *Hukou* status, number of children in the household, province, and year fixed effects. Robust standard errors are clustered at the city level in brackets. *** $p < 1\%$.

Table 5 IV Estimates of the Effect of Migration on Household Outcomes

Variables	(1) Migration	(2) Income	(3) Migration	(4) Consumption	(5) Migration	(6) Savings
IV results		0.338 (0.258)		0.567*** (0.218)		-0.403** (0.185)
First stage and reduced form	-0.028*** (0.005)	-0.009 (0.007)	-0.028*** (0.005)	-0.016*** (0.006)	-0.028*** (0.005)	0.011** (0.005)
<i>F</i> value	149.2		143.0			152.3
Control mean	0.751	7.135	0.751	6.417	0.750	0.719
<i>N</i>	23,989	23,989	23,973	23,973	23,963	23,963
Variables	Migration	Food	Migration	House rent	Migration	Remittances
IV results		0.083 (0.062)		0.064 (0.060)		-1.316* (0.781)
First stage and reduced form	-0.028*** (0.005)	-0.002 (0.002)	-0.027*** (0.005)	-0.002 (0.002)	-0.035*** (0.008)	0.046* (0.027)
<i>F</i> value	154.8		148.8		96.8	
Control mean	0.751	0.258	0.746	0.111	0.762	0.855
<i>N</i>	23,716	23,716	22,219	22,219	13,523	13,523

Notes: The IV used in the first stage is whether the child is born in the fourth quarter. Controls include parental migration status, parental education, dummy variables of the number of co-residing grandparents more than/less than 65 years old, age of the child, dummy variable for whether the child attends primary school, ethnic, *Hukou* status, number of children in the household, province, and year fixed effects. Robust standard errors are clustered at the city level in brackets. * $p < 10\%$, ** $p < 5\%$, *** $p < 1\%$.

Table 6 Estimates of the Effect of Migration on School Type and Sponsorship Fees

Variables	All		Boys		Girls	
	Private school	Sponsorship fees	Private school	Sponsorship fees	Private school	Sponsorship fees
	(1)	(2)	(3)	(4)	(5)	(6)
Migration	0.096*** (0.016)	0.096*** (0.017)	0.099*** (0.019)	0.089*** (0.021)	0.092*** (0.016)	0.105*** (0.016)
Controls	YES	YES	YES	YES	YES	YES
<i>N</i>	17,168	8,850	9,127	4,709	8,041	4,141

Notes: The dependent variables are a dummy of private school (yes=1, no=0) and sponsorship fees (yes=1, no=0). Controls include parental migration status, parental education, dummy variables of the number of co-residing grandparents more than/less than 65 years old, age of the child, ethnicity, *Hukou* status, number of children in the household, province, and year fixed effects. Robust standard errors are clustered at the city level in brackets. *** $p < 1\%$.

Table 7 IV Estimates of the Push Effect of Missing Rural Primary Schools on Migration

Variables	All		Boys		Girls	
	Primary	Migration	Primary	Migration	Primary	Migration
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: High school-pupil ratio (\geqMedian)						
IV results		0.145** (0.064)		0.230** (0.094)		0.060 (0.092)
First stage and reduced form	-0.081*** (0.007)	-0.012** (0.005)	-0.079*** (0.008)	-0.018** (0.007)	-0.082*** (0.010)	-0.005 (0.007)
F value	424.6		253.4		222.6	
Control mean	0.418	0.771	0.421	0.773	0.416	0.768
N	24,327	24,327	12,833	12,833	11,494	11,494
Panel B: Low school-pupil ratio ($<$Median)						
IV results		0.243*** (0.081)		0.330*** (0.120)		0.129 (0.113)
First stage and reduced form	-0.083*** (0.005)	-0.020*** (0.007)	-0.083*** (0.009)	-0.028*** (0.009)	-0.083*** (0.009)	-0.011 (0.009)
F value	521.9		360.7			
Control mean	0.414	0.720	0.408	0.724	0.419	0.715
N	20,981	20,981	11,219	11,219	9,762	9,762

Notes: The IV used in the first stage is whether the child is born in the fourth quarter. Controls include parental migration status, parental education, dummy variables of the number of co-residing grandparents more than/less than 65 years old, age of the child, ethnicity, *Hukou* status, number of children in the household, province, and year fixed effects. Robust standard errors are clustered at the city level in brackets. ** $p < 5\%$, *** $p < 1\%$.

Table 8 IV Estimates of the Effect of Attending Primary School on Parental Migration Status

Variables	Primary (1)	Mother migrates (2)	Mother migrates across provinces (3)	Mother migrates across cities (4)	Father migrates (5)	Father migrates across Province (6)	Father migration across cities (7)
Panel A: All							
IV results		0.050** (0.022)	-0.070 (0.058)	-0.021 (0.051)	0.002 (0.013)	-0.067 (0.056)	-0.041 (0.046)
First stage and reduced form	-0.082*** (0.005)	-0.004** (0.002)	0.006 (0.005)	0.002 (0.004)	-0.000 (0.001)	0.006 (0.005)	0.003 (0.004)
<i>F</i> value	528.5						
Control mean	0.416	0.969	0.503	0.798	0.986	0.521	0.814
<i>N</i>		45,450	45,450	45,450	45,309	45,309	45,309
Panel B: Boys							
IV results		0.050 (0.034)	-0.102 (0.089)	-0.132* (0.072)	-0.002 (0.020)	-0.088 (0.085)	-0.122** (0.060)
First stage and reduced form	-0.081*** (0.007)	-0.004 (0.003)	0.008 (0.007)	0.011* (0.006)	0.000 (0.002)	0.007 (0.007)	0.010** (0.005)
<i>F</i> value	352.5						
Control mean	0.415	0.967	0.504	0.799	0.986	0.522	0.816
<i>N</i>		24,082	24,082	24,082	24,008	24,008	24,008
Panel B: Girls							
IV results		0.045 (0.034)	-0.022 (0.077)	0.104 (0.076)	0.008 (0.021)	-0.033 (0.074)	0.053 (0.071)
First stage and reduced form	-0.082*** (0.008)	-0.004 (0.003)	0.002 (0.006)	-0.008 (0.006)	-0.000 (0.002)	0.003 (0.006)	-0.004 (0.006)
<i>F</i> value	381.2						
Control mean	0.417	0.971	0.503	0.798	0.986	0.520	0.812
<i>N</i>		21,285	21,285	21,285	21,218	21,218	21,218

Notes: We only report the first stage results for one subsample since the results in another two subsamples are almost the same. The IV used in the first stage is whether the child is born in the fourth quarter. Controls include parental education, dummy variables of the number of co-residing grandparents more than/less than 65 years old, age of the child, ethnicity, *Hukou* status, number of children in the household, province, and year fixed effects. Robust standard errors are clustered at the city level in brackets. * $p < 10\%$, ** $p < 5\%$, *** $p < 1\%$.

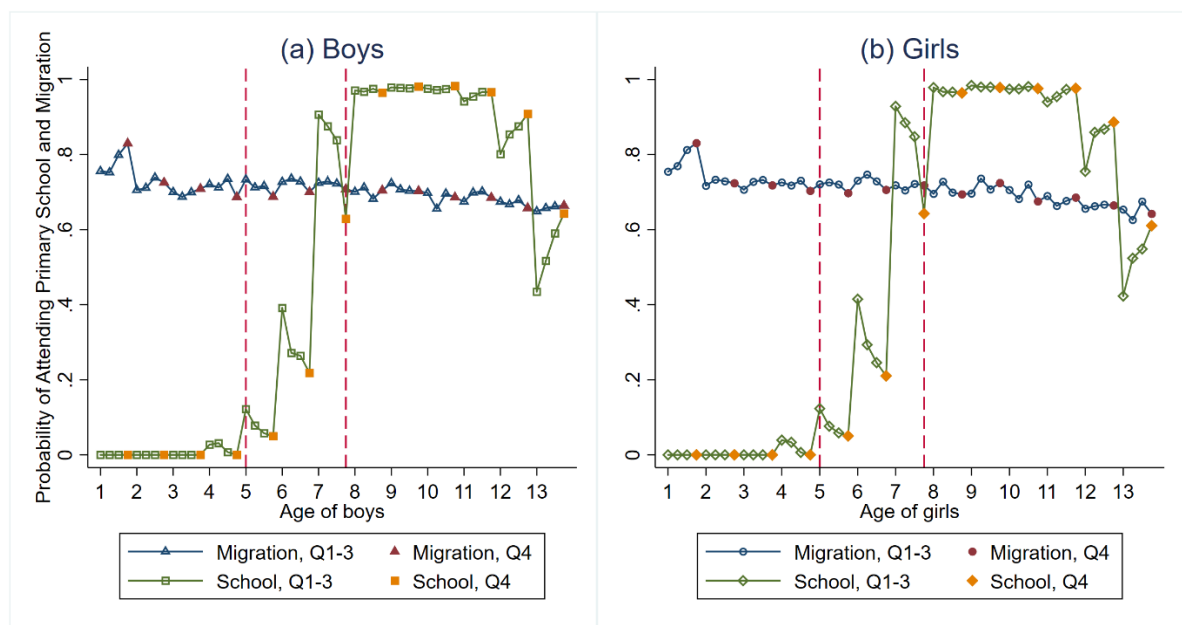


Figure 1 Probability of Attending Primary School and Migration by Age and Quarter of Birth

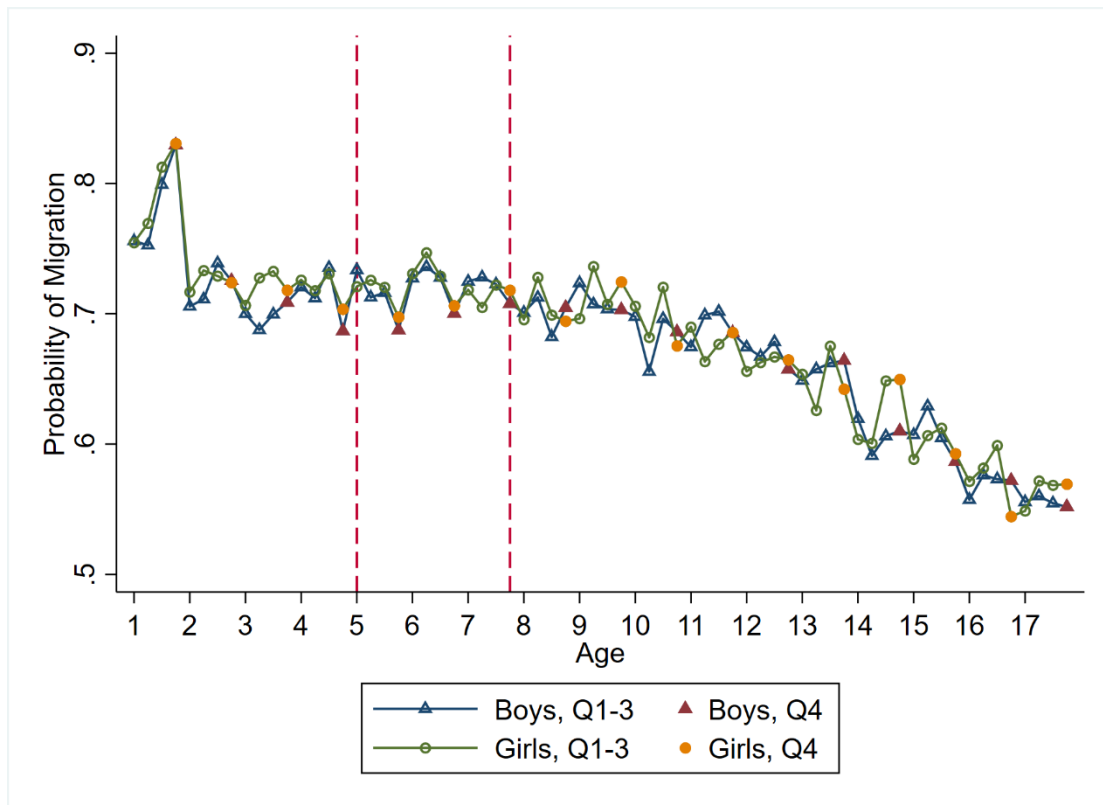


Figure 2 Probability of Child Migration by Age and Quarter of Birth

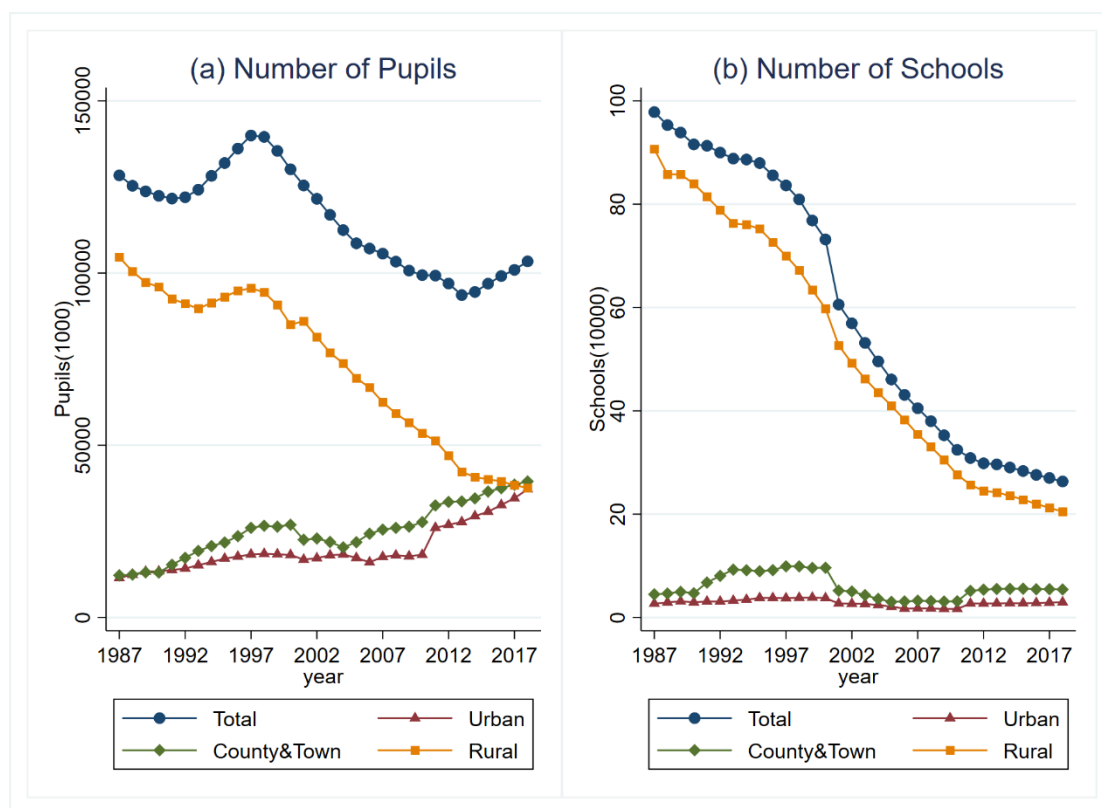


Figure 3 The Number of Pupils and Schools in China: 1987-2018

Source: *China Education Statistics Yearbook: 1988-2019*

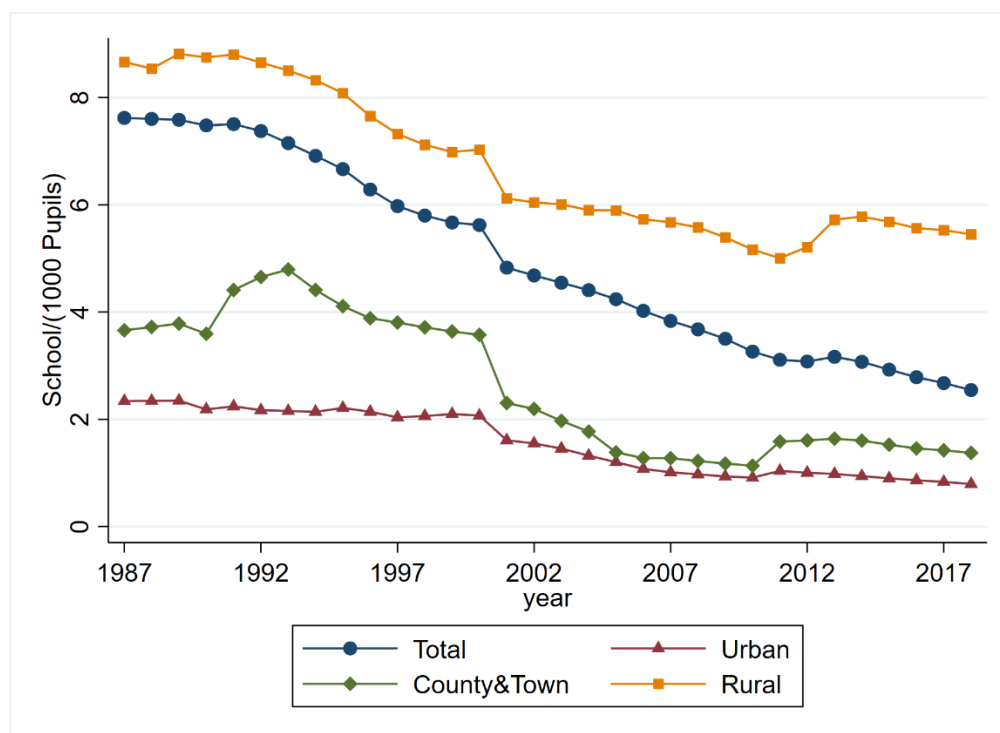


Figure 4 The School-Pupil Ratio in China: 1987-2018

Appendix:

Table A1 IV Estimates of the Effect of Attending Primary School on Outcomes among Migrated

Boys						
Variables	(1) Primary	(2) Income	(3) Primary	(4) Consumption	(5) Primary	(6) Savings
IV results		0.046 (0.089)		0.136** (0.064)		-0.078 (0.066)
First stage and reduced form	-0.093*** (0.008)	-0.004 (0.008)	-0.093*** (0.008)	-0.013** (0.006)	-0.093*** (0.008)	0.007 (0.006)
<i>F</i> value	363.4		360.3		365.7	
Control mean	0.407	7.127	0.407	6.469	0.407	0.660
<i>N</i>	17,815	17,815	17,803	17,803	17,794	17,794
Variables	Primary	Food	Primary	House rent	Primary	Remittances
IV results		0.018 (0.021)		0.019 (0.021)		0.322 (0.255)
First stage and reduced form	-0.094*** (0.008)	-0.002 (0.002)	-0.094*** (0.008)	-0.002 (0.002)	-0.090*** (0.011)	-0.029 (0.024)
<i>F</i> value	392.4		470.9		203.9	
Control mean	0.407	0.270	0.403	0.116	0.426	0.621
<i>N</i>	17,623	17,623	16,416	16,416	10,167	10,167

Notes: The IV used in the first stage is whether the child is born in the fourth quarter. Robust standard errors are clustered at the city level in brackets. ** $p < 5\%$, *** $p < 1\%$.

Table A2 IV Estimates of the Effect of Attending Primary School on Outcomes among
Unmigrated Boys

Variables	(1) Migration	(2) Income	(3) Migration	(4) Consumption	(5) Migration	(6) Savings
IV results		0.381 (0.234)		0.134 (0.280)		0.020 (0.257)
First stage and reduced form	-0.049*** (0.011)	-0.185* (0.011)	-0.048*** (0.011)	-0.006 (0.014)	-0.049*** (0.011)	-0.001 (0.013)
<i>F</i> value	128.9		133.8		130.0	
Control mean	0.439	7.159	0.439	6.261	0.439	0.898
<i>N</i>	6,174	6,174	6,170	6,170	6,169	6,169
Variables	Migration	Food	Migration	House rent	Migration	Remittances
IV results		-0.017 (0.070)		0.034 (0.058)		-3.951* (2.034)
First stage and reduced form	-0.048*** (0.012)	0.001 (0.003)	-0.051*** (0.011)	-0.002 (0.003)	-0.040** (0.016)	0.156*** (0.060)
<i>F</i> value	135.0		137.8		15.3	
Control mean	0.439	0.222	0.438	0.098	0.454	1.602
<i>N</i>	6,093	6,093	5,803	5,803	3,356	3,356

Notes: The IV used in the first stage is whether the child is born in the fourth quarter. Robust standard errors are clustered at the city level in brackets. * $p < 10\%$, ** $p < 5\%$, *** $p < 1\%$.

Table A3 IV Estimates of the Effect of Attending Primary School on Outcomes among Girls

Variables	(1) Migration	(2) Income	(3) Migration	(4) Consumption	(5) Migration	(6) Savings
IV results		0.028 (0.079)		0.070 (0.067)		-0.069 (0.073)
First stage and reduced form	-0.082*** (0.008)	-0.002 (0.006)	-0.082*** (0.008)	-0.006 (0.005)	-0.082*** (0.008)	0.006 (0.006)
<i>F</i> value	373.8		364.3		374.0	
Control mean	0.417	7.080	0.417	6.391	0.418	0.690
<i>N</i>	21,225	21,225	21,186	21,213	21,202	21,202
Variables	Migration	Food	Migration	House rent	Migration	Remittances
IV results		-0.017 (0.026)		-0.005 (0.018)		0.402 (0.328)
First stage and reduced form	-0.083*** (0.008)	0.001 (0.002)	-0.084*** (0.008)	0.000 (0.002)	-0.075*** (0.011)	-0.030 (0.025)
<i>F</i> value	382.5		381.9		231.8	
Control mean	0.417	0.266	0.415	0.112	0.440	0.852
<i>N</i>	20,968	20,968	19,604	19,604	11,947	11,947

Notes: The IV used in the first stage is whether the child is born in the fourth quarter. Robust standard errors are clustered at the city level in brackets. *** $p < 1\%$.