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Effect of Parental Migration on the Academic Performance of Left-behind Middle School Students in Rural China

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Abstract

China's rapid development and urbanization over the past 30 years have caused large numbers of rural residents to migrate to urban areas in search of work. This has created a generation of children who remain behind in rural areas when their parents migrate for work. Previous research has found mixed impacts of parental migration on the educational achievement of left-behind children (LBC), perhaps because of methodological deficiencies and lack of recognition of the heterogeneity of this population of children. Our study attempts to examine the impact of six types of parental migration on the academic achievement of a rural junior high school sample. Our study uses a panel of 7148 junior high school students to implement a difference-in-difference analysis and finds that parental migration has a negative and significant impact on the academic achievement of junior high school students. Our study suggests that the Chinese Government should implement measures to dismantle barriers to the human capital accumulation of LBC to ensure sustainable economic growth and human capital development in China.

Key words: academic performance, left-behind children, parental migration, rural China
JEL codes: I20; I25; I28

I. Introduction

China's rapid development and urbanization over the past 30 years have caused large numbers of rural residents to migrate to urban areas for work (e.g. Hu et al., 2008;

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Csanádi et al., 2015; Wang et al., 2016). Rural to urban labor migration not only provides migrant workers with more employment opportunities and higher wages (Liu and Zou, 2011; Li et al., 2013), but has also changed the demographic composition of rural China. In particular, it has created a generation of children who remain in the countryside with a surrogate caregiver when their parents migrate for work (Duan and Zhou, 2005; Ye et al., 2006; Zhan et al., 2014). The statistics from China's Sixth Population Census show that there were more than 61 million left-behind children (LBC) in China in 2010 (NBS, 2011). With the increased rural-to-urban migration in recent years (from 221 million in 2010 to 245 million in 2013; see NBS, 2015), it is likely that the number of LBC will continue to increase.

Because one-third of LBC are still enrolled in compulsory education (MOE, 2014), many researchers have sought to examine how being left behind affects educational outcomes. In some cases, researchers have found that migration positively affects the academic performance of LBC (Yang, 2008; Chen et al., 2009; Roy et al., 2015; Xu and Xie, 2015). Evidence suggests this may occur through mechanisms such as relaxing household liquidity constraints (Du et al., 2005) and encouraging higher investments in LBC (Edwards and Ureta, 2003; Yang, 2008; Ambler et al., 2015). However, other researchers have found a negative relationship between parental migration and the educational outcomes of LBC (Meyerhoefer and Chen, 2011; Zhang et al., 2014; Zhao et al., 2014; Zhou et al., 2014). These negative effects may arise from an absence of parental care (Lahaie et al., 2009; Ye and Lu, 2011) or the increased time LBC spend doing on-farm or in-home work (Chang et al., 2011; McKenzie and Rapoport; 2011). Other studies find that there is no relationship between migration and the academic performance of LBC (Zhou et al., 2015).

These mixed impacts may be due in part to systematic weaknesses in the literature. For example, some studies do not have a valid comparison group (e.g. Meyerhoefer and Chen, 2011; Zhou et al., 2014). Specifically, Meyerhoefer and Chen (2011) define LBC as children whose parents reported engaging in off-farm work in a location outside of their township of residence for a period of more than 6 months, while Zhou et al. (2014) define this group as children whose parents were not at home at the time of the survey. Although both methods may identify LBC, their comparison groups may include children whose parents spent a significant amount of time out-migrating for work. For this reason, we cannot consider these to be credible comparison groups, especially considering research findings that parental return can do little to offset the effects of prior migration (Shi et al., 2016). Second, many of the published studies are based on small samples (Ye and Lu, 2011; Lu, 2012; Zhou et al., 2014). For example, Ye and Lu (2011) conducted their research with a sample of only 400 LBC and 200 children

living with parents; Lu (2012) based their analysis on a panel of 885 children, only 18.7–33.8 percent of whom could be classified as LBC; and the sample used by Zhou et al. (2014) only included 1010 children.

In addition, most studies only examine the overall effect of being an LBC on educational outcomes and do not examine the heterogeneous impacts of different household migration patterns. Only a limited number of published studies distinguish the effects of paternal and maternal migration when estimating impacts on academic performance (Chen et al., 2009). These distinctions are important because mothers are generally the primary caregivers for both children and elderly household members in rural China (Qiao et al., 2015). To our knowledge, only Chen et al. (2009) has analyzed the effect of different types of parental migration on children's educational performance in China. However, Chen et al. (2009) only examines the situation of children at the elementary school level. It is likely that the impacts of parental migration are affected by a child's age; therefore, it is necessary to conduct further research with LBC samples of different ages.

The overall goal of the present study is to examine the effects of different household migration patterns on the academic performance of left-behind junior high school students. To meet this goal, we have five specific objectives. First, we examine the prevalence of parental migration among households in our sample. Second, we compare the distribution of children's scores across different types of migrant households. Third, we use a difference-in-difference estimation strategy to examine whether parental migration affects the educational performance of LBC. Fourth, we examine how the impact of parental migration varies across different types of migrant households. Finally, we investigate whether the effects of different forms of parental migration vary based on different student and household characteristics.

The rest of the paper is structured as follows. In Section II, we present our data and methodology. Section III presents the results of the analysis. Section IV concludes the paper and provides some policy suggestions.

II. Data and Methodology

To examine the impact of parental migration on the academic performance of LBC, we conducted two rounds of surveys: a baseline survey in December 2012 and an endline survey in June 2014. In the following subsections, we will discuss the study's sampling protocol and data collection process, and our analytical method.

1. Sampling

Our sample is comprised of 7148 students from 74 junior high schools from 8

nationally-designated poverty counties in Yulin Prefecture of Shaanxi Province. Yulin Prefecture is predominantly Han Chinese and its rural areas had a per capita annual income of approximately RMB8687 in 2013 (Shaanxi Provincial Bureau of Statistics, 2014), which is slightly lower than the RMB8896 national average for all rural areas in the same year (NBS, 2014). To choose our sample, we first obtained a list of all counties in Yulin Prefecture, Shaanxi Province. We ranked the 12 counties from richest to poorest according to the average per capita income reported for each county in 2011 (Shaanxi Provincial Bureau of Statistics, 2011), and then chose the 8 poorest counties for inclusion in our sample.

The second step in the sampling protocol was to choose the sample schools. Using official records, we first created a list of 170 junior high schools from all sample counties. Based on administrative records, we applied two exclusion criteria. First, because our interest is in rural schools, we excluded 12 junior high schools that are in county seats or the prefecture seat (which primarily enroll urban students). Second, because the Chinese Government is currently consolidating existing rural schools into new centralized schools, we excluded schools with fewer than 90 students (45 students in seventh grade and 45 students in eighth grade) to safeguard against excessive attrition. After applying this exclusion criteria, we had 74 schools in our sample. In the baseline survey, we surveyed all seventh and eighth grade students in all 256 classes in 74 schools. Although our sample is only from one prefecture, it contains 7148 students and, therefore, can be considered large enough to be roughly representative of junior high schools in north-west China.

2. Data Collection

The research group conducted two waves of surveys in the 74 sample schools. The first round of surveying was conducted in December 2012 and the follow-up survey was conducted at the end of June 2014, which coincided with the end of the 2013–2014 academic year. In the survey, we collected data from all sample schools' seventh and eighth grade students, their homeroom teachers and school principals. In each wave of the survey, the enumeration team visited all 74 schools and conducted a three-part survey.

(1) Academic Performance

First, students were given a 30-min standardized math test, the scores of which we used as our measure of student academic performance. The content of this math test was drawn from a pool of questions from the Trends in International Mathematics and Science Study (TIMSS). All the questions in the endline test were different from those in the baseline test. We administered and printed the test ourselves to ensure that it was not

possible for students and teachers to prepare for the examination. At the same time, our enumeration team strictly proctored the test to minimize cheating and strictly enforced time limits for the exams.

We use standardized test scores rather than raw test scores so that student performance was comparable across different grades, classes, time periods, and cohorts. To standardize each individual observation, we subtracted the mean of the comparison group and divided by the standard deviation (SD) of the distribution of the comparison group. Therefore, a standardized score of 0.2 represents someone who scored 0.2 SD above the average of the comparison group. We standardized scores by the grades of the students separately.

(2) Parental Migration

Second, to measure parental migration status, we collected detailed information on the migration histories of each student's family. This information is derived from the student survey questionnaires that were completed under the supervision of enumerators. In the questionnaire, we included a section that asked for the migration status of each parent. Homeroom teachers were then asked to verify the information on parental migration status as a form of crosschecking. Based on migration status, there are two main types of households of interest in this study: migrant households (in which at least one parent out-migrated between our baseline and endline surveys) and non-migrant households.

Recognizing that the effect of migration on student performance may be affected by which family member out-migrates (i.e. father, mother or both), we further subdivided the migrant households into six types of households: any parent migrated (father, mother or both parents out-migrated), father migrated only, father migrated (unconditional on mother's migration status), mother migrated only, mother migrated (unconditional on father's migration status), and both parents migrated households. It should be noted that these six types of households are not mutually exclusive. For example, father/mother migrated (unconditional on mother/father's migration status) households include those in which only fathers/mothers migrate and those in which both parents migrate. For brevity, when we talk about these households as a group, we call them "new migrant households" to distinguish them from households that were already in the migrant labor force by the time of the baseline survey. In addition, we define "never migrant households" as those in which both parents stayed at home in the time between the two study periods.

(3) Other Covariates

In the third step of the survey we collected data on the characteristics of the sample students. The dataset includes measures of each student's characteristics, such as gender,

grade and boarding status. We also collected several variables to capture household characteristics, such as father's education level, mother's education level and number of siblings. In this part of the survey, we also asked a series of questions related to the student's household assets, such as whether the household owned certain common household items, livestock or small businesses, and the material used to construct their home, and the size of their home. Most responses to household asset ownership variables in our dataset are dichotomous, so we used polychoric principal components analysis (PCA; see Kolenikov and Angeles, 2009) to construct a standard index for household wealth among our sample students. This information is beneficial to our research as these variables may directly affect the academic performance of students, and controlling them may enable more efficient measurement of the effect of migration on the academic performance of students.

3. Methodology

We use a difference-in-difference approach to compare the academic performance of LBC students (our treatment group) before and after their parents migrate with the performance of students in our comparison group (children whose parents did not migrate during the study period). The equation estimated is as follows:

$$\Delta Score_{is} = \alpha + \beta MIG_{is} + \delta \cdot Score_{is,baseline} + \gamma \cdot X_{is} + \lambda \cdot C_c + \varepsilon_{is}, \quad (1)$$

where the dependent variable, $\Delta Score_{is}$, indicates the change in the standardized math test score of student i in school s between the baseline and the endline. MIG_{is} is the treatment variable, and β represents the parameter of interest. $Score_{is,baseline}$ represents the baseline standardized math test score of student i in school s. The effect of baseline standardized math scores is captured by δ. The term X_{is} is a vector of covariates that are included to capture the characteristics of students and their households, such as gender, grade, boarding status, assets, parent's educational level, and number of siblings. The effects of this vector are captured by γ. The term C_c is the county dummy. The county effects are captured by λ. We account for the clustered design by constructing Huber–White standard errors clustered at the county level.

III. Results

1. Prevalence of Migrant Households

Similar to the state of migration in many other rural areas in China (Rozelle et al., 1999),

Table 1. Patterns of Migration in Sample Households in Shaanxi Province in 2012 and 2014

	Migration status in 2012	Migration status in 2014						
	(1) Number of households in 2012	(2) Any parent migrated in 2014	(3) Father migrated only in 2014	(4) Father migrated in 2014	(5) Mother migrated only in 2014	(6) Mother migrated in 2014	(7) Both parents migrated in 2014	(8) Neither parent migrated in 2014
Father migrated only	1688	753	614	727	26	139	113	935
Mother migrated only	139	61	12	28	33	49	16	78
Both parents migrated	560	305	83	280	25	222	197	255
Neither parent migrated	4761	618	383	542	76	235	159	4143
Total number of households	7148	1737	1092	1577	160	645	485	5411

Source: Authors' own survey.

Notes: Column (1) = Column (3) + Column (5) + Column (7) + Column (8); Column (2) = Column (3) + Column (5) + Column (7); Column (4) = Column (3) + Column (7); Column (6) = Column (5) + Column (7). The households in Column (8), rows 1, 2 and 3 are returned migrants (or those households in which an individual had migrated in 2012 and returned home in 2014). The households in rows 1–3, columns 2–7 are always migrant households. Both returned migrant and always migrant households are dropped from the multivariate analysis.

many households were already in the migrant labor force in 2012, the first year of our sample. Of the 7148 households in our sample, at least one parent out-migrated in 2387 households (33.4 percent of the sample; see rows 1–3, column 1 in Table 1). Within our sample of migrant households, we find differences in the prevalence of migration type. Of the 2387 households with out-migrants, only the father out-migrated in 1688 households, which accounts for 23.6 percent of the total sample and 70.1 percent of the migrant household sample (see row 1, column 1 of Table 1). In contrast, only the mother out-migrated in 139 households, which accounts for only 1.94 percent of the total sample and 5.82 percent of the migrant household sample (see row 2, column 1 of Table 1). According to our data, both parents out-migrated in 560 households, which accounts for 7.83 percent of the total sample and 23.5 percent of migrant households (see row 3, column 1 of Table 1).[1]

In addition, our study finds that the number of new migrant households in our sample decreases slightly over the study period. Among 4761 households that did not have any migrating parents in 2012 (see row 4, column 1 of Table 1), at least one of the parents in 618 households (13.0 percent) entered the migrant labor force between the December 2012 baseline survey and the June 2014 endline survey (any

[1]However, it is likely that many of the mother migrated only families are truly broken families where the parents have divorced and the student respondents report that their mother has out-migrated because of the embarrassment or the fact that they do not know the true reason for their mother's absence.

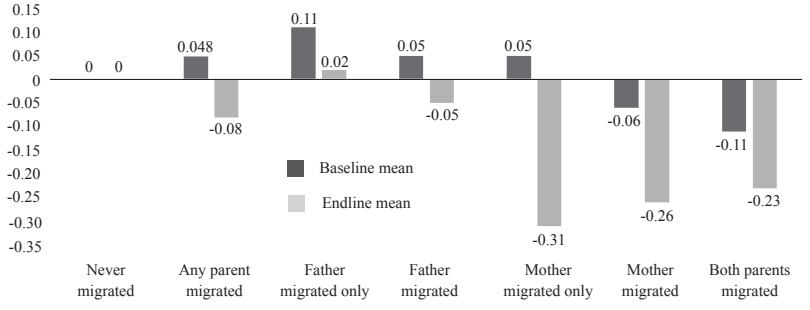
migrant households, see row 4, column 2 of Table 1). After accounting for the 1268 households that out-migrated at baseline and returned to the village at endline (see rows 1–3, column 8 of Table 1), the total number of migrant households reduced to 1737 households (24.3 percent of the total sample) by June 2014 (see row 5, column 2 of Table 1). This decrease represents a 9-percentage point reduction from the baseline migration level. Our sample also includes a subset of households that did not have any household members migrate during our study period. Specifically, 4143 households (58.0 percent of the total sample) did not migrate in either period (see row 4, column 8 of Table 1). This group of households constitutes our never migrant sample and provides the comparison group against which we can measure the impact of parental migration.

2. Correlation between Parental Migration and the Academic Performance of Children

Our descriptive results presented in Figure 1 suggest that an analysis of the change in standardized math test scores in relation to a valid comparison group (i.e. the never migrant group) is necessary to evaluate the effect of household migration on the academic achievement of students. Figure 1 shows that students from any parents migrated, father migrated only, father migrated (unconditional) and mother migrated only households scored higher than those from the never migrated households in 2012. It seems that parental migration might have improved student academic achievement.

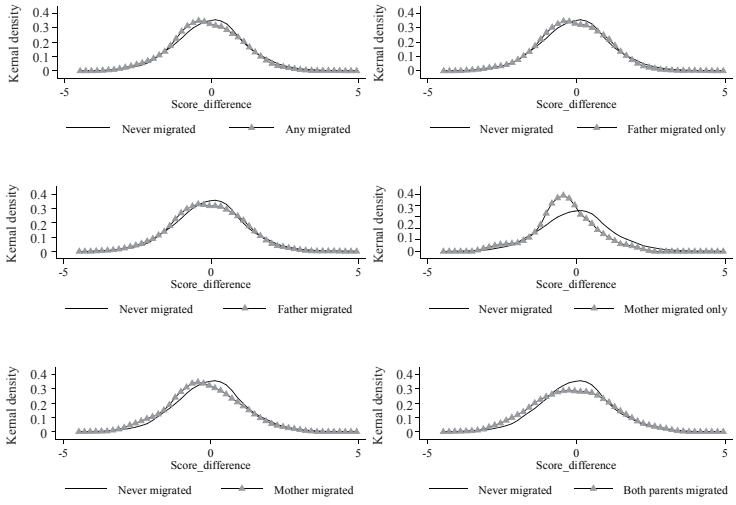
However, when we compare the change in standardized math test scores between students from new migrant and never migrant households within the study period, we find that the average standardized math test score of students decreased (see Figure 1). This suggests that, taking into consideration the baseline standardized math test scores, parental migration may have had a negative effect on their children's test scores. Similar conclusions can be drawn when comparing the distributions of scores of students from

Figure 1. Average Standardized Math Test Scores of Sample Students of Baseline and Endline in 2012 and 2014



Source: Authors' own survey.

Figure 2. Kernel Density Plots of the Distribution of the Average Change in Standardized Math Test Score between Students of Various Types of New Migrant Households and Students from Never Migrant Households in Shaanxi Province in 2014



Source: Authors' own survey.

different types of migrant households between the time of the baseline and endline surveys (see Figure 2).

Still, the decreases in math test scores of children from new migrant households may not be solely explained by migration. It may be the case that school performance can be explained by many factors other than migration activities that change over time and differ between migrant and non-migrant households. Therefore, further multivariate analysis is needed to explore the impact of migration on academic performance while holding other factors constant.

3. Multivariate Analysis

From our multivariate analysis presented in Table 2, we find that the coefficient on the any parent migrated household variable is negative and significantly different from zero. This means that, everything else held constant, after any parent in a household out-migrated, their child's standardized math test score decreased relative to that of children from never migrant households.

This result holds when we examine the effect of migration on academic performance in all six types of migrant households (see Table 3). In this case, we find that, in

Table 2. Difference-in-difference Analysis of the Effects of Parental Migration on Student Academic Performance in Shaanxi Province in 2012 and 2014

Dependent variable: $\Delta Score_i = Score_{i,2013} - Score_{i,2012}$	
Independent variable	Coefficient
Any parent migrated (1 = yes; 0 = no)	–0.07*
	(0.04)
Student characteristics	
Female (1 = female; 0 = male)	–0.02
	(0.03)
Eighth grade (1 = yes; 0 = no)	–0.01
	(0.05)
Boarding student (1 = yes; 0 = no)	–0.05
	–0.02
Parent and household characteristics	
Household assets	(0.01)
	0.08***
Father has at least junior high school degree (1 = yes; 0 = no)	(0.03)
	0.04
Mother has at least junior high school degree (1 = yes; 0 = no)	(0.04)
	0.00
Number of siblings	(0.01)
	(0.01)
Baseline standardized math test score (standard deviation)	–0.70***
	(0.03)
Controlled county dummy	Yes
Constant	–0.23*
	(0.13)
Number of observations	4639
R^2	0.38

Source: Authors' own survey.

Notes: Robust standard errors clustered at school level are presented in parentheses. *** and * indicate significance at 1 and 10-percent levels, respectively. The model includes county fixed effects.

addition to any parent migrated households, significant effects on children's educational outcomes occur in mother migrated only, mother migrated (unconditional) and both parents migrated households. In each of these cases, the standardized math test scores of LBC decreased significantly after their parent or parents migrated (see rows 4–6, column 2 of Table 3).

4. Heterogeneous Analysis

We present our heterogeneous analysis of the effect of parental migration on the academic performance of LBC students with different student and household-level characteristics in Table 4. The purpose of this analysis is to investigate whether students with certain characteristics are more or less susceptible to the effects of parental migration. From this analysis, we find that in father migrated only and father migrated

Table 3. Difference-in-difference Analysis of the Effects of Six Types of Parental Migration on Student Academic Performance in Shaanxi Province in 2012 and 2014

Dependent variable: $\Delta Score_i = Score_{i,\,2013} - Score_{i,\,2012}$	
Treatment variables	Coefficient
Any parent migrated	–0.07*
Standard error	0.04
Number of observations	4639
R^2	0.38
Father migrated only	0.01
Standard error	0.05
Number of observations	4409
R^2	0.39
Father migrated (unconditional)	–0.03
Standard error	0.04
Number of observations	4564
R^2	0.39
Mother migrated only	–0.30***
Standard Error	0.11
Number of observations	4117
R^2	0.39
Mother migrated (unconditional)	–0.20***
Standard error	0.07
Number of observations	4272
R^2	0.39
Both parents migrated	–0.16*
Standard error	0.09
Number of observations	4197
R^2	0.39

Source: Authors' own survey.

Notes: Presents robust standard errors clustered at school level. *** and * indicate significance at 1 and 10-percent levels, respectively. Model includes county fixed effects.

(unconditional) households, female students have significantly worse academic outcomes as compared to male students (see row 1, columns 2–3 of Table 4). In addition, we find that in mother migrated (unconditional) and both parents migrated households, eighth grade students have significantly better academic outcomes as compared to seventh grade students (see row 2, columns 5–6 of Table 4). These findings suggest that parental migration has not only had an impact on the whole student academic outcomes, but also has had an influence on students with different household characteristics.

IV. Conclusions

We employ difference-in-difference analysis using a panel dataset of 7148 seventh and

Table 4. Heterogeneous Effects of Six Types of Parental Migration on the Academic Performance of Junior High School Students in Shaanxi Province in 2012 and 2014

Dependent variable: $\Delta Score_i = Score_{i,2013} - Score_{i,2012}$						
	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables	Any parent migrated	Father migrated only	Father migrated (unconditional)	Mother migrated only	Mother migrated (unconditional)	Both parents migrated
Characteristics of the students						
Female	–0.10	–0.18**	–0.17**	0.25	–0.00	–0.14
	(0.07)	(0.08)	(0.07)	(0.19)	(0.14)	(0.17)
Eighth grade	0.10	–0.02	0.12	0.04	0.31**	0.44***
	(0.10)	(0.11)	(0.10)	(0.22)	(0.13)	(0.15)
Boarding student	–0.01	–0.11	–0.03	0.19	0.26	0.29
	(0.10)	(0.10)	(0.10)	(0.23)	(0.16)	(0.17)
Characteristics of the parents and the households						
Assets	0.10	0.16	0.12	0.04	0.05	0.05
	(0.08)	(0.12)	(0.09)	(0.20)	(0.11)	(0.15)
Father's education level	–0.01	–0.03	–0.03	0.10	0.02	–0.01
	(0.07)	(0.09)	(0.09)	(0.18)	(0.12)	(0.16)
Mother's education level	–0.09	–0.16	–0.14	0.22	0.00	0.00
	(0.08)	(0.10)	(0.08)	(0.23)	(0.15)	(0.15)
Only child	–0.07	0.12	0.07	–0.48**	–0.18	0.05
	(0.10)	(0.13)	(0.11)	(0.19)	(0.16)	(0.20)
Baseline math test score	–0.05	–0.07	–0.04	–0.11	0.02	0.07
	(0.09)	(0.09)	(0.09)	(0.19)	(0.13)	(0.17)
Controlled county dummy	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	4639	4409	4564	4117	4272	4197

Source: Authors' own survey.

Notes: Robust standard errors clustered at school level are presented in parentheses. *** and ** indicate significance at 1 and 5-percent levels, respectively.

eighth grade students from rural Shaanxi Province and find that parental migration has a negative impact on the academic performance of LBC at the junior high school level. It is clear that in any parent migrated households, parental migration reduces a child's standardized math test score by 0.07 points (see Table 2), on average. In addition to the case where any parent migrates, we also find significant negative impacts on LBC academic achievement in mother migrated only, mother migrated (unconditional), and both parents migrated households.

These findings suggest that migration can negatively impact the academic performance and human capital formation of LBC even though the households are capable of providing some necessary resources to invest in the education of their children. We believe that these negative findings are related to the reduced care that

children receive after one or both parents migrate. After parents migrate, it is likely that students take on in-home and on-farm responsibilities. In addition, after parental migration there are likely fewer or no individuals in the household that can help students with their school work. Both situations will have a negative effect on the academic outcomes of students at the junior high school level.

These findings not only have negative consequences for LBC, but also for China's future economic growth if the country's future workforce is not sufficiently skilled. To ensure more sustainable economic growth and human capital development in China, we suggest that the Chinese Government should take active measures to dismantle barriers to the human capital accumulation of LBC. For example, the government should reform the current household registration system that prevents children from accompanying their migrating parents and attending schools in cities. In China, rural migrant families who live in cities have little or no access to public services, such as public education. Their children cannot be enrolled in urban public schools without paying a substantial fee, which they usually cannot afford. Although there are a number of private and for-profit schools that migrant children can attend, these schools are often prohibitively expensive and of poor quality. In addition to loosening household registration restrictions, the government should implement programs targeted at offering greater support and fostering a better learning environment for LBC in rural areas. For example, school counseling has proven to be an effective method for reducing learning anxiety (Whiston et al., 2011; Wang et al., 2016). Offering similar programs to LBC students may hold the potential to help them cope with the effects of reduced care after their parents migrate.

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