

Parental Migration and the Academic Performance of Left-behind Children——Evidence from a Two-wave Panel Dataset of 10 Thousand Students in 5 Provinces in China

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Abstract Since the 1990s, the large-scale migrant labor force from rural to urban areas has made great contributions to the growth in China. However, migration does not come without costs. The potential impacts of parental migration on the left-behind children have aroused wide concerns. Based on a two-wave panel dataset of nearly 10 thousand students in 166 schools from 13 counties in 5 provinces between 2014 and 2015, differences-in-differences (DID) and propensity score matching plus DID (PSMDID) approaches were used to examine the changes in academic performances before and after the parental out-migration. The results indicated that the mother only migration has a significant negative impact on the academic performances of left-behind children, and it was especially true when the mother only migration lasted more than a semester. For left-behind children whose parents were out or only the father was out, their academic performances were not affected.

Key words Parental migration; Left-behind children; Academic performance; Differences-in-differences; Propensity score matching

Since the 1990s, the large-scale migrant labor force from rural to urban areas has made great contributions to the economic development in China. However, migration does not come without costs. The potential impacts of parental migration on the left-behind children have aroused wide concerns. The “Report on the Monitoring Survey of Migrant Workers in 2015” issued by the National Bureau of Statistics of the People’s Republic of China shows that in 2015 the number of migrant workers was 168 840 000 in China^[1], an increase of 28 430 000 from 2008^[2]. With the continuous growth of the number of migrant workers, the number of rural left-behind children has also increased. According to the 6th Population Census in 2010, there are approximately

61 026 000 left-behind children in China, an increase of 3 026 000 from 2008^[3-4]. At the same time, the number of left-behind children accounts for 21.88% in the total number of children in China, of which 48.31% of the left-behind children are in compulsory education stage^[3].

In recent years, the problem of rural left-behind children has attracted wide attention from government and society, and by the end of October 29, 2016, 26 provinces had introduced policies for left-behind children^[5], but how to define left-behind children remains controversial. Most scholars believe that left-behind children are the children with at least one of their parents in out-migration^[6-7]. Some scholars start from the aspects of lack of parental roles and upbringing of chil-

父母外出务工与农村留守儿童学习成绩——5省近万名学生的实证依据

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摘要 20世纪90年代以来大规模的农村劳动力向城市流动,为我国经济发展作出了巨大贡献,由此带来的留守儿童问题也引起了各界的关注。该文基于2014和2015年在5省13县166所农村中小学收集的近万名中小学生的两期面板数据,采用倍差法和倍差匹配法,实证分析父母外出对留守青少年学习成绩的影响。研究发现,仅母亲外出对留守儿童学习成绩有显著的负面影响,且这种负面影响主要存在于仅母亲外出一个学期及以上的情况。父母均外出、仅父亲外出对留守儿童学习成绩的影响均不显著。

关键词 父母外出;农村留守儿童;学习成绩;倍差匹配法

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dren, and define left-behind children as the children with both parents out^[8-10]. Released in 2016, the “Opinions of the Stage Council on Strengthening the Work of Caring for Left-behind Children in Rural Areas” define left-behind children as the “children or teenagers under 16 years old with both parents out or one in out-migration and the other having no custody ability”^[11]. The definition excludes the condition of one parent out while the other caring children at home, but it makes no specific demands on the parents’ average annual out-migration time.

The reason why left-behind children groups are concerned by all walks of life is that the state and society generally agree that left-behind children are vulnerable groups needing attention, and one of the important concerns is the education of left-behind children. But what is the influence of parental out-migration on the academic performances of the left-behind children? There are no consistent results at home and abroad. Some studies have found that the parental out-migration has a positive impact on the academic performances of left-behind children^[12-13], because the migration work increase family income and investment in education, thus improving the academic performances of left-behind children^[14-17], in other words, the migration of parents has a positive income effect. Others have found that parental out-migration has a negative effect on the academic performances of left-behind children^[18-19], because the parents’ out-migration can lead to the lack of parents’ care and supervision^[7], increase the burden of housework and field service^[20-21], in other words, the migration of parents has a negative effect of lack of parental care. And

there are also other studies which have found that there is no significant relationship between children’s academic achievement and their parents’ out-migration^[22-23].

It is of important significance for the correct recognition and solution of left-behind children’s education problem to analyze the influencing factors of the academic performances of left-behind children, such as the out-migration modes of parents and the migration duration. Some research shows that there was no significant negative effect of parental out-migration on the school performances of left-behind children^[24], even has a positive promoting role^[22], while some find that the mother only migration has significant negative effect on the academic performances of left-behind children^[24]. In addition, some studies have pointed out that only the long-term migration of both parents has significant negative effects on the academic performances of left-behind children^[25].

Previous studies have provided a good basis for understanding the impact of parental out-migration on the academic performance of left-behind children, but there are still some shortcomings. First, some studies only use the left-behind children as the study group, but not introduce the corresponding non left-behind children as control^[7], so it is difficult to make a more persuasive causal inference on the effects of parental out-migration on the academic performances of left-behind children. Second, whether the parents go out-migration is not random, but under the combined effects of parents, family and the children themselves, and taking no account of the endogenous problem^[26] will lead to biased estimation results, so it is nec-

essary to adopt other econometric methods to resolve the problem of endogeneity. Third, the measurement indicators of children’s performances are not enough, and many studies use the midterm and final term performances in school record to represent the academic performances of students^[18, 22], and some even use the self rating scores of students^[6], making it have no comparability among the academic performances of different grades and different schools, thereby affecting the reference values of the research results. Fourth, there is a lack of the discussion on the effect of out-migration patterns on the academic performances of left-behind children. The out-migration of parents has 3 mutual exclusive modes, namely, both parents out, only father out and only mother out, and the investigation on the effect of different modes on the performances of left-behind children is conducive to further understand the role of parents in children’s study.

In view of this, this paper used the two-wave (base year and track year) panel dataset from 5 provinces from east, west and central China, and the samples with both parents staying at home during the base year were used as the study object. The samples with both parents at home during the base year and track year were used as the control group, and the parents staying at home during the base year and out-migration of different patterns during the track year was used as the Differences in Differences (DID) and Propensity Score Matching plus DID (PSMDID) were used to make the analysis, which can solve the above endogenous problems. Through the above analysis, the effects of different out-migration patterns of parents, the

Table 1 Definitions of 3 patterns of parents’ migration

Parents’ migration mode	Explanatory variable	Definition
Intervention group (at least one of the parents out):	Both parents stay at home during the base years, and at least one out during the track years	Both parents stay at home during the base years, and at least one out during the track years
Both parents out		Both parents stay at home during the base years, and both out during the track years
Only mother out		Both parents stay at home during the base years, and only mother out while father staying home during the track years
Only father out		Both parents stay at home during the base years, and only father out while mother staying home during the track years
Control group (both parents at home):		Both parents stay at home during the base years, and also at home during the track years

out-migration duration of each mode on the academic performances of left-behind children were investigated systematically, so as to provide references for the correct understanding and achieving good care and service of left-behind children.

Data

The data used in this paper were from the tracking studies in 166 rural primary and middle schools in the 13 counties (districts) from Fujian, Shanxi, Hubei, Shaanxi and Guizhou in March, 2014 and May, 2015. Fujian is located in the eastern part of China, with relatively high level of economic development. Shanxi and Hubei are cities in the middle part of China, and Shaanxi is a typical province in Northwest China. Guizhou is a big province in southwest China. At the same time, Guizhou and Hubei are also major provinces of left-behind children in China^[3]. Therefore, the collected samples of left-behind children from 166 rural primary and secondary schools in the above-mentioned 5 provinces have good national representativeness.

The sampling method was as follows: based on the consideration of feasibility research, the investigation object needed to have abilities to independent reading, fill in questionnaire and standardized math test questionnaire, and can participate in the follow-up survey in 2015, so the target grades of the study were set at grade 4 and grade 7 in the 2014 survey. Each school randomly selected 3 classes of Grade 4 or Grade 7 as the sampling classes. If there were not enough 3 classes, all the classes or Grade 4 or Grade 7 were investigated, and all the school students of the sampling classes were the sampling students. In this way, there were totally 18 181 primary and secondary school students from 397 classes were investigated in 2014 from 166 complete pri-

mary, junior middle schools and nine-year schools in 13 counties (districts) of 5 provinces. Among the schools, 60 were in Jiangxi, 12 in Shaanxi, 20 in Hubei, 34 in Guizhou and 40 in Fujian. There were 229 classes of Grade 4, totally 11 090 students, and 168 classes of Grade 7, totally 7 091 students.

In May 2015, the follow-up survey was done again to the 18 181 students and their teachers and headmasters from the 166 rural primary and secondary schools. The actual traced samples were 16 852 students, and 1 329 students were failed to trace for the reasons of school transferring, leaving school or vacating in the survey day, with the sample loss rate of 7.31%. In addition, 16 students were excluded from the questionnaire because of mental retardation or other physical causes. The effective sample size was 16 836. Among them 10 478 sample students were of Grade 5, 6 358 were of Grade 8. Among the 16 836 samples, 624 sample students came from single parent families. In order to distinguish the single parent from the parents of migration, the single parent samples were excluded. Thus, an effective sample size of 16 212 students was finally involved in this study.

In the two rounds of surveys in 2014 and 2015, 2 questions were designed to find out more about the situation of parents of out-migration. And the questions for the 2014 survey were: “from September 2013 to now, how long has your father lived outside? 1=a semester or more; 2=less than a semester; 3=staying at home”, “from September 2013 to now, how long has your mother lived outside? 1=a semester or more; 2=less than a semester; 3=staying at home”. In the survey in May 2015, the 2 questions were: “from April, 2014 to now, how long has your father lived outside? 1=a semester or more; 2=less than a

semester; 3=staying at home”, “from April 2014 to now, how long has your mother lived outside? 1=a semester or more; 2=less than a semester; 3=staying at home”.

Standardized math test results were used to measure the academic performances of the students. The reason why math was chosen was that compared with the subjects like Chinese, English, standardized math test results had good comparability in different countries and regions. The professional evaluation experts were invited to make the standardized math test papers for different grades, and the test time was 30 min. The test papers were printed, handed and scored by the researchers, and all tests were monitored by the researchers. There were 29 questions in the standardized math test papers for students of Grade 4 and 5, and 25 questions for students of Grade 7 and 8, with a total score of 100.

In addition to collecting the out-migration conditions of the parents, and carrying out the standardized math tests of the students, the 2 surveys also collected the personal information, parents information and family information of the sample students. Personal information included the demographic variables (such as gender, age, and ethnicity) and accommodation. Family conditions included parents' age, education, household fixed assets and family population. At the same time, a questionnaire survey was conducted on the mathematics teachers and principals of the sample students. The questionnaire for mathematics teachers included personal situation, basic teaching situation and so on, and the questionnaire for the principal included school hardware, school faculty information. The whole questionnaire survey was explained by a trained researcher and explained that the notes should be filled out by students, math teachers and principals. In order to ensure that the collected information was accurate and effective, all questionnaires were examined three times and any problems were verified and corrected timely by contacting with respondents.

Table 2 Standardized math scores of left-behind children

	All samples	Both parents at home	At least one parent out-migrate	Parents out conditions		
				Both out	Only mother out	Only father out
Base years	-0.06	0.00	-0.26	-0.49	-0.35	-0.08
Track years	-0.06	0.00	-0.25	-0.45	-0.41	-0.07

Data source: author survey.

Table 3 the influence of parents' migrant workers on the mathematics achievement of left behind children

Explained variable: the difference value of standardized mathematical scores between the base period and the track period

	Difference-in-difference Coefficient (standard error)	Difference-in-difference matching Coefficient (standard error)
Parental out-migration condition:		
At least one out (1=Yes; 0=No)	-0.04** (0.02)	-0.03(0.03)
Individual student characteristics:		
Annual standardized testing results in the base period	-0.40*** (0.01)	-0.38*** (0.01)
Girl (1=Yes; 0=No)	0.02(0.02)	0.02(0.02)
Age	-0.10*** (0.01)	-0.10*** (0.02)
Grade 4 (1=Yes; 0=No)	-0.40*** (0.06)	-0.36*** (0.07)
Han nationality (1=Yes; 0=No)	0.04(0.04)	0.04(0.05)
Boarding (1=Yes; 0=No)	-0.00(0.02)	-0.00(0.03)
Family characteristics:		
The only child (1=Yes; 0=No)	0.04* (0.02)	0.02(0.03)
Whether the father has high school education or above (1=Yes; 0=No)	0.07*** (0.02)	0.03(0.03)
Whether the mother has high school education or above (1=Yes; 0=No)	-0.02(0.03)	-0.01(0.04)
Father's age	-0.00(0.00)	-0.00(0.00)
Mother's age	0.00(0.00)	0.00(0.00)
Number of durable consumer goods (10 at most)	-0.00(0.01)	0.00(0.01)
Number of family members	0.01(0.01)	0.01(0.01)
Mathematics teacher characteristics:		
Female (1=Yes; 0=No)	0.09*** (0.03)	0.09*** (0.03)
Han nationality (1=Yes; 0=No)	0.13* (0.07)	0.11(0.07)
Schooling age	-0.00(0.00)	-0.00(0.00)
Normal bachelor degree or above (1=Yes; 0=No)	0.03(0.04)	0.01(0.03)
Advanced primary school/high school teacher of first class or above	0.08** (0.03)	0.09** (0.04)
School characteristics:		
Coverage area	-0.03(0.05)	-0.00(0.05)
Teacher-student ratio	-1.60*** (0.45)	-1.65*** (0.49)
Rubber playground or not (1=Yes; 0=No)	-0.00(0.05)	0.01(0.05)
Constant term	1.42*** (0.31)	1.30*** (0.38)
Prefectural dummy variable	Yes	Yes
R-squared	0.20	0.19
Sample size	976 1	466 0

"*", "**", "***" respectively indicate significant differences at the levels of 10%, 5% and 1%; the data in the brackets are robust standard errors used to control the effect of class clustering.

Basic Description

Situation of parents leaving home for migrant workers in rural areas

In order to go deep into the study on the effect of parental out-migration on the performances of left-behind students, after referring to the existing studies^[7, 9, 25], this paper mainly focused on the children of the compulsory education stage in the rural area whose both parents or one of the parents were out. At the same time, in order to facilitate the description, the time from

September 2013 to the end of March, 2014 was called the base period, and the time from April, 2014 to May, 2015 was called the track period.

In order to identify the influence of parental out-migration on the academic performances of left-behind children, the samples with both parents at home during the base year were used as the study objects based on the theories and methods of impact assessment. And the samples with both parents staying at home in both the base peri-

od and track period were the control group, while the samples with parents staying at home in the base period while out-migration in different modes in the track period (both parents out, only father out and only mother out) were set as different intervention groups^[22]. The influence of parental out-migration on the academic performances of left-behind children was identified through the comparison on the differences of the academic performances of students between the

control group and different intervention groups in the base period and track period. Therefore, the out-migration conditions of parents were also one only the concerned variables in this paper.

According to the research design, 6 451 samples were excluded from the 16 212 samples because at least one of their parents were out during the base year, so there were 9 761 samples left in the actual analysis. And 7 431 students in the control group had their both parents staying at home in the base period and track period, while 2 330 students were in the intervention groups (accounting for about 23.87%). In the intervention groups, 842 students had their both parents out, 304 had only mother out and 1 184 had only father out.

In order to analyze the effects of the short-term migration (less than a semester) and long-term migration (a semester or above) of parents on the academic performances of left-behind students, the 3 out-migration patterns mentioned above were further subdivided into 6 types as follows: both parents out and at least one staying outside for a semester or above (670 students), both parents out for less than a semester (172 students), only the mother out and staying outside for a semester or above (161 students), only mother out and staying outside for less than a semester (143 students), only father out and staying outside for a semester or above (686 students), and only father out and staying outside for less than a

semester (498 students).

Academic performances of left-behind children

The mathematics performances of left-behind children were the outcome variable concerned in this study, and in order to ensure that the scores of standardized mathematics tests were comparable in different grades, the test scores were processed with standardized processing according to the grades. The specific method was as follows: based on the average and standardization of the test results of the students in the control group, the score of each sample student in the intervention groups and control group was subtracted the average score of the students in the control group, which was then divided by the standard deviation of the results in the control, thereby getting the standardized score of mathematics performance of each sample student.

As shown in Table 2, the scores of standardized mathematics results of the children with both parents staying at home and at least one migrating out in the track years were obtained by using all the 9 761 samples whose parents were both at home during the base period. Furthermore, the migration of parents in the track period was further divided into both parents out, only mother out and only father out, and the differences in the sample children's mathematics performances under different modes in base period and track period were compared. As shown in Table 2, compared with the children whose parents stayed at

home during the track period, the left-behind children with parents out in the track period had universally lower mathematics performances. Moreover, the mathematics performances of the left-behind children of mother only migration in the track period decreased by 0.06 standard deviation than those in the base period, while there was no decrease in the mathematics performances of the left-behind children in the groups of both parents out and father only migration in the track periods.

Research Methods and Quantitative Analysis Results

Research methods

As mentioned above, in order to alleviate the possible endogenous problems, differences-in-differences (DID) and propensity score matching plus DID (PSMDID) approaches were used to examine the changes in academic performance before and after the parental out-migration. DID method was an impact evaluation method by comparing the averages of the intervention group and control group before and after intervention. It was based mainly on the assumption of parallel trends, *i.e.*, if the intervention group was not intervened, the intervention group and the control group had the same variation trend before and after the intervention^[27].

According to the parallel trend assumption, if there was no difference in the out-migration of parents in track period, the changes of sample stu-

Table 4 The mathematical performances of left-behind children under 3 different patterns of parental out-migration conditions

Explained variable: the difference value of standardized mathematical scores between the base period and the track period

	DID	PSMDID
	Coefficient (standard error)	Coefficient (standard error)
Both parents out (1=Yes; 0=No)	-0.07*(0.04)	-0.05(0.04)
Only father out (1=Yes; 0=No)	-0.01(0.03)	-0.00(0.03)
Only mother out (1=Yes; 0=No)	0.13**(0.05)	-0.11**(0.05)
Annual standardized testing results in the base period	-0.40(0.01)	-0.38*** (0.02)
Control variable	Yes	Yes
Prefectural dummy variable	Yes	Yes
R-squared	0.20	0.19
Sample size	9 761	4 660

"*", "**", "***" respectively indicate significant differences at the levels of 10%, 5% and 1%; the data in the brackets are robust standard errors used to control the effect of class clustering; due to space limitations, the regression results of the control variables and prefectural dummy variables are not listed in this table, and if interested, you can claim to the author.

dents' performances were the same in the intervention group and control group. Based on satisfying the assumption of parallel trend, the effectiveness of the evaluation results of DID also depended on the similarity between the intervention group and control group in the base period. The results of DID became more persuasive if the two groups were more similar^[28]. Through the comparison on the 20 visible features like personal information, family, mathematics teachers and schools in the intervention group and control group, it found that 8 features showed no significant difference between the intervention group and control group (Table 1). In view of this, based on the DID method, the PSM-DID method was further taken to make the analysis.

Integrated the advantages of DID and propensity score matching, PSM-DID could well alleviate the estimation error caused by endogenous problems. Moreover, DID could solve the heterogeneity bias caused by some unobservable factors, and the propensity score matching method could correct the self selection estimation bias caused by some observable heterogeneity^[29-32]. According to the principle of the propensity score matching method, the samples of children whose parents were both at home in the base period included 3 kinds of in-

tervention groups, namely the children with parents staying at home in the base period but both out, only father out and only mother out in the track period, and 1 control group with both parents staying at home in both the base period and track period. As for the sample children in each intervention group, PSMDID method was used to find a "twin" in sense of statistics in the control group, and the estimation results of the PSMDID was obtained by comparing the differences between the twins in different intervention group and the control group^[33].

In this study, 8 variables were selected as the independent variables (W_{ij}) according to the grades, including the individual student feature variable and the family feature variables like father's education, mother's education and family durable consumer goods, and whether the children was the sample in the intervention group was used as the dependent variable (T_{ij}). And then Logit regression was used to calculate the propensity score of each child, and then a "twin" child in the statistics sense with the closest propensity score was found in the control group. Afterwards, the matched "twins" were used to compare the average difference in the mathematics performances of the "twins" in the intervention group and control group, thereby obtaining the

average intervening effects of parental out-migration on the performances of left-behind children. The empirical model was as shown in the following formula (1):

$$Y_{ij} = \beta_0 + \beta_1 T_{ij} + \beta_2 A_{ij0} + \beta_3 X_{ij0} + U_{ij} \quad (1)$$

Where, $Y = A_{ij1} - A_{ij0}$ represents the added value of annual standardized performance scores of the sample students from the base period to the track period; A_{ij1} is the standardized mathematics score of sample student i in school j in the track period; A_{ij0} is the standardized mathematics score of sample student i in school j in base period. T_{ij} is a dummy variable that represents intervention. If the student i is an intervention student, then the value of T_{ij} is 1, otherwise, the value is 0. X_{ij0} is a set of control variables, representing the features of student i in the base period, including the following 4 categories: students' personal characteristics, including gender, age, nationality, grade, boarding or not; family features, including the only child or not, parents' education level, parents' ages, number of durable consumer goods in the family, and the family population; mathematics teacher features, including the sex, nationality, teaching age, education degree and highest tile of the mathematics teacher; school features, including the coverage area (taking logarithm), student-faculty ratio, having rubber playground or not. U_{ij}

Table 5 Relationship of different parental out-migration time with the mathematical performances of left-behind children under the 3 modes
Explained variable: the difference value of standardized mathematical scores between the base period and the track period

	DID	PSMDID
	Coefficient (standard error)	Coefficient (standard error)
Both parents out and at least one staying outside for over a term (1=Yes; 0=No)	-0.07*(0.04)	-0.05(0.04)
Both parents out and staying outside for less than a term (1=Yes; 0=No)	-0.06(0.08)	-0.04(0.07)
Only mother out and staying outside for over a term (1=Yes; 0=No)	-0.18**(0.07)	-0.16**(0.07)
Only mother out and staying outside for less than a term (1=Yes; 0=No)	-0.07(0.09)	-0.05(0.08)
Only father out and staying outside for over a term (1=Yes; 0=No)	0.01(0.03)	0.02(0.03)
Only father out and staying outside for less than a term (1=Yes; 0=No)	-0.03(0.04)	-0.03(0.04)
Annual standardized testing results in the base period	-0.40*** (0.06)	-0.38*** (0.02)
Girl (1=Yes; 0=No)	0.02(0.02)	0.02(0.02)
Control variable	Yes	Yes
Prefectural dummy variable	Yes	Yes
R-squared	0.20	0.19
Sample size	9 761	4 660

"*", "**", "***" respectively indicate significant differences at the levels of 10%, 5% and 1%; the data in the brackets are robust standard errors used to control the effect of class clustering; due to space limitations, the regression results of the control variables and prefectural dummy variables are not listed in this table, and if interested, you can claim to the author.

stands for the stochastic error after controlling the class clustering effect. Based on the above model, the estimated value of β_1 was the influence of parental out-migration on the mathematics performances of students.

Regression analysis of parents' out-migration on the academic performances of left-behind children

In order to overall grasp the influence of parental out-migration, the variable of at least one parents out was used as the base point of this study to analyze the influence of parental out-migration on the academic performances of left-behind children (Table 3). According to model (1), first, the DID regression was used, that is, the 9 761 samples were analyzed before the propensity score matching. And then, the propensity score matching method was used, that is, the 2 330 pairs of "twins" samples in statistical sense were analyzed. In the regression, the difference value of standardized mathematical scores between the base period and the track period was used as the explained variable, and at least one of the parental out-migration (1=Yes; 0=No) was used as the explanatory variable. The influences of parental out-migration on the academic performances of left-behind children were evaluated by controlling the annual standardized mathematics results in the base period, students' personal features, family features, teachers features, school features and prefectural dummy variable.

Based on the analysis results of DID method, compared with the children with both parents staying at home in the track period, the left-behind children with at least one of the parents out showed a standard deviation of 0.04 lower in the mathematics results, and the difference was significant at the level of 5%. However, PSMDID analysis showed that although the influence of at least one of the parental out-migration on the mathematics results of left-behind children was a negative value (-0.03), the estimation coefficient was not statistically significant. Based on the results of the DID method and PSMDID method, it was necessary to further analyze the influences of different out-migration patterns of parents on the

mathematics performances of the left-behind children.

The out-migration of parents was subdivided into 3 modes of both parents out, only father out and only mother out, which could be used to further analyze the influences of the 3 parental out-migration patterns on the mathematics performances of left-behind children, and the estimation results were shown in Table 4.

The results of the DID method showed that both parents out and only mother out had significant negative effects on the mathematics performances of left-behind children, but no significant effect was found of only father out on the mathematics performances of left-behind children. With all the other influencing factors controlled, compared with the children with both parents staying at home in the track year, the left-behind children with both parents out showed a standard deviation of 0.07 lower in the average mathematics results, although the difference was significant only in the level of 10%. However, the average mathematics performance of left-behind children with only mother out showed a standard deviation of 0.13 lower, and the difference was significant at the level of 5%.

Compared with DID method, the results of PSMDID method showed that mother only migration still had significant negative effects on the mathematics performances of the left-behind children, but the negative effects were not significant of both parents migration. In particular, compared with the children with both parents staying at home in the track period, the left-behind children of mother only migration had a 0.11 standard deviation lower in the mathematics results, and the difference was significant at the level of 5%. Previous research has found that if the performances of the two have a standard deviation of 0.40, one is a school year left behind the other^[34]. That is to say, the changes of the mathematics performance from the base period to the track period showed that compare with the children with both parents staying at home in the track period, the left-behind children of mother only migration had nearly half semester left behind in study. It indicat-

ed that although the income effect of parents migration and father only migration was almost balanced with the lack of care effect, the lack of care effect of mother only migration was significantly larger than the income effect, which had significant negative effect on the performances of left-behind children.

Relationship between the different parental out-migration time with the academic performances of left-behind children

Since the migration time of parents might be different, the effects on the performance of left-behind children might also be different. The above-mentioned 3 types of parental out-migration modes were further divided into 6 types as follows: both parents out and at least one staying outside for a semester or above, both parents out for less than a semester, only mother out and staying outside for a semester or above, only mother out and staying outside for less than a semester, only father out and staying outside for a semester or above, and only father out and staying outside for less than a semester, to explore their effects on the mathematics performances of left-behind children, and the specific results were shown in Table 5.

The analysis results showed that the negative influence of parents' long-term outing on the mathematics scores of left-behind children was more obvious than that of short-term outing. The results of DID method showed that there were significant negative effects in the mathematics scores of left-behind children in both parents out and staying out for a semester or above, only mother out and staying outside for a semester or above, while the effects were not significant in both parents out and staying outside for less than a semester, only mother out and staying outside for less than a semester, only father out and staying outside for a semester or above, only father out and staying outside for less than a semester. Specifically, compared with the children with both parents staying at home in the track period, the left-behind children with at least one of their parents out for a semester or above showed a standard deviation of 0.07 lower ($P < 0.10$)

in the mathematics scores, and the left-behind children with mother only migration for a semester or above showed a standard deviation of 0.18 lower ($P < 0.05$). Compared with the DID method, the results of PSMDID showed that mother only migration for a semester or above had significant negative effects on the mathematics performances of left-behind children, and the influence level was a 0.16 standard deviation, which was significant at the level of 5%. It further proved that if only mother out for a semester or above, the lack of care effect of mother migration was significantly greater than the income effect of out-migration.

Research Results and Recommendations

Based on a two-wave panel dataset from the survey in Fujian, Shanxi, Hubei, Shaanxi, Guizhou in 2014-2015, DID and PSMDID approaches were used to examine the parents migration and different migration modes on the mathematics performances of the left-behind children. After summarizing the analysis results, the findings were shown as follows:

First, there were significant differences in the effects of the out-migration patterns of parents and the migration time on the mathematics performances of left-behind children, so it not only needed to pay attention to the different out-migration patterns of parents but also needed to pay attention to the duration of the migration to analyze the effects of parental out-migration on the academic performances of left-behind children.

Second, PSMDID analysis showed that the mother only migration for a semester or above had significant negative effects on the mathematics scores of the left-behind children, while both parents out and father only migration had no significant effect on the academic performances of the left-behind children.

These findings showed that from the perspective of academic performances, the left-behind children with mother only migration for a semester or above was the most fragile, which requires special attention from all

walks of life. In this regard, in addition to emphasizing the guardianship, the relevant departments of the government in formulating relevant policies of left-behind children also should pay attention to the importance of mother care for children's development, and consider the influence of parental out-migration time on the left-behind children. It should take positive measures to create an environment to attract and encourage migrant workers to return home for employment and entrepreneurship. In view of the difference between the results of DID and PSMDID, it is necessary to do more research on the care and service of the left-behind children.

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and friendliness. So, these help village economy to grow and attract more migrant workers to come back.

To create diversified home-stay image

A characteristic home-stay relies on local culture, living environment, customs, and it can be varied in theme and style to allow tourists to truly feel the rural life. Still, nearby environment can be made use of but destructions have to be avoided.

Conclusion

We are refocusing attention on traditional villages, but only buildings, space and styles are included. In contrast, native residents are relocated for

the so-called sake of construction protection; while their role is always slighted. Native residents should learn and improve cultural awareness and government should take actions to protect ICH, intensify promotion and educate native residents in cultural inheritance. After all, only when native residents are available could traditional village sustainable development be promoted. And home-stay industry helps local economy and keeps native residents. If the historical culture is disappearing, where does our cultural pride and national pride come from?

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