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The Impact of Parent Migration on Education Expenditures for Children in Rural China

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Abstract

More than 200 million residents of rural China migrate to urban destinations for work, but due to restrictions on household registration (the hukou system), these migrations are often cyclical and temporary. These patterns have resulted in a phenomenon in which rural children are left in the care of relatives while parents migrate for higher wages in urban labour markets. The impacts of this migration on children's outcomes are often ambiguous: while separation from parents is associated with a range of developmental and social challenges, the higher incomes that come from urban labour markets allow parents to send substantial remittance payments back to their primary household. We use panel data from the China Family Panel Studies (2010–2014) to test how parental migration affects (1) household education expenditure and (2) saving for future education. Left behind children are poorer and experience smaller increases in education spending than peers with co-resident parents. At the same time, households with a migrating parent are modestly more likely to start saving for education. These results, robust to propensity score matching, suggest migration changes expectations more than near-term expenditures.

Keywords: *development, labour migration, educational attainment, stratification, China, left behind children*

Introduction

Despite becoming a majority-urban country in 2012, China remains home to hundreds of millions of rural families (Wei, 2019). In transitioning economies, significant disparities exist in social service provision between rural and urban communities that impact life outcomes for children who are raised in rural contexts (Nworgu & Nworgu, 2013). Education in China is particularly unequal across spatial dimensions, as many rural communities in China cannot provide the same level of instruction or extra-curricular opportunities as in the country's rapidly growing cities (Zhang, 2017). However, formal restrictions on internal migration preclude rural families from simply moving to the city in search of better labour markets and better schools (Wu, 2024). Instead, an increasing number of young parents choose to move to urban labour markets on a temporary basis, leaving their children in the care of relatives.

The structure of rural education outcomes in China remains an important subject for scholars of international rural education (Roberts & Hannum, 2018). This is particularly true for so-called 'left behind children', or the children who remain in rural communities when their parents migrate for work on a temporary basis. The consequences of parental out-migration have considerable

importance for scholars of rural education; labour migration is a common income maximising strategy for young adults in developing or middle-income countries, yet the incentives for labour migration are in tension with children's needs for residential stability and consistent education. Thus, documenting the consequences of parent migration on left behind children remains a crucial concern for scholars of rural education. We address this gap, highlighting one of the largest populations of rural students in the world and their relationship to developing labour markets. This article explores how internal migration decisions of parents impact investments and planning related to children who are left behind in rural contexts, typically in the care of extended family. The article considers two related research questions: How does a parent's decision to migrate to an urban context for work influence expenditures on children's education, and how do those decisions shape long term planning for education?

The article proceeds with a review of relevant literature that provides motivation for the research questions described here. A discussion of methods and data follows, then we present our primary findings. Using data from the China Family Panel Study (2010-2014), our analysis suggests that parents' migration decisions lead to a paradoxical pair of outcomes: families with a migrating parent spend less on their children's education, but are more likely to begin saving for larger, future education expenditure. These findings are robust to the use of propensity score matching methods that limit the analysis to households that are similar on observable characteristics. A concluding section includes implications for future research on migration, space, and education in rural contexts.

Literature Review

Internal Migration in China

China is home to the world's largest internal migrations, largely due to the needs of urbanising economies combined with the incentive structure created by the hukou system, a system of household registration that ties people to their birthplaces. A history of the modern household registration system by Liang and White (1996) outlines the broad contours of the hukou system and it's impacts on internal migration. Categories of hukou are divided into agricultural (rural) and non-agricultural (urban) and are associated with differential access to state social services and economic opportunities. Notably, children are only entitled to free public education and other basic services where they are registered. Changing a hukou status is difficult; graduating college and obtaining a job offer is the most direct way to convert an agricultural hukou to an urban hukou. Despite these official restrictions, China's government (at both the provincial and national level) has adopted varying degrees of forbearance toward adults seeking to move for work, and significant internal migration has been observed throughout recent Chinese history, particularly in the post-reform periods of the 1980s (Liang & White, 1996). Adults with an agricultural hukou have limited options to permanently move into an urban area and seek mainstream employment, but many are able to work in manufacturing or construction in these areas. Chan (2010) notes that this migration is typically temporary and cyclical, as adults return home each year during holidays and often expect to permanently return home after gaining experience and saving for future family expenses. The adults who participate in this process are often referred to as the 'floating population' (Chan, 2010). Research by Chang (2009) details the internal migration trajectories of young Chinese adults in the years after China entered the World Trade Organization and became more integrated with the global economy. Young women would leave for work in factories in coastal provinces, while young men would seek construction work in the country's rapidly growing cities. After years of seasonal migration, these adults might settle in their home communities with the benefit of new skills and saved income (Chang, 2009).

The number of individuals who were not officially registered in their current place of residence, the floating population, was 140 million in 2003, 221 million by 2010 (Liang et al., 2014), and 370

million by 2020, representing 26% of the population of China (Cao et al., 2024). Most of these individuals were labourers from rural areas in China's interior who relocated to cities and coastal areas. Despite the formal restrictions imposed by the hukou system, the Chinese government has taken a more encouraging stance on rural-urban migration in recent years and has implemented several measures to help rural residents who migrate to cities. Huang and Zhan (2005) explored the connection between migration, development, and reducing poverty. Their analysis demonstrated that many local governments in sending regions, particularly in the western regions Sichuan, Gansu, and Chongqing, view labour migration as one of the key tactics for fostering economic growth. Furthermore, since the late 1990s, labour migration has been embraced as a national strategy to lessen poverty in rural areas (Huang & Zhan, 2005).

Migrant workers' remittances, particularly those from the poorest families, have fostered local development and reduced poverty in migrant-sending areas. Remittances help poor families overcome poverty and contribute to lower spatial inequality within China (Pan & Sun, 2024). Research by Yu B. et al. (2023) demonstrates that labour migrants with a broader range of experiences and enhanced human capital can contribute positively to the socio-economic development of the sending areas. Many migrants who established their own businesses in Anhui Province, a primary sending place for mass migration since the early 1980s, have returned (Yu B. et al., 2023). Furthermore, after returning to their home villages, several migrant workers went on to assume leadership roles in their communities. The process of local development may benefit greatly from the contributions of these new leaders (Yu B. et al., 2023). However, other research demonstrates that internal migrants struggle to benefit from the agglomeration of human capital in urban contexts because of continued restrictions imposed by the hukou system (Yu L. et al., 2017).

Since the early 1980s, internal migration has increased consistently, largely through informal movements associated with cyclical labour migration. Formal movements, however, entail a hukou change. Movements across city, town, or township limits, are subject to tight regulations and need permission from the public security authorities (Cao et al., 2024). There is considerable spatial heterogeneity in internal migration patterns, both across and within provinces. Migration decisions can be sensitive to local level investments in infrastructure (Parsons, 2022) or can be shaped by province-level development strategies that may, to varying degrees, incentivise rural development or rural-to-urban migration (Donaldson, 2011).

Left Behind Children and Internal Migration

The process of internal migration described in the previous section typically involves adults leaving their children in the care of other family members. The impacts of labour migration on left-behind child outcomes are key to analysing the incentive structure leading to those migrations. While a neoclassical analysis of labour migration would be primarily concerned with the individual migrant's income maximisation potential, alternative frameworks account for broader household dynamics. The new economics of labour migration framework described by Stark and Bloom (1985) conceptualises migration decisions as household risk-minimisation strategies, rather than solely focusing on income. This framework considers reducing the risk of economic fluctuations, improving the social status of family members, accounting for market frictions, and other non-income-based variables. In this framework, a parent's decision to migrate could be motivated by a desire to improve outcomes for the child generation, irrespective of the immediate consequences for the individual parent's income (Stark & Bloom, 1985).

Parents participating in China's rural-to-urban cyclical migrations often leave dependent children behind due to aspects of China's social welfare system described by Kan (2013). Municipal governments, through the hukou system, restrict rural migrants and their children from accessing urban housing, healthcare, social security, and education. Additionally, disparities in educational curricula across administrative districts mean that children moving across provinces

face challenges, such as being required to take entrance exams for senior high school and university in their registered province (Kan, 2013). Zhou et al. (2014) examined the impact of parental migration on left behind children in Anhui and Jiangxi provinces. Their findings revealed that while the migration of one parent did not significantly affect children's math and Chinese exam scores, the absence of both parents led to lower scores.

Over 60 million rural children were classified as left behind in 2013, more than double the number from 2005, growth which highlights the long-term implications of rural labour migration and the importance of studying left behind children (Pan & Ye 2017). Pan and Ye (2017) also highlight the challenges faced by left behind children, including lower state investments in rural education and discrimination against economically disadvantaged children. Zhou et al. (2019) argue that rural education in China suffers from insufficient funding and uneven resource distribution, further exacerbated by urban-centric planning. Their work suggests administrative policies have concentrated educational resources in urban areas, marginalising rural communities. As a result, rural families must invest significant financial and human resources in their children's education, often forcing students to leave their villages at a young age to enrol in residential high schools, most of which charge tuition. For left behind children, this separation compounds the challenges of adjusting to an urban-oriented educational system, leading many to abandon their studies or enter the workforce prematurely without adequate preparation (Zhou et al., 2019).

The adverse effects of parental migration on left behind children extend beyond education. Tian et al. (2017) compare the growth of left behind children with non-left behind children, finding that left behind children, particularly in households where the mother out-migrates, had lower body mass indices and slower growth rates. Nutritional deficiencies contributed to poorer physical development outcomes for left behind children compared to their peers. Financial barriers further exacerbate the challenges faced by left behind children. The Law of Compulsory Education mandates nine years of schooling for all children, but universal education does not fully alleviate the financial burden on families (Huang et al., 2021). China's decentralised education funding system requires sub-national governments to cover approximately 95% of public education costs (Huang et al., 2021). Migrant parents who bring their children to urban areas face higher education expenses, including fees associated with private schools. Since school funding does not follow migration, migrant children are often subject to additional penalties. These financial pressures compel many parents to leave their children in rural areas (Zhang et al., 2021).

China's internal migration patterns provide a unique context for studying the impacts of parental migration on left behind children. With rapid growth in labour migration, the phenomenon of left behind children is closely tied to institutional policies. Lu and Pang (2022) investigated the effects of parental migration on educational investment for left behind children, finding that families with migrant parents spent less on extracurricular education expenses compared to non-migrant families. Analyses revealed that parental migration significantly reduced investments in supplemental education and negatively affected school preferences and funding. Additionally, the increased income from migration raised the opportunity cost of education, leading parents to undervalue educational spending (Lu & Pang, 2022).

Educational Attainment in Contemporary China

As in any national context, educational attainment in China is shaped by the socioeconomic status of students and local institutional factors. China is marked by significant spatial variation between rural and urban contexts, particularly since liberalisation and other economic reforms began in 1978 (Xie & Zhou, 2014). Rural families have long been disadvantaged in terms of education, occupational status and labour market opportunities, household incomes, housing, and other measures of well-being (Treiman, 2013). These disadvantages are further compounded

by intersections with other marginalised identities, such as ethnicity (Clothey et al., 2018), language spoken at home (Ma et al., 2018), and gender (Hannum, 2005).

Although the country has reduced spatial inequalities in Gross Domestic Product, the gap in educational attainment—particularly in higher education—remains stark (Wu, 2024). While China's rapidly expanding economy has earned it the moniker 'the world's factory', firms in the industrial sector struggle to attract low-skilled labour. Fu and Gabriel (2012) note that a growing number of highly educated individuals, including college graduates, face extended periods of unemployment. This challenge is especially pronounced for graduates from rural areas. Despite aspiring to secure high-paying jobs in urban centres, these individuals often find their skill levels and educational experiences insufficient to compete effectively. As a result, many return to rural regions, where they accept lower-paying positions that match their qualifications (Fu & Gabriel, 2012).

Rural students in China face unique barriers to higher education. They encounter more institutional obstacles compared to their urban peers and are more likely to seek positions within lower-paying sectors of the economy (Kan, 2013, Zhang et al., 2021). Financial disparities also contribute to education inequality, as decentralised funding mechanisms result in lower overall education expenditure in poorer provinces. In the most severe cases, provincial education budgets are inadequate to cover compulsory education expenses (Roberts & Hannum, 2018).

The hukou system adds another layer of complexity to educational inequality in China. This system exacerbates disparities through its connection to family origins, geographic location, and selective mobility (Huang, 2020). The hukou system has been linked to lower levels of social mobility for rural students (Huang, 2020). Moreover, the conversion of hukou status from rural to urban areas remains highly selective, restricting upward mobility for rural populations (Wu, 2024). Wu's research highlights the stark differences in educational outcomes between urban and rural hukou holders. For example, individuals with urban hukou status receive an average of 10.3 years of education, whereas those with rural hukou status receive approximately six years. Transition rates between educational levels further illustrate this divide. Among urban hukou holders, 93% continue their education to junior high school after completing primary school, compared to only 78% of rural hukou holders. Similarly, 67% of urban hukou holders advance to academic senior high school after junior high, whereas the rate drops to 29.9% for their rural counterparts (Wu, 2024).

Geographic location within China's administrative hierarchy also plays a significant role in determining educational attainment. These disparities highlight the deep-rooted inequalities that persist in China's education system, despite the country's rapid economic growth and modernisation efforts (Zhang et al., 2015). Despite these barriers, rural students remain strongly incentivised to pursue education as returns on investments in higher education are often higher for rural students relative to their urban peers (Lin, 2018).

Remittances and Education Spending in Developing Contexts

The relationship between remittances and household education expenditures represents a critical component of understanding how migration shapes human capital investment in sending communities. Remittances—monetary transfers from migrants to their households of origin—constitute a significant source of external finance for families in developing economies.

Existing research examines how these monetary transfers affect educational spending, with empirical evidence pointing to generally positive, though context-dependent, impacts. Meta-analytic evidence provides strong confirmation of the remittance-education relationship. Askarova and Doucouliagos (2020) synthesise results from 73 studies covering 30 countries, finding that international remittances increase household education expenditure by approximately 35% on average after adjusting for selection bias and reverse causality. They report

particularly pronounced effects in Latin America, where remittances are associated with education spending increases as high as 53%. However, their analysis suggests that domestic remittances generate smaller effects relative to international transfers. If this pattern holds for China, then the impacts of remittances for internal migration contexts like China are likely lower than what we might expect for international migration contexts.

Country-specific analyses largely confirm these patterns in education spending while highlighting context-specific sources of heterogeneity. Thapa and Acharya (2017) demonstrate that in Nepal, remittance-receiving households allocate a larger portion of their budget to education compared to non-recipients, consistent with the hypothesis that remittances relax constraints on discretionary household spending. Similarly, Bansak et al. (2015) report that remittances lead to higher education spending in Nepal, with impacts correlated with higher school quality. Cross-national evidence from Sezgin et al. (2023) suggests that remittances represent a meaningful determinant of educational attainment in emerging markets, though effect sizes remain modest compared to other structural factors.

The impact of remittances on education spending is not uniform across contexts. Démurger and Wang (2016) find that in rural China, internal remittances may reduce education expenditures, as households channel funds toward consumption and housing (this article we use newer data covering a broad portion of China to suggest that remittances lead to ambiguous impacts on education spending). Wang et al. (2021) observe limited influence of remittances on education budget shares in Kyrgyzstan, suggesting households treat these transfers as permanent income, leading to proportional spending increases across budget categories rather than targeted educational investment. The source of remittances—whether international or internal—also shapes educational outcomes.

Several studies emphasise the importance of intra-household dynamics. Using evidence from Ghana, Pickbourn (2016) demonstrated that remittances sent to women were more than twice as likely to be spent on education compared to those sent to men, underscoring that gendered patterns in household resource allocation extend to remittance spending. This finding aligns with broader evidence identifying gendered patterns when making household budget decisions related to surplus income (López-Feldman & Escalona 2016; Pickbourn 2016; Urbina 2020). In summary, the remittance literature suggests that these transfers can play a substantial role in increasing household education spending and improving enrolment rates, particularly when alleviating other constraints. However, the magnitude and direction of effects vary based on the origin of remittances, local returns to schooling, household decision-making dynamics, and the broader policy environment. The impact of remittances from internal migration are particularly understudied.

Research Questions

The literature surveyed here suggests that parents in contemporary China must balance the incentive to participate in labour migration, restrictions on their children's movement, and the tension between the material needs of their children and their caregiving roles as parents. Insights from this review of the literature underpin two research questions:

RQ1: How does a parent's out-migration impact the family's spending on a child's education?

Because labour migration is an income-maximising strategy, we might expect that these households would see an increase in education spending; as disposable income increases, these households have more capacity to invest in education through tuition as well as extracurricular opportunities. However, labour migration also (by definition) separates the parent from the child. The distance between family members may influence household spending priorities. Labour migration may also result in new perspectives on the utility of voluntary education

spending. For example, parents with success as labour migrants in urban industries may be more confident that the same economic opportunities will be available to their children, irrespective of educational attainment.

> *RQ2: How does a parent's out-migration impact the family's planning for a child's future education?*

The first research question considers actual spending; the second accounts for future-oriented decision making. While out-migration may or may not result in measurable changes to *present* education spending, it may influence decisions to save for future expenses. One possibility is that families may value the symbolic importance of savings, even if present spending on education remains largely the same. However, migration may also incentivise families to spend on present-needs such as paying down debt, investing in household needs, and other large expenses that may preclude saving.

Methods and Data

This article leveraged panel data from the China Family Panel Studies (CFPS) administered by Peking University. The CFPS is a representative sample of families from most provinces of mainland China (the Special Administrative Regions of Hong Kong and Macau, Taiwan, and some provinces in western China are excluded). We used data from the 2010, 2012, and 2014 waves of the survey. There are separate survey modules for community-level features, adults, children, and family rosters. The data include approximately 15,000 unique families in the first wave with survey responses related to nearly 9,000 unique children. For a complete discussion of the CFPS, see Xie and Hu (2014). Because this article used already-collected secondary data it was deemed low risk research by the authors' institution ethics board.

Background characteristics about the child and their family (e.g., ethnicity) are reported in Wave 1. The treatment variable (i.e., whether a parent migrated for work) is measured in Wave 2. The outcome variables are measured in Wave 3. We selected these three waves because they allow for a clear chronological sequence: time-invariant background and baseline covariates (Wave 1), treatment (parental migration, Wave 2), and outcomes (education expenditures or saving, Wave 3). This sequencing ensures that the treatment temporally precedes the outcome.

The outcomes of interest in this article relate to investment in children's education and the associations between parents' migration decisions and those investments. Migration decisions are not random, making formal causal inference impossible. Many factors that shape an adult's decision to migrate for work may also influence decisions around a child's education. We leveraged several techniques to address potential confounders and other sources of bias. Our primary analytic strategy relied on propensity score matching (PSM), a method to create a subset of the data in which observations that receive the treatment (in this case, having a parent migrate for work) are matched with observations that do not receive this treatment yet are otherwise similar (Caliendo & Kopeinig, 2008). PSM is a useful tool for dimension reduction and helps avoid overfitting compared to other matching techniques. Propensity scores are the predicted probabilities that an observation receives the treatment in question and are typically calculated as the output of a logistic regression in which the treatment is the dependent variable. We used the nearest-neighbour matching method in the MatchIt R package (Ho et al., 2011). In practical terms, this meant that for each child with a parent who migrated, we identified a child who looked similar on key background characteristics (such as parental education and household income) but whose parent did not migrate. This created two groups that were more directly comparable.

Computing propensity scores in this way required choosing a set of covariates that may predict the treatment. We used Least Absolute Shrinkage and Selection Operator (LASSO) regression as a strategy to choose these covariates from the adult datasets in the CFPS. LASSO is a

regularisation technique that reduces the dimensionality of a dataset by selecting only the features that are most predictive of the outcome in question (Ranstam & Cook, 2018). This strategy allowed us to avoid overfitting when calculating propensity scores and reduced the potential bias caused by relying on researcher discretion when choosing these features. We selected eight features (from an initial set of 372 covariates in the adult dataset of Wave 1) for the PSM model to predict likelihood of treatment. In this case, the features identified by the LASSO procedure largely aligned with theoretical expectations about what motivates migration decisions (e.g., parent level of education and child's age). Leveraging the LASSO algorithm provided further support for researcher intuition about what features were appropriate for using PSM. Running the PSM model with these features returned a matched dataset with 833 observations (contrasted with 2,831 complete rural observations in the full data set), of which 776 were complete cases without missing data for relevant control variables. While formal causal inference was still not possible with these data, focusing on this set of matched observations reduced the influence of confounders.

Our first set of models were ordinary least squares (OLS) linear regressions in which the outcome was the total spending on a child's education in 2014. A second set of models were linear probability models in which the outcome was a binary variable indicating whether a child's family had started saving for future education expenses. The key independent variable was a binary variable reporting whether one of the child's parents migrated for work between the 2010 and 2012 waves of the CFPS (i.e., Waves 1 and 2). This variable was measured in the Wave 2 survey data. We controlled for a range of variables associated with both the child and their parents as well as province-level fixed effects. We also included a lagged dependent variable (the amount of education expenditure reported in Wave 1). Inclusion of this lagged variable, combined with the use of propensity score matching, addressed potential bias resulting from the fact that parents who migrate were fundamentally different from those who do not. While there are more recent data in the CFPS, education spending is not measured as consistently. Many of the children observed in Waves 1 through 3 of the survey had 'aged out' of their education trajectories by later waves. As a result, inclusion of these later data risks attenuating the relationship because of the relatively large number of situations in which education spending drops to 0 due to graduation.

Table 1 includes descriptive statistics for these variables in both the full and matched samples. The 'Full Data' section reports descriptive statistics (mean, standard deviation, and minimum and maximum values) from the 2,831 complete observations in the full sample (cases with missing data are excluded). Approximately 14% of children in the full sample had a parent who migrated for work between Wave 1 and Wave 2 of the survey. A slight majority (54%) of focal children (i.e., the children about whom the survey was completed) were male, and 12% belonged to one of China's 55 recognised ethnic minority groups. A large majority (85%) have an 'agricultural hukou', which means they were registered in a rural area at birth. This value is less than 100% because the sample includes a small number of children who are registered in suburban, exurban, or urban locales. However, all children included in the models below lived in a rural village at the time of the survey.

The latter portion of Table 1, labelled 'Matched Data', reports descriptive statistics for the sample of children who were matched with observably similar respondents using propensity score matching. There were 776 complete cases in the matched sample. Half (.50) of the observations in the smaller matched sample had parents who migrated. This 50-50 split between treated and untreated observations is a result of the matching process; for each child exposed to the treatment (parental migration), a non-treated child with similar background covariates is included.

Table 1: ***Descriptive Statistics, Full and Matched Data***

	Full Data (n = 2,831)				Matched Data (n = 776)			
Variable	Mean	SD	Min	Max	Mean	SD	Min	Max
Total Education Expenditure in Wave 3 (RMB)	3,446.63	5,348.91	0	100,800	2,486.86	3,585.49	0	39,500
Started Saving?	0.13	-	0	1	0.12	-	0	1
Parent Migrated (1 = Yes)	0.14	-	0	1	0.50	-	0	1
Sex (1 = M)	0.54	-	0	1	0.53	-	0	1
Age of Child in 2010	5.59	3.40	0	12	5.15	3.42	0	12
Rural Household	0.85	-	0	1	0.95	-	0	1
Minority (1 = non-Han)	0.12	-	0	1	0.12	-	0	1
Highest Parental Education Level	3.02	1.17	0	8	2.76	0.96	1	6
Mother's Marital Status	2.02	0.24	2	5	2.02	0.22	2	5
Household Income in 2010	22,296.91	30,163.94	0	800,000	15,138.85	14,989.19	0	100,000
Education Spending, Wave 1	920.04	2,225.41	0	50,500	482.37	955.91	0	11,000

Table 2 reports the means for the covariates in the treated and untreated groups of the smaller matched sample; this balance table suggests that the matching algorithm returned comparable groups of children with and without a parental migration experience.

Table 2: ***Balance Table for PSM Output***

	Treated	Untreated
Variable	Mean	Mean
Sex (1 = M)	0.55	0.52
Age of Child in 2010	4.67	5.45
Rural Household	0.82	0.81
Minority (1 = non-Han)	0.13	0.12
Highest Parental Education Level	2.78	2.78
Mother's Marital Status	2.00	2.02
Household Income in 2010	15,280.75	15,199.23
Education Spending, Wave 1	554.00	448.00

We report findings from two sets of regression models in Tables 3 and 4. The first is a measure of change in education spending. The ordinary least squares (OLS) model specification for the models without fixed effects is reported in Equation 1:

$$(1)\quad Y_i = \beta_0 + \beta_1 Moved_i + \boldsymbol{\beta}_2 \boldsymbol{Z}_i + \epsilon_i$$

where Y_i corresponds to the outcome of interest for child *i* (i.e., education spending) , β_0 represents an intercept, $Moved_i$ is a binary variable indicating whether or not child *i's* parent moved, $\boldsymbol{Z}_i$ is a vector of control variables measured for child *i* (including the lagged dependent

variable), and ϵ_i is an error term. The coefficient β_1 represents the association between a parent's moving and changes in education spending. The term $\boldsymbol{\beta}_2$ represents a vector of coefficients relating control variables to the outcome. As noted above, Y_i is measured in Wave 3, $Moved_i$ is measured in Wave 2, and the control variables in vector $\boldsymbol{Z}_i$ in Wave 1. For the province fixed effect models, the specification is:

$$(2)\ Y_{ip} = \delta_0 + \delta_1 Moved_i + \boldsymbol{\delta}_2 \boldsymbol{Z}_i + \alpha_p + \epsilon_{ip}$$

where the subscript *p* represents within-province measurements and the term α_p denotes province-level fixed effects, capturing all time-invariant differences across provinces. The coefficients in equations (2), (3), and (4) are represented with δ, θ, and φ, respectively, to highlight that they will vary across specifications.

The second outcome, represented below as S_i, is a binary variable indicating whether a family has begun saving for a child *i*'s education (in province *p* for fixed effects models). We estimate these models as linear probability models with specifications similar to models 1 and 2. The model without fixed effects is:

$$(3)\ S_i = \theta_0 + \theta_1 Moved_i + \boldsymbol{\beta}_2 \boldsymbol{Z}_i + \epsilon_i$$

and the corresponding fixed effects model is:

$$(4)\ S_{ip} = \varphi_0 + \varphi_1 Moved_i + \boldsymbol{\varphi}_2 \boldsymbol{Z}_i + \alpha_p + \epsilon_{ip}$$

Here, the terms $Moved_i$, $\boldsymbol{Z}_i$, and α_p represent the same variables as in Equations 1 and 2.

Results

Table 3 reports the results corresponding to Equations 1 and 2. The outcome variable is the amount of total education expenditures for the focal child as reported in the third wave of the survey. The model names at the top of the table indicate (a) whether the model uses the full or matched sample and (b) whether province-level fixed effects are included. Model 1 provides the bivariate association between parental migration and education spending. Model 2 adds child and family background controls, which allowed us to isolate whether the migration effect persisted once these factors were accounted for. Model 3 then adds province fixed effects, capturing unobserved regional differences. By comparing results across these models, we can assess whether the association is robust to increasingly stringent controls.

Model 1 suggests that in situations where a parent out-migrates, families spend around 1,500 RMB [1] less per year on the child's education. Model 2 introduces a range of control variables that may separately influence education spending: the sex of the child, their age, whether the child has an agricultural (rural) hukou, whether the child is a member of a recognised ethnic minority group, the highest level of education attained by the child's parents, the mother's marital status in Wave 1 of the survey, and the total household income in Wave 1.

In this model, the coefficient of –500 indicated that, on average, children in families where a parent migrated had education expenditures about 500 RMB lower than otherwise comparable children. To put this in context, this represents roughly 15% of the sample's mean education spending. Model 3 introduced province-level fixed effects. The main coefficient of interest was not statistically significant in this model, suggesting that spatial variation at the province level plays an important role in the overall trends. However, the R^2 value (a measure of how much variation in the outcome can be explained by the independent variables) for this model is much lower than Model 2.

[1] R*enminbi* (RMB), or Chinese yuan (CNY), is the currency of the People's Republic of China.

Models 4, 5, and 6 report results for similar regression models using the matched sample. The matched sample regressions returned similar results to the first three models. Despite the lack of statistical significance in some of the models in Table 3, the consistently negative direction of the coefficients suggest that parental out-migration does not increase investment in children's education.

In general, the coefficients in Table 3 suggest widespread disadvantage for rural children (i.e., many of the factors we might associate with improved education outcomes like education spending are not statistically significant, meaning that the true direction of the association could be positive or negative). The pattern of results in the models in Table 3, particularly the models that leverage propensity score matching (models 4-6) provides tentative evidence that labour migration is not (in itself) a causal pathway to higher education investments. Non-statistically significant results in Models 5 and 6 are a further indication that parent migration does not meaningfully offset the disadvantage these children face.

Table 3: ***Total Education Expenditure in Wave 3 for Full and Matched Sample***

	Total Education Expenditure in Wave 3					
	Bivariate – Full Sample	Controls Added	Controls + Fixed Effects	Binary - PSM	Controls Added - PSM	Controls + Fixed Effects - PSM
Parent Migrated (1 = Yes)	-1,521.987***	-500.422*	-121.861	-534.005***	-394.267	-128.653
	(285.360)	(267.280)	(262.074)	(247.997)	(250.342)	(246.453)
Sex (1 = Male)		-174.173	-122.644		-86.514	-18.917
		(174.720)	(167.842)		(250.030)	(240.551)
Age of Child in 2010		46.782	111.928***		34.235	64.014
		(28.499)	(32.395)		(41.404)	(39.874)
Rural Household		490.869*	-866.524***		-13.845	4.084
		(269.081)	(219.072)		(552.707)	(546.824)
Minority (1 = non-Han)		-385.473	-436.156		-360.370	89.566
		(277.378)	(320.541)		(391.421)	(475.194)
Highest Parent Education		943.232***	669.832***		732.190***	568.628***
		(87.386)	(85.911)		(140.622)	(142.001)
Mother's Marital Status		480.712	11.297		-97.576	-64.510
		(1,131.318)	(1,088.629)		(532.097)	(511.911)
Household Income in 2010		0.038***	0.034***		0.033***	0.012
		(0.003)	(0.003)		(0.009)	(0.009)
Ed. Spending, Wave 1		0.594***	0.434***		0.612***	0.447***
		(0.043)	(0.042)		(0.136)	(0.133)
Intercept	3,735.117***	-2,209.618		2,747.136***	50.048	
	(103.387)	(2,328.618)		(173.136)	(1,367.905)	
Observations	2,831	2,831	2,831	776	776	776
R^2	0.009	0.244	0.157	0.006	0.120	0.054
Adjusted R^2	0.009	0.242	0.147	0.004	0.110	0.013

Note: p<.1*, p<.05**, p<.01***

Table 4 considers a different outcome variable (corresponding to Equations 3 and 4 above): whether the family has begun to save for a child's future education expenses by Wave 3 of the survey. We included results from matched sample models only in Table 4, as the matched samples better account for unobserved variables. The results for the full sample are substantively similar.

The models in Table 4 are linear probability models, which have the same general form as OLS regression. Each survey wave asked parents if they had begun to save for their child's education; a value of 1 for this variable indicates that a family was not saving for education expenses in Wave

1 of the survey but began saving by Wave 3. The coefficients correspond to percentage point increases in the likelihood that a given child's family had begun saving.

Table 4: ***Family Saving for Future Education Expenses (Matched Sample)***

	Likelihood of Starting to Save for Education		
	Bivariate - PSM	Matched Sample	Matched Sample with Fixed Effects
Parent Migrated (1 = Yes)	0.043**	0.043*	0.041*
	(0.022)	(0.022)	(0.024)
Sex (1 = Male)		-0.015	-0.017
		(0.022)	(0.023)
Age of Child in 2010		-0.001	-0.003
		(0.003)	(0.004)
Rural Household		-0.019	-0.018
		(0.049)	(0.052)
Minority (1 = non-Han)		0.035	0.052
		(0.034)	(0.046)
Highest Parent Education		-0.013	-0.011
		(0.012)	(0.014)
Mother's Marital Status		-0.057	-0.054
		(0.049)	(0.050)
Household Income in 2010		0.00000	0.00000
		(0.00000)	(0.00000)
Ed. Spending, Wave 1		0.00001	0.00001
		(0.00001)	(0.00001)
Intercept	0.095***	0.263**	
	(0.015)	(0.114)	
Observations	776	776	776
R^2	0.005	0.010	0.014
Adjusted R^2	0.003	0.001	-0.027

Note: p<.1*, p<.05**, p<.01***

Model 1 of Table 4 reports the bivariate relationship; Model 2 introduces the same control variables as in Table 3 (the inclusion of child's age in 2010 accounts for potential cases in which a child was not yet old enough for parents to consider saving for education; that is, controlling for age avoids the possibility that a large number of infant children may attenuate observed savings patterns). The main coefficient of interest in Models 1 and 2 is identical after rounding; parental migration is associated with around a four percentage points increase in rates of education saving. Model 3 introduces province-level fixed effects. The coefficient of interest in Model 3 is very similar to Models 1 and 2, corresponding to a four percentage point increase in likelihood of education-related saving relative to similar families without a migrant parent.

The outcome variables considered in Table 3 and Table 4 differ in important ways. Actual education expenditures represent real investment in a child's education but are limited by present income constraints; that is, even if parents wish to increase spending on their children's education, they cannot spend more than they have available.

However, saving for a child's education (even if only a nominal amount) reflects a belief in the value of education and optimism about the child's education trajectory. The findings in Table 4 thus suggest that parental out-migration is associated with higher expectations about a child's future education, even if present-day expenditures remain limited.

In a small number of households, both parents reported migrating during Wave 2. Separate models estimating the association between dual-parent migration and children's outcomes return largely comparable results, though several additional coefficients were not statistically significant because of sample size limitations. Household contexts in which two adults out-migrate are likely to be different from single-migrant households in important ways; future research should investigate these situations, though the results discussed here suggest that the short-term disadvantage facing these children is comparable to their peers.

Other results in Tables 3 and 4 highlight expected relationships between migration and education investment. Model 6 in Table 3, for example, demonstrates the intuitive finding that education spending is positively associated with parents' levels of education and prior levels of education spending. Equally noteworthy are the null associations with ethnicity, rurality, and sex. Despite the documented disadvantages discussed above for non-Han minority children, girls, and rural children (e.g., Hannum 2005; Clothey et al. 2018; Lin 2018; Ma et al. 2018), none of these coefficients achieve conventional levels of statistical significance. One possibility for this finding is that the measured impacts of minoritised status (e.g., being an ethnic minority child in a rural village) are subsumed within the larger impacts of labour migration and province-level fixed effects (e.g., province-level policies that impact minoritised groups might be captured in the fixed effect estimation).

Similar interpretations can be applied to Table 4; parental migration is the only predictor associated with a change in savings behaviour. However, the R^2 value for the models in Table 4 is much lower than the corresponding values in Table 3. The results related to changes in savings behaviour should be treated as suggestive and less definitive than our findings related to education spending.

In summary, our findings about the relationship between labour migration and education investment in rural China are ambiguous at best. Families in which a parent migrates for work saw lower rates of education spending on children compared to families without an out-migrating parent, even when restricting the overall sample to observably similar families. Families with an out-migrating parent had slightly higher rates of new saving for future education expenses, but these models' explanatory power is much lower, suggesting that migration is not the most meaningful driver of variation in savings behaviour. While labour migration has important economic benefits for rural-origin families in China, it does not appear to be sufficient to ameliorate differences in household education spending among rural families.

Discussion and Conclusion

Millions of parents in rural China migrate to urban economies each year as part of an effort to boost family income and acquire transferable skills. The nuances of China's household registration policies incentivise many parents to leave their children in the care of extended family in rural hometowns. The data analysed in this article suggest that labour migration does not have a measurable impact on how much the family spends on the child's education in the time period captured in these survey waves. However, households with an out-migrating parent

are marginally more likely to begin saving for future education expenses, suggesting that outmigration may have longer-term impacts that are not observable with existing data.

Our analysis vis-à-vis Research Question 1 (How does a parent's out-migration impact the family's spending on a child's education?) finds that parental outmigration is associated with lower spending or no impact on educational spending, even after restricting analysis to observably similar families. This supports earlier research by Démurger and Wang (2016) in the Chinese context that internal migration may not increase education spending. Our findings also align with broader patterns observed by Askarov and Doucouliagos (2020) that remittance payments from internal migration more generally do not lead to higher human capital investments. Regarding Research Question 2 (How does a parent's out-migration impact the family's planning for a child's future education?) we find evidence that migrating parents are more likely to plan for future education expenses.

These findings are robust for inclusion of standard control variables and propensity score matching that confines the analysis to observably similar families. The apparent tension between these two findings reflects the difference in present day needs and future expectations. Opportunities for extra education spending (tutoring, afterschool programming, at-home study materials) are both more common and more discretionary. A rural family who expects their child to enter the same occupation as their parents may not choose to set aside disposable income for more than the necessary education expenses. By contrast, a family that has different expectations for a child's future may be prone towards saving. Labour migration has a considerable impact on an adult's social context and understanding of social institutions and opportunities. Thus, while labour migration may not provide enough surplus income for substantial changes in present day education spending, exposure to new ways of living and new occupations does potentially increase savings rates. In the Chinese context, these results suggest that internal migration may offset some of the ambivalence about education imposed by the hukou system (Huang 2020; Kan, 2013), even if the immediate impacts are minimal.

These results suggest several important insights for policymakers. While education spending at the household level may not be a major driver of educational inequality in countries with robust, publicly funded education, in transitioning economic contexts (such as rural China), supplementary and extracurricular spending may narrow gaps between rural and urban students. The findings related to education savings also point to important policy and practice implications; while year-to-year education spending may not be a significant concern for socioeconomically disadvantaged families, the positive association with *saving* for future education spending suggests that labour migration may induce long-term thinking and planning about education. Because compulsory and free education in China is less robust at the secondary level, this change in savings patterns highlights longer-term concerns for poor families. The preference for savings, rather than an increase in yearly spending, may reflect a desire to ensure children can enrol in secondary schools and post-secondary education.

Additional research should investigate the nuances of spatial variation. The role of provincial fixed effects in attenuating our results suggests that negative outcomes are particularly strong within a select few provinces. Province-level policies and other political economic considerations may help explain these patterns and highlight the political decisions that contribute to negative outcomes for left behind children. This finding aligns with existing research that identifies spatial heterogeneity in China's social services (Cao et al., 2024).

Analysis of rural China provides insights into more generalisable mechanisms, particularly rapid urbanisation and development as well as their interaction with status attainment and mobility processes (Roberts & Hannum, 2018). Our central contributions are to understandings of the relationship between spatial context, labour dynamics, and attitudes towards education. Labour migration provides parents with a broader social horizon, greater information about education

and occupations, and increased household incomes. While the income gains associated with labour migration may not have an obvious impact on education spending in the present, labour migration does increase planning for a child's future. Future research should explore how labour migration as a process shapes these attitudes, particularly given the cyclical nature of internal migration in China; as parents return to their hometowns with expanded horizons and new endowments of social and cultural capital, they also reshape collective expectations about the futures possible for their children.

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