



DEMOGRAPHIC RESEARCH

A peer-reviewed, open-access journal of population sciences

DEMOGRAPHIC RESEARCH

VOLUME 54, ARTICLE 20, PAGES 591–644

PUBLISHED 26 MARCH 2026

<https://www.demographic-research.org/Volumes/Vol54/20/>

DOI: 10.4054/DemRes.2026.54.20

Research Article

Return migration and educational investments in children in China: Hukou differences and the role of parental coresidence

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Return migration and educational investments in children in China: Hukou differences and the role of parental coresidence

Xinyue Wu¹

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Abstract

BACKGROUND

Returned children relocate to their original hukou locations after migration, often due to systemic barriers. China's hukou system, which assigns rural or urban status, imposes institutional hurdles to those with non-local and rural hukou, resulting in educational exclusion and eventual return. Despite their non-negligible presence, these children remain hard to identify in surveys and overlooked in research on hukou-perpetuated educational inequities.

OBJECTIVE

This study examines how children's return migration influences household monetary and time investments in their education. It also investigates how the association between return migration and educational investments varies by hukou status and whether it is moderated or mediated by parental coresidence.

METHODS

Using data from the 2013–2014 China Education Panel Survey, this study applies inverse probability of treatment weighting with linear logged regression and logistic regression models. Karlson-Holm-Breen decomposition is used to test the mediating role of changes in parental coresidence on investment outcomes.

RESULTS

Return migration is associated with a decline in the probability of investments in out-of-school education (e.g., extracurricular programs and private tutoring), particularly among families with rural hukou. The likelihood of quality time falls, but among households that do invest time, primary caregivers devote more time, consistent with the substitution of time for money under constraint. The absence of parental figures mediates a substantial share of the reduction in the probability of monetary participation in out-of-school education.

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CONTRIBUTION

This study highlights how return migration and hukou status intersect to shape educational inequality and intergenerational mobility. It provides new evidence on the redistributive role of migration in family educational investments.

1. Introduction

China has experienced unprecedented levels of internal migration over the past few decades, with hundreds of millions of people moving mostly from rural to urban areas in search of better economic opportunities (Giles and Huang 2020). This mass migration has been facilitated by the country's rapid economic growth and urbanization, but it has also been shaped by the household registration system, known as hukou, which ties access to public services, including education, to one's place of registration (Chan 2010). This system classifies residents as local or non-local, creating a structural divide with profound implications for educational opportunities and social stratification (Whyte 2010; Xu and Wu 2022). In fact, those with non-local hukou status face discrimination and exclusion from many social services (Chen and Feng 2013; Li, Gu, and Zhang 2015; Song 2014). Structural barriers to the educational attainment of non-local children are also substantial as they often face limited access to quality education (in particular post-compulsory education) due to hukou-based discriminatory enrollment policies (Xiang and Stillwell 2023).

Within this context, return migration, or the movement of migrants back to their hukou of origin, is also a common phenomenon in China. Nationally representative surveys suggest that more than half of migrant families plan to return to their hukou of origin within five years (Xu, Chen, and Wu 2022). Overcoming barriers to accessing post-compulsory education may be a key motivation for migrant children to return to their hukou of origin (Zhang 2012). Given that migration is tied to access to educational resources and opportunities, it is possible that migration patterns are intertwined with families' strategies for intergenerational upward mobility, including educational attainment (Guo and Qu 2022).

Despite a growing body of research documenting key determinants of educational investments (e.g., Conley and Glauber 2006; Ketkar and Cho 1982; Lee 2008; Mauldin, Mimura, and Lino 2001), this study is the first to investigate the link between children's return migration and parents' educational investments. To do so, we use data from the 2013–2014 China Education Panel Survey (CEPS) and rely on inverse probability of treatment weighting (IPTW) alongside logistic and linear regression models. Given that China's hukou system includes a deeply embedded rural–urban hierarchy (Chan and Wei

2019; Wu and Treiman 2007; Wu and Wallace 2021), we further investigate heterogeneity in the outcomes of return migrants in rural and urban hukous. Finally, because many migrant children return to their hukou locations without their parents (Zhao et al. 2022) and unaccompanied children often face more deleterious outcomes (Zhou, Murphy, and Tao 2014), we investigate the role of a parental figure's absence as both a pathway and a moderator through which return migration impacts educational investments.

Findings suggest that return migration is associated with reduced financial investments in children's education, particularly in the form of lower participation in out-of-school learning, such as interest-based or academic-related classes and private tutoring. It is, however, positively associated with conditional time investments from primary caregivers. This latter finding likely reflects adaptive strategies employed by families to overcome structural differences in resources available in return contexts. Overall, this study contributes to the understanding of how migration patterns and family dynamics, shaped by China's unique hukou system, may influence intergenerational mobility and educational attainment in China.

Notably, this study captures baseline associations during a pivotal transitional period: between the 2012 *gaokao* reform, which theoretically allowed migrant children to take college entrance exams in their places of residence, and the 2014 hukou reforms (Hao 2022). Due to data limitations (explained later in detail), this analysis cannot be extended to the post-reform years. Still, we believe our findings remain highly relevant for current policy debates. Although both initiatives aimed to expand access to public services and residency, they shared a common exclusionary structure that limited benefits primarily to advantaged groups (Dong and Goodburn 2020; Holdaway 2018; Wang 2018). For the 2012 reform, strict eligibility thresholds (e.g., social insurance and housing requirements) meant that local exam access remained largely out of reach for most low-skilled and inter-provincial migrant families (Wang et al. 2025). Similarly, while the 2014 reforms created new pathways for converting hukou status, these opportunities are concentrated among high-skilled workers, while strict population caps in megacities continue to exclude low-skilled migrants (Chan 2021; Li and Chen 2024; Song and Smith 2021; Wan and Vickers 2022; Wang 2020; Zhang et al. 2020). Consequently, despite legislative updates, the structural barriers driving return migration for vulnerable families have not fundamentally changed. In fact, recent nationally representative data (from the 2016 China Migrant Population Dynamic Monitoring Survey and the 2010–2018 China Family Panel Study) continue to identify a non-negligible population of returned children (Huangfu 2024; Li and Liang 2019). Finally, although the reforms may have reduced the flux of return migration among more advantaged socioeconomic and demographic groups, we have no reason to believe that the consequences of return migration for educational investments have fundamentally changed for the disadvantaged groups that

remain. All in all, our work suggests that the hukou system has shaped – and likely continues to shape – children’s access to quality education and household educational investments.

2. Background

2.1 Hukou system, educational opportunities, and return migration

To regulate internal migration, mainland China’s hukou system registers individuals to a specific household (*hu*) at a specific address (in a specific township or urban subdistrict) under the jurisdiction of a local police station (Wu and Treiman 2004). Hukou status is assigned at birth and based not on place of birth but instead on either parent’s hukou (Song 2014; Zhou and Hui 2022).³ In China today there are approximately 71 million migrant children – that is, children born or brought to reside outside their hukou of origin (NBS of China, UNICEF, and UNFPA 2023).⁴ If these migrant children return to their hukou location, they are classified as returned children (Li and Liang 2019). Precise estimates of the number of returned children in China remain unavailable because surveys often misclassify return migrants as local-born residents, obscuring their visibility to researchers and policymakers (Li and Liang 2024).

Non-local hukou holders face restricted eligibility for local government-funded services (Song 2014); discriminatory policies in health care, health insurance, and pensions (Chen and Feng 2013); and further discrimination in the labor market (Li et al. 2015). Structural barriers to the educational attainment of migrant children are also substantial. Before 2012, migrant children were effectively barred from taking school entrance exams in their host cities. After completing nine years of compulsory schooling (which includes elementary and junior high school), they were required to return to their original hukou location to take enrollment exams for academic high schools and universities (Koo, Ming, and Tsang 2014; Li and Zhang 2023).

Since 2012, national policy has allowed eligible migrant children to take high school and national college entrance exams (*gaokao*) in their places of residence (Wang et al. 2025), but local governments continued to impose restrictive eligibility criteria (e.g., multi-year local school enrollment, stable parental employment and housing, and long-term social security/insurance contributions) that many migrant families cannot meet, effectively continuing to limit migrant children’s access to post-compulsory education

³ Before 1998, hukou was strictly matrilineal (inherited only from the mother).

⁴ This estimate includes children aged 0–17 whose actual place of residence and hukou registration are located in different townships or urban subdistricts and who have lived away from their place of hukou registration for at least six months, excluding moves that occur within the same municipal district.

(Chen, Zou, and Song 2024). In 2014, additional hukou reforms eased restrictions on internal migration and hukou conversion (a permanent change of hukou). However, these reforms prioritized hukou conversion for skilled migrants (Zhang et al. 2020) and migrants with higher education and wealth (Lin et al. 2024; Song and Smith 2021). Furthermore, many migrants opt out of hukou conversion (Chen and Fan 2016). As a result, return migration persists (Huangfu 2024) alongside ongoing exclusionary policies for non-local migrant children (Zhou and Cheung 2017).

Because of barriers to accessing post-compulsory education, the hukou system continues to force many migrant children with high educational aspirations to return to their hukou of origin. Before the age of 15, or ninth grade (Fan and Li 2020), migrant children must choose between returning to their hukou location (with or without their parents) or staying in their destination location and navigating exclusionary educational barriers that may limit their attainment and mobility (Zhang 2012). Although the decision to return may allow access to four-year universities, it comes with important disadvantages: Returned children experience poorer living conditions, more family and residential transitions, increased social isolation, poorer mental health, and lower chances of academic success (Koo, Ming, and Tsang 2014; Ling 2017; Zhao et al. 2022).

2.2 Educational investments in returned children

Parental investments in children's education can be understood through the lens of human capital theory, which posits that such investments are driven by expectations of future labor market returns (Wen and Witteveen 2021; Wiswall and Zafar 2021). In China, a context of rising income inequality combined with high economic returns with additional years of schooling incentivizes families to invest in their children's education as a strategy for upward mobility (Guo and Qu 2022). In fact, parents in China often believe that greater investments in education will enhance their children's chances of admission to elite universities and, subsequently, stable and well-remunerated employment (Wang, Cheng, and Smyth 2022).

Although primary and lower secondary education in China is largely tuition-free due to compulsory education policies, families frequently invest in private supplementary education, often referred to as shadow education. Research on educational investments in China highlights that shadow education constitutes a substantial component of private educational spending (Lin 2019; Lu, Zhou, and Wei 2022; Zhang and Bray 2018). These investments are aimed at improving children's academic performance in formal schooling and reflect a strong cultural emphasis on achievement (Gong, Xue, and Chen 2025).

A well-established body of work identifies key determinants of family educational investments. Investments in shadow education, for example, are strongly associated with household income (Gong, Xue, and Chen 2025) and have increased disproportionately among wealthier families over time (Chi and Qian 2016). Other key determinants of educational investment are children's sibship size and parents' educational attainment, employment status, and geographic location (Conley and Glauber 2006; Ketkar and Cho 1982; Lee 2008; Mauldin, Mimura, and Lino 2001). Additionally, child-specific attributes such as health status (Yi et al. 2015), gender (Song and Zhou 2019), and birth order (Conley and Glauber 2006) seem to shape parents' investment decisions. Notably, studies on educational investments in China largely focus on non-migrant populations (e.g., Li and Qiu 2018; Wei 2024; Zhang and Xie 2016) or classify children using broad migration statuses that ignore return migration (Chen, Salagean, and Zou 2024; Lu and Pang 2022; Wang, Peng, and Cai 2023; Zheng and Zhou 2024). To date, only one study has focused on the potential consequences of return migration for educational investments; it shows that fathers' *intentions* to return to the hukou of origin can reduce parental educational investments in migrant children (Xu, Chen, and Wu 2022). Although intentions to return can shape investment decisions based on expectations about the future, we contend that the actual return migration *behavior* may alter the context in which investment decisions are made (Carling and Pettersen 2014).

The present study examines how return migration shapes family investments in children's education. The direction of the relationship between return migration and educational investments is unclear. On the one hand, return migration might reduce household educational investments due to limited resources for education or expected returns of education at the hukou of origin (Xu, Chen, and Wu 2022). On the other hand, return migration might increase educational investments as parents seek to offset prior disruptions to children's education (Liu, Yu, and Zheng 2018; Yang and Bansak 2020) or children's motivation for educational pursuit becomes more salient (Li and Liang 2024). Understanding this relationship is key to assessing how mobility and policy constraints drive educational inequality in China.

2.3 The rural–urban divide

China's hukou system includes a deeply embedded rural–urban hierarchy that differentially shapes access to social and economic opportunities. Whereas urban hukou holders receive broader benefits (including social services and health care; Wang et al. 2010; Zhang and Treiman 2013; Zhu and Österle 2017), hundreds of millions of rural hukou holders face persistent disadvantages when migrating to cities (Giles and Huang 2020). These exclusionary barriers are especially salient in megacities like Shanghai,

where institutional restrictions on public services can be particularly stringent (Ling 2017; Qian and Walker 2015).

Compared to urban migrants, rural migrant children face greater challenges in accessing educational resources in their destination cities (Goodburn 2009; Lai et al. 2014; Xiong 2015). Upon return to rural areas, rural hukou children often exchange the higher-quality education found in urban destinations (*suzhi jiaoyu*) for a more exam-focused system, with fewer resources, lower funding, and less qualified teachers (Koo, Ming, and Tsang 2014; Ling 2017; Xiang and Stillwell 2023). Moreover, parents with rural hukou status may have lower incentives to invest in their children's education, as rural migrant workers tend to receive lower returns on schooling than their urban counterparts (Wang and Ye 2014).

Given these structural inequalities, the relationship between educational investments and return migration may be especially pronounced among children with rural hukou status – a source of variation that we examine in this study. This investigation helps unveil the geographic divide through which institutional inequality is reproduced across generations in contemporary China.

2.4 The role of parental coresidence

Although some school-aged children return to their hukou of origin accompanied by their parents, others return on their own (Li and Liang 2024; Liu and Zhu 2011). At baseline, returned children who are accompanied or unaccompanied may differ in meaningful ways. For instance, children from households with higher socioeconomic status are more likely to return to their hukou of origin accompanied by their parents (Huangfu 2024).

Accompanied and unaccompanied children may also differ in terms of motivations for returning to their hukou of origin. Namely, whereas children who return with parental figures may do so due to parents' needs or preferences (e.g., to deal with unemployment, pursue new opportunities, or care for elderly parents), children who return on their own more likely do so based on higher-education aspirations and/or educational constraints in their parents' adopted location (Koo, Ming, and Tsang 2014; Zhang 2012).

Whether returned children are accompanied by their parents may also be associated with the consequences of return migration for children's educational performance and attainment. In China, just as in the United States, children residing with both parents tend to perform better educationally (Brand et al. 2019; Huang et al. 2020). This better educational performance may occur in part because coresidence with parents meaningfully improves migrant children's mental and physical health, cognitive development, and non-cognitive outcomes (He et al. 2022; Huang et al. 2018; Liang 2016; Liang and Sun 2020; Liu et al. 2021; Lu et al. 2019; Lu, Zhang, and Du 2021;

Meng and Yamauchi 2017; Zhang and Zheng 2022; Zheng, Zhang, and Jiang 2023; Zhou, Murphy, and Tao 2014).

Importantly for the purposes of this study, whether or not children return accompanied by parental figures may be associated with household educational investments in children. On the one hand, parents living in destination cities may earn more than parents who return to their hukou of origin (Liu, Feng, and Brandon 2018; Sicular et al. 2007; Wang and Fan 2006), and remittances from these parents may help increase financial investments in children's education (Hu 2012, 2013; Huang, Dang, and Selod 2016). On the other hand, physical distance may prevent non-resident parents from investing time in their children's education (Zhang et al. 2014).

Taken together, prior research suggests that family coresidential arrangements are potential correlates of children's motivations for returning and of their outcomes (including levels of investment received) upon return. This literature suggests that the consequences of return migration may vary meaningfully among children who return accompanied and those who return unaccompanied. Changes to children's coresidential arrangements are also a potential consequence of children's return. These changes are therefore also potential pathways through which return migration may shape educational investments. Building on the prior literature, we investigate how parental figures' coresidence potentially *moderates* and *mediates* the relationship between return migration and educational investments, advancing our understanding of how migration-related family dynamics shape children's opportunities.

3. Methods

3.1 Data and sample

This study uses the first wave of the CEPS, which took place from 2013 to 2014.⁵ The survey follows a stratified, multistage sampling design with probability proportional to size. It includes approximately 20,000 students of grades 7 or 9 in 438 classrooms at 112 schools across 28 counties in mainland China (Wang, Hao, and Zhang 2015). The dataset includes children's hukou status, their current residence, and parental figure reports on educational investments, making it a good fit for this study. The CEPS is also ideal for this study because it not only provides a large sample but also oversamples high-

⁵ Notably, we do not use the 2014–2015 CEPS wave, which adds no additional insight to our analysis. The school-based panel design neither expands the baseline sample nor tracks the destinations of children who remigrate. Furthermore, this CEPS wave took place too early to capture potential effects of the 2014 hukou relaxation guidelines. (Although these were enacted in July 2014, local implementation required significant lead time.)

migration counties/districts. Thus, compared to other surveys,⁶ the CEPS offers the most statistical power for our analyses, which uses inverse probability of treatment weighting and delves into heterogeneous associations.

The initial student sample from the CEPS consisted of 19,487 students. We merged student responses with those of their parental figures and principals to obtain information on parental educational expectations, educational investments, and school location, which was used to determine whether a student's current location was in a rural or urban area (Zhang and Glick 2024). This merging process did not result in any sample loss. We then restricted the sample to migrant children (whose registered hukou was outside their current county/district of residence) and returned children (who lived in a county/district that matched their registered hukou and moved to this place after birth). This yielded a sample with 6,531 students, including 3,379 migrant children and 3,152 returned children. Out-of-school educational expenditures were missing for 4.78% of observations.⁷ Time-use reports were missing for 9.20% of observations.⁸ We dropped observations missing any outcome variable, resulting in the exclusion of 695 students (10.64%) from our sample. Our final analytic sample therefore consists of 5,836 students.⁹

To address missing data in covariates, we conducted multiple imputation with 30 imputations in Stata (Woods et al. 2024). For missing age, we inferred values from students' grades, assigning age 13 to grade 7 and age 15 to grade 9. Before imputation, proportions of missing data were as follows: academic performance (0.55 %, n = 32), parental educational expectations (0.69 %, n = 40), father's educational attainment (0.21 %, n = 12), mother's educational attainment (0.21 %, n = 12), father's occupation (2.90 %, n = 169), mother's occupation (2.88 %, n = 168), and family economic status (0.12 %, n = 7). After imputation, the distributions of these variables were similar to those from the original data without imputation.

⁶ Another survey, the China Family Panel Studies (CFPS), collects similar data in a more recent time frame (2010–2018). But it has a much smaller sample of identified returned children and is also subject to non-random attrition associated with migration (Huangfu 2024).

⁷ Expenditures were truncated at 99,999 RMB for three observations in the CEPS.

⁸ We identified one time input value exceeding 24 hours and treated it as missing.

⁹ We tested the robustness of our results through two alternative specifications: (1) the complete case, non-imputed dataset (n = 5,522; Appendix B); (2) nonparametric multiple imputation with predictive mean matching (MI-PMM) for both time and monetary investment variables with multiply imputed covariates (n = 6,531; Appendix C). The results remain substantively the same in all specifications.

3.2 Measures

Household investments in education. We estimated expenditures on children following established methodologies in the literature on educational investments in China (Guo and Qu 2022; Wang and Cheng 2022; Wang et al. 2022; Zheng and Zhou 2024). In the English-translated CEPS, parents were asked, “What is the total cost of [student’s] cram school or extracurricular courses this semester?” Notably, in the Chinese context, cram school denotes academic-related classes and private tutoring, whereas extracurricular courses are interest-based activities such as dancing, chess, piano, and violin. Using this question, therefore, we construct a measure of out-of-school educational expenditures, or shadow education (see also Wang, Cheng, and Smyth 2022).

Parents were also asked, “How much time do you spend directly on this child (including taking care of his/her living, helping with coursework, and entertainment) every day on average?” Using this question, we measure *household time investment* in children as the number of hours per day the primary caregiver spends assisting the child with homework or engaging in general caregiving activities, noting that the caregiver may not be the parent.¹⁰ Unfortunately, time spent on caregiving cannot be distinguished from educational support, potentially leading to an overestimation of this variable. Yet, based on the age of our sample (13- to 15-year-olds), we expect that the caregiving needs of children are minimal and that time spent with the primary caregiver may be interpreted as “quality time” spent with children (Guo and Qu 2022).

To analyze the likelihood of educational investment, we first created binary indicators for each outcome (0 = no spending/time; 1 = any positive spending/time). We then analyzed the conditional amount of investment by restricting the sample to households with positive expenditures or time (> 0) and log-transforming these amounts (monetary or hours) to reduce skewness and facilitate robust comparisons. This two-part specification allows us to understand correlates for when households make the choice to invest and, conditional on them doing so, how much time and money they invest in children’s education.

Type of migration. As mentioned before, we limit our sample to children who have experienced either migration or return migration based on our belief that migrant children who have not returned appropriately shed light on the counterfactual of not returning (aka, staying as a migrant). Thus models use a binary indicator of whether a child has experienced (1) migration or (2) return migration. Following Li and Liang (2024), we define migrant children as (a) those whose registered hukou is not in their current county/district of residence (which ensures they experienced migration);¹¹ and (b) those

¹⁰ Among primary caregivers, 92.85% are parental figures (biological parents or stepparents).

¹¹ Children in this group may have been born in the destination area; they didn’t necessarily move there after birth. In other words, their parents may have been the ones who physically migrated. Regardless of whether the

who are classified as migrant children by the CEPS survey (which further confirms that their current residence differs from their hukou location).¹² We define returned children as (a) those who moved to their current county/district of residence after birth (which ensures they experienced a return);¹³ (b) those whose registered hukou is in their current county/district of residence (which ensures they are now at their hukou location); and (c) those classified as non-migrant children by the CEPS survey (which further confirms that their current residence matches their hukou location).¹⁴

Parental coresidence. Parental coresidence is treated as a potential moderator and a mediating variable in different models. While the CEPS originally categorized students into four distinct groups based on parental presence in the household (both parents, mother only, father only, and neither parent),¹⁵ we collapsed the mother-only and father-only groups into a single category due to the small number of children living with only their father ($n = 207$; 3.55%). This resulted in a final trichotomous variable: (1) two parental figures, (2) one parental figure, and (3) no parental figure.¹⁶ Children living with no parental figure at home may be living with other relatives (such as grandparents) or in institutional settings (e.g., group homes or boarding school).

Socioeconomic and demographic controls. The models adjust for a range of child- and family-level characteristics that may influence educational investments. Child-level controls include age, rural hukou status, whether the child resides in a rural area, gender, and only-child status. Students' academic performance is measured by their self-rated rank in their current class (below average, average, and above average).¹⁷ Family-level controls include father's and mother's educational attainment (junior high or less, high school/vocational school, college or above), father's and mother's occupation (professional/managerial/state, non-agricultural worker/self-employed, agricultural/farmer, unemployed/other), and family economic status based on parents' or children's assessment of family financial conditions (low, middle, or high economic status).¹⁸

migration occurred before or after birth, all of these children live outside of their hukou of origin and therefore are exposed to exclusionary hukou policies (Ma 2020).

¹² CEPS documentation uses the term *floating* to identify migrant children.

¹³ These children reported an age greater than 0 in response to the survey question "How old were you when you came to this county/district?"

¹⁴ CEPS documentation uses the term *local non-floating* to classify these children.

¹⁵ Results using the four original categories are substantively equivalent (see Table A-3).

¹⁶ While children reported living with a mother or father, the CEPS does not distinguish between biological parents and stepparents for this living arrangement. Therefore these categories reflect the presence of parental figures rather than strictly biological relationships.

¹⁷ Academic performance is based on children's answer to the survey question "How does your academic record rank in your class at present?" The response options are: 1 = near the bottom, 2 = below the average, 3 = about the average, 4 = above the average, and 5 = around the top.

¹⁸ CEPS does not collect information on household income. Family economic status, therefore, is proxied from parents' and children's responses to the survey question "Which one of the following best describes the financial conditions of your family at present?" The five original options were: 1 = very poor, 2 = somewhat poor, 3 =

Finally, the models control for parental educational expectations, categorized as non-university (< BA), college (BA), and postgraduate (MA/PhD).

Table 1: Descriptive statistics by migration status

	All children	Return	Migrant	Diff. (p-value)
Child characteristics				
Age	14.05 (1.43)	14.05 (0.04)	14.07 (0.04)	0.63
Rural hukou (%)	64.14	62.75	66.62	0.03
Rural location (%)	27.42	31.06	20.91	0.00
Male (%)	55.40	55.89	54.51	0.45
Only child (%)	31.04	31.90	29.52	0.15
Academic performance				
Below average (%)	34.64	35.50	33.10	0.17
Average (%)	30.94	31.35	30.20	0.50
Above average (%)	34.42	33.14	36.70	0.04
Family characteristics				
Father's educational attainment				
Junior high or less (%)	70.40	70.67	69.91	0.64
High school/vocational (%)	20.30	19.52	21.69	0.13
College or above (%)	9.30	9.81	8.39	0.14
Mother's educational attainment				
Junior high or less (%)	76.73	76.44	77.25	0.58
High school/vocational (%)	16.63	16.68	16.55	0.92
College or above (%)	6.64	6.89	6.20	0.39
Father's occupation				
Professional/managerial/state (%)	13.47	13.70	13.07	0.60
Non-agricultural worker/self-employed (%)	51.56	46.41	60.75	0.00
Farmer/agricultural (%)	26.13	31.71	16.19	0.00
Unemployed or other (%)	8.84	8.19	9.99	0.09
Mother's occupation				
Professional/managerial/state (%)	8.65	9.02	7.98	0.28
Non-agricultural worker/self-employed (%)	45.69	40.34	55.23	0.00
Farmer/agricultural (%)	28.99	35.10	18.07	0.00
Unemployed or other (%)	16.68	15.53	18.72	0.02
Family economic status				
Low (%)	27.00	30.84	20.14	0.00
Middle (%)	68.64	64.97	75.19	0.00
High (%)	4.36	4.19	4.67	0.49
Parental educational expectations				
Non-college (< BA) (%)	30.58	30.30	31.09	0.65
College (BA) (%)	35.19	34.35	36.68	0.18
Postgrad (MA/PhD) (%)	34.23	35.35	32.23	0.07
Parental coresidence				
Two parental figures (%)	68.71	63.05	78.82	0.00
One parental figure (%)	14.10	16.00	10.71	0.00
No parental figure (%)	17.19	20.95	10.47	0.00

moderate, 4 = somewhat rich, and 5 = very rich. CEPS constructs this combined measure using both reports to address missingness. We combine them as low (categories 1 and 2), middle (category 3), and high (categories 4 and 5).

Table 1: (Continued)

	All children	Return	Migrant	Diff. (p-value)
Household financial and time investment				
Out-of-school education (%)	19.71	16.80	24.90	0.00
Time investment (%)	85.46	83.83	88.39	0.00
Out-of-school educational expenditure (RMB per semester)	642.56	515.86	868.71	0.03
	(3490.39)	(2079.56)	(5838.68)	
Time investment (hour per day)	3.14	3.17	3.09	0.56
	(3.65)	(3.21)	(4.27)	
Conditional out-of-school educational expenditure	3260.86	3071.23	3489.23	0.52
	(7301.28)	(4771.85)	(10002.57)	
Conditional time investment (hours per day)	3.67	3.78	3.49	0.05
	(3.70)	(3.25)	(4.28)	
<i>N</i>	5,836	2,802	3,034	

Notes: Data from CEPS 2013–2014 after multiple imputation for covariates; $n = 5,836$. Sample statistics were adjusted by sampling weight. Standard deviation is shown in parentheses for continuous variables. If not other indicated by (%), it is showing mean.

Table 1 presents descriptive statistics comparing returned children and migrant children across a range of individual, family, and investment-related characteristics. Both groups are similar across several demographic characteristics. Children in both groups are 14 years old on average, slightly over half of them are males, and about one-third of them have no siblings. Around one-third of children in each group rate their academic performance as below average, and another third rate it as above average. Both groups are predominantly from rural hukou backgrounds, although returned children were more likely to live in rural areas at the time of the survey (31.06% vs. 20.91%). Parents in both groups generally have low levels of formal education: Fewer than 10% of fathers or mothers have at least a college degree.

In contrast, family, economic, and occupational profiles differ substantially. Mothers and fathers of returned children are more likely to work in agriculture (35.10% and 31.71% vs. 18.07% and 16.19%), whereas mothers and fathers of migrant children are more often non-agricultural workers or self-employed (40.34% and 46.41% vs. 55.23% and 60.75%). Returned children's families more frequently classify themselves as having low economic status (30.84% vs. 20.14%), whereas migrant families more often self-classify as having middle economic status (75.19% vs. 64.97%). Finally, returned children are less likely to live with two parental figures (63.05% vs. 78.82%) and more likely live only with one parental figure (16.00% vs. 10.71%) or no parental figure (20.95% vs. 10.47%).

The last section of Table 1 gives descriptive insight into investments gaps. It reports that a smaller share of returned children receive out-of-school education spending (16.80% vs. 24.90%) and parental time investment (83.83% vs. 88.39%). Mean and conditional out-of-school educational expenditures are also lower for returned children (515.86 RMB vs. 868.71 RMB; 3071.23 RMB vs. 3489.23 RMB). On the other hand,

conditional parental time investments are greater for returned children on average – by about 17 minutes per day.

3.3 Analytic strategy

To examine the relationship between return migration and household investments in children's education, we employed IPTW. It allows us to combine propensity score modeling with outcome regressions, ensuring consistent estimation even when one of the models is incorrectly specified (Funk et al. 2011; Li and Shen 2020). IPTW helps create balanced distributions between the treated group (returned children) and the control group (migrant children), thereby reducing bias from observed confounders (Li, Morgan, and Zaslavsky 2018). In this study, IPTW is used not to establish a causal effect but rather to adjust for measured confounding in observational data and to provide less biased estimates of the association between return migration and educational investments (Li, Morgan, and Zaslavsky 2018).

To implement IPTW, we first estimated the propensity of experiencing return migration through logistic regression. These models rely on all controls but exclude the potentially mediating variable (parental coresidence), in line with research from Coffman et al. (2024). Since this study combines multiple imputation for missing values with IPTW, we followed the “within” approach recommended by Granger, Sergeant, and Lunt (2019) to compute the propensity scores within each imputed dataset. Covariate balance was successfully achieved, as all absolute standardized mean differences between the treated and control groups were smaller than 0.1 after weighting (Chesnaye et al. 2022). Figure A-1 provides further details.

Next we adjusted the original survey sampling weights by multiplying them with the propensity score weights. These combined weights were used in all subsequent regression models (Lenis et al. 2019; Ridgeway et al. 2015). After weighting, the treatment variable (return migration) should be independent of the measured covariates included in the final models (Austin and Stuart 2015). To investigate the association of return migration for each of our two outcomes of interest (out-of-school expenditures and time investments), we used a two-part approach. First we used logistic regressions for binary outcomes (the probability of making each type of investment). Then we estimated regressions for continuous outcomes (amounts invested, conditional on having made any investment). Notably, because we expect that return migration will be more consequential for rural hukou holders, we also conducted these analyses separately on restricted samples of children holding rural hukou or urban hukou status.

We also aim to understand the role of parental coresidence in the relationship between return migration and educational investments. Parental coresidence could

arguably represent a moderator of this relationship, as children's motivations and experiences upon return are likely to vary depending on whether they return accompanied or not. Yet return migration may itself prompt changes in living arrangements. Thus we theorize such family arrangements as a potential key mechanism through which return migration can impact educational investments. Overall, we have limited ability to delve into the likely complex role of parental coresidence in this relationship given our cross-sectional data. Yet we make an initial attempt to describe this nuance by first conducting the main analyses separately on restricted samples of children who return accompanied or unaccompanied (shedding light on parental coresidence's potential role as a moderator). Second we estimate whether the direct association between return migration and educational investments remains after we control for parental coresidence (shedding light on its potential role as a mediator). To conduct this latter analysis, we add a measure of parental coresidence to the baseline models described above and we test for the degree and significance of the cross-sectional mediation by parental coresidence using the KHB command in Stata (Karlson, Holm, and Breen 2012). The remaining association between return migration and educational investments is interpreted as being either direct or mediated by other pathways that cannot be tested in this study. Notably, the KHB method is appropriate for models with binary outcome variables and allows for the inclusion of sampling weights (Breen, Karlson, and Holm 2021). This analysis does not imply a causal interpretation but instead aims to unpack the association through the potential explaining role of parental coresidence (Sohn and Bacong 2021).

4. Results

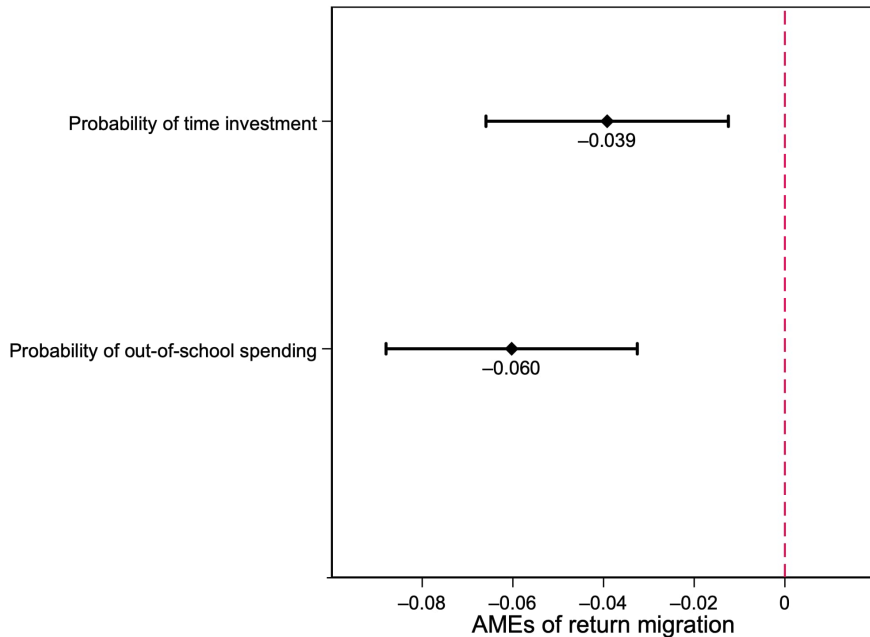
4.1 Return migration and educational investments

Figure 1 presents average marginal effects (AMEs) of return migration from IPTW-adjusted logistic regressions on the likelihood of any out-of-school educational expenditure and any time investment in children, net of all controls. The AMEs indicate differences in the likelihood of receiving these investments for returned children relative to migrant children. Table A-1 reports AMEs for all other covariates.

In our sample, about 85% of all primary caregivers report spending some quality time with the child on a typical day. Figure 1 shows that returned children are 3.9 percentage points less likely to spend quality time with their parents (a nearly 4.7% [$1 - (0.81/0.85)$] reduction in overall probability compared to baseline). In terms of financial investments, Figure 1 shows that returned children are 6.0 percentage points less likely to receive any out-of-school investment compared to migrant children. Given that only about 20% of children in our sample receive any out-of-school investment, this

represents a substantial 30% decrease ($[0.06/0.20 = 0.3]$) in the probability of receiving any out-of-school expenditure of returned children compared to migrant children.

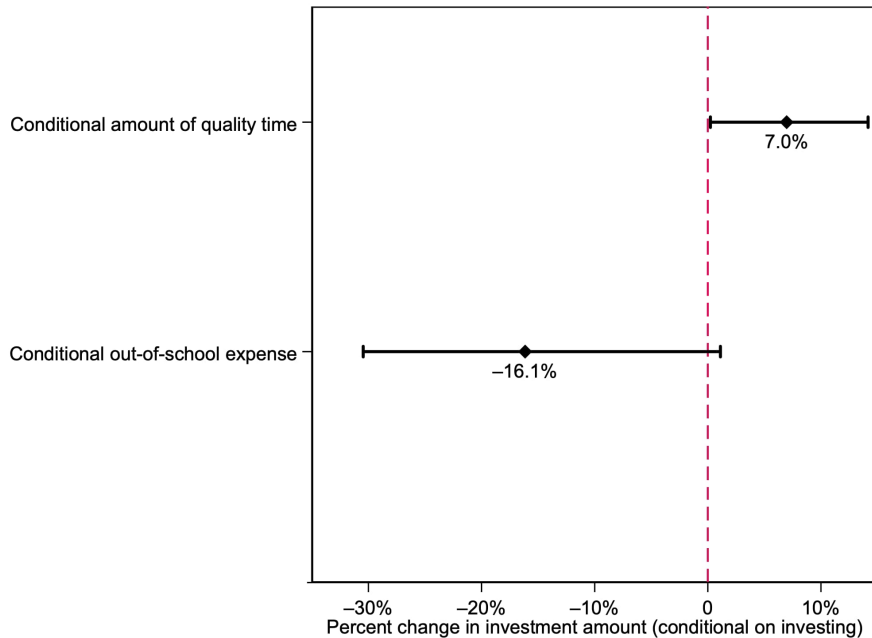
Figure 1: Return migration and the probability of educational investments



Notes: Data from CEPS 2013–2014 after multiple imputation for covariates; $n = 5,836$. Logistic regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, rural hukou status, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. Confidence intervals are based on robust standard errors.

Figure 2 plots transformed AMEs of return migration from IPTW-adjusted log-linear models for the *conditional* time or monetary amounts invested in children, restricting the sample to children who receive any investment. For ease of interpretation, we convert AMEs to percent changes as $100(\exp(\text{AMEs}) - 1)$, so the plotted values can be interpreted as the percentage difference in investment levels for returned children relative to migrant children, conditional on any investment. Table A-2 reports AMEs for all covariates.

Figure 2: Return migration and the conditional amount of educational investments



Notes: For out-of-school educational expenditure, $n = 1,687$. For quality time, $n = 5,267$. Data from CEPS 2013–2014 after multiple imputation for covariates. Linear regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, rural hukou status, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. Confidence intervals are based on robust standard errors.

Figure 2 shows that, conditional on receiving any monetary investment, returned children receive, on average, out-of-school investments that are about 16% smaller than those received by migrant children. Given a baseline conditional investment of about 3,261 RMB per semester, the gap between migrant and returned children is nontrivial. We estimate it to be about 522 RMB per semester. Notably, this difference is not statistically significant – which may result from the much smaller sample used for this conditional analysis. (Only 29% of the original sample of children is included.)

In addition, whereas returned children are less likely to receive any time investments (Figure 1), those who do receive household time investments spend about 7% more time with their primary caregivers than their migrant counterparts. On a baseline of 3.7 hours per day, this increase in time investments represents about 15.5 extra minutes per day on

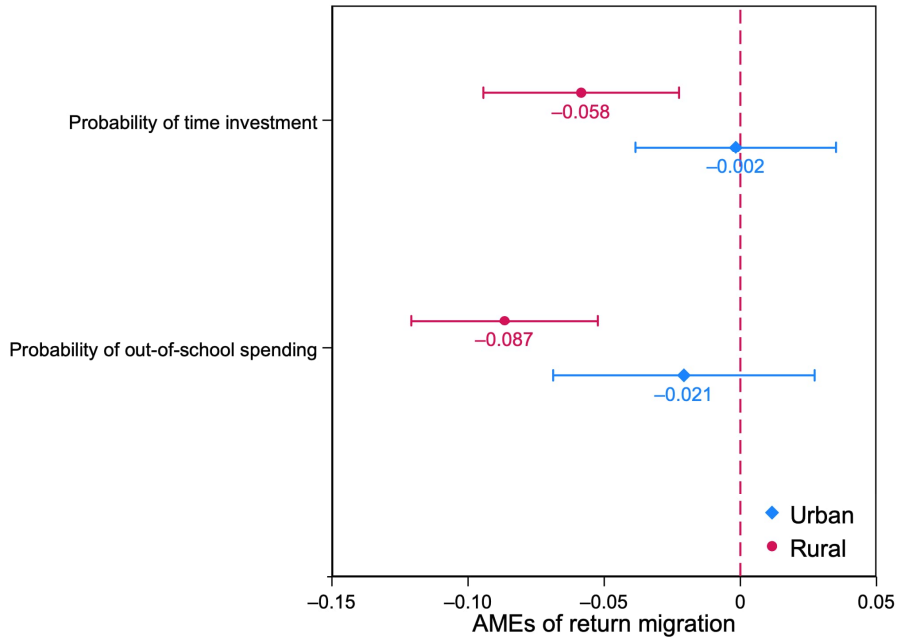
average with primary caregivers – nearly two hours a week. These results potentially suggest a compensatory shift from financial to personal involvement among households of returned children.

4.2 Educational investments by rural vs. urban hukou status

Next we stratify the analyses by children's rural vs. urban hukou status, as rural hukou children are not only more likely to return due to institutional barriers in accessing upper-tier education but are also more likely to experience deleterious consequences to their educational experiences by returning. Figures 3 and 4 illustrate the AMEs of return migration on the probability of investing and the conditional amount of time and money invested in education, by rural and urban hukou. Although the confidence intervals for rural and urban hukou groups overlap, the pattern of AMEs suggests that the associations between children's return migration and educational investments are more pronounced among rural hukou children.

Figure 3 reports that among rural hukou holders, returned children are 5.8 percentage points less likely to receive parental time investment and 8.7 percentage points less likely to receive out-of-school educational investment than migrant children. Among urban hukou holders, returned and migrant children do not differ significantly in the probability of receiving these educational investments. These results suggest that the decreases in the likelihood of investment experienced by returned children and documented in Figure 1 are driven by changes among rural hukou holders.

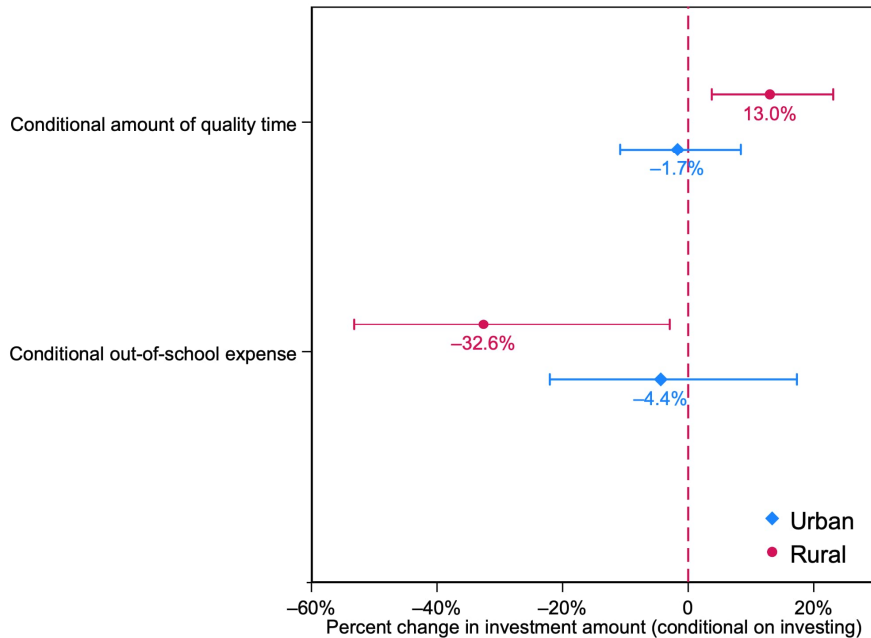
Figure 3: Return migration and the probability of educational investments by hukou status



Notes: Data from CEPS 2013–2014 after multiple imputation for covariates; $n = 5,836$. Logistic regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by hukou status. Confidence intervals are based on robust standard errors.

Figure 4 presents the transformed AMEs of return migration from log-linear models by rural and urban hukou. Among rural hukou holders, return is associated with a 13% increase in conditional quality time with primary caregivers relative to their migrant counterparts. This represents an increase of about 30 minutes a day on average (on a baseline of 3.7 hours per day for rural hukou holders). Over the course of a week, this represents an increase of about 3.5 hours spent with primary caregivers. These increases are greater than documented for the entire population of returned children (see Figure 2), suggesting once again that the documented associations are driven by the experiences of rural hukou holders.

Figure 4: Return migration and the conditional amount of educational investments by hukou status



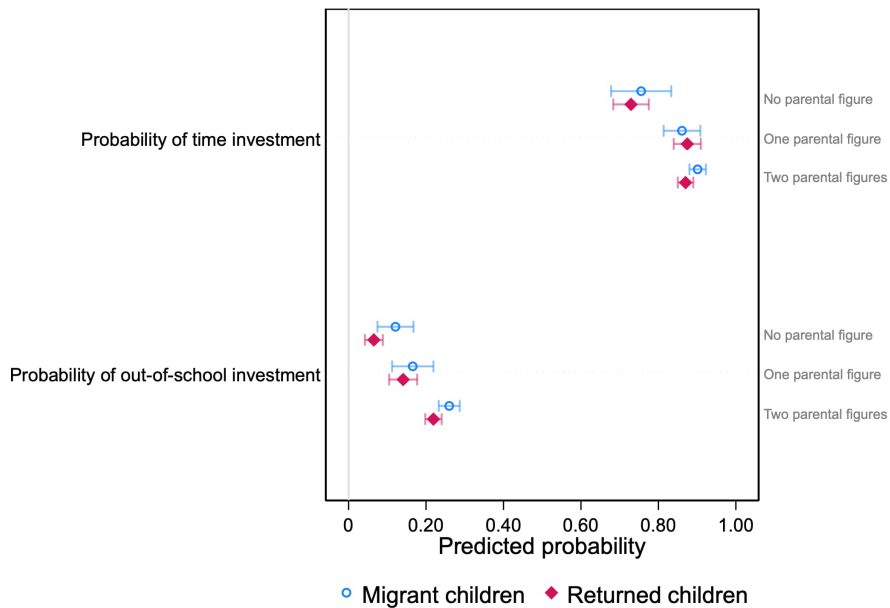
Notes: For out-of-school educational expenditure, $n = 1,687$. For quality time, $n = 5,267$. Data from CEPS 2013–2014 after multiple imputation for covariates. Linear regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by hukou status. Confidence intervals are based on robust standard errors.

Alongside increases in time investments, Figure 4 also documents sizable reductions in conditional financial investments in returned children with rural hukou status. On the other hand, unlike what we documented for the whole population of returned children (Figure 2 did not document significant decreases in out-of-school conditional investments), Figure 4 reports significant and substantially large decreases in the conditional amount allocated to out-of-school expenditures among rural hukou holders only. Rural hukou returned children receive nearly 32.6% (about 845 RMB per semester) less in out-of-school conditional expenditures compared to their migrant counterparts.

4.3 The role of parental coresidence

Here we investigate the role of parental coresidence in the relationship between return migration and educational investments – both as a potential moderator and a potential mediator of this relationship. We start by investigating whether the association between investments in children and return migration varies by parental coresidential status. Figure 5 shows predicted probabilities of receiving any time or monetary investments for returned and migrant children, by coresidential status with parental figures. A figure showing the predicted conditional amounts is included in the appendix (see Figure A-2).

Figure 5: Migration status and the probability of educational investments by parental coresidence



Notes: Data from CEPS 2013–2014 after multiple imputation for covariates; $n = 5,836$. Logistic regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, rural hukou status, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by parental coresidence status. Confidence intervals are based on robust standard errors.

Figure 5 suggests that children living with two parental figures are substantively more likely to spend quality time with their primary caregivers and to receive financial

investments in shadow education (out-of-school investments) than children living with no parental figure. And a comparison of the investments received by returned children and their migrant counterparts within each residential arrangement suggests that parental coresidence is generally not a substantively relevant moderator. Specifically, returned children and migrant children are similarly likely to receive time and financial investments regardless of whether they live with two, one, or no parental figures.

Importantly, however, children's living arrangements may not stay unchanged when they experience return migration. In fact, children who are living with two parental figures in the destination location may return on their own or with just one parental figure. If we expand our comparison groups across living arrangement categories, Figure 5 suggests that children who return unaccompanied (transition from living with two to living with no parental figures) may experience substantial declines in their educational investments. For example, about 90% of migrant children living with two parental figures spend some quality time with the primary caregiver during a day. Upon unaccompanied return, however, only 73% of children would be expected to spend quality time with a primary caregiver (who may be a grandparent, aunt, uncle, or other relative) during a day. This represents a decrease of 19% ($1-0.73/0.90$) in the likelihood of spending quality time with a caregiver. Similarly, about 26% of migrant children living with two parental figures receive out-of-school investments. Upon unaccompanied return, however, only 6.5% of children would be expected to receive such investments. This represents a decrease of 75% ($1-0.065/0.26$) in the likelihood of out-of-school investments.

Analyses of differences in predicted conditional amounts (see Figure A-2) suggest smaller and insignificant changes in the time and money invested in children once an initial investment is made. The stronger moderation on initial investment (probability) vs. spending levels (conditional amounts) may indicate that the presence of parental figures fundamentally shapes the initial commitment to educational investment more than it constrains the financial scale of that commitment once it is made.

Notably, and as previously mentioned, changes in family arrangements are also a potential consequence of children's return. Thus these changes are also a potential mechanism through which return may shape household educational investments. Table 2 compares results from our main multivariate models, which do not control for parental coresidential status (main model), with results from models that include this measure (full model). We report the average partial effects (APEs)¹⁹ of return migration for both models. Table 2 also includes the percentage of the original association between return migration and each educational investment outcome, which is explained when a measure of parental coresidence is included in the model (% explained). This percentage captures

¹⁹ APEs can be interpreted as the average change in probability of incurring any educational investment for one standard deviation change in the mediator. We report APEs rather than log-odds from the logit models, as APEs provide a more interpretable metric than logit coefficients (Kohler, Karlson, and Holm 2011: 430).

what share of the total association is mediated by parental coresidence (indirect pathway); the remaining share is considered a component of the relationship, which is either direct or mediated through other pathways (Breen, Karlson, and Holm 2021).

Table 2: Mediation of the relationship between investment in education and return migration by parental coresidence using KHB method

Mediator: parental coresidence (three categories)			
Outcome	Main model	Full model	Explained (%)
Out-of-school expenditure probability	-0.06 (-0.09, -0.04)	-0.05 (-0.07, -0.02)	27.20
Quality time probability	-0.04 (-0.06, -0.01)	-0.03 (-0.05, 0.00)	
Out-of-school expenditure conditional amount	-0.18 (-0.36, 0.01)	-0.14 (-0.33, 0.04)	
Quality time conditional amount	0.07 (0.00, 0.13)	0.06 (0.00, 0.13)	

Notes: Reported as APEs. For probability outcomes, $n = 5,836$. For out-of-school educational expenditure, $n = 1,687$. For quality time, $n = 5,267$. Weights are a product of survey weights and propensity score. Controls include age, rural hukou, rural location, gender, only-child status, academic performance, father's educational attainment, mother's educational attainment, father's occupation, mother's occupation, family economic status, and parental educational expectations. Confidence intervals (95%) based on robust standard errors are shown in parentheses.

Table 2 indicates that parental coresidence explains approximately 27% of the negative association between return migration and the probability of incurring out-of-school educational expenditures. In other words, the relation between return migration and the probability of incurring out-of-school educational expenditures partly operates indirectly through changes in the presence of parental figures in the home. However, Table 2 also suggests that a direct association between return migration and educational investments remains net of parental coresidence. In fact, a greater share of the relationship remains unexplained by the inclusion of parental coresidence in our models. This implies that there are likely other key pathways linking children's return migration to educational investments (e.g., family income instability, reintegration costs, or changed priorities). These have not been included in this study.

5. Conclusion and discussion

This study has examined the consequences of return migration in China, a context where large-scale rural-to-urban migration and the institutional constraints of the hukou system jointly shape children's educational opportunities. Return migration is not only a labor market or family decision but also a process that can reconfigure the resources and strategies parents allocate to their children's education. Against this backdrop, the goal of this study is to assess how return migration is associated with different forms of

educational investments in children, considering both monetary expenditures and time inputs. Overall, results indicate that return migration generally reduces the likelihood or conditional amount of investments in children's education, especially among rural hukou holders who are already most exposed to systemic barriers (Ma and Wang 2025).

We find that, compared to their migrant counterparts, returned children – particularly rural hukou returned children – are less likely to receive investments in out-of-school expenses (shadow education). Several factors may help explain this pattern. First, the educational environment in many return destinations, typically less developed rural areas, offers fewer opportunities for supplementary or shadow education, thereby constraining access to such resources. Second, it is also possible that this decrease results from changes in families' resources (such as living and work arrangements) after return, which could also limit children's participation in the existing (even if fewer) educational opportunities. Third, the subjective willingness of parents to invest in children's education may diminish after return, particularly if they perceive a lower return on this investment (Gao and Li 2022). Finally, this decrease could simply reflect a selection process, where families who return are less likely to value shadow education in the first place. We cannot, with this cross-sectional analysis, detangle these different explanations. Given that investments in shadow education are linked to children's educational outcomes in China (Guo et al. 2020; Sun et al. 2020), future studies should try to understand the processes behind this descriptive disparity in out-of-school investments.

In terms of quality time with a primary caregiver, our results suggest that returned children are slightly less likely to receive such time investments. Changes in the probability of spending time with a primary caregiver are substantively small: We document a 4% decrease in the likelihood of spending time with a primary caregiver (from 88.13% to 84.21%). This decrease could be a consequence of unaccompanied returns. Yet among those who do spend time with their primary caregivers, returned children receive slightly *more* time relative to their migrant counterparts. Our results suggest that returned children may spend nearly two extra hours with their caregivers per week compared with migrant children, and rural hukou migrant children spend, on average, 3.5 additional hours per week. This increase in time investments, coupled with decreases in investments in shadow education, could point to an adaptive strategy or a compensatory mechanism, where families compensate for decreases in monetary investments through investments of time. This is likely particularly in rural contexts, where high-quality educational services are less accessible. This type of tradeoff (invest time instead of money) has been documented in resource-constrained households in the United States (Gautham and Folbre 2024). The inverse relationship, where parents spend money to offset a lack of time, has been found among migrant families in China (Yang and Bansak 2020).

A final goal of our study was to shed light on the complex relationship between family living arrangements and return migration in shaping educational investments. There are reasons to theorize family living arrangements as both a moderator and a mediator of the relationship between return migration and educational investments. First, we find that within each coresidential category, the investments received by migrant and returned children are virtually the same. In other words, keeping the family coresidential status unchanged, return migration will not significantly shape investments. Yet children's living arrangements are likely to *not* stay unchanged when they experience return migration. Our results provide suggestive evidence that children who return unaccompanied (transition from living with two parental figures to living with no parental figure) may experience substantial declines in the probability of quality time spent with primary caregivers and out-of-school investments.

Notably, because changes in family coresidential arrangements are also a potential consequence of children's return, we investigate if they represent a pathway to explain the relationships we document. We find that the impact of return migration on the probability of incurring out-of-school educational expenditures partly operates indirectly through changes in parental figures' presence in the home. Thus, above and beyond the potential changes in opportunities for shadow education in return contexts discussed above, potential changes in parental coresidential status also explain some of the decrease in shadow education investments. If parental figures are less likely to live with children in return contexts, both disruptions of caregiving arrangements and the increased costs of boarding children due to parental figures' absence may act as barriers to participating in educational opportunities out of school.

This study has several limitations. First, the reliance on CEPS 2013–2014 data means findings may not fully capture recent dynamics, including the evolving situation of returned children or the impact of post-2014 hukou reforms (e.g., relaxed conversion policies). At the same time, the data are well suited to capturing return migration driven by educational discrimination embedded in the pre-reform hukou system. Second, because CEPS does not provide specific county/district identifiers that can be linked to local price indices, we cannot separate cost-of-living differences between inland sending regions and coastal host cities from the institutional mechanisms we emphasize. Thus some observed gaps in educational expenditures may reflect regional price variation rather than differences in parental investment. Third, the measure of household time investment, while indicative of quality caregiver–child interaction, is not education-specific and encompasses broader companionship. Fourth, due to limited geographic detail in the data, the definition of returned children used in this study does not capture those who return to county/district-level locations near but not identical to their hukou county/district. This subgroup has become more common in recent years as the hukou system has gradually relaxed. Fifth, we are unable to distinguish between intra-provincial

and inter-provincial returned children or include province fixed effects to account for regional variation, as the CEPS data do not provide provincial identifiers.²⁰ Finally, this descriptive study cannot make causal claims. We rely on cross-sectional data that do not allow us to establish a temporal order between our dependent and independent variables. Although existing literature suggests a logical path from experiences of return to investments, we cannot discard the possibility of reverse causality, in which families that invest less in children are more likely to migrate.

Despite these limitations, this paper contributes to the literature and policymaking by showing that return migration is associated with a unique pattern of household educational investments. Whereas it reduces both the probability and intensity of financial inputs, it also modestly increases time engagement among households that provide any quality time to children, especially among rural hukou holders. These findings highlight how spatial and institutional discontinuities between migration destinations and origins reshape family strategies concerning educational attainment. Despite the 2014 hukou reform, our findings remain policy-relevant. Recent merit-based registration systems primarily benefit high-skilled workers, leaving low-skilled migrants subject to continued exclusionary pressures. Consequently, the patterns of return migration and educational investment tradeoffs identified here likely persist for vulnerable families today. Future research might consider investigating how these investment shifts influence the long-term educational outcomes of returned children.

6. Acknowledgments

We thank the anonymous reviewers for their helpful comments and suggestions. We also thank Monica Kirkpatrick Johnson for helpful feedback on an earlier version of this manuscript.

7. Data availability statement

The data that support the findings of this study are openly available from the Chinese National Survey Data Archive (CNSDA) at <http://nsrc.ruc.edu.cn/>. The specific dataset used is the 2013–2014 CEPS baseline data. Access is free for academic research purposes upon registration with the archive.

²⁰ Although CEPS does provide anonymized county-level identifiers, we cannot include these controls in our models. Because migration status is defined at the county level, we need to capture between-county variation (which would be absorbed by including county-level fixed effects).

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Appendix A

Table A-1: Migration status and household educational investment probability in children

	Probability of out-of-school spending	Probability of time investment
Return migration	-0.06 (-0.09, -0.03)	-0.04 (-0.07, -0.01)
Age	0.01 (0.00, 0.02)	-0.03 (-0.04, -0.02)
Rural hukou	-0.03 (-0.06, 0.00)	-0.01 (-0.04, 0.02)
Rural location	-0.02 (-0.05, 0.02)	-0.01 (-0.05, 0.02)
Male	-0.03 (-0.06, -0.01)	-0.02 (-0.04, 0.01)
Only child	0.05 (0.02, 0.08)	0.03 (0.00, 0.06)
Academic performance (ref: Below the average)		
Average	-0.03 (-0.06, 0.01)	0.02 (-0.02, 0.05)
Above the average	0.00 (-0.04, 0.04)	0.01 (-0.03, 0.04)
Family characteristics		
Father's educational attainment (ref: Junior high or less)		
High school/vocational	0.04 (0.00, 0.08)	0.03 (-0.01, 0.06)
College or above	0.10 (0.04, 0.17)	0.06 (0.01, 0.11)
Mother's educational attainment (ref: Junior high or less)		
High school/vocational	0.06 (0.01, 0.10)	0.02 (-0.02, 0.06)
College or above	0.08 (0.01, 0.15)	0.05 (-0.01, 0.11)
Father's occupation (ref: Professional/managerial/state)		
Non-agricultural worker/self-employed	0.02 (-0.02, 0.06)	0.00 (-0.04, 0.05)
Farmer/agricultural	0.01 (-0.07, 0.09)	-0.04 (-0.11, 0.03)
Unemployed or other	-0.01 (-0.07, 0.05)	0.01 (-0.05, 0.07)
Mother's occupation (ref: Professional/managerial/state)		
Non-agricultural worker/self-employed	-0.02 (-0.08, 0.04)	0.02 (-0.05, 0.10)
Farmer/agricultural	-0.12 (-0.20, -0.04)	0.03 (-0.06, 0.12)
Unemployed or other	0.01 (-0.06, 0.07)	0.04 (-0.04, 0.12)
Family economic status (ref: Low)		
Middle	0.08 (0.05, 0.11)	0.00 (-0.03, 0.03)
High	0.13 (0.05, 0.21)	0.06 (0.01, 0.12)
Parental educational expectations (ref: Non-college [< BA])		
College (BA)	0.07 (0.04, 0.11)	0.03 (0.00, 0.07)
Postgrad (MA/PhD)	0.09 (0.05, 0.14)	0.04 (0.00, 0.08)

Notes: Data from CEPS 2013–2014 after multiple imputation for covariates; n = 5,836. AMEs are estimated from logistic regressions adjusted using the product of survey weights and propensity score. Confidence intervals based on robust standard errors are shown in parentheses.

Table A-2: Migration status and household educational investment in children

	Conditional out-of-school expense	Conditional amount of quality time
Return migration	-0.18 (-0.36, 0.01)	0.07 (0.00, 0.13)
Age	0.13 (0.06, 0.20)	-0.02 (-0.05, 0.00)
Rural hukou	-0.27 (-0.45, -0.09)	-0.02 (-0.09, 0.06)
Rural location	-0.05 (-0.47, 0.37)	0.00 (-0.08, 0.08)
Male	-0.02 (-0.21, 0.17)	-0.05 (-0.11, 0.02)
Only child	0.12 (-0.07, 0.31)	0.08 (0.00, 0.16)
Academic performance (ref: Below the average)		
Average	-0.31 (-0.61, -0.01)	-0.06 (-0.14, 0.02)
Above the average	-0.34 (-0.70, 0.03)	-0.09 (-0.17, -0.01)
Family characteristics		
Father's educational attainment (ref: Junior high or less)		
High school/vocational	0.18 (-0.03, 0.40)	-0.02 (-0.11, 0.07)
College or above	0.16 (-0.17, 0.49)	-0.10 (-0.25, 0.05)
Mother's educational attainment (ref: Junior high or less)		
High school/vocational	0.14 (-0.10, 0.39)	0.06 (-0.04, 0.17)
College or above	0.41 (0.08, 0.74)	-0.02 (-0.17, 0.14)
Father's occupation (ref: Professional/managerial/state)		
Non-agricultural worker/self-employed	-0.37 (-0.59, -0.16)	-0.04 (-0.16, 0.07)
Farmer/agricultural	-0.70 (-1.44, 0.03)	0.01 (-0.19, 0.21)
Unemployed or other	-0.35 (-0.69, -0.01)	0.10 (-0.06, 0.25)
Mother's occupation (ref: Professional/managerial/state)		
Non-agricultural worker/self-employed	0.30 (0.03, 0.58)	-0.04 (-0.18, 0.10)
Farmer/agricultural	0.42 (-0.38, 1.22)	-0.03 (-0.24, 0.17)
Unemployed or other	0.31 (-0.03, 0.64)	-0.01 (-0.16, 0.15)
Family economic status (ref: Low)		
Middle	-0.12 (-0.62, 0.38)	0.09 (0.01, 0.18)
High	0.25 (-0.36, 0.86)	0.20 (0.06, 0.35)
Parental educational expectations (ref: Non-college [< BA])		
College (BA)	0.36 (0.13, 0.60)	-0.09 (-0.17, 0.00)
Postgrad (MA/PhD)	0.39 (0.03, 0.75)	-0.01 (-0.10, 0.08)
N	1,687	5,267

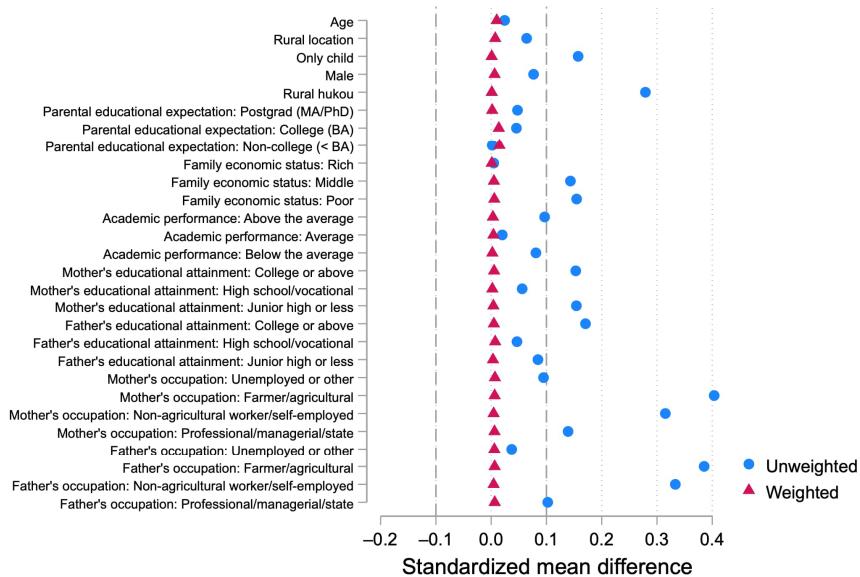
Notes: Data from CEPS 2013–2014 after multiple imputation for covariates. AMEs are estimated from logistic regressions adjusted using the product of survey weights and propensity score. Confidence intervals based on robust standard errors are shown in parentheses.

Table A-3: Mediation of the relationship between investment in education and return migration by parental coresidence using KHB method

Mediator: parental coresidence (four categories)			
Outcome	Main model	Full model	Explained (%)
Out-of-school expenditure probability	-0.06 (-0.09, -0.04)	-0.05 (-0.07, -0.02)	26.52%

Notes: Reported as APEs;²¹ n = 5,836. Weights are products of survey weights and propensity score. Controls include age, rural hukou, rural location, gender, only child status, academic performance, father's educational attainment, mother's educational attainment, father's occupation, mother's occupation, family economic status, and parental educational expectations. Confidence intervals (95%) based on robust standard errors are shown in parentheses.

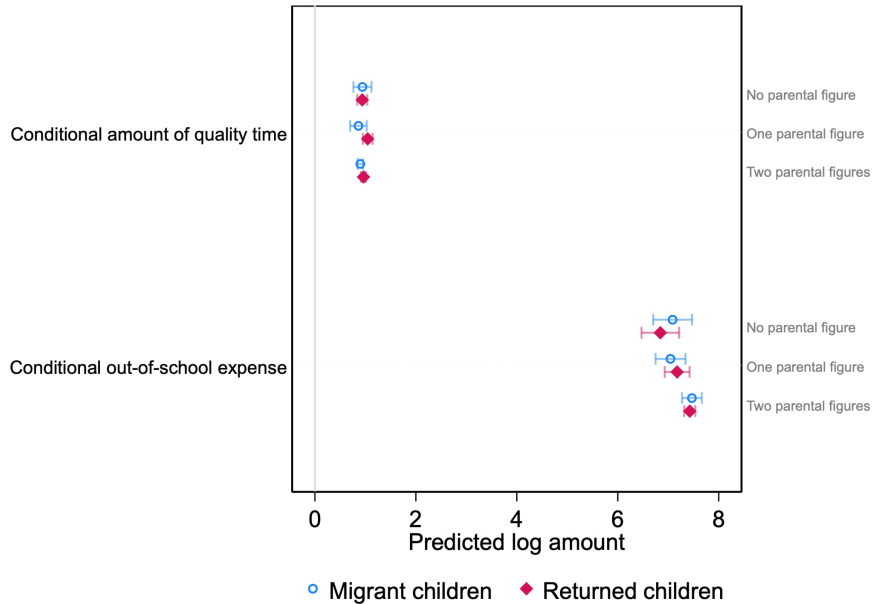
Figure A-1: Standardized mean differences after adjustment using survey-weighted propensity scores



Notes: n = 5,836. Weights are products of survey weights and propensity score. The vertical dashed lines indicate $\pm 10\%$ thresholds.

²¹ APEs reported for binary outcomes in the KHB decompositions differ slightly from AMEs shown in Tables A-1 and A-2. This is because the KHB APE command in Stata does not simply estimate a reduced logit model and apply margins. Instead it first rescales the reduced model so it is on the same underlying latent scale as the full model (adjusting for differences in the residual variance) and then computes AMEs from this rescaled specification (Breen, Bernt Karlson, and Holm 2021). By contrast, the AMEs in Figures 1 and 2 are based on the un-rescaled logit models, so the two sets of APEs/AMEs are not numerically identical.

Figure A-2: Migration status and the conditional educational investments by parental coresidence

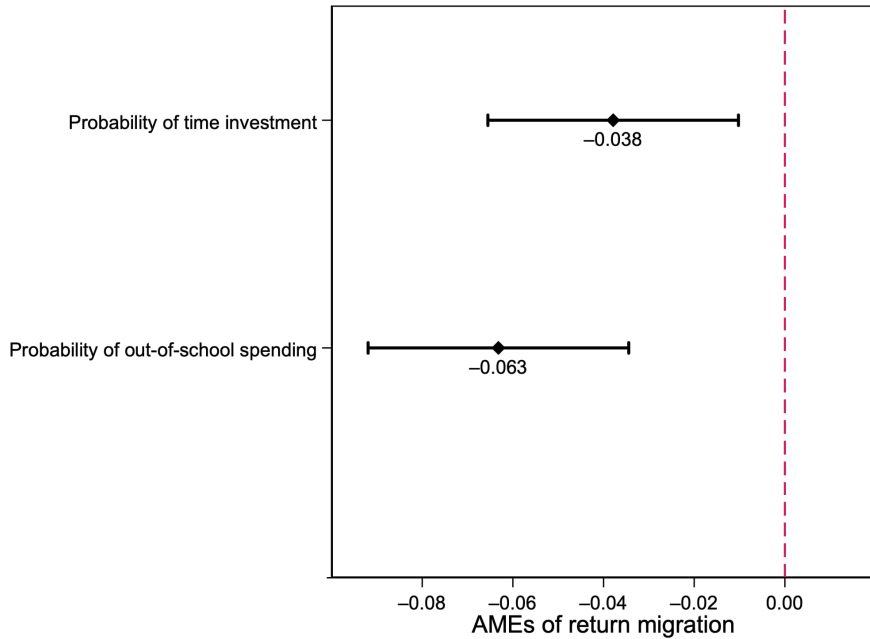


Notes: For out-of-school educational expenditure, n = 1,687. For quality time, n = 5,267. Data from CEPS 2013–2014 after multiple imputation. Linear regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, rural hukou status, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by parental coresidence status. Confidence intervals are based on robust standard errors.

Appendix B

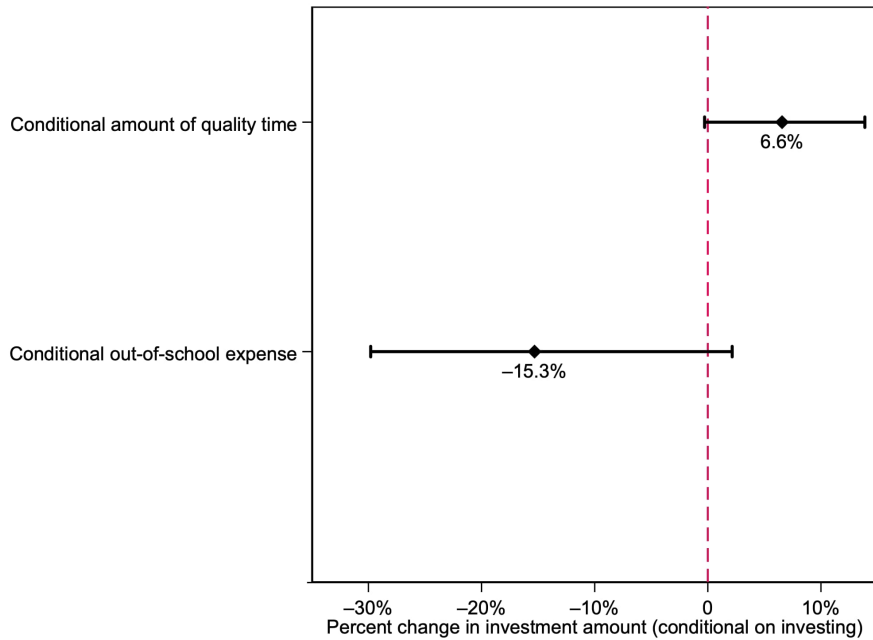
Robustness test: the complete-case, non-imputed dataset

Figure B-1: Return migration and the probability of educational investments



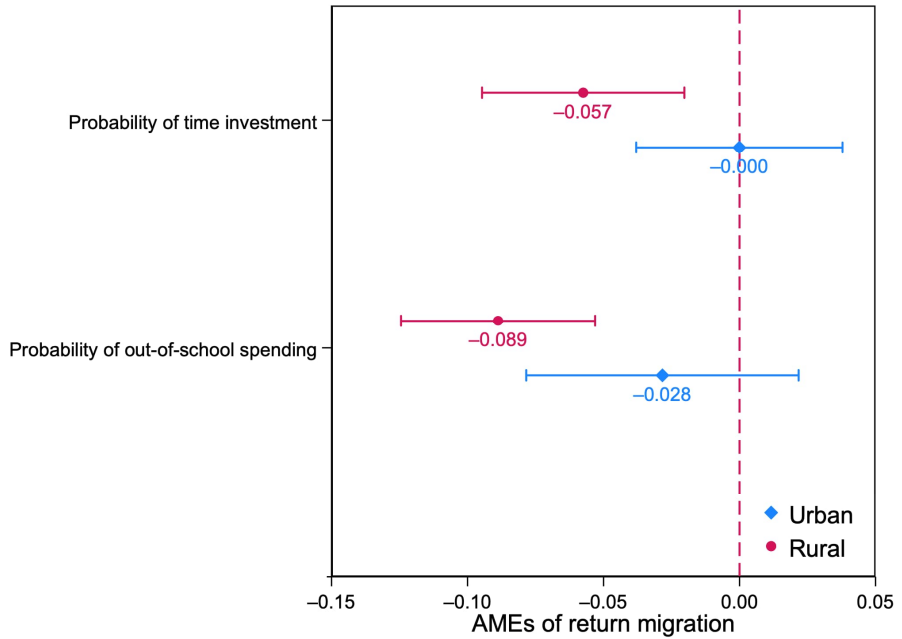
Notes: Data from CEPS 2013–2014; $n = 5,522$. Logistic regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, rural hukou status, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. Confidence intervals are based on robust standard errors.

Figure B-2: Return migration and conditional amount of educational investment



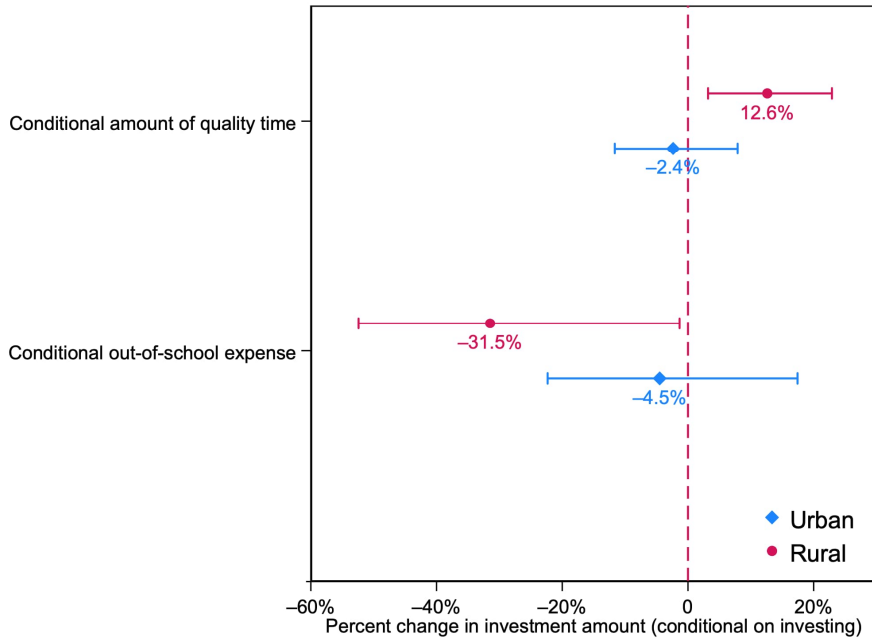
Notes: For out-of-school educational expenditure, $n = 1,611$. For quality time, $n = 4,980$. Data from CEPS 2013–2014. Linear regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, rural hukou status, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. Confidence intervals are based on robust standard errors.

Figure B-3: Return migration and the probability of educational investments by hukou status



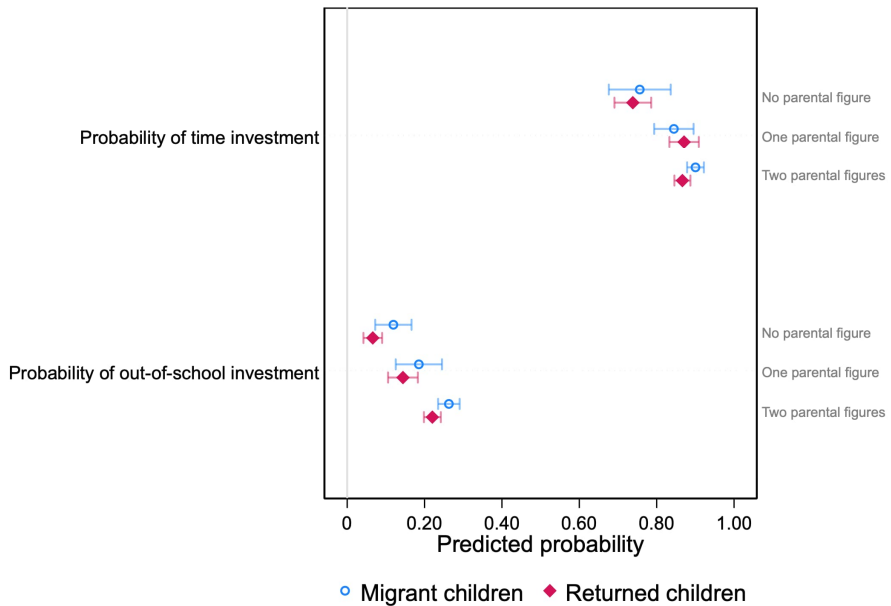
Notes: Data from CEPS 2013–2014; $n = 5,522$. Logistic regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by hukou status. Confidence intervals are based on robust standard errors.

Figure B-4: Return migration and the conditional amount of educational investments by hukou status



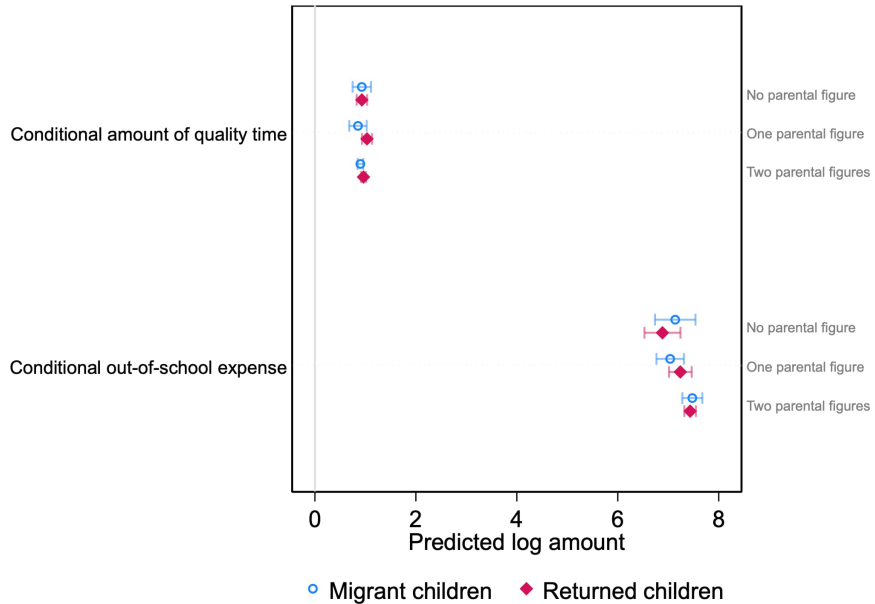
Notes: For out-of-school educational expenditure, n = 1,611. For quality time, n = 4,980. Data from CEPS 2013–2014. Linear regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by hukou status. Confidence intervals are based on robust standard errors.

Figure B-5: Migration status and the probability of educational investments by parental coresidence



Notes: From CEPS 2013–2014; n = 5,522. Logistic regressions were adjusted by the product of survey weights and propensity score. Controls include the child’s age, rural hukou status, residence in a rural area, gender, only-child status, academic performance ranking, father’s educational attainment, mother’s educational attainment, father’s job category, mother’s job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by parental coresidence status. Confidence intervals are based on robust standard errors.

Figure B-6: Migration status and conditional amount of educational investments by parental coresidence

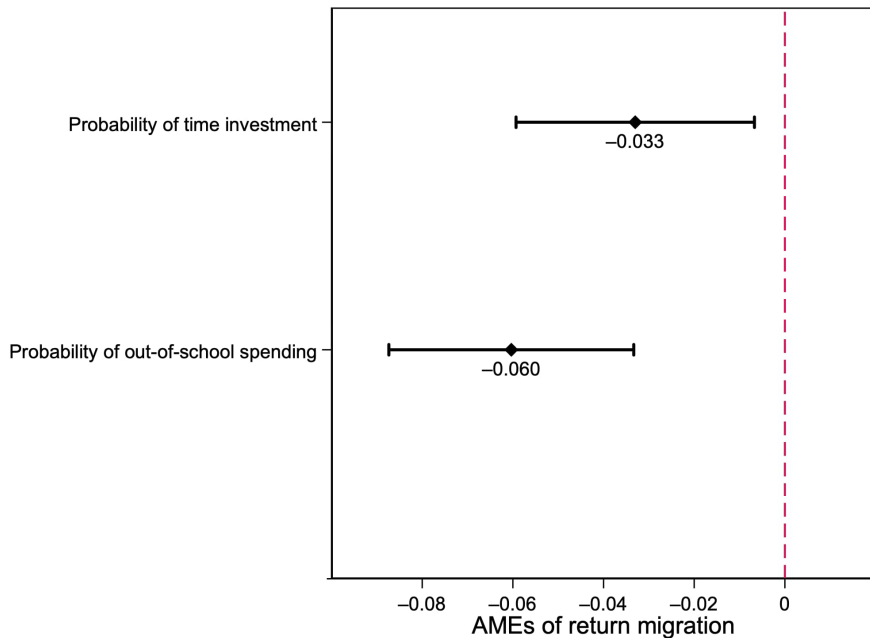


Notes: For out-of-school educational expenditure, n = 1,611. For quality time, n = 4,980. Data from CEPS 2013–2014. Linear regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, rural hukou status residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by parental coresidence status. Confidence intervals are based on robust standard errors.

Appendix C

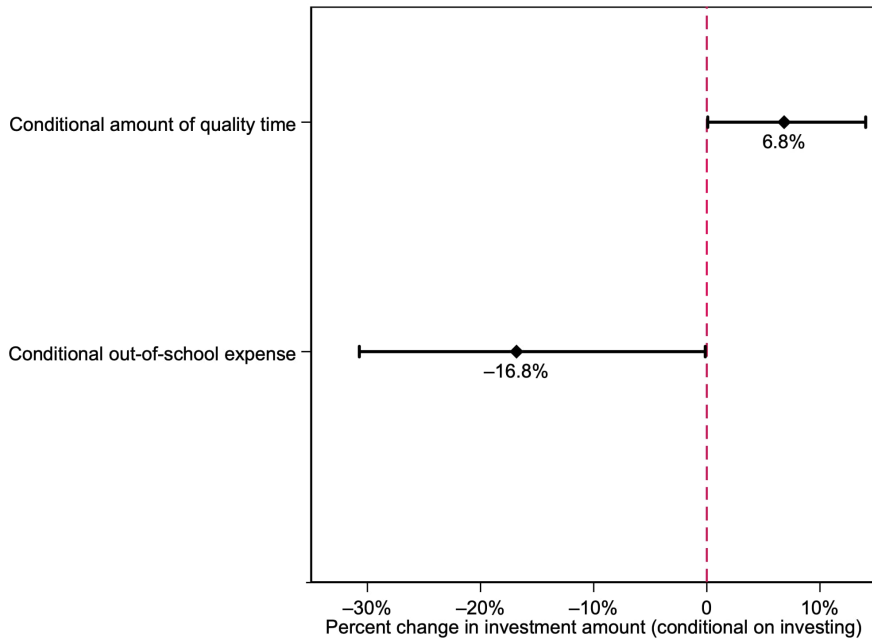
Robustness test: MI-PMM for all time and monetary investment variables with multiply imputed covariates

Figure C-1: Return migration and the probability of educational investments



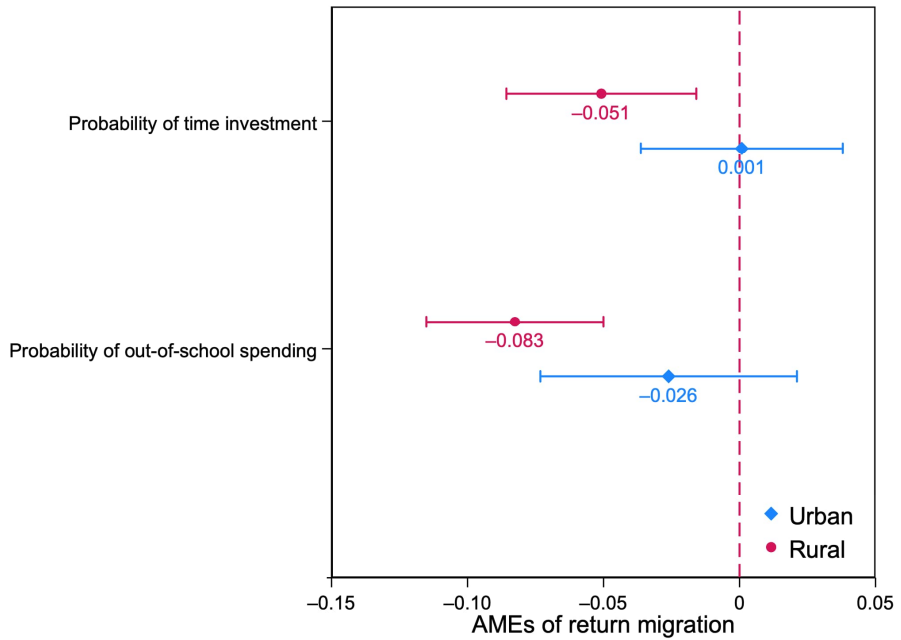
Notes: Data from CEPS 2013–2014; $n = 6,531$. Logistic regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, rural hukou status, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. Confidence intervals are based on robust standard errors.

Figure C-2: Return migration and conditional amount of educational investments



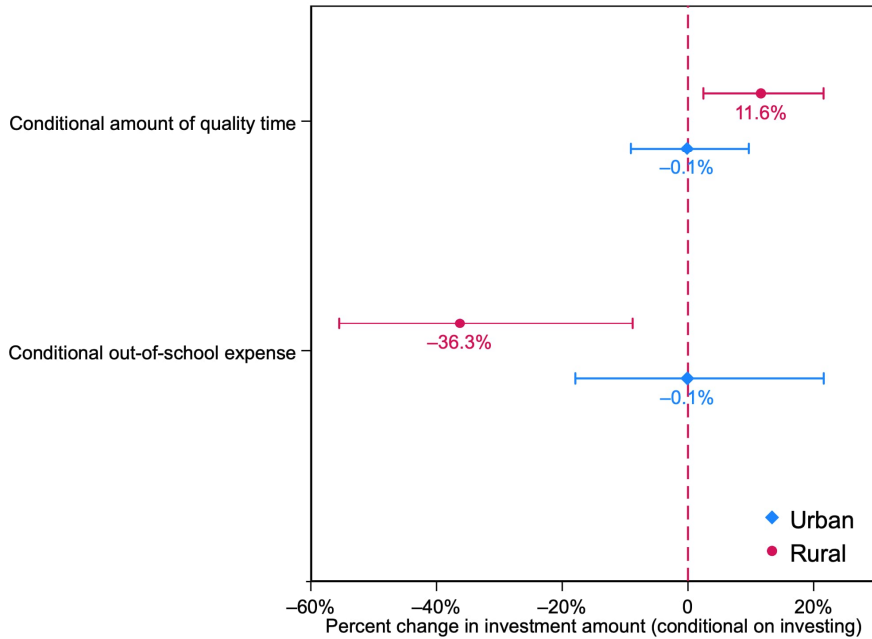
Notes: For out-of-school educational expenditure, n = 1,847. F for quality time, n = 5,886. Data from CEPS 2013–2014. Linear regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, rural hukou status, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. Confidence intervals are based on robust standard errors.

Figure C-3: Return migration and the probability of educational investments by hukou status



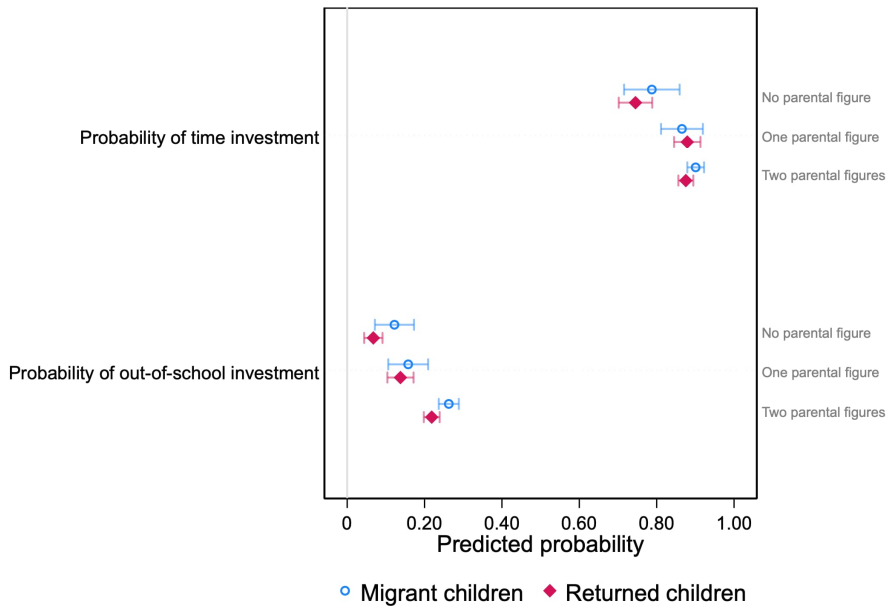
Notes: Data from CEPS 2013–2014; $n = 6,531$. Logistic regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by hukou status. Confidence intervals are based on robust standard errors.

Figure C-4: Return migration and the conditional amount of educational investments by hukou status



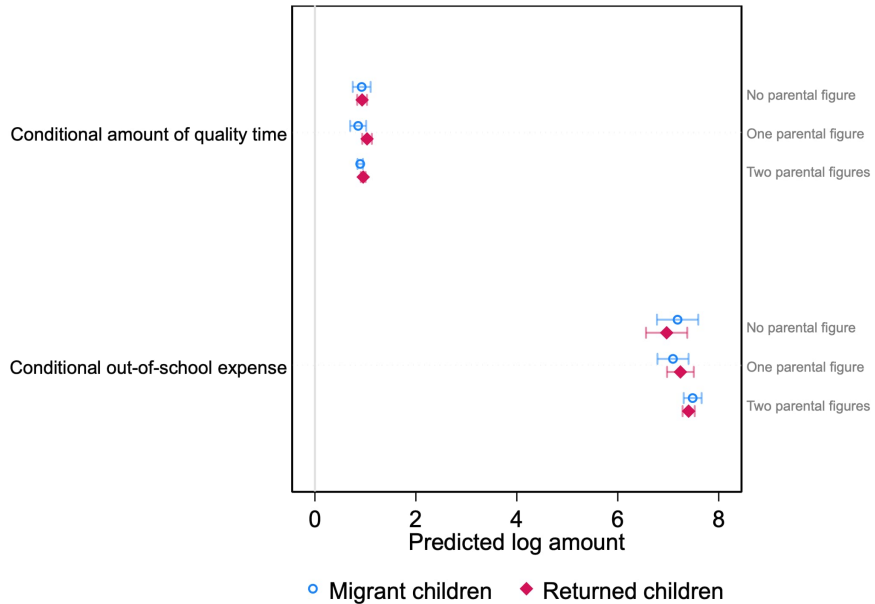
Notes: For out-of-school educational expenditure, $n = 1,847$. For quality time, $n = 5,886$. Data from CEPS 2013–2014. Linear regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by hukou status. Confidence intervals are based on robust standard errors.

Figure C-5: Migration status and the probability of educational investments by parental coresidence



Notes: Data from CEPS 2013–2014; n = 6,531. Logistic regressions were adjusted by the product of survey weights and propensity score. Controls include the child’s age, rural hukou status, residence in a rural area, gender, only-child status, academic performance ranking, father’s educational attainment, mother’s educational attainment, father’s job category, mother’s job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by parental coresidence status. Confidence intervals are based on robust standard errors.

Figure C-6: Migration status and conditional amount of educational investments by parental coresidence



Notes: For out-of-school educational expenditure, n = 1,847. For quality time, n = 5,886. Data from CEPS 2013–2014. Linear regressions were adjusted by the product of survey weights and propensity score. Controls include the child's age, rural hukou status, residence in a rural area, gender, only-child status, academic performance ranking, father's educational attainment, mother's educational attainment, father's job category, mother's job category, family economic status, and parental educational expectations. All models are estimated in subsamples stratified by parental coresidence status. Confidence intervals are based on robust standard errors.

