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Private Educational Expenditure Inequality between Migrant and Urban Households in China's Cities

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Abstract: This paper studies households' expenditure on the education of children in China's cities to assess how internal migrant families' investment in the human capital of their offspring differs from that of local urban families. The private education-related expenditure reflects both households' willingness to invest in human capital and institutional constraints, as China's household registration (hukou) system prevents children without a local city hukou from enrolling in urban public schools. In-school fees (consisting of statutory tuition and institutional tuition fees) are commonly topped-up with substantial private tutoring expenditure. We apply multiple regression to the 2008 "Rural–Urban Migration Survey in China" data to analyze the average expenditure differences between temporary migrants, permanent migrants and locals. The findings are, after controlling for social and economic characteristics, that: (1) the overall spending on education of migrant households overwhelmingly exceeds that of locals, which is expected since migrants must finance privately all education-related expenses their children incur; (2) migrant households spend more on institutional tuition fees compared to households with a local city hukou, reflecting the varying severity of administrative hurdles faced by families; and (3) temporary migrants spend more on institutional tuition fees than permanent migrant households, but less in private tutoring.

Keywords: private educational expenditure; Chinese internal migrant children; educational investment; hukou registration

JEL Classification: O15; I31; J13; R23

1. Introduction

China's spatially unequal economic development motivates many Chinese parents to move from rural to urban areas and from poorer cities to more affluent ones. The number of internal migrants has roughly doubled between 2000 and 2018 when it reached 286 million. While many parents choose to leave their children behind in rural villages, the number of rural children having moved with their parents to China's cities was estimated to have reached 35 million in 2015 (Bulletin 2021).

Despite bringing their contribution to the economic growth of their destination city, Chinese internal migrants face significant barriers to accessing local public services. For example, China's household registration (hukou) system restricts the access of rural migrant children to urban public schools. Because China's education system is fiscally decentralized, neither the origin nor the destination regions have strong incentives to bear the costs of educating migrant children.[1] The impact of this massive internal migration on children has received much attention from policy-makers as well as academics, with outcomes of interest being children's physical and mental health (Lee 2011; Qin and Albin 2010; Zhang

and Liu 2016), their school achievement and academic performance (Chen and Feng 2013; Liu et al. 2017; Wang 2008) and their well-being (Lu et al. 2016). However, only a few studies have assessed its implications for the inequalities in households' expenditures related to the education of their children, which is the focus of the present paper.

Studying migrant households' spending on children's education, as well as the structure of this spending, is relevant in several regards. First, families without a local city hukou may pay extra fees imposed by the schools in the destination city (see Section 3 for details on the Chinese context), thus increasing the parents' burden of building their children's human capital in the city. Gauging the size of this burden can help explain some migrants' choice of leaving their children behind. Second, existing evidence shows that the consumption of migrants in the city is significantly lower than that of urban households (Chen 2018). Previous studies have suggested that these lower levels of consumption may be attributed to larger precautionary savings by migrants. If, beyond the precautionary savings, the share of spending on education is large, then the resources families have left to spend on food or health-related items would be compressed, thus lowering the overall well-being of migrant families. Third, the inequality of educational expenditure reflects the variation in human capital investment and the subsequent productivity of children. Intergenerational social mobility will be hampered if investment in children's human capital closely follows the level accumulated by parents and the consequences of such immobility would be particularly acute in a populous and rapidly developing country such as China. By using nationally representative sample from the National Children's Study of China, Li et al. (2021) find that educational expenses are one of the most important factors driving the cognitive gap among children. Cheng (2021) presents a positive effect of educational attainment on consumption among domestic migrants in Chinese cities. Inefficiencies in the allocation of public educational resources may widen the inequalities in educational attainment of the next generation. This could translate into a persistently negative effect on the consumption of migrant workers in the city.

In this paper, we investigate the effect of internal migration and of hukou status on households' total spending on educating children and on subcategories of this expenditure. We compare migrant and local urban households by drawing on the first wave of the Rural–Urban Migration Survey in China (RUMiC). The education-related expenses collected in the survey are grouped into three categories following the purpose of the spending, namely into institutional tuition fees, in-school fees, and private tutoring fees. Institutional tuition fees are paid to secure a child's admission in a school: they are paid by local families who want their children to attend a school other than the local public school, as well as by migrant families whose children are not eligible for free public schooling. A second category of fees, labeled "in-school fees", is paid by all admitted children. It comprises "statutory tuition fees" and other miscellaneous in-school fees (e.g., for books, school materials, etc.). Statutory tuition fees are paid by local households whose children meet the entry requirements (such as hukou status or home location, etc.) set by public or private schools, as well as by the migrant children who secure admission. Finally, private tutoring fees refer to expenditure by families for additional educational services purchased outside the formal school education.

Our analysis provides the following results. Households migrating with children to cities have higher education-related expenses than local urban households, after controlling for social and economic characteristics. The analysis of the three subcategories of educational expenditure shows that migrant households spend larger amounts on institutional tuition fees, whereas urban households spend much more on private tutoring expenditure. Comparing the education-related expenses of permanent migrant households, who converted their hukou from a non-local to a local urban one, with that of temporary migrants who hold a non-local hukou, shows that the overall spending on education of permanent migrant households is lower than that of the temporary migrant households, even though they all have a migration background. The private tutoring expenditure of the permanent migrants is significantly higher compared to that of the temporary migrants.

The rest of the paper is structured as follows. Section 2 presents a literature review. Section 3 briefly depicts the hukou system and gives an overview of education-related costs in China. Section 4 outlines the theoretical framework. Section 5 describes the data and provides descriptive statistics. Section 6 presents the empirical strategies used, a tobit model and discusses the choice of the instrumental variable. The results are presented in Section 7. Section 8 concludes with a brief discussion.

2. Literature Review

As has been argued in the human capital literature starting with (Schultz 1961) and Becker (1962), obtaining a high level of education facilitates children's access to the labor market and improves their productivity. Many empirical studies have confirmed that investment in education and training indeed raises productivity and labor market earnings (Becker 2009; Gradstein and Justman 2000, 2002). In China, admission to university is considered to be one of the most effective ways for realizing upward social mobility (Wang et al. 2018; Zhao et al. 2017) and securing a university degree is a cornerstone in the lengthy and difficult process for migrants converting their rural hukou to a local city one (see Section 3). However, the way the migration background and the administrative hurdles created by the hukou-system constrains migrant families' investment in their children's human capital is at present insufficiently understood.

Post-migration investment in education has been investigated by many researchers (Borjas 1987; Khan 1997; Van Tubergen and Van de Werfhorst 2007). Mitrut and Wolff (2014) who explore the investment heterogeneity among different ethnicities in the same host country by examining whether immigrant Muslims in France invest differently in their children's education compared to non-Muslims immigrants. They find no evidence of differences in educational achievement between children of different religions, but show more within-family inequality in the distribution of educational resources among Muslims households relative to non-Muslims.

In the Chinese context, a few recent studies have attempted to study the patterns of household education expenditure. Using 2007 and 2011 data from the Urban Household Education Surveys, Chi and Qian (2016) find that education expenditure incurred outside school significantly contributes to the increase in overall household education expenditure. Yuan and Zhang (2015) identify the important role of public spending on education on the level of household spending on private tutoring in China. They argue that an increase in public education spending is associated with a significant reduction in school tuition fees paid by families in China. Chyi and Zhou (2014) investigate the effect of tuition reduction in rural parts in China on children's school enrollment. However, few studies have discussed the educational spending of migrant households in the city and addressed the inequality in educational expenditure between migrant and urban households. One exception is Dang et al. (2020), who investigated the role school fees play in the decision of Chinese migrant parents to leave their child behind or to migrate with them.

As a result of the household registration system of China, internal migrant workers face the similar barriers in the destination city as international immigrants in their destination country, in terms of accessing schools. Generally, the migration literature comparisons between migrants and natives are complicated by many differences that are to be expected between the host and origin countries (e.g., in terms of language spoken, culture, etc.). Chinese internal migration offers a rare opportunity to compare migrants with local urban households in the absence of such cultural differences. This is why, to assess the effect of administrative hurdles on educational cost, we compare education-related spending of rural migrants with not only local residents, but also with migrants to the city who successfully converted their hukou into a local city hukou. We extend the existing literature also by examining the structure of migrant households' expenditure, which is shaped by the need to substitute public expenditure on education by private expenditure on school attendance fees. By analyzing both aggregate level and subcategories of educational expenditure, we can provide insights into the patterns of total spending we observe.

3. The Chinese Context: Children's Education, Migration and Education Related Costs

Admission to university in China is decided primarily by the ranking of pupils' scores in the National College Entrance Examination, known as Gaokao in Chinese. Pupils may participate in the Gaokao after graduating from 3 years of non-compulsory senior high school education. Enrollment in senior high school education is itself conditioned by the successful completion of 9 years of compulsory education (the first six of which are considered elementary education, the subsequent ones constituting junior high school education). Generally, compulsory education starts at age 6.

The types of cost incurred by families to educate their children depend on the level of education their offspring attends, on the household's official registration (hukou) status, as well as on the choice of school that families make.

The hukou system is a household registration system established about six decades ago to facilitate resource distribution, to control internal migration, and to monitor criminal behavior. The hukou determines individuals' official place of residence and submits the right to migrate inside China to the approval of local governments. Each person is ascribed a household registration status (or hukou status) classified either as "rural" or as "urban", which ties the person to a single administrative unit. An individual must be registered in one and only one place, and can only draw on welfare benefits and public services, such as public education, in their place of registration. Families were originally registered in the places where they permanently resided when the policy was first enforced, in the late 1950s. Subsequently, children have automatically inherited the hukou status of one of their parents.[2] Children of migrants holding a rural hukou are thus still deemed rural, even if they are born in the city where their parents migrated. This policy has prevented many migrant workers' children who lack a local city hukou from attending public schools in cities.[3]

However, while the conversion of hukou status is difficult, it is not impossible. This conversion is not arbitrary, migrants need to meet the specific criteria set by the local government of the destination city. Since 1997, following the central government's proposal, certain cities, typically small cities, have begun easing their hukou conversion criteria. Migrants can convert their hukou status through channels like earning a higher education degree, making business investments or gaining employment at the destination. Notably, hukou conversions in small and medium-size cities, where state-provided welfare is limited, are considerably easier compared to larger cities with more job opportunities and public benefits. In major cities like Beijing, Shanghai, Guangzhou, or Shenzhen, local governments only grant local hukou status to individuals who are affluent, highly educated, or engaged in reputable positions within the public sector or large private companies (Cai 2011; Chan and Buckingham 2008; Song 2014). Zhang et al. (2019) report that between 2000 and 2013, qualifying for hukou conversion through investment in first-tier cities required investments of around CNY 3.4 million (about USD 425K). But once migrants successfully convert their hukou to a local status at the destination, they can expect to enjoy the same social welfare benefits, including education, as local citizens.[4]

Regarding education-related expenses, tuition fees that used to be charged by urban public schools have been formally abolished by the central government since September 2008 for all children enrolling in compulsory education at the public school situated in the neighborhood of their official (hukou) residence.[5] Private schools are, however, free to set tuition fees as they see fit, irrespective of the level of education they offer. Some private schools are able to charge tuition fees because they provide better education than local public schools, catering especially to pupils residing officially in cities. However, other private schools offer poorer education, but are able to extract tuition fees from migrant families who lack a local hukou and whose children are consequently barred from free public education.

Public schools in China have adopted an "enrollment in a nearby school" policy. The school's criteria for student selection is the family's residential address. Extra fees (institutional tuition fees) may be demanded of households who want their child to join a

public school other than the nearby school. Families holding a local hukou may choose not to enroll their offspring in the public nearby school of their place of residence presumably because the local school's quality is deemed unsatisfactory. Migrant families, the vast majority of whom do not have a local hukou in the city they migrated to, are charged the fees or are forced to offer "donations" to the public schools where they register their children, mirroring tuition fees that are demanded by private schools. This type of fees tends to be higher in more affluent cities (Zhang 2017), and they are far from insignificant: according to Goodburn (2009), a child without a local residence permit in Beijing was required to pay per term extra fees ranging from CNY 1200 (USD 175) to more than CNY 8000 (USD 1167).

Education-related expenditures also arise for households from the hiring of tutors outside of school (thus generating private tutoring fees), a practice which is very common in China's cities, regardless of the educational level attended by the children.[6] Data from the Chinese National Assessment for Education Quality suggests that 43.8% of fourth grade and 23.4% of eighth grade students participated in mathematics shadow education in 2015 (National Center of Education Quality 2018). Many parents see academic private tutoring as a supplement to school-provided education that can enhance the chances of admission to (the most prestigious) universities. Private tutoring is often provided by teachers as one-to-one instruction tailored to the needs of the individual pupil, but also in the form of optional after-school classes aimed to consolidate the lessons learned in class or as optional supplementary classes in cram schools, whose stated aim is to improve the children's test scores in school. Private tutoring also extends to non-academic skills, since mastering foreign languages and having artistic or athletic skills also count among the acceptance criteria used by prestigious higher education institutions.

Finally, a category of education-related expenditures borne by households spring from buying books and other school material, uniforms, food provided at the school, etc. The 2015 version of the Law on Compulsory Education stipulates that only slim profits may be drawn in China from selling textbooks used in public schools (OECD 2016).

4. Theoretical Model

We consider only[7] households living in urban China and their expenditure decision regarding their offspring's education. Suppose households of generation t differ in their origin (and thus hukou status), in their human capital endowment h_t^i, and in their taste for children's human capital accumulation.

A household i (with $i = u$ indicating urban households and $i = m$ identifying migrant households) at time t faces the following optimization problem:

$$\max_{e_t^i} h_{t+1}^i = \begin{cases} \mu \left[\theta^u + g^u(e_t^u) \right]^\eta (h_t^u)^\alpha (\overline{h_t})^{(1-\alpha)}, & \text{if } i = u, \\ \mu \left[g^m(\theta^m, e_t^m) \right]^\eta (h_t^m)^\alpha (\overline{h_t})^{(1-\alpha)}, & \text{if } i = m, \end{cases} \tag{1}$$

in which h_{t+1}^i is children's human capital and $\overline{h_t}$ is the quality of the education offered to the children. Parameter $\mu > 0$ is the productivity of children, which we assume to be the same for all children. We also assume η, $\alpha \in (0,1)$. $\theta^u > 0$ captures the facts that children with urban hukou enrolling in public schools gain human capital, even without private education investment, while $\theta^m \geq 0$ captures the situation that migrant children with rural hukou may not benefit from the public education if private investment is absent. $g^i(e_t^i)$ represents household i's private education-related investment which essentially depends on the hukou status of the household. Thus, we can assume

$$g^m(\theta^m, 0) = 0 \text{ and } g^m(0, e_t^{m,r}) \geq 0 \text{ if } e_t^m \geq 0.$$

Equation (1) is a modification of the classical human capital accumulation formulation, such as Glomm and Ravikumar (1992) and de la Croix and Doepke (2003).

Obviously, this model could be solved via the standard first order condition, provided the private household educational investment functions, $g^u(e_t^u)$ and $g^m(\theta^m, e_t^m)$, would be known. However, as has been shown above and as has mentioned by Yuan and Zhang (2015), some households' investment in their children's education is a substitute to public spending, while some household's spending is a complement to public spending, and for other households, the expenditure may serve as both a supplement and a complement. Therefore, instead of solving the first order condition by assuming some given educational investment functions, empirical tests are used in what follows to explore the differences in educational expenditure among of households with different hukou status.

5. Data and Descriptive Statistics

Our empirical analyses use data from two of the three surveys that compose the large-scale Rural–Urban Migration in China (RUMiC) survey[8] for the year 2008: the Urban Household Survey (UHS) and Migrant Household Survey (MHS). The two surveys were carried out through face-to-face interviews with the selected individuals and members of their households[9] in 15 cities from nine provinces: Shanghai, Guangdong, Jiangsu, and Zhejiang (destination provinces), and Anhui, Hubei, Sichuan, Chongqing, and Henan (origin provinces). Both collected rich information on demographic and socio-economic characteristics of household members living in the city, as well as data on broad household expenditure categories. Parents or custodians declared separately for each child the education-related expenditures they incurred in the year preceding the survey. The set of RUMIC surveys has been specifically designed to study the effects of migration in China, thus asking relevant questions to the households who are typically unavailable in standard surveys.

We define our sample by selecting families with children who were enrolled in compulsory education or senior high school education. We distinguish migrant households from local urban households based on whether the head of the household holds a non-local city hukou. Both of the surveys included only children who lived in the same city as the head of household. After excluding 129 observations whose information was missing on relevant variables, we analyze 1829 children in 1681 households, of which 498 migrant children and 1331 local urban children.

As mentioned before, education-related expenses from the survey were categorized into in-school fees, institutional tuition fees, and private tutoring fees. In-school fees included statutory tuition fees and other in-school fees (miscellaneous). Institutional tuition fees were usually incurred by holding non-local city hukou or registering children in a public school other than a nearby school.

Tables 1–3 report descriptive statistics on the characteristics of migrant households and local urban households as well as their spending.

Demographic characteristics and hukou status significantly influence households' education expenditure in China. Urban families spend, on average, only about 5% more on education compared to migrant families, though their average income per capita is more than 2.5 times as high. This sizable gap in income is not surprising, as local urban households are more likely to work in well-paying sectors, such as the public sector or the banking sector. By contrast, 77% of migrants are employed in the sector of wholesale, retail trade, technical and service activities, or in manual occupations. Heads of migrant households are, on average, younger and received many fewer years of schooling compared to urban household heads.

The only slightly higher level of total spending on education by urban households (CNY 4177) compared to migrant households (CNY 3992) shown in Table 2, as well a variability of spending that is twice as high among locals than among migrant households, are the net result of multiple influences. On the demographic side, the share of local urban children who were attending a grade beyond compulsory education was 9 percentage points higher than that of migrant children (see Table 1), which could be expected to raise the average expenditure of local households. The interplay between hukou policy and

household preferences results in starkly different public/private school attendance rates and levels of satisfaction with school quality for urban and migrant households. The share of children holding a local hukou who attend a private school is small (5%), consistent with existing literature. According to parents' own assessment of the quality of the school their children attended, 81% of local urban households deemed the school to be of good quality when their children attended a private school. Among migrants, the share of children attending a private is three times higher, reaching 15%. Yet, only a quarter of migrants that sent their children to private schools considered the private school to be a good school. This suggests migrant children are more likely to attend private schools of poorer quality than local children. The more detailed education-expenditure patterns presented in Table 2 add support to this hypothesis.

Table 1. Characteristics of children and households by household hukou status.

	(1) Local Urban	(2) Migrant	(3) Difference
Characteristics of the household or household head			
Household income per capita	25,974	11,484	14,489 ***
	(26,397)	(10,009)	(13)
Age	40.74	38.22	2.52 ***
	(5.34)	(5.02)	(9.62)
Male	0.67	0.75	−0.08 ***
	(0.47)	(0.43)	(−3.43)
Years of schooling	11.89	8.06	3.82 ***
	(3.37)	(2.72)	(23.92)
Employment sector			
Agriculture, industry and construction	0.29	0.19	0.10 ***
	(0.45)	(0.39)	(4.49)
Wholesale, retail trade, technical and service activities	0.42	0.75	−0.33 ***
	(0.49)	(0.43)	(−13.92)
Public sectors	0.19	0.03	0.16 ***
	(0.40)	(0.17)	(9.47)
Bank, insurance and real estate activities	0.04	0.02	0.03 **
	(0.21)	(0.13)	(2.81)
Other sectors	0.05	0.01	0.04 ***
	(0.21)	(0.07)	(4.65)
Characteristics of the child			
Public school	0.95	0.85	0.10 ***
	(0.22)	(0.36)	(7.39)
Good quality of school	0.68	0.40	0.28 ***
	(0.47)	(0.49)	(12.03)
Grade			
Elementary school	0.48	0.56	−0.08 **
	(0.50)	(0.50)	(−3.08)
Junior high school	0.25	0.27	−0.02
	(0.43)	(0.44)	(−0.81)
Senior high school	0.26	0.17	0.09 ***
	(0.44)	(0.37)	(4.47)
Proportion of people contacted living in cities	0.41	0.10	0.31 ***
	(0.14)	(0.13)	(46.01)
Observations	1331	498	

Data Source: RUMiC data. MHS wave 2008 and UHS wave 2008. *Note*: All education-related expenditures and income per capita are measured in Chinese yuan per year. Standard deviations are reported in parenthesis. **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 2 reports average spending on subcategories of education-related expenditures by household hukou status. The most important component of education-related spending for migrant households are institutional tuition fees (which are paid to secure admission into the school). On average, institutional tuition fees account for half of the overall educational costs born by migrant households. Urban households spent almost five times less on this type of fees (CNY 408), which amounted on average to about 10% of their budget of expenditure on education. Conversely, we observe a sizable gap in private tutoring fees paid by migrant and local urban households, with local urban households spending, on average, 7 times as much as migrant households (the shares of this expenditure type in the

education budget of local and migrant households are 23% and 3%, respectively). Local urban households spend, on average, 45% of their education budget on other in-school fees.

Table 2. Education-related expenditures by household hukou status.

	(1) Local Urban	(2) Migrant	(3) Difference
Total educational expenditure	4177	3992	185
	(5857)	(4028)	(0.649)
In-school fees	2819	1871	947 ***
	(4631)	(2160)	(4.389)
of which			
Statutory tuition fees	921	838	83
	(1558)	(1102)	(1.094)
Other in-school fees	1897	1033	864 ***
	(3976)	(1619)	(4.705)
Institutional tuition fees	408	1984	−1576 ***
	(1675)	(3063)	(−13.998)
Private tutoring fees	950	137	814 ***
	(1943)	(411)	(9.268)
Observations	1331	498	1829

Data Source: RUMiC data. MHS wave 2008 and UHS wave 2008. *Note*: All education-related expenditures and income per capita are measured in Chinese yuan per year. Standard deviations are reported in parenthesis. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Average amounts paid for statutory tuition fees are substantial, both for migrant and local households. Migrants' expenditure is about 10% less than that of locals. Thus, despite the official implementation of "free" nine-year compulsory basic education in urban areas since September 2008, we find, consistent with other existing literature, that households are still required to pay for some illegal and/or informal fees, including heating fees, exam fees, etc. (Kipnis and Li 2010; Zhang 2014). Children attending senior high school education pay legal tuition fees.

The heavier spending on institutional tuition fees by migrants and their lower average satisfaction with school quality suggest that migrants who cannot secure a place in public schools for lack of an urban hukou pay to enroll children in poorer quality private schools. Table 3, which shows a low correlation between household income and the amount of institutional fees paid, also compounds this evidence.

Table 3. Education-related expenditures across household income distribution.

Quintile	1st	2nd	3rd	4th	5th
Share of household					
Local urban	14.12	17.66	20.36	23.22	24.64
Migrant	40.36	26.91	14.46	10.84	7.43
Total educational expenditure	2575	3738	3954	4540	5649
	(2532)	(4955)	(6287)	(5179)	(6720)
In-school fees	1532	2129	2570	2823	3548
	(1811)	(3623)	(5479)	(3544)	(4860)
of which					
Statutory tuition fees	758	728	860	1041	1115
	(1039)	(970)	(1310)	(1706)	(1951)
Other in-school fees	774	1401	1710	1782	2433
	(1297)	(3284)	(5274)	(2800)	(3824)
Private tutoring fees	203	546	662	914	1353
	(502)	(1466)	(1548)	(1910)	(2366)
Institutional tuition fees	841	1062	722	803	748
	(1753)	(2725)	(1757)	(2261)	(2587)

Data Source: RUMiC data. MHS wave 2008 and UHS wave 2008. *Note*: All education-related expenditures are measured in Chinese yuan per year. Standard deviations are reported in parenthesis.

To gauge the relationship between educational expenditure and income, Table 3 shows the average level of subcategories of educational expenditure across the household income distribution. More than half of the migrant households cluster in the first two quintiles of the household income distribution, and only 7% of migrant households are in the top

quintile. By contrast, 25% in the top income quintile are local urban. As expected, moving up in the income distribution, the total educational expenditure, the in-school fees as well as the private tutoring expenses, increase. But this pattern does not hold for institutional tuition fees, where the maximum level of average expenditure is seen in the second income quintile and no clear pattern of association with household income is found.

6. Empirical Methodology

This section lays out the econometric framework used to investigate the heterogeneity in education-related expenditure and its subcategories between migrant households and local urban households. Our first strategy is to use an OLS model to estimate the effect of the hukou status on the total educational expenditure. We then rely on tobit models to estimate the impact of the hukou status on three of the subcategories of education-related expenditure (because many households in our sample reported zero expenditures for these subcategories).

The specification of the (standard) tobit model is as follows:

$$Y_{ih}^{(j)*} = \beta_0 + \beta_1 M_h + X_{ih}\beta_2 + P_h\beta_3 + X_c\beta_4 + \epsilon_{ih}, \tag{2}$$

where j indexes the type of educational expenditure for child i in household h, namely statutory tuition fees, institutional tuition fees and private tutoring fees[10]; the relationship between the actual outcome variables $Y_{ih}^{(j)}$ and the latent ones $Y_{ih}^{(j)*}$ is given by $Y_{ih}^{(j)} = max(0, Y_{ih}^{(j)*})$; M_h is taking a value of 1 if the head of household holds non-local city hukou and zero otherwise; X_{ih} is a vector of control variables referring to characteristics of each child i in household h, including the grade of the child, the quality of the school attended and the type of school in which the child enrolls. P_h refers to a vector of variables related to household characteristics, including the household income per capita, as well as the gender, age, years of schooling and employment status of the head of the household. X_c captures the characteristics of the destination city (e.g., public spending on education and the number of public schools). ϵ_{ih} is an error term with a mean equal to 0. Standard errors are clustered at the household level.

The parameter of interest is β_1. It indicates the difference between the rural-migrant and local urban groups in the households' propensity to spend or in actual households' spending on education per child living in the household.

Several potential sources of bias may affect this parameter. One of the primary concerns in studies of migration is the self-selection of the migrant population, with more able individuals being more likely to migrate. If, being more capable, migrants also earn more than locals, then they are likely to spend more on educating their children. However, in our data, the number of years of schooling achieved by migrants and locals is known. By introducing the years of schooling as well as the household income as control variables in our models, we are able to reduce concerns about self-selection, at least with regard to the educational achievement. To the extent that other unobserved factors such as grit or personal ambition are also correlated with educational achievement, their impact on our coefficient of interest (the hukou status) is also removed, thus mitigating bias concerns.

Rural–urban migrants may systematically differ from urban households on other intrinsic characteristics such as "soft" or social skills, or in the amount of social support they may receive in the local urban area. Many of these characteristics usually remain unobserved. Better social skills and having larger local urban social networks may provide migrants as well as locals with opportunities to gain both higher earning jobs and, most importantly, with access to public as opposed to private schools, to better quality schools, or to schools charging relatively lower fees, thus impacting educational-related expenditure. We lack a direct measure of social skills, but we use survey information on the share of the households' social network (i.e., number of people contacted during the Chinese New Year celebration preceding the survey) who are living "in cities" as a control variable in

order to address as best we can this issue. The control variable is labeled *proportion of people contacted living in cities*.

Another self-selection mechanism at play is that the propensity to migrate and to stay in the city is correlated with the gains that individuals can expect to earn in their destination region compared to what they can expect to earn in their origin region. The individuals who can expect the highest economic gains from migrating that are the ones most likely to migrate. Households whose members earn higher incomes are also more likely to spend more on educating their offspring. Furthermore, households who find themselves unable to sustain the high private costs in the cities might return to their regions of origin. This attrition leaves the "surviving" migrants' educational expenditure in the cities consistently high. To address this concern, we use an instrumental variable strategy (see below). We also control for the level of public spending on education in the destination city and for the number of public schools in the destination city in the attempt to isolate the effect of the affluence of the destination regions on households' own education-related spending.

We use the emigration rate from the migrants' province of origin during the year of the survey as our instrumental variable. This variable serves as a plausible instrument, as it is closely related to the likelihood of migration and its corollary, the *hukou status*, but does not directly influence household decisions on *education-related expenditure*. Higher emigration rates in a province signals poor economic or social conditions there, driving people to seek better opportunities elsewhere. Families in regions with higher emigration rates are, thus, more likely to migrate and hold a non-local hukou[11]. While the emigration rate in the province of origin is not expected to have a direct effect on households' educational expenditure, one concern is that migrants from provinces with higher emigration rates may have more social connections in destination cities. Having social ties with others who can provide support during the migration process makes the decision to migrate with children more likely. Social connections may also facilitate the admission of children from migrant families into public schools or help in selecting schools in the destination cities. This suggests that the emigration rate might also influence the educational expenditure, thus weakening our control strategy. Including in our models the *proportion of people contacted living in cities* aims to capture the effect of the size of households' social network on their education-related expenses.

We have undertaken a series of statistical tests to evaluate the validity of our instrumental variable and complement the intuitive reasoning that guided its selection. These tests confirm the instrument meets the necessary conditions to be included in the analysis. Specifically, we conduct tests for under-identification and for weakness of the instrument[12]. Under-identification refers to the possibility that the instrument is not sufficiently correlated with the endogenous regressor (migration status, in our case), meaning it may not provide adequate leverage to correct for endogeneity. When an instrument has only a weak correlation with the endogenous variable, biased estimates and misleading results in instrumental variable regression might be produced. The null hypothesis of under-identification as well as that of a weak instrument are both rejected (see Section 7) at a confidence level of 1%.

We use the user-written command -cmp- in Stata, which allows tobit-type dependent variables and binary endogenous explanatory variables to be included in the model. The estimation is implemented using the method of limited-information maximum likelihood (LIML). The module cmp solves simultaneous-equation systems, provided that recursivity and full observability conditions are met. Recursivity means that the equations can be arranged so that the matrix of coefficients of the endogenous variables in each other's equation is triangular. Recursive models have clearly defined stages, with one or more equations in each stage. We use the instrument to construct a recursive set of equations. The condition of full observability is also fulfilled, as the endogenous binary variable M_h is entirely observed. More details about this methodology can be found in Roodman (2011).

7. Results

7.1. Results of Education-Related Expenditures

We provide a series of estimates of the differences in education-related expenses between migrant and local urban households.

Table 4 shows the effect of hukou status on total educational expenditure. The first column displays the OLS estimates, columns (2) and (3) show the results after addressing the endogeneity concerns.

The first-stage results (column (2)) indicate a strong correlation between the emigration rate from the source province and the hukou status of households. First-stage F-statistics show that the null hypothesis of weak instrument is rejected at the 1% significance level.

Table 4. OLS and IV estimates for total educational expenditures.

	OLS	IV	
Dependent Variable	**(1)** **Total Educational Expenditure**	**(2)** **Migrant (IV-First, Stage)**	**(3)** **Total Educational Expenditure**
Out-migration rate in the source province		0.164 ***	
		(0.031)	
Migrant	1370.324 ***		6621.845 **
	(484.097)		(2964.226)
Household income per capita	19.557 ***	−0.002 ***	30.267 ***
	(6.721)	(0.000)	(9.377)
Age	81.777 **	−0.009 ***	131.589 ***
	(31.975)	(0.002)	(42.256)
Male	−435.248 *	0.064 ***	−757.999 **
	(257.618)	(0.016)	(312.477)
Years of schooling	159.928 ***	−0.022 ***	274.336 ***
	(40.400)	(0.003)	(79.458)
Employment sector(ref: agriculture, industry and construction)			
Wholesale, retail trade, technical and service activities	−176.566	0.095 ***	−679.751
	(333.183)	(0.018)	(451.227)
Public sectors	−441.048	−0.004	−424.693
	(414.533)	(0.020)	(425.921)
Bank, insurance and real estate activities	−534.139	−0.005	−496.024
	(575.835)	(0.030)	(590.537)
Other sectors	−159.623	−0.055 *	135.191
	(590.644)	(0.030)	(623.454)
Proportion of people contacted living in cities	−149.609	−1.247 ***	6528.698 *
	(1156.607)	(0.060)	(3767.634)
Public school	−2065.258 ***	−0.109 ***	−1454.273 **
	(533.101)	(0.025)	(684.957)
Good quality of school	1021.826 ***	−0.056 ***	1308.323 ***
	(241.984)	(0.016)	(327.247)
Grade of the child(ref:elementary school)			
Junior high school	922.045 ***	0.026	795.760 ***
	(287.477)	(0.017)	(308.611)
Senior high school	2685.917 ***	0.024	2569.610 ***
	(404.350)	(0.019)	(408.273)
Public spending on education in the destination city	0.127 ***	0.000 ***	0.120 ***
	(0.019)	(0.000)	(0.021)
Number of public schools in the destination city	0.076	−0.000 ***	0.054
	(0.081)	(0.000)	(0.085)
Constant	−1729.328	1.153 ***	−8936.760 **
	(1515.028)	(0.081)	(4321.114)
Adjusted R^2	0.126		
Kleibergen–Paap rk LM statistics		26.142 (*p*-value < 0.01)	
F test of first stage		27.532	
Observations	1829	1829	1829

Data Source: RUMiC data. MHS wave 2008 and UHS wave 2008. *Note*: Household income per capita is measured in thousand yuan while public spending on education is measured in million yuan. Standard errors in parentheses are clustered at the household level. Kleibergen–Paap rk LM test and F test statistics represent the corresponding statistics for the under-identification and weak instrument tests, respectively. Stock–Yogo weak ID test critical values: 10% maximal IV size 16.38. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

With regard to our main variable of interest, a substantially higher spending on children's education is observed on behalf of migrant households compared to local urban families (column (3)). After controlling for all children-, family-, and regional-level characteristics, the total spending of migrant households on education is about CNY 6622 higher than that of local urban households. The coefficient is significantly different from zero at the 5% confidence level.

The results concerning the subcategories of educational expenditure are shown in Tables 5 and 6. The tables present the marginal effects derived from the tobit results and the instrumental variable (IV) results, respectively.[13] Column (2) of Table 6 shows that the substantial difference in total educational expenditure between the migrant and local urban households is primarily due to substantially higher institutional tuition fees paid by households. For families with positive institutional tuition fees, the fees paid by migrant families were CNY 6963 higher than those of local urban families. This finding is consistent with previous results: households holding a local city hukou spent much less on this type of fees compared to the ones lacking a local hukou. Focusing on Beijing, Goodburn (2009) found that migrant children were charged 5 or 6 times the fees charged to local students during the years of compulsory education. The difference in the amount spent on statutory tuition was less pronounced and was not statistically significant after accounting for endogeneity in hukou status (column (1) in Table 6).

Considering families that paid private tutoring fees, migrants spent overwhelmingly less compared to locals (column (3) in Table 6). We estimate the spending of migrants to be CNY 1676 less than that of locals. One explanation of this finding is that other types of education-related costs who take priority over private tutoring, such as institutional tuition fees, have accounted for a significant share of migrant households' income, thus crowding out the spending on private tutoring.

Table 5. Tobit regression results of education-related expenditure.

Dependent Variable	Marginal Effects Conditional on Being Uncensored ($E(y/y > 0)$)		
	(1) Statutory Tuition Fees	(2) Institutional Tuition Fees	(3) Private Tutoring Fees
Migrant	148.241 **	1676.991 ***	−431.982 ***
	(60.208)	(178.219)	(97.912)
Household income per capita	0.884	3.584	1.367
	(1.062)	(2.368)	(1.143)
Age	7.213 *	10.163	3.478
	(3.944)	(9.498)	(5.756)
Male	54.686	−3.011	−146.669 ***
	(34.233)	(88.893)	(55.802)
Years of schooling	16.608 ***	−0.238	29.909 ***
	(5.720)	(14.648)	(7.755)
Employment sector (ref: agriculture, industry and construction)			
Wholesale, retail trade, technical and service activities	−36.095	−176.082 *	4.674
	(42.210)	(99.035)	(59.571)
Public sectors	43.352	−133.907	72.517
	(68.946)	(137.047)	(79.509)
Bank, insurance and real estate activities	100.381	−349.192	−21.107
	(113.683)	(264.973)	(103.601)
Other sectors	−31.720	−116.240	172.718
	(111.976)	(245.545)	(123.705)
Proportion of people contacted living in cities	2.605	−113.970	488.003 **
	(166.503)	(317.661)	(194.556)
Public school	−587.128 ***	−274.788 *	81.939
	(125.712)	(144.311)	(95.984)
Good quality of school	36.737	320.270 ***	123.255 **
	(32.373)	(89.018)	(54.096)
Grade of the child (ref: elementary school)			
Junior high school	204.814 ***	99.704	7.015
	(46.637)	(93.287)	(62.000)
Senior high school	787.561 ***	145.793	−194.009 ***
	(63.952)	(125.827)	(70.039)
Public spending on education in the destination city	0.018 ***	−0.017 ***	0.015 ***
	(0.003)	(0.006)	(0.004)
Number of public schools in the destination city	0.011 *	0.048 **	−0.020
	(0.006)	(0.022)	(0.013)
Number of uncensored observations	1649	514	793
Observations	1829	1829	1829

Data Source: RUMiC data. MHS wave 2008 and UHS wave 2008. *Note*: Household income per capita is measured in thousand yuan while public spending on education is measured in million yuan. Standard errors in parentheses are clustered at the household level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Our IV estimates (column (3) in Tables 4 and 6) are significantly larger than those found in our OLS model (column (1) in Table 4) or Tobit model (Table 6). As mentioned before, migrant families residing in cities with their children might undergo a self-selection process. Barriers such as restricted access to public services or discrimination in cities, can

prompt families unable to afford the high costs to leave the city. By only observing migrant families who can afford these private education costs, differences between migrant and local households are underestimated, making migrants appear more similar to local urban families in terms of educational expenditure. This bias cannot be adequately captured by the OLS or Tobit models. To compound this, when the urban and migrant households are different from each other on some unobserved characteristics, such as grandparents' help and financial contributions to grandchildren's education, then the estimates in standard OLS and Tobit model cannot be interpreted as causal effects. Children in the urban household may have other advantages than the children in migrant families. For instance, it is very common for grandparents to co-raise children with young parents in urban areas of China (Goh 2006; Sun and Jiang 2017). Given that the average annual income for urban grandparents is significantly higher than for the grandparents living in the rural parts (Xu 2019), grandparents in the urban areas are more likely to share parts of the financial burden of their grandchildren. The impact of the financial resources from grandparents can bias our estimates. The direction of bias is however determined by whether the financial support from grandparents substitute or complement the spending of household on their children's education. In our case, the effects estimated by OLS/Tobit were much smaller than those by IV estimation.

Table 6. IV tobit estimates on the education-related expenditures of households.

Dependent Variable	Marginal Effects Conditional on Being Uncensored ($E(y/y > 0)$)		
	(1) Statutory Tuition Fees	(2) Institutional Tuition Fees	(3) Private Tutoring Fees
Migrant	617.999	6963.287 ***	−1675.749 **
	(437.770)	(1915.534)	(707.254)
Household income per capita	1.837	14.420 ***	−1.066
	(1.488)	(5.466)	(1.743)
Age	11.657 **	59.342 ***	−7.754
	(5.655)	(21.600)	(8.582)
Male	25.567	−302.989 *	−78.510
	(45.665)	(174.653)	(69.383)
Years of schooling	26.824 **	105.870 **	4.470
	(11.872)	(45.563)	(16.437)
Employment sector (ref: agriculture, industry and construction)			
Wholesale, retail trade, technical and service activities	−80.719	−681.402 ***	124.653
	(59.898)	(241.507)	(96.459)
Public sectors	45.395	−147.321	69.644
	(71.049)	(207.732)	(83.311)
Bank, insurance and real estate activities	105.344	−406.664	−27.234
	(114.609)	(420.329)	(108.468)
Other sectors	−5.575	156.659	102.389
	(119.224)	(388.887)	(135.139)
Proportion of people contacted living in cities	600.213	6085.955 ***	−1050.248
	(551.986)	(2338.960)	(885.456)
Public school	−531.251 ***	226.801	−56.835
	(148.462)	(307.928)	(130.905)
Good quality of school	62.265	662.707 ***	61.442
	(39.003)	(177.600)	(70.487)
Grade of the child (ref: elementary school)			
Junior high school	194.514 ***	4.504	37.295
	(49.697)	(145.870)	(71.036)
Senior high school	772.637 ***	71.556	−175.898 **
	(66.739)	(178.760)	(76.243)
Public spending on education in the destination city	0.018 ***	−0.034 ***	0.016 ***
	(0.003)	(0.009)	(0.005)
Number of public schools in the destination city	0.009	0.046	−0.015
	(0.007)	(0.032)	(0.014)
Observations	1829	1829	1829

Data Source: RUMiC data. MHS wave 2008 and UHS wave 2008. *Note*: Household income per capita is measured in thousand yuan while public spending on education is measured in million yuan. Standard errors in parentheses are clustered at the household level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Tables 4 and 6 also report the estimated coefficients of our control variables. The positive impact of household income on educational spending is only significantly different from zero in the model estimating the total expenditure, with the effect on each subcategory of spending being small. A household headed by a male spent much less on children's education than a household head by a female, especially in terms of private tutoring. Years

of schooling of the head of household led to increases in the amount spent on statutory tuition fees and private tutoring fees. Total spending on education for households with children studying in private schools was higher than families whose children were enrolled in public schools. Households with children in public schools paid less statutory tuition fees than households with children in private schools and the former household also spent less on institutional tuition. We also observe differences in institutional tuition fees between children who study in good quality schools and children who do not. This suggests that parents are willing to pay fees to register their children in schools they consider to be good schools rather than let their children study in the local free public school. Not surprisingly, as the grade attended by children rises, the total educational spending increases. This is mainly explained by the fact that higher statutory tuition fees are charged in senior high school compared to the compulsory education phrase. Households' spending on education can be both a substitute and a complement to public spending. The impact of public spending on families' educational expenditure thus depends on which effect prevails. Our results show that higher public spending on education in destination cities is associated with an increase in overall family educational expenditure.

To summarize, our results point to a ceteris paribus higher spending by migrant households on the education on their children, compared to local urban households. But migrant children are much more likely to live in lower income households, with less educated household heads, and to attend schools of poorer quality. This is why the total private investment into their education is predicted to be lower than that of local urban children, suggesting a disadvantage for the migrant children.

7.2. Robustness Tests

A series of robustness checks has been carried out to ensure the reliability and consistency of the results discussed in the previous section. These checks assess whether our findings hold under different model specifications and assumptions. The estimated coefficients for the key variable of interest, denoted as M_h, are presented in Table 7. These estimations are conducted using the same set of control variables as in the baseline regressions, thus maintaining consistency across all models.

In Panel A of Table 7, we provide marginal effect estimates of the hukou status on the education-related expenses per child, as opposed to the total household expenditure. The results presented in Panel A allow us to verify that the relationship between migration status and education spending persists.

We have also checked for the sensitivity of our results by omitting from the sample the households who converted their hukou status. As discussed in Section 3, migrants can convert their rural hukou status to local urban status if they meet the eligibility requirements set by the government of the destination city. This conversion opens access for households to free public services, including education, and thus may affect their spending patterns. In our sample, 315 households reported that they had successfully changed their hukou status during the survey period.

We present in panel B the estimate of the marginal effect of the hukou status after restricting our analysis to this more homogeneous sample. We limit the sample to include only migrant households that have retained their rural hukou and local urban households that have never undergone hukou conversion, this approach allows us to isolate the effects of migration itself, separate from the additional influences that may arise from hukou conversion.

Finally, in Section 7.3, we consider the heterogeneity of educational costs across three distinct groups: migrant households, urban households that have converted their hukou status, and urban households that have never needed to do so. This analysis explores how the process of hukou conversion may create disparities in access to educational resources and how these disparities manifest in household spending.

The coefficients in Panel A and Panel B show slight differences in magnitude compared to the baseline results, but there is no change in the sign or statistical significance of the

results. The finding that migrant households spend more on institutional tuition fees but less on private tutoring fees compared to urban families remains robust.

Table 7. Robustness tests.

	Marginal Effects Conditional on Being Uncensored ($E(y/y > 0)$)		
Dependent Variable	**(1)** **Statutory Tuition Fees**	**(2)** **Institutional Tuition Fees**	**(3)** **Private Tutoring Fees**
Panel A.			
Education-related expenses per child			
Migrant	437.862	5897.898 ***	−1652.533 **
	(403.229)	(1629.718)	(685.961)
Observations	1829	1829	1829
Panel B.			
Urban households that never changed hukou status			
Migrant	206.402	9285.181 ***	−2817.841 **
	(698.57)	(3476.969)	(1425.451)
Observations	1514	1514	1514

Data Source: RUMiC data. MHS wave 2008 and UHS wave 2008. *Note*: The specifications include the same characteristics of children and household as Table 6. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Standard errors in parentheses are clustered at the household level.

7.3. Comparison of Education-Related Expenditures between Temporary Migrant, Permanent Migrant Households and Urban Households

Migrant families in the destination city were observed to spend significantly more on education compared to local urban families, with a substantial part of these expenses being related to institutional tuition fees. These fees were charged to families enrolling their children in public schools located in a place different from where they registered their hukou or a private school. The lack of a local hukou in the destination city for migrant households is a key factor driving institutional tuition fees.

As mentioned above, 315 households in our sample reported a change in their hukou status. In this section, we analyze the households who have transitioned from a non-local city hukou to a local one, becoming permanent migrant households, as a separate category. Temporary migrant households are those who still held a non-local hukou while living in the city. Upon successful hukou conversion, permanent migrants are expected to enjoy the same privileges in public education as locals. In this section, we examine whether disparities exist in education-related expenses among these three groups.

In Table 8, we report the characteristics of children and households. Compared to temporary migrant households, permanent migrant households have on average a 2.5 times higher household income than the temporary migrants (column (1) and column (3)). A substantial gap exists in terms of educational achievement, with permanent migrants having finished on average 3 years more schooling than temporary migrants. Permanent migrants were more likely to work in the public sectors than temporary ones. These findings confirm that migrants in the city convert their hukou status through the channels of investment, education or employment. After removing the administrative hurdles, permanent households benefit from public education in the destination city. Only 4% of children were enrolled in the private schools and 65% of permanent migrants were satisfied with the quality of the school attended by their child. No statistically significant differences between permanent migrant households and local urban households are found in terms of household and children's characteristics, except for a slight age difference (on average the head of permanent migrant households being slightly younger than the head of urban households).

We re-estimated the models presented in Section 7 to assess whether the investment in education is different between these three groups of households. Table 9 shows that, after controlling for the characteristics of children and households, the amount spent by permanent migrants differed significantly from the amount spent by temporary migrants and was mainly driven by higher institutional tuition fees and lower private tuition fees. For those families that paid institutional tuition fees, the expected expenditure on this type of education was CNY 1490 higher than that of permanent migrants with similar character-

istics. This underscores the heavy burden borne by temporary migrant households who do not have local hukou status and who cannot access free public education. Conversely, the expected expenditure of temporary migrants on private tutoring was CNY 395 less compared to the permanent migrants. Temporary migrant households also incurred higher statutory tuition fees compared to permanent migrant households.

Table 8. Children and household characteristics of temporary, local urban and permanent households.

	Temporary Migrant	Local Urban	Permanent Migrant
Characteristics of the household or household head			
Household income per capita	10,932 ***	25,784	26,551
	(8871)	(25,690)	(29,078)
Age	38.042 **	41.222 ***	39.114
	(4.84)	(5.44)	(4.53)
Male	0.749	0.660	0.702
	(0.43)	(0.47)	(0.46)
Years of schooling	8.014 ***	12.078	11.225
	(2.67)	(3.21)	(3.84)
Employment sector			
Agriculture, industry and construction	0.181 **	0.301	0.263
	(0.39)	(0.46)	(0.44)
Wholesale, retail trade, technical and service activities	0.769 ***	0.403	0.457
	(0.42)	(0.49)	(0.50)
Public sectors	0.026 ***	0.193	0.222
	(0.16)	(0.39)	(0.42)
Bank, insurance and real estate activities	0.018	0.048	0.035
	(0.13)	(0.21)	(0.18)
Other sectors	0.006	0.055 *	0.022
	(0.08)	(0.23)	(0.15)
Characteristics of the child			
Public school	0.845 ***	0.943	0.956
	(0.36)	(0.23)	(0.21)
Good quality of school	0.388 ***	0.695	0.651
	(0.49)	(0.46)	(0.48)
Grade			
Elementary school	0.584	0.458 ***	0.568
	(0.49)	(0.50)	(0.50)
Junior high school	0.277	0.259	0.232
	(0.45)	(0.44)	(0.42)
Senior high school	0.139 *	0.283 **	0.200
	(0.35)	(0.45)	(0.40)
Observations	498	1016	315

Data Source: RUMiC data. MHS wave 2008 and UHS wave 2008. *Note:* All education-related expenditures and income per capita are measured in Chinese yuan per year. Standard deviations are reported in parenthesis. Asterisks indicate p value from t test for the difference between that group and permanent migrant household group: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Table 9. Estimates of hukou status on the education-related expenditures of migrant households.

	OLS	Marginal Effects Conditional on Being Uncensored ($E(y/y > 0)$)		
	(1) Total Educational Expenditure	(2) Statutory Tuition Fees	(3) Institutional Tuition Fees	(4) Private Tutoring Fees
(ref: permanent migrant)				
Temporary migrant	1568.684 ***	191.743 ***	1490.025 ***	−395.234 ***
	(467.811)	(62.276)	(105.067)	
Local urban	372.903	80.658	−245.52 *	68.803
	(310.775)	(51.46)	(128.56)	(66.952)
Observations	1829	1829	1829	1829

Data Source: RUMiC data. MHS wave 2008 and UHS wave 2008. *Note:* The specifications include the same characteristics of children and household as Table 6. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Standard errors in parentheses are clustered at the household level.

No disparities were found in statutory tuition fees and private tutoring fees between permanent households and urban households. However, permanent migrant households paid higher institutional tuition fees compared to local urban families. This finding can be explained for reasons outlined in Section 3. Due to data limitations, we are not able to explore this disparity further[14]. Research on this aspect in the future should be pursued.

Overall, our findings highlight that migrant households with local city hukou have a different pattern of spending on their children's education compared to migrant households without a city hukou. Temporary migrant households had to substitute public spending

with the private expenditure, while permanent migrant households and local urban households complement public spending on education with private investment in the human capital of children.

8. Discussion

The education of children is an important issue for many migrant families. Chinese internal migrant children face significant barriers to the access public schools in the destination city because of the hukou policy. These barriers may deter many families from migrating together with their children or reduce the consumption and well-being of all members of families who migrate together with their children to the city.

In this paper, we studied the effect of hukou status on households' expenditure on the children's education, as well as the structure of this spending. Using the 2008 wave of RUMiC data, we first compared the educational cost of migrant households that did not hold local city hukou to that of local city residents in the host cities and then compared the differences in education-related expenses among those families with different hukou status. Our analysis showed that overall educational expenditure of migrants overwhelmingly exceeded the expenditure of local urban households, even after controlling for social and economic characteristics. However, there was substantial heterogeneity in this effect by different types of expenditures.

In terms of formal education, we observed at the descriptive level only small differences between institutional tuition fees across the income distribution, suggesting that this type of fee was charged regardless of migrants' income. Our regression results showed that migrant households spent far more on institutional tuition fees than local households. Moreover, there were notable differences in institutional tuition fees when comparing migrant households without local hukou with those who had successfully converted their hukou. These findings were consistent with existing evidence on how the hukou system had created administrative and financial barriers for migrants to access affordable formal schooling (Goodburn 2009; Wei and Gong 2019; Xu and Wu 2022; Zhang 2017). Migrant households are forced to pay to attend the local public schools. Despite the central government's efforts to reduce barriers to education for migrant children, in recent years, as urban expansion has outpaced the development of urban schooling capacity, many large cities in China have tended to implement stricter enrollment policies that restrict migrant children's access to education in the destination city (Chen and Fu 2023).

However, compared to local urban households, migrant households invested significantly less in private tutoring, often referred to as shadow education, as its curriculum closely mirrors that of formal schooling. For temporary migrants, their spending on private tutoring fees was also lower than that of their counterparts who had acquired city hukou. The significant gap in spending on private tutoring has profound implications in the Chinese context, where parents view shadow education as an essential way for enhancing academic performance, despite ongoing debates about its effectiveness (Dang 2007; Suryadarma et al. 2006; Zhang 2013; Zhang and Liu 2016). Lower spending on private tutoring did not reflect lower aspirations on the part of migrant households, but rather externally imposed budget constraints, as we did not observe a statistically significant difference in private tutoring investment between migrant households that had changed their hukou and local urban households. The additional fees imposed on migrants put a strain on their financial resources. As a result, unlike local urban households who can spend discretionary funds on private tutoring, migrant families had limited financial flexibility, making it more difficult for them to afford additional educational support. The divergence in opportunities for migrants resulted from institutional policies that not only limited their access to affordable formal education at the destination, but also restricted their financial freedom to optimize their educational investments in informal schooling. These double disadvantages may hinder upward mobility of migrant children and perpetuate their continued disadvantage. For example, Goodburn (2020) finds that migrant youth, regardless

of their educational pathways, are directed towards low-skilled urban service work in Shenzhen when they grow up.[15]

It is worth noting that our analysis compared educational expenditures across permanent migrants, temporary migrants, and local urban families; however, permanent migrants who successfully obtained local hukou status likely differed fundamentally from the other two groups in some unobserved characteristics like ability and motivation. This selectivity added complexity to causal interpretation, raising the possibility that expenditure differences may be triggered by pre-existing factors rather than migrant status alone. Future research should focus on disentangling these selection issues. Additionally, we still observed heterogeneity in institutional tuition fees between migrant households that had already changed their hukou status and local urban households, emphasizing the need for further study to investigate the mechanisms driving this gap.

9. Conclusions

Our findings complement the literature on education of migrant children in China by documenting the heterogeneity in household educational investment among residents in urban areas of China. Our results have shown that the hukou policy indeed put the financial burdens on migrant parents in the host cities. Migrant families have to top up their children's school attendance fees with substantial private expenditures. The pattern of higher expenditure on formal schooling but lower expenditure on informal schooling for migrant families reflects their doubly disadvantaged position. Excessive compulsory payments and insufficient discretionary investment in education mean that migrant families are not only priced out of public systems, but also constrained in their ability to optimally allocate financial resources to education. The substantial educational disadvantages of migrant children relative to the local urban children can lead to the inequalities between migrant and urban children in terms of school attainment and future job opportunities, which may result in the persistent differences between migrants and the local city residents and then pose a threat on the economic development and social stability.

While the 2008 Rural–Urban Migration Survey in China provides valuable historical insights, there are several limitations to consider. The data are over 15 years old, and may not accurately reflect current trends and conditions due to significant economic, social, and policy changes since then. Numerous reforms to the hukou system aimed at improving migrant integration and access to education are not captured in the 2008 data. Additionally, technological advancements and economic shifts have altered education investment patterns, making the data less representative of the present day. Furthermore, the sample from 2008 may not be representative of the current population, given the large-scale internal migration and demographic changes over the past 15 years. Nonetheless, this historical context is crucial for identifying patterns and shifts over time, evaluating the effectiveness of policies, and conducting longitudinal analyses. Additionally, the 2008 data can serve as a foundation for future research, enabling comparisons with more recent data.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Marginal effects on the expected value of education-related expenses ($\frac{\partial E(y)}{\partial x_j}$)).

	(1) Statutory Tuition Fees	(2) Institutional Tuition Fees	(3) Private Tutoring Fees
Migrant	824.986	7670.351 ***	−2129.904 **
	(575.427)	(2000.221)	(901.409)
Household income per capita	2.452	15.884 ***	−1.354
	(1.967)	(5.818)	(2.216)
Age	15.561 **	65.368 ***	−9.855
	(7.424)	(23.114)	(10.928)
Male	34.130	−333.755 *	−99.788
	(61.166)	(189.687)	(88.034)
Years of schooling	35.808 **	116.620 **	5.681
	(15.479)	(48.774)	(20.882)
Employment sector (ref: agriculture, industry and construction)			
Wholesale, retail trade, technical and service activities	−107.881	−746.019 ***	158.072
	(79.210)	(254.810)	(122.498)
Public sectors	60.420	−165.016	87.767
	(94.535)	(232.160)	(105.195)
Bank, insurance and real estate activities	139.843	−450.771	−33.890
	(151.384)	(460.231)	(134.623)
Other sectors	−7.435	177.408	129.522
	(159.032)	(441.338)	(172.609)
Proportion of people contacted living in cities	801.242	6703.933 ***	−1334.883
	(728.537)	(2489.607)	(1127.120)
Public school	−709.182 ***	249.831	−72.238
	(200.073)	(336.806)	(166.467)
Good quality of school	83.120	729.999 ***	78.093
	(51.536)	(187.669)	(89.466)
Grade of the child (ref: elementary school)			
Junior high school	267.864 ***	4.951	47.993
	(68.635)	(160.380)	(91.538)
Senior high school	1030.735 ***	78.925	−220.859 **
	(85.963)	(197.096)	(94.460)
Public spending on education in the destination city	0.024 ***	−0.037 ***	0.021 ***
	(0.004)	(0.009)	(0.006)
Number of public schools in the destination city	0.012	0.051	−0.019
	(0.009)	(0.035)	(0.018)
Observations	1829	1829	1829

Data Source: RUMiC data. MHS wave 2008 and UHS wave 2008. *Note*: Household income per capita is measured in thousand yuan while public spending on education is measured in million yuan. Standard errors in parentheses are clustered at the household level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table A2. Marginal effects on the expected value of education-related expenditures among households ($\frac{\partial E(y)}{\partial x_j}$).

	(1) Statutory Tuition Fees	(2) Institutional Tuition Fees	(3) Private Tutoring Fees
(ref: permanent migrant)			
Temporary migrant	257.424 ***	1538.306 ***	−494.601 ***
	(83.370)	(188.254)	(131.365)
Local urban	108.288	−253.475 *	86.101
	(69.201)	(133.057)	(83.695)
Observations	1829	1829	1829

Data Source: RUMiC data. MHS wave 2008 and UHS wave 2008. *Note*: The specifications include the same characteristics of children and household as Table 6. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Standard errors in parentheses are clustered at the household level.

Notes

[1]   To the extent that rural–urban migrants' stay in the cities is temporary, destination regions have no incentive at all to invest in the education of incoming migrant children. Destination regions often prefer to allocate resources to generating rapid economic growth rather than to providing public education. The poorer origin regions often lack the means to support the educational costs incurred by migrants to richer regions (Dang et al. 2020). However, in their endeavor to integrate into the host cities and secure better economic prospects for their children, migrant parents have strong incentives to invest in their offspring's education. For rural–urban migrant children, achieving higher education is also essential in the difficult and lengthy process of converting their rural hukou into a local city hukou.

[2]   Until 1998 a newborn's hukou status followed that of its mother.

[3]   This description of the hukou system draws on (Chan and Buckingham 2008; Zhang et al. 2019).

[4] This conversion has equivalent effects to that of migrants obtaining local citizenship in the western context of immigration.

[5] Tuition fees that used to be charged by rural public schools were abolished by the central government in the spring of 2007 (ChinaDaily 2006).

[6] This is the case even though, in the field of educational studies, it is still debated whether private tutoring benefits children's school performance (Zhang and Liu 2016).

[7] A more general theoretical study of Chinese internal migrants' choice concerning their children's location and school performance can be found in Chen et al. (2019).

[8] A detailed description of this survey's methodology was provided by Kong (2010) and Akgüç et al. (2014).

[9] Households were defined as persons living together at the time of the survey and sharing income and expenditure.

[10] The analysis of the "other in-school fees" collected in the survey is not pursued.

[11] In the literature, the proportion of people migrating within a community or province has already been used as the instrument for individual migration behavior (Dustmann and Glitz 2011; Khan 1997; Wang et al. 2019).

[12] As our model is just-identified, we are not able to perform overidentification tests such as the Hansen J test.

[13] In Tables 5 and 6, we report the average marginal effects conditional on being uncensored ($\frac{\partial E(y/y>0)}{\partial x_j}$). The average marginal effects on the unconditional expected value of y ($\frac{\partial E(y)}{\partial x_j}$) can be found in Appendix A.

[14] We also conducted propensity score matching (PSM) between the permanent and local urban households. The results based on the PSM approach are consistent with the results presented. The results are not presented here and are available upon request.

[15] Empirical research exploring the long-term and cumulative impacts of the experiences of migrant children remains limited, presenting a potential direction for future research.

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