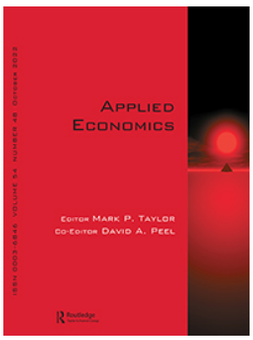
Internal migration, children's schooling and gender gaps in education



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Internal migration, children's schooling and gender gaps in education

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ABSTRACT

In many sub-Saharan African countries, a large number of people migrate internally due to economic, demographic and political factors. We ask whether household mobility affects child educational outcomes and in what direction. Because girls and boys face different challenges in achieving education, and families often underinvest in girls' human capital, we focus on gender differentials. We study the case of Uganda, a country where universal basic education and gender equality are still complicated goals. We use the National Panel Survey of 2005, 2009, 2010 and 2011 to develop fixed effects models of the relationship between mobility and children's educational outcomes: school delay and attendance. We find that moving with the family during primary or lower secondary school decreases delay in schooling and increases school attendance for boys, while we do not find any significant effect for girls. We argue that our results confirm pro-male preferences of families, where girls do not benefit equally from the opportunities offered by internal migration. Expanding girls' opportunities, as well as providing adequate services, are crucial steps in achieving gender equality in education.

KEYWORDS

Internal migration; gender disparity; school delay; Uganda; child education

JEL CLASSIFICATION

I25; J13; O15

I. Introduction

Research on the relationship between education and migration is abundant, but many important questions remain unanswered. One of them is whether and how internal migration, which is pervasive in many sub-Saharan countries, will affect children's education in a region where school progression and the gender gap in education still represent important challenges. In this paper, we focus on Uganda and examine the gender-differentiated effect of family mobility on children's school progression.

In many sub-Saharan African (SSA) countries, the lack of infrastructure and government funds, and often institutional frailty, take a severe toll on achieving universal education (Glewwe and Muralidharan 2016; Glewwe et al. 2021). Problems arise in the attendance and consequently completion of elementary school because of late enrolment, grade repetition and dropout before completion of the entire cycle (UNESCO 2015). In the region, 32.2 million children of primary school age are out of school, with a higher out-of-school rate for girls, 21.4% against 16.3% for boys; out-of-school rates of lower secondary adolescents reach the huge figure of 35% for boys and 38% for girls (UNESCO 2019). The chronic shortage of well-trained teachers (UNESCO 2021; Bold et al. 2017), also determined by low teacher pay (Evans, Yuan, and Filmer 2022), and school fees (UNICEF 2009; Talan, Rosenblum, and Tinker 2015) contribute to this critical situation.

Girls' education has a plethora of positive impacts on society: from children's educational attainment and achievement (Behrman and Rosenzweig 2002; Carneiro, Meghir, and Parey 2013; Cui, Liu, and Zhao 2019) to lower fertility and child mortality rates (Chicoine 2012, 2021; Gakidou et al. 2010; Andriano and Monden 2019; Schellekens 2021). In Uganda, primary school fee abolition reduced fertility (Burlando and Bbaale 2022); the rise in girls' secondary school enrolment resulted in a decline of the HIV epidemic (Alsan and Cutler 2013) and educating mothers leaded to greater adoption of health-promoting behaviours by the household (Björkman-Nyqvist and Jayachandran 2017). Moreover, the literature has found that education expands girls' and young women's aspirations, leading to an increase in the entrepreneurship and leadership of a country, thus

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potentially breaking the circle of under-education of girls (O'Neil, Plank, and Domingo 2015); educated girls also outperform boys in academic achievements (Buhl-Wiggers, Jones, and Thornton 2021). Investing in girls' education seems therefore one of the best investment choices, at least at the national level (Sperling and Winthrop 2016).

Despite its many positive effects and countries' efforts to promote education for girls, in SSA, reducing gender differences in education, even at lower education levels, remains one of the main challenges to reach Sustainable Development Goal 5, 'Achieve gender equality and empower all women and girls'. Girls' enrolment in primary and secondary education has grown only slightly over time, representing a disadvantage for girls emerging early in childhood and increasing in the poorest households (Filmer 2005; World Bank 2012, 2018).

The choice of investing in education remains ultimately with the household, whose incentives and preferences may differ from the wider societal ones and, at the same time, may be influenced by other considerations, including opportunity costs, community expectations, and social norms around gender roles. In a standard model of investment in education, potential returns are weighted against direct and indirect costs: if both direct (fees, uniform, transport) and indirect (opportunity cost of time) costs of girls' education are higher than boys', families will prefer to allocate resources towards the education of boys.

The economic and social structures determine different returns and costs patterns for boys and girls. If the value of women's work is not increasing in education, and the cost of working outside the home for women is higher than the value of their domestic contribution, then investing in girls' education will not be an efficient allocation of family's resources. For boys, the net return of investment in education is more likely to be positive.

Evidence confirms this conceptual framework, showing that girls' education is often more sensitive to costs (Evans and Yuan 2022). Negative income shocks also affect girls' education: Björkman-Nyqvist (2013) finds that in Uganda a negative income shock due to changes in rainfall results in lower enrolment and lower scores on academic tests for girls, but not for boys, showing that families reallocate resources away from girls' education in the face of a tighter budget. In SSA, women's labour force participation rate is 60%, while men's participation rate is 72%, and in Uganda, 64% and 71% respectively. Although not huge gaps, there is still an economic disadvantage for women.

As to the role of internal migration for children's education, Uganda like other SSA countries is characterized by substantial flows of internal mobility prompted by demographic, economic and political factors (Lucas 1997, 2015). A large part of this mobility in SSA takes place from rural areas to other rural areas (Castaldo, Deshingkar, and McKay 2012; Christiaensen, De Weerdt, and Todo 2013; De Brauw, Mueller, and Lee 2014; Wineman and Jayne 2017). The factors that drive this type of population mobility are similar to other types of migration, and include: the search for better economic opportunities and amenities (Ruyssen and Rayp 2014), the displacement resulting from climate change and natural disasters (Kubik and Maurel 2016), the desire for family formation and unification (Beegle and Poulin 2013), and the need to escape conflicts and violence (Naudé 2010).

This pronounced household mobility is likely to have produced consequences for child education, since, as said, Uganda still is far from reaching the goal of universal primary or lower secondary education, experiencing high repetition rates and low primary school completion rates. In principle, we would expect migration to be beneficial for children's education, since families will move to areas with higher services and better quality of life, as well as better economic opportunities.

In this paper, we seek to understand whether internal mobility affects child education and in what direction. Because education has different costs and returns by gender, we do so separately for boys and girls. We investigate the relationship between children's mobility, defined as internal changes of residence, and child education outcomes in terms of grade delay and school attendance. From a theoretical standpoint, mobility can have different effects on the education of boys and girls: 1) mobility affects boys' and girls' education in the same direction; 2) mobility has differentiated effects by gender. Because of the prevalent socio-

economic structures, including expected returns on education and gender norms, we expect outcomes to be null or negative on girls, and null or positive for boys. To date, we are aware of only one paper, the study by Lin, Sun, and Xing (2021), that has examined, as we do here, the gendered-effects on education of children migrating internally with their parents. The authors, who focus on rural-urban migration of Chinese households, find that girls are more often left behind, because of son's preferences. These preferences are revealed by the 'Hukou' system that makes migration to cities quite costly for rural household, thus unveiling the fact that in the Chinese economy daughters' education is a less convenient investment in human capital with respect to boys' education.[1]

Drawing data from the Uganda National Panel Survey (UNPS) for 2005, 2009, 2010 and 2011 (Uganda Bureau of Statistics, 2005–2009, 2010–2011, 2011–2012), and exploiting the longitudinal nature of the survey, we are able to follow children's migration experiences and school outcomes from ages 5 to 9 in 2005 until they reached ages 10 to 15 in 2011. Therefore, at the baseline, children were either about to start school or of primary school age, while at the end line, they were about to complete primary school or had already entered lower-secondary school. Methodologically, we first develop and implement a simple linear regression model with child individual fixed effects to quantitatively assess the effect of moving on school delay and school attendance, controlling for individual unobserved heterogeneity. We find that boys who have moved experience a significant reduction in school delay and a significant increase in school attendance, while for girls, we do not find any significant effect. Second, we address the issue of selection, which underlies the decision to move, instrumenting migration with the presence of non-school infrastructures at destination, since we observe that the growth of non-school facilities in the communities of destination was higher for movers than for non-movers. We argue that households moved internally to places with better amenities and quality of life so that moving improved boys' education outcomes through this channel. The IV with fixed individual effects estimates confirms the direction and significance of the effects found with the simpler OLS-FE model.

Our paper contributes to the literature of gender differences in education analysing the effect of a phenomenon, internal mobility, which is quite common in the region and the country. We add new insights in two main ways: first, most of the literature on the effects of mobility on education, focuses on children left behind, while we observe children moving with their families, a rather overlooked issue for developing countries. Currently, there is plenty of evidence regarding the effects on the education of children left behind by migrant parents (McKenzie and Rapoport 2011; Antman 2012; Zhou, Murphy, and Tao 2014) and children's independent migration (Hashim 2007; Zimmerman 2003). The body of available literature on the effects of migration of the whole family on children's educational performance at destinations is also rich, but the majority of studies concern international migrants in developed countries (Akresh and Akresh 2011; Ohinata and Van Ours 2012). Second, the literature on gender differentials in education focuses mainly on exogenous income shocks (Björkman-Nyqvist 2013; Bandara, Dehejia, and Lavie-Rouse 2015). We add evidence of an endogenous kind of shock: household migration. Finally, we add evidence on the gender gap in education in Uganda (Wells 2009; Björkman-Nyqvist 2013), and show that rural-to-rural mobility can actually be beneficial for households' welfare (Wineman and Jayne 2017) and economic diversification (Christiaensen, De Weerdt, and Todo 2013).

We find that migration of the family has a positive effect on boys' education and that, as in Björkman-Nyqvist (2013), the effect is stronger for older children. However, we find no significant effect on girls. These findings add to the evidence of the preferences of families for allocating resources towards sons, rather than daughters as found in Lin, Sun, and Xing (2021). While girls are not worse off because of migration, they do not benefit from it.

The paper is organized as follows. In the following sections, we present the Case of Uganda and the

[1]Chea and Wongboonsin (2020) investigates the effects of internal rural-urban migration in Cambodia on the education of children left behind compared to the effects on children migrating with their parents. The study finds that children migrating with their parents are disadvantaged, but this result is not differentiated by gender since the survey does not ask about the sex of the child.

Data and Methods. We then show our Results, discuss how they are placed in the literature, and provide conclusions.

II. The case of Uganda

The choice of Uganda as a case study of the relationship between education and migration is justified by three main relevant factors.

First, universal primary and lower-secondary education are still considered difficult goals in Uganda, even though gross enrolment ratios have risen in recent years. According to the International Standard Classification of Education (ISCED) mapping of the Ugandan educational system, the official entry age for primary education is six years. The official entry age for secondary education (O' level) is 13 and for upper-secondary education (A' level) is 17. Diploma and bachelor's degree programmes start at age 19, and post-graduate studies start at age 22.

In the period we study, the majority of Ugandans had either no formal education or, at most, some primary education. According to the Demographic and Health Survey for 2011, 56.8% of women and 65.1% of men aged 15 to 19 had completed some grades of primary education. Only 9% of women and 5.8% of men in the same age range had completed primary education (Uganda Bureau of Statistics and ICF 2012).

In 1997, Uganda undertook a major reform programme under the name of Universal Primary Education (UPE), which abolished fees for primary enrolment to ensure that up to four children per family were able to attend school. The programme was associated with a significant increase in enrolment, especially for girls (Deininger 2003; Nishimura, Yamano, and Sasaoka 2008). Moreover, the elimination of school fees had significant positive effects on the timely enrolment of girls and children living in rural areas. In fact, considering that school entry at ages above eight is very strongly associated with early school drop-out, the UPE programme was found to result in a three percent increase in the probability of a child beginning to attend school before age nine (Grogan 2008). However, an analysis of eight UNPS cohorts exposed to the reform finds that two decades later, abolishing school fees had no effect on primary school completion and only a weak effect on the likelihood that those who completed primary education after UPE had started secondary school (Kan and Klasen 2021).

The results on the effects of UPE demonstrate that such programmes have been effective in poor countries in the short run, where even a small tuition fee is an obstacle to school attendance. On the downside, probably because of the fast pace of the programmes, the quality of schooling did not improve at the same rate, and only weak effects are detected in the long run. Among East African countries, Uganda performs best in terms of enrolment but worst in terms of learning outcomes (Jones et al. 2014). A rough indication of the efficacy of the primary education system can be drawn from the primary completion rate. During the first decade of 2000, this rate was quite low (less than 60%), and there was still no tendency towards a reduction of the dramatic gap in the gross enrolment rate (more than 100%, according to UNESCO).[2] This is mostly due to grade repetition, which begins in the first few grades of primary school and remains a major concern for the Ugandan education system (Weatherholt et al. 2019).

The second factor that makes Uganda a relevant case for our topic of analysis is that the Ugandan population shows high internal migration rates, while international migration is a rather rare phenomenon. Although the Ugandan economy lags behind,[3] in the period we study, namely, the first decade of the 2000s, Uganda was one of the few countries in SSA that experienced a period of significantly faster growth, the so-called 'African Growth Miracle' (Young 2012), reaching 4.6% in 2005–2010 (McKay 2013). Many countries of 'emerging Africa' seemed ready to guide Africa out of the stagnated, conflict-ridden dictatorships

[2]Source: UNESCO http://data.uis.unesco.org. The gross enrolment rate is the total number of students attending primary school, regardless of age, expressed as a percentage of the official primary school-age population.

[3]Gross national income per capita is lower than the average of other SSA countries, and even though poverty levels have been falling in recent years, Uganda still has a low Human Development Index (HDI), standing at 159th out of 189 countries. Human Development Report 2020, 2019 ranking. http://hdr.undp.org/en/data.

of the past, and Uganda was one of them (Radelet 2010). With data drawn from the UNPS, we show the considerable growth of infrastructures across districts of Uganda. Better economic opportunities and higher expected incomes in some areas of the country may have acted as a pull factor for internal mobility, not only for rural-urban moves but also for rural-rural migration. In Uganda, rural-rural migration represented approximately one-third of the internal movements of people in 2010 (Mercandalli et al. 2019). Several mechanisms have driven this mobility: search for better land access and the need for more productive land (Baland et al. 2007), income diversification by means of intra-rural relocation to larger villages with better amenities and off-farm income-generating opportunities (Haggblade, Hazell, and Reardon 2010).

The last relevant factor for our analysis is gender inequality in Ugandan society and the economy, which helps us understand gender differences in education. Culture and gender roles have a pervasive negative influence on social and economic life of girls and women. Limited control over fertility and sexuality (Muhanguzi 2011), early marriage (Wodon, Nguyen, and Tsimpo 2016), limited access to information and credit, customary patrilineal practices (Mukasa et al. 2004; Ellis, Manuel, and Blackden 2006), and heavy domestic child work (Björkman-Nyqvist 2013) are only some examples of these social customs (Mukasa et al. 2004; Ellis, Manuel, and Blackden 2006). The gender gap in education has decreased over the years, especially in primary education (the ratio of gross enrolment of girls on boys was 1.03 in 2017), but it is still present at higher educational levels; in 2007, the gender parity index (GPI) for secondary gross enrolment was 0.8, and the GPI of tertiary education in 2014 was 0.73 (UNESCO 2015).

In the labour market, a distinguishing characteristic of Uganda, which is shared with other SSA economies, is that participation in the labour force is generally high for both men and women. However, since women's participation is mainly informal and many women work unpaid in the family farm business, women are economically dependent on men. Computing the earning differential based on wages is not very informative since participation in wage and salaried work is low. The percentage of wage and salaried workers in Uganda increased for both men and women between 2005 and 2011, but it was generally higher for men; 26.13% in 2011 of total male employment versus 13.2% of total female employment (World Bank Open Data). Estimates of the gender wage gap in 1992 in Uganda show that male wages exceeded female wages by approximately one-third (Appleton, Hoddinott, and Krishnan 1999). We computed average wages on UNPS 2005/06 data at the community level for men and women, both in the agricultural and non-agricultural sector. Wages for men are higher in both sectors, but particularly in the non-agricultural sector (both differences are statistically significant).[4]

III. Data and methods

Data

We draw our sample from the four waves of the Uganda National Panel Survey (UNPS) collected in 2005/06, 2009/10, 2010/11 and 2011/12. The survey is a part of the World Bank Living Standard Measurement Study programme. The four waves collect data from a national representative sample. The survey collects a substantial amount of information on the sociodemographic, educational, work and consumption characteristics of households and their members.

The main dependent variable is school *Delay*, measured as the difference between the theoretical grade a child should be attending depending on his or her age and the actual grade of attendance. Our second outcome is school *Attendance*, a dummy variable that takes value 1 if the child is 'currently attending school'.[5]

Our sample is composed of children aged 10 to 15 in the last wave of the survey, who were 5 to 9 years old in the baseline year. In Uganda, the official entry age at primary school in 2005 was 6[6]; hence, children in the sample at baseline were

[4]These statistics are available on request.
[5]See Section 4 of the questionnaire. Questions about education are asked to all persons aged 5 years and above.
[6]Source: UNESCO http://data.uis.unesco.org.

either about to start school or of primary school age. The attrition rate for our sample between 2005 and 2011 is approximately 17%.[7] To check for potential differential attrition, we performed a logistic regression on the probability of being in the panel, which is presented in Table A1.

We examine the effect of mobility during children's primary or early secondary school years. The reason for this selection is twofold; first, before age 7 or 8 (allowing room for birthday effects), it is technically impossible to calculate a delay in school progression, as there is no calculable difference between age and grade at this stage.[8] Second, school delay tends to appear towards the end of elementary school (see, for example, UNICEF Tanzania 2016; UNICEF Malawi 2016).

To build our migration variable, we use the information on the length of stay in the current place of residence for household members. We categorize as child as having migrated if he or she resided five years or less in her current place of residence.[9] We use the 2005/06 wave as our baseline, the 2011/12 wave as our end line, and the intermediate waves (2009/10 and 2010/11). We specify our mobility variable *Moved* as a dummy that takes value 1 if the child has changed the place of residence between any of the waves.[10] This allows us to exploit the longitudinal nature of the data and makes use of maximum variation in outcomes and mobility.

Inspection of the main reason for moving[11] of our panel children aged 10–15 in 2011 shows that 51% moved to 'join/follow' their family (the two categories are put together in the questionnaire), 20% for 'other income reasons' (different than looking for work), 15% for 'education' and 6% 'to return from displacement'. Regarding the latter reason, although the impact of conflicts on migration and education is a relevant issue for Uganda, our sample does not contain enough observations to address this issue.

Another limitation of our analysis is that we are not able to investigate the case of children migrating independently of their families. The panel data do not allow us to track children who have left their household at baseline to move to a different household unless they have re-entered the original household in a subsequent wave. The only way we can indirectly control for independent migration is to control for the group of children for whom both parents are absent from the household. We deal with this issue with a robustness check where we discard these children from the sample to find that the estimated coefficients do not change significantly (see the Results section).

Table 1 presents the descriptive statistics of the sample by year, Table 2 presents the descriptive statistics by gender and Table 3 for movers and non-movers. Approximately 20% of our sample set ended up moving residence at some point between 2005 and 2011, and there were no substantial differences between boys and girls. Most of our samples reside in rural areas and are poorer, with less than 15% of children living in a household in the top quintile. In 2005, movers were substantially poorer than non-movers (for 2005, *Movers* identifies the children who report moving in the later waves).

Delay in school is relatively stable in the waves following 2005; it does not appear to accumulate over time but is rather set from the start (see also Figures 1 and 2). This could be due to children late entry rather than children repeating grades. *Delay* slightly decreased in 2010 and then increased again in 2011. This difference is driven by older children (14 and 15 years old in 2011) and can be attributed to children catching up at the end of elementary school while starting lower-secondary school late and falling back again. However, we cannot exclude some degree of measurement error.

At the end of the period, in 2011, movers showed a smaller delay than non-movers. Interestingly, girls have a lower delay, although the difference is

[7]We discarded use of the latest waves of the UNPS, since the attrition rate with the baseline year was too high.
[8]For the same reasons, given that our age range of interest involves very young children at baseline, it makes little sense to investigate school dropout, since in this context, children up to age 15 might go back to school any time.
[9]See Section 3 of the questionnaire, question h3q15: "How many years has [NAME] lived in this place/village?" We have chosen five years, since this is the time span between the first and second wave. After 2009, the time span between the following waves is one year, so that under the same conditions, we capture the movements of children who did not move before 2009, but moved afterwards.
[10]We use a dummy variable, since the very few multiple movements observed in the panel time span due to its structure (five-year time span between the first and the second wave, and then a one-year time span between each successive wave) did not allow us to build a continuous variable.
[11]Question h3q18.

Table 1. Descriptive statistics of the sample of children by year.

	2005	N	2009	N	2010	N	2011	N
Moved to residence less than 5 yrs ago	0.00	859	0.11	854	0.17	847	0.20	863
Delay in school	0.56	735	2.28	847	1.79	814	2.24	863
School *Attendance*	0.63	859	0.96	848	0.96	814	0.94	863
Age in yrs	6.75	859	10.71	854	11.59	847	12.68	863
Female	0.51	859	0.51	854	0.50	847	0.51	863
Urban	0.15	859	0.15	854	0.16	847	0.16	863
1st expenditure quintile	0.24	859	0.20	853	0.24	839	0.19	863
2nd expenditure quintile	0.23	859	0.23	853	0.23	839	0.25	863
3rd expenditure quintile	0.20	859	0.26	853	0.22	839	0.20	863
4th expenditure quintile	0.20	859	0.20	853	0.20	839	0.23	863
5th expenditure quintile	0.13	859	0.10	853	0.11	839	0.14	863
Both parents absent or dead	0.05	859	0.05	845	0.04	812	0.03	847
Orphan of both parents	0.01	859	0.01	854	0.01	847	0.00	863
Age of head of HH	39.80	859	44.25	425	44.37	802	45.62	863
Father has completed primary	0.45	859	0.45	851	0.46	843	0.45	859
Mother has completed primary	0.23	859	0.23	851	0.23	843	0.23	859
N. of children <5 yrs old	0.20	859	1.18	854	1.05	847	1.02	863
N. of members >15 yrs old	2.49	859	3.01	854	3.49	847	3.93	863
N. of children 5–17 yrs old	3.51	859	4.00	854	4.09	847	4.10	863
N. of schools in the community	0.66	859	3.88	775	3.80	662	3.84	863
N. of non-school facilities in the community	4.83	859	14.67	775	15.69	662	15.17	863

N: number of children 10 to 15 in 2011. Source: Authors elaboration on UNPS.

Table 2. Descriptive statistics of the sample of children by gender.

	2005				2009				2010				2011			
	Boys	N	Girls	N	Boys	N	Girls	N	Boys	N	Girls	N	Boys	N	Girls	N
Moved to residence less than 5 yrs ago	0.00	423	0.00	436	0.12	420	0.11	434	0.18	421	0.16	426	0.21	425	0.19	438
Delay in school	0.57	357	0.54	378	2.39	417	2.16*	430	1.87	409	1.71	405	2.36	425	2.12	438
School *Attendance*	0.62	423	0.63	436	0.94	417	0.97	431	0.96	409	0.96	405	0.94	425	0.94	438
Age in yrs	6.80	423	6.70	436	10.76	420	10.67	434	11.60	421	11.58	426	12.69	425	12.66	438
Urban	0.18	423	0.13	436	0.17	420	0.12	434	0.18	421	0.14	426	0.18	425	0.13	438
1st expenditure quintile	0.25	423	0.23	436	0.20	419	0.19	434	0.24	418	0.24	421	0.20	425	0.18	438
2nd expenditure quintile	0.21	423	0.24	436	0.24	419	0.22	434	0.20	418	0.25	421	0.25	425	0.24	438
3rd expenditure quintile	0.19	423	0.22	436	0.25	419	0.28	434	0.21	418	0.23	421	0.17	425	0.22	438
4th expenditure quintile	0.21	423	0.19	436	0.19	419	0.22	434	0.23	418	0.17*	421	0.21	425	0.24	438
5th expenditure quintile	0.14	423	0.11	436	0.12	419	0.09	434	0.12	418	0.10	421	0.16	425	0.11	438
Both parents absent or dead	0.03	423	0.06*	436	0.03	413	0.06*	432	0.03	407	0.06*	405	0.02	419	0.04*	428
Age of head of HH	39.63	423	39.97	436	44.34	223	44.14	202	44.57	400	44.17	402	45.63	425	45.62	438
Father has completed primary	0.47	423	0.44	436	0.47	419	0.44	432	0.47	419	0.44	424	0.47	423	0.44	436
Mother has completed primary	0.24	423	0.21	436	0.24	419	0.21	432	0.24	419	0.21	424	0.24	423	0.21	436
N. of children <5 yrs old	0.21	423	0.19	436	1.16	420	1.20	434	1.04	421	1.06	426	1.05	425	0.99	438
N. of members >15 yrs old	2.46	423	2.52	436	3.02	420	2.99	434	3.58	421	3.40	426	4.05	425	3.81	438
N. of children 5–17 yrs old	3.58	423	3.44	436	4.10	420	3.91	434	4.14	421	4.04	426	4.14	425	4.07	438
N. of schools in community	0.68	423	0.64	436	3.91	373	3.86	402	3.83	336	3.78	326	3.90	425	3.79	438
N. of non-school facilities in the community	*4.76*	*423*	*4.89*	*436*	*14.72*	*373*	*14.62*	*402*	*15.88*	*336*	*15.50*	*326*	*15.27*	*425*	*15.07*	*438*

N: number of children 10 to 15 in 2011. *T*-test of equality of the means: p-val <0.05.
Source: Authors elaboration on UNPS.

small. There are no differences between genders and mover status in school attendance, which is low in 2005 and then increases sharply and remains high until 2011.

All facilities and services show a marked increase after 2005. In 2005, movers were shown to live in communities with a smaller number of facilities, both schools (Figure 3(a)) and non-schools (Figure 3(b)). In all subsequent years, movers report living in communities with a higher number of facilities, which shows that families choose to move from a low-service environment to one with more services.

Statistics show a similar increase in facilities (schools and non-schools) for both movers and non-movers, although more so for movers, who appear to reside in areas with a higher number of facilities. We argue that the fact that they moved to these areas is what causes children who moved to have, on average, a lower delay in school than those who did not move.

Table 3. Descriptive statistics of the sample of children by mover status.

	2005				2009				2010				2011			
	Non-movers	N	Movers	N	Non-movers	N	Movers	N	Non-movers	N	Movers	N	Non-movers	N	Movers	N
Delay in school	0.58	593	0.48	142	2.31	749	2.04	98	1.82	675	1.68	139	2.29	691	2.04*	172
School *Attendance*	0.63	690	0.60	169	0.96	750	0.97	98	0.96	675	0.97	139	0.94	691	0.95	172
Age in yrs	6.77	690	6.65	169	10.69	756	10.87	98	11.59	704	11.60	143	12.71	691	12.55	172
Female	0.51	690	0.49	169	0.51	756	0.48	98	0.51	704	0.47	143	0.51	691	0.49	172
Urban	0.14	690	0.22*	169	0.13	756	0.23*	98	0.14	704	0.27*	143	0.14	691	0.22*	172
1st expenditure quintile	0.21	690	0.40*	169	0.19	755	0.22	98	0.23	697	0.27	142	0.18	691	0.24	172
2nd expenditure quintile	0.23	690	0.20	169	0.23	755	0.23	98	0.23	697	0.20	142	0.23	691	0.30	172
3rd expenditure quintile	0.21	690	0.17	169	0.27	755	0.19	98	0.22	697	0.23	142	0.19	691	0.21	172
4th expenditure quintile	0.21	690	0.17	169	0.20	755	0.23	98	0.20	697	0.23	142	0.25	691	0.12*	172
5th expenditure quintile	0.14	690	0.07*	169	0.10	755	0.11	98	0.12	697	0.07*	142	0.14	691	0.13	172
Both parents absent or dead	0.04	690	0.06	169	0.05	747	0.06	98	0.04	673	0.06	139	0.03	680	0.04	167
Age of head of HH	40.45	690	37.16*	169	44.68	375	41.02*	50	44.69	673	42.71*	129	46.04	691	43×.93	172
Father has completed primary	0.46	690	0.44	169	0.46	754	0.40	97	0.47	703	0.40	140	0.46	690	0.44	169
Mother has completed primary	0.23	690	0.21	169	0.23	754	0.22	97	0.23	703	0.22	140	0.23	690	0.21	169
N. of children <5 yrs old	0.19	690	0.22	169	1.17	756	1.24	98	1.05	704	1.07	143	1.01	691	1.05	172
N. of members >15 yrs old	2.53	690	2.33*	169	3.02	756	2.91	98	3.49	704	3.52	143	3.88	691	4.13	172
N. of children 5–17 yrs old	3.53	690	3.41	169	4.04	756	3.76*	98	4.08	704	4.15	143	4.11	691	4.09	172
N. of schools in the community	0.68	690	0.56*	169	3.85	722	4.28*	53	3.71	537	4.19*	125	3.81	691	3.99	172
N. of non-school facilities in community	4.92	690	4.44*	169	14.42	722	18.06*	53	14.91	537	19.04*	125	14.56	691	17.58*	172

N: number of children 10 to 15 in 2011. *T*-test of equality of the means: p-val <0.05×.
Source: Authors elaboration on UNPS.

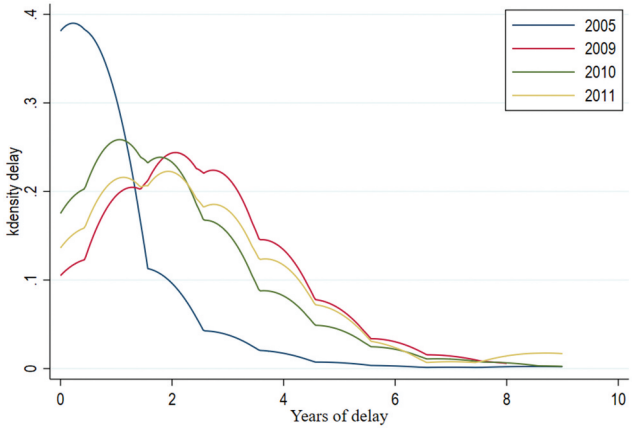

Figure 1. School delay. Boys.

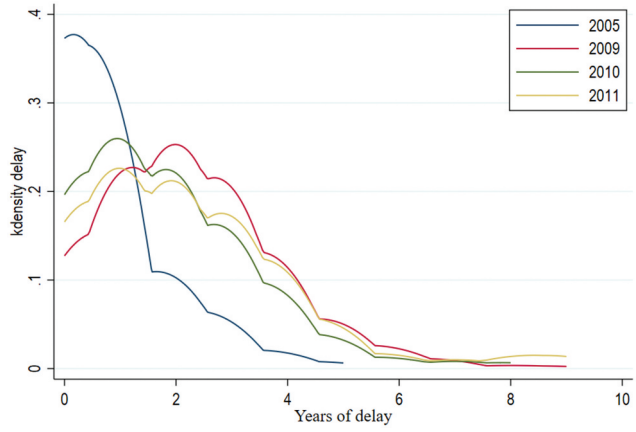

Figure 2. School delay. Girls.

Estimation strategy

We exploit the panel structure of the data to address the problem of unobserved heterogeneity and endogeneity of the migration decision in two ways. First, we run OLS regressions with individual fixed effects (OLS-FE) to control for unobservable and unobserved time-invariant child characteristics. Second, we estimate instrumental variables models with individual fixed effects (IV-FE) as an alternative methodology, with the aim of addressing the problem of time-variant heterogeneity that may cause self-selection in the decision to migrate. We use the FE within estimator. It could be argued that, because of the accumulating nature of *Delay* and the binary nature of *Moved*, which is set to zero in 2005 and then switches to one in case of migration in the panel time span, the within estimator, which we have used, could have the problem of a spurious correlation between the two variables. The first differences estimation method (FD) might represent an alternative in this case. However, when building first differences, given the timing of the waves, we observed a large first difference (between 2009 and 2005) and small and sometimes negative differences between the

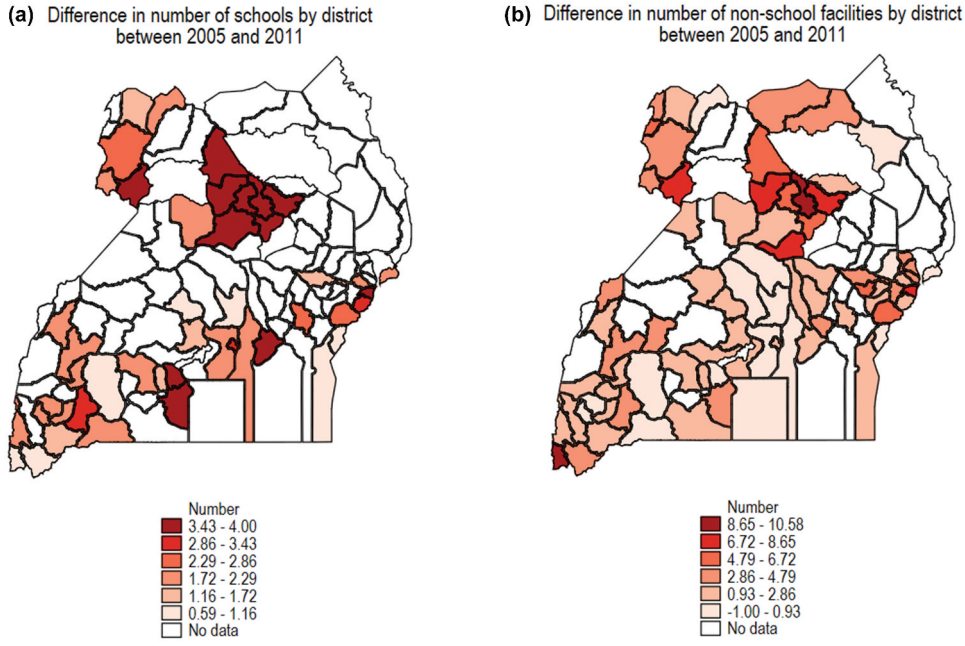

Figure 3. a) Difference in number of schools by district between 2005 and 2011. b) Difference in number of non-school facilities by district between 2005 and 2011.

following waves.[12] Moreover, the FD estimator has the disadvantage that, with a continuous outcome and a binary treatment, as in our case, the estimated coefficient of the treatment might be downward biased[13] (Angrist and Pischke 2009).

As stated above, our main dependent variable is *Delay* in school, measured in years of delay with respect to the supposed grade a child should be attending for his/her age. We compare the different levels of delay in the schooling of children who have moved and children who have not moved during primary and early secondary school ages, which are particularly crucial moments in a child's school career, as discussed in the previous section. As said, we also perform the same analysis on school attendance. As shown above (Tables 2 and 3, and Figure 1 and 2), both the distribution of delay and the probability of attendance vary across years, for both girls and boys, and for movers and non-movers. Among the control variables, most of the variation is given by time. Varying observables include demographic composition, consumption, and age of the child.

The OLS-FE strategy has the advantage of controlling for the unobserved time-invariant heterogeneity that is inherent to education and migration choices. Families with a higher predisposition to move may be, in fact, different from other families in a way that affects both moving and education, thus creating a self-selection problem. Moreover, educational outcomes may be influenced by unobservable factors, such as parental preferences, beliefs and values, in addition to the child's natural ability, which remains difficult to observe and account for and can influence parents' choices.

Our OLS-FE model is shown in the following:

$$\begin{aligned} Y_{iht} = {} & \alpha + \beta M_{iht} + \gamma \boldsymbol{X}_{iht} + \delta_1 \boldsymbol{V}_{ih2005} t_{2009} \\ & + \delta_2 \boldsymbol{V}_{ih2005} t_{2010} + \delta_3 \boldsymbol{V}_{ih2005} t_{2011} + \kappa_1 t_{2009} \\ & + \kappa_2 t_{2010} + \kappa_3 t_{2011} + \theta_{ih} + \varepsilon_{iht} \end{aligned} \tag{1}$$

where the dependent variable $Y_{i,h,t}$ is the school outcome of child i, in household h, at time t. M_{iht} is a dummy that takes value zero at baseline and 1 at end line if child i in household h has moved or

[12]On a more practical side, using the within estimator, we smooth some measurement errors due to inconsistencies in the reported age and completed school grade, and therefore in the theoretical grade for the age variable used to build *Delay*.

[13]Ch. 5, appendix 5.4, p.246-7: ". . .with a continuous outcome and a binary treatment one mistakenly estimate a first-differenced equation in an effort to kill the fixed effect".

zero otherwise. This variable is built using the information provided in the 2009/10, 2010/11 and 2011/12 surveys and assigning a value of 1 if the child reported having moved in one of these panel waves. $\boldsymbol{X}_{iht}$ is a vector of individual/household time-variant characteristics, and $\boldsymbol{V}_{ih2005}$ is a vector of household characteristics at baseline interacted with the time dummies t. θ_{ih} is the individual fixed effect, and ε_{iht} is the error term.

The limit of this OLS-FE strategy is that there might be some sources of unobserved time-varying heterogeneity. For example, expectations or beliefs regarding children's education may vary or external conditions such as economic growth or prices. This is a common weakness of fixed effects models and one that is not easily solved.

To tackle this issue, following Beegle, De Weerdt, and Dercon (2011), in our IV-FE approach, we simultaneously instrument mobility and control for unobservable child characteristics with fixed effects. This strategy allows us to control for both time-varying and time-invariant sources of unobserved heterogeneity, as well as for the self-selection that is inherent to education and migration choices.

In the IV-FE model, Eq. 1 represents the second stage. The first stage is shown below:

$$M_{iht} = \alpha + d_1 Z_{iht} + b\boldsymbol{F}_{iht} + \theta_{ih} + \varepsilon_{iht} \qquad (2)$$

where Z_{iht} is the instrument, namely, the number of non-school facilities available in the community where the household resides, such as health facilities, infrastructure and transport, the presence of community groups and NGOs, and the presence of the district council. We expect this variable to be positively related to the choice of mobility.

We employ a two-stage least squares, as it offers the least problematic solution; having a binary endogenous regressor poses a problem when the dependent variable is not binary as well. While it is possible to use the predicted values of M as an instrument in the second stage, it is not clear that this produces a substantial advantage in the presence of possible assumption violations (Wooldridge 2015).

Instrument validity

As shown in Figure 3(b), non-school facilities, such as the presence of hospitals, health units, consumer markets and financial services, vary substantially across space and time in our sample in a rather non-systematic way.[14] Descriptive statistics (Table 3) show increases in facilities (schools and non-schools) for both movers and non-movers; however, movers show a change from residing in areas with fewer facilities in 2005 to residing in areas with a considerably higher number of facilities than non-movers.

We assume that a change in non-school facilities is exogenous to households' decisions. Between 2005 and 2009 (the year we observe the highest increase in facilities), the share of government expenditures for construction and transport increased from 10% to 14.5%,[15] while private procurement of infrastructural investment went from 96 million dollars in 2005 to 871 million dollars in 2007.[16] While not exhaustive of all sectors, this points towards a substantial increase in investment in infrastructure that is reasonably independent from households' schooling and moving decisions.

We observe that migrants move to areas that have experienced faster growth in non-school facilities. Our hypothesis is that the effect of infrastructure on children's schooling happens through the fact that the family, and therefore the child, is residing in that specific place, i.e. through the choice the family has made to have moved or not. In other words, the change in infrastructure is an indicator of economic opportunities, and therefore, it drives the choice of the parents to move or not. Non-movers decide to stay in place because their expected benefits from moving are not sufficient; therefore, nothing changes for the children, and they follow their natural trend.

An argument can be made that i) the expectation of variation in infrastructure may be the cause of moving and ii) that the presence (or anticipation) of schools can influence parents' attitudes and decisions towards schooling. Regarding the first problem, we believe that this does not substantially change our model, since the decision to move or

[14]This information is drawn from the Community/Facility questionnaire.
[15]IFPRI SPEED Database https://www.ifpri.org/project/speed (Accessed: July 2020).
[16]World Bank Private Participation in Infrastructure (PPI) Project Database https://ppi.worldbank.org/en/ppidata (accessed May 10, 2021).

not move is still caused by variations in infrastructure. Additionally, to avoid the second problem, we opted to use non-school facilities; while there is a moderate correlation between the two, 0.38 in all panel years, it is not so high to indicate collinearity. We argue that households move to look for better places to live in terms of economic opportunities and quality of life.

Finally, as an external factor that does not depend on the decision of the household, we avoid problems derived from using as instruments household variables measured after migration (Cockx 2022). Additionally, because the number of services is requested at the community level to the local leader, we also avoid possible biases introduced by household members subjective reporting. It is important to recognize here that migration is a deliberate, intentional decision, and many factors that are likely to influence migration are unobservable; therefore, part of the endogeneity remains unaccountable.

Moreover, we have considered other possible instruments, such as climatic variations and shocks, which the evidence has shown to also cause migration (Rappaport 2007; Gray and Mueller 2011). However, such shocks can also influence school outcomes directly, as recently demonstrated by Agamile and Lawson (2021) and argued by Thiede, Randell, and Gray (2021), therefore violating the exclusion restriction.

IV. Results

Ols-Fe

Table 4 presents the OLS-FE estimated coefficients of Equation (1) for *Delay* and *Attendance* separately for boys and girls. We find that having *Moved* since 2005 onwards reduces *Delay* for boys of one-third of the year, and for girls it is not significant, while the results for attendance are neither significant for boys nor for girls (although the standard error for boys is not as high as it is for girls). These results point towards a gender-differentiated effect of moving. We control for household composition, expenditure quintiles, and for parents' education at baseline, i.e. a dummy equal to one if they completed primary education in 2005, which the highest level in the majority of cases interacted with the time dummies. The mother's and father's education reduces *Delay* by a relevant amount (more than half a year, with a greater effect of the mother's education than the father's), but, unexpectedly, mothers' education[17] and *Urban* reduce Attendance.[18]

We have also controlled for the *Number of schools* in the community, which is significant and has the expected negative sign for *Delay* of boys only, but it is not significant for *Attendance*.

IV-Fe

Table 5 presents the estimated coefficients of the IV-FE model for *Delay*. Col. 1 and 3 show the first stage for boys and girls, respectively. The coefficients represent the effects of the control variables on having moved to the current place of residence since 2005. We find that an additional unit of the *Number of non-school facilities* increases this probability by 1.4 and 1.3% points for boys and girls, respectively. Interestingly, the *Number of schools* has a negative effect; an additional school unit decreases the probability of having moved to that community by 2.4 and 1.8% points for boys and girls, respectively. If non-school and school facilities had grown at a similar pace in developing areas, we should have observed a positive coefficient, since movers choose a destination with better facilities altogether. This was not the case for Uganda, where starting from the important reform of 1997, programmes of school construction for universal primary education have typically targeted the poorest areas, from which migrant households were more likely to escape. School construction, therefore, is more a proxy for underdevelopment than for growth. Regarding the other variables, the effects on

[17]A tentative explanation might be that literate mothers have more chances to work, so that children have to replace them in the household chores, thus reducing attendance. We cannot control for parents' hours worked because in years 2010 and 2011 it is not possible anymore to link children with parents. For education, we use information derived in 2005 assuming that the education of parents is concluded.

[18]We have treated *Urban* as a fixed variable interacted with the time dummies because we could not detect enough variability—namely, changes of residence from urban to rural areas or vice versa in the panel time span—to estimate a time varying coefficient. The interpretation of its coefficients is as if the child had always resided in the same area as the baseline area. As mentioned in the data section, urban areas are underrepresented in the data because of the survey design and this might represent a problem for the estimated coefficient of this variable.

Table 4. Delay and attendance by gender – OLS-FE.

	(1) Boys Delay	(2) Attendance	(3) Girls Delay	(4) Attendance
Moved to residence less than 5 yrs ago	−0.294*	0.069	−0.012	0.031
	(0.154)	(0.043)	(0.152)	(0.042)
N. of schools in community	−0.090**	0.016	−0.024	−0.008
	(0.039)	(0.010)	(0.038)	(0.010)
N. of members >15 yrs old	−0.001	−0.020**	−0.016	0.001
	(0.037)	(0.009)	(0.034)	(0.009)
N. of children 5–17 yrs old	0.001	−0.006	−0.004	0.008
	(0.035)	(0.009)	(0.034)	(0.009)
N. of children <5 yrs old	0.040	0.000	0.049	−0.017
	(0.054)	(0.014)	(0.056)	(0.014)
1st expenditure quintile	0.122	−0.063	0.150	−0.048
	(0.152)	(0.040)	(0.167)	(0.042)
2nd expenditure quintile	0.124	−0.007	0.073	−0.011
	(0.145)	(0.036)	(0.154)	(0.039)
3rd expenditure quintile	0.076	−0.027	0.169	−0.036
	(0.130)	(0.031)	(0.141)	(0.034)
4th expenditure quintile	−0.023	0.019	0.003	−0.004
	(0.121)	(0.028)	(0.134)	(0.030)
No parents/only one parent	0.129	0.008	−0.051	0.010
	(0.164)	(0.040)	(0.160)	(0.043)
2011#father_ed	−0.578***	0.034	−0.817***	−0.016
	(0.193)	(0.052)	(0.162)	(0.047)
2011#mother_ed	−0.670***	−0.131**	−0.576***	−0.101**
	(0.236)	(0.057)	(0.183)	(0.050)
2011#urban	−0.440**	−0.121**	−0.229	−0.137***
	(0.206)	(0.050)	(0.209)	(0.047)
2010#father_ed	−0.474**	0.094*	−0.825***	−0.001
	(0.192)	(0.052)	(0.163)	(0.048)
2010#mother_ed	−0.822***	−0.133**	−0.306*	−0.107**
	(0.224)	(0.055)	(0.185)	(0.051)
2010#urban	−0.006	−0.151***	−0.148	−0.146***
	(0.206)	(0.054)	(0.210)	(0.051)
2009#father_ed	−0.400**	0.050	−0.539***	−0.019
	(0.183)	(0.052)	(0.156)	(0.046)
2009#mother_ed	−0.622***	−0.134**	−0.335*	−0.081
	(0.221)	(0.056)	(0.180)	(0.051)
2009#urban	0.009	−0.144***	−0.256	−0.131***
	(0.216)	(0.055)	(0.215)	(0.050)
2009	2.594***	0.205***	2.056***	0.323***
	(0.195)	(0.054)	(0.187)	(0.051)
2010	2.185***	0.215***	1.739***	0.304***
	(0.213)	(0.056)	(0.195)	(0.053)
2011	2.716***	0.230***	2.143***	0.310***
	(0.216)	(0.057)	(0.193)	(0.052)
Observations	*1,449*	*1,449*	*1,505*	*1,506*
R-squared	0.472	0.199	0.414	0.205
Number of children	*418*	*418*	*433*	*433*

Children in sample: 10–15 years old in 2011. Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

Moved are negative for girls in the poorest households and for boys with fathers who completed elementary school, while they are positive for boys residing in urban areas.

Col. 2 and 4 show the estimated coefficients of the second stage. The coefficients of *Moved* have the same sign as the OLS-FE, but with a larger effect on *Delay*, minus 1.85 years, an important reduction if compared to the average delay observed for boys (2.36 in 2011 including the zeros, see Table 2; 2.81 conditional on positive delay). Conversely, *Moved* is not significant for girls. The *Number of schools* has a negative coefficient, similar to that estimated with OLS-FE. The education of the mother and father have the same signs as in the OLS-FE but larger coefficients.

Table 6 presents the estimated coefficients of the IV-FE model for *Attendance*. Col. 1 and 3 show the first stage, and the coefficients are obviously the same as in Table 5. Col. 2 shows that *Moved* increases the probability of *Attendance* for boys

Table 5. Delay in school – IV-FE.

	(1) Boys First Stage	(2) Second stage	(3) Girls First Stage	(4) Second stage
Moved to residence less than 5 yrs ago		−1.847**		0.608
		(0.820)		(0.798)
N. of non-school facilities in community	0.014***		0.013***	
	(0.002)		(0.002)	
N. of schools in community	−0.024***	−0.078**	−0.018**	−0.030
	(0.009)	(0.039)	(0.009)	(0.037)
N. of members >15 yrs old	0.008	0.008	0.016**	−0.027
	(0.007)	(0.039)	(0.007)	(0.035)
N. of children 5–17 yrs old	0.005	0.007	0.010	−0.009
	(0.007)	(0.035)	(0.007)	(0.034)
N. of children <5 yrs old	−0.007	0.036	0.008	0.045
	(0.011)	(0.055)	(0.010)	(0.050)
1st expenditure quintile	0.008	0.139	−0.125***	0.229
	(0.033)	(0.169)	(0.033)	(0.189)
2nd expenditure quintile	0.014	0.147	−0.046	0.101
	(0.030)	(0.158)	(0.032)	(0.158)
3rd expenditure quintile	0.029	0.128	−0.027	0.186
	(0.029)	(0.150)	(0.030)	(0.146)
4th expenditure quintile	0.029	0.023	−0.049*	0.035
	(0.026)	(0.138)	(0.028)	(0.141)
No parents/only one parent	−0.049*	0.049	0.070**	−0.096
	(0.029)	(0.156)	(0.030)	(0.155)
2011#father_ed	−0.124***	−0.761***	0.029	−0.838***
	(0.034)	(0.199)	(0.033)	(0.159)
2011#mother_ed	−0.017	−0.740***	0.001	−0.567***
	(0.040)	(0.209)	(0.039)	(0.189)
2011#urban	0.197***	−0.125	−0.007	−0.215
	(0.041)	(0.268)	(0.047)	(0.225)
2010#father_ed	−0.157***	−0.724***	−0.033	−0.809***
	(0.036)	(0.229)	(0.036)	(0.174)
2010#mother_ed	−0.028	−0.913***	0.000	−0.294
	(0.043)	(0.224)	(0.042)	(0.204)
2010#urban	0.235***	0.357	0.045	−0.160
	(0.042)	(0.290)	(0.050)	(0.240)
2009#father_ed	−0.083**	−0.518***	−0.038	−0.520***
	(0.035)	(0.190)	(0.033)	(0.161)
2009#mother_ed	−0.001	−0.672***	0.001	−0.323*
	(0.041)	(0.211)	(0.040)	(0.193)
2009#urban	0.231***	0.354	0.086*	−0.293
	(0.044)	(0.291)	(0.049)	(0.238)
2009	0.034	2.717***	0.003	2.025***
	(0.037)	(0.197)	(0.034)	(0.166)
2010	0.136***	2.503***	0.066*	1.662***
	(0.039)	(0.257)	(0.036)	(0.193)
2011	0.143***	3.019***	0.061*	2.074***
	(0.038)	(0.248)	(0.034)	(0.183)
Observations	*1,449*	*1,449*	*1,505*	*1,505*
R-squared		0.419		0.404
Number of children	*418*	*418*	*433*	*433*
Cragg-Donald weak identification F-statistic		39.86		36.51
Sargan statistic		0		0

Standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1. Instrumented var. Moved. Instrument: N. of non-school facilities in the community.

by 37% points, while Col. 4 shows that for girls it is not significant. *Mother's* education and *Urban* reduces attendance, and the same comments as for the OLS-FE apply.

Robustness checks

We have performed some checks to test the robustness of these results.

First, to investigate the age profiles of *Delay* and *Attendance* with respect to *Moved*, we re-estimated the model for each subsample resulting from a reduction in children's age in 2011 by one year from 15 to 10 years. Figure 4 shows the estimated coefficients of *Moved* with the IV-FE model. Regarding the significant effects of *Moved* for *Delay*, boys aged less than 12, who moved when they were between 7 and 11 years

Table 6. School attendance – IV-FE Model.

	(1) Boys First Stage	(2) Second stage	(3) Girls First Stage	(4) Second stage
Moved to residence less than 5 yrs ago		0.366*		0.155
		(0.196)		(0.199)
N. of non-school facilities in community	0.014***		0.013***	
	(0.002)		(0.002)	
N. of schools in community	−0.024***	0.013	−0.018**	−0.009
	(0.009)	(0.009)	(0.009)	(0.009)
N. of members >15 yrs old	0.008	−0.022**	0.016**	−0.002
	(0.007)	(0.009)	(0.007)	(0.009)
N. of children 5–17 yrs old	0.005	−0.007	0.010	0.007
	(0.007)	(0.008)	(0.007)	(0.008)
N. of children <5 yrs old	−0.007	0.001	0.008	−0.018
	(0.011)	(0.013)	(0.010)	(0.012)
1st expenditure quintile	0.008	−0.067*	−0.125***	−0.032
	(0.033)	(0.040)	(0.033)	(0.047)
2nd expenditure quintile	0.014	−0.011	−0.046	−0.005
	(0.030)	(0.038)	(0.032)	(0.039)
3rd expenditure quintile	0.029	−0.037	−0.027	−0.032
	(0.029)	(0.036)	(0.030)	(0.036)
4th expenditure quintile	0.029	0.010	−0.049*	0.002
	(0.026)	(0.033)	(0.028)	(0.035)
No parents/only one parent	−0.049*	0.023	0.070**	0.001
	(0.029)	(0.037)	(0.030)	(0.039)
2011#father_ed	−0.124***	0.069	0.029	−0.020
	(0.034)	(0.048)	(0.032)	(0.040)
2011#mother_ed	−0.017	−0.118**	0.001	−0.100**
	(0.040)	(0.050)	(0.039)	(0.047)
2011#urban	0.197***	−0.182***	−0.007	−0.134**
	(0.041)	(0.064)	(0.047)	(0.056)
2010#father_ed	−0.157***	0.142***	−0.033	0.002
	(0.036)	(0.055)	(0.036)	(0.043)
2010#mother_ed	−0.028	−0.116**	0.000	−0.105**
	(0.043)	(0.054)	(0.042)	(0.051)
2010#urban	0.235***	−0.221***	0.045	−0.148**
	(0.042)	(0.070)	(0.050)	(0.060)
2009#father_ed	−0.083**	0.073	−0.038	−0.015
	(0.035)	(0.046)	(0.033)	(0.040)
2009#mother_ed	−0.001	−0.125**	0.001	−0.079
	(0.041)	(0.050)	(0.040)	(0.048)
2009#urban	0.231***	−0.210***	0.086*	−0.138**
	(0.044)	(0.070)	(0.049)	(0.059)
2009	0.034	0.181***	0.003	0.317***
	(0.037)	(0.047)	(0.034)	(0.041)
2010	0.136***	0.154**	0.066*	0.289***
	(0.039)	(0.062)	(0.036)	(0.048)
2011	0.143***	0.172***	0.061*	0.296***
	(0.038)	(0.060)	(0.034)	(0.046)
Observations	*1,449*	*1,449*	*1,506*	*1,506*
R-squared		0.150		0.197
Number of children	*418*	*418*	*433*	*433*
Cragg-Donald weak identification F-statistic		39.86		36.56
Sargan statistic		0		0

Standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1 Instrumented var.: Moved. Instrument: N. of non-school facilities in community.

old, had −2.9 years of *Delay* compared with non-movers. Including children who moved between ages 8 and 14, the reduction stabilizes to −2 to reach the sample value of −1.8 (see Table 5). We also find a significant value of −1.9 for girls aged less than <12, who moved between 7 and 11 years old. Overall, the earlier the children moved was, the larger was the reduction in delay, meaning that younger children benefit more from migrating. Moreover, Figure 4 shows the stability of the impact of *Moved* on *Attendance* for boys at all ages, similar to what we found for the whole sample. The Cragg-Donald Wald F statistics range from a maximum value of 50 to a minimum value of 20 for all regressions.[19]

[19]Full results are available on request.

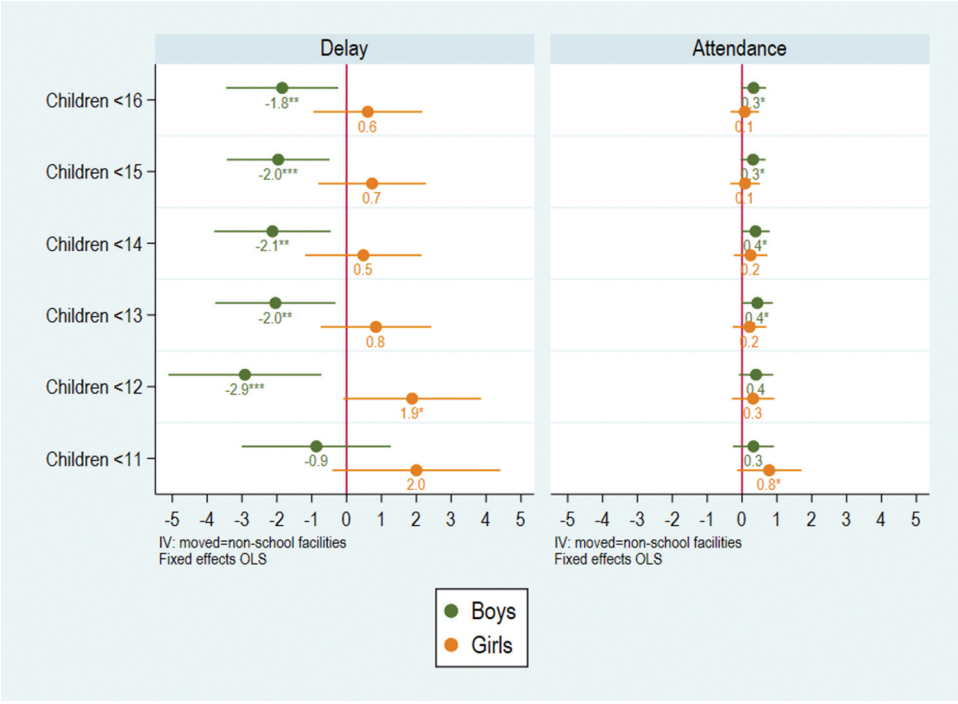

Figure 4. Coefficients of moved by age and gender of the child.

As an additional robustness check, to address the problem of possible bias due to the limit of the within estimator, we chose to use only two waves to reestimate the model in levels for 2011, adding to the 2011 control time-varying variables their lagged values in 2005 together with the lagged value of *Delay*.[20] Table A2 in the Appendix shows the estimated IV-FE coefficients for this model. The coefficient of *Moved* is always positive and significant for boys' *Delay*, but its negative coefficient is larger than that of Table 5. The autocorrelation coefficient is sensibly higher for girls. The coefficient of *Moved* for boys' *Attendance* is significant and positive but somewhat lower than that in Table 4. Note, however, that with two waves, we have a lower number of observations.

Finally, to explore the issue of weak instruments in IV regression (Andrews, Stock, and Sun 2019), we reestimated the model separating the single instrument of non-school facilities into two instruments. Using two instruments, namely, *Number of health facilities* and *Number of other facilities* (i.e. consumer and financial market facilities, and other facilities), we obtain very similar estimated coefficients, and the weak identification test (Cragg-Donald Wald F) is above 20 in all cases (Tables A3 and A4). The effect of *Moved* for *Attendance* of boys, however, is hardly significant.

Overall, the results of our benchmark models seem to be robust to all the robustness checks we have performed.

V. Discussion and conclusions

Our paper studied the different gender effects on educational outcomes of rural-to-rural migration of children moving with their parents. While there is a broad literature about children left behind, we add evidence on children moving with their family, explicitly addressing gender disparities in the effects of migration, which remains an understudied topic. We also contribute to the migration literature by studying what is mainly migration from one rural area to another, which differs from the majority of the available studies.

Migration is the result of a maximization process that includes two main factors: the aspiration to migrate and the ability to migrate (Carling and

[20]SFull results are available on requestSo that the coefficient of *Delay* is not constrained to be one as in first differences. Of course, the lagged value of *Moved* is zero.

Schewel 2018). There is ample evidence that migrants are positively selected on several characteristics that fuel aspirations, i.e. entrepreneurial spirit and propensity to risk (Czaika and Vothknecht 2014), while the ability to move is constrained by both internal and external factors. When we consider migration as a household rather than an individual decision, we can think of moving as a form of investment in the family's future, including present and future children. Parents everywhere make rational decisions, and in a poor country, an improvement in the economic condition of the household relaxes constraints that impede human capital investment in children before migration. In a context where social safety nets, public transfers and pension systems remain largely insufficient, parents have a clear perception of the necessity of investing in the education of their children to guarantee a stable economic future for the household. Given the prevailing socio-economic structures, however, this investment is likely to be differentiated by gender. The previous literature finds ample evidence of son's preference in different contexts.

We find that moving is beneficial for boys' education, both in reduced delay and increased attendance, while it has no effect on girls' education. We also observe that younger boys, those who have emigrated earlier and could take full advantage of the new opportunities, have a larger reduction in delay (see Figure 4). This is important evidence since late enrolment and grade repetition represent two major problems of the Ugandan primary education system that mobility helps reduce. However, we find that this positive outcome does not extend to girls. The fact that the effect is null, does not mean that girls are worse off, but it indicates that they do not benefit from the same opportunities and advantages that household migration seems to provide to boys: this contributes to maintaining and possibly widening the gender gap in education.

We recognize that our study has several limitations: the fixed-effects model is still not able to capture time-varying unobservable factors and attrition in the sample could have biased the estimates (although the initial balance table does not show substantial differentials). In addition, the instrumental variable estimates could still be biased upwards because of the inherent characteristics of migrants and the fact that migration is the result of a deliberate decision process.

In the context of prevailing discriminatory gender norms and worse labour market outcomes for women, it is not unexpected to find gender differences in education: if the economic advantage of being educated is higher earnings, the disadvantage of women in the labour market could lead parents to invest less in girls' education. This explanation would also apply to a rural economy where men specialize in agricultural occupations where not only greater physical strength is needed, but significant returns to education are also observed (Jayachandran 2015). With limited resources, it is not uncommon for parents to discriminate in favour of sons who are perceived to have the highest expected returns (Lin, Sun, and Xing 2021).

Gender differences in education within the household exist in many societies (Kaul 2018), and internal migration is unlikely to reduce them, since gender attitudes towards cultural norms and economic opportunities in the area of destination would not differ considerably from the area of origin. If migration is driven by better economic opportunities in destination areas, then we observe an improvement in educational outcomes of migrant boys because parents have an incentive to invest more in their human capital development, and not in that of migrant girls.

Removing barriers to migration and promoting mobility can allow those who have the aspiration and the initiative to move, therefore improving not only the economic outcomes of the adults who migrate, but also allowing more opportunities for their children to flourish. Literature shows that both generic interventions that lowers education costs (directly or relaxing budget constraints), as well as providing essential services such as adequate food and access to water and sanitation, are all effective ways of improving girls' participation in education (Evans and Yuan 2022; Psaki et al. 2022). However, literature also shows that girls' education is more sensitive to costs, and face specific cultural barriers. Dizon-Ross and

Jayachandran (2022), for example, find that fathers in Uganda are less likely to spend on their daughters' human capital: if that is the case, policies that act only on budget constraints, such as cash transfers, may not be enough. Additionally, costs and barriers can be higher for migrants' families, in terms of resources, time, and energy, for example to integrate in a new school, transfer records, and so on. This can lead families to concentrate their effort on boys rather than girls (Lin, Sun, and Xing 2021).

Removing these barriers by improving school integration for incoming students, shaping girls aspirations by sponsoring role models (Riley 2022), reducing education costs and providing crucial services, incentivizing women's participation in the labour force and expanding earnings opportunities for girls (Field et al. 2021), would help ensure that girls can take full advantage of the opportunities offered by migration.

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Appendix

Table A1. Probability to be in the panel sample.

Covariates in 2005	(1) Individual present in all waves
Age	−0.63**
	(0.29)
Female	−0.12
	(0.25)
No parents	−0.05
	(0.50)
Urban	−0.64*
	(0.33)
N. Children under 5	−0.26
	(0.24)
N. Children 5-17	0.39***
	(0.10)
N. Adults	−0.04
	(0.07)
Quintile 2 (Base is 1=poorest)	0.59*
	(0.34)
Quintile 3 (Base is 1=poorest)	0.80**
	(0.37)
Quintile 4 (Base is 1=poorest)	0.56
	(0.41)
Quintile 5 (Base is 1=poorest)	0.12
	(0.37)
Age of head: 15-19	−2.51
	(1.54)
Age of head: 20-24	−1.57*
	(0.95)
Age of head: 25-29	0.09
	(0.80)
Age of head: 30-34	−0.25
	(0.74)
Age of head 35-39	−0.63
	(0.77)
Age of head: 40-44	−0.12
	(0.77)
Age of head: 45-49	−0.75
	(0.74)
Age of head: 50-54	−0.48
	(1.02)
Age of head: 55-59	−0.74
	(0.80)
Age of head: 60+ Base category	-
Constant	3.91***
	(1.27)
Observations	*9,895*

Standard errors in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.1.

Table A2. Delay and attendance by gender model for 2011 with 2005 lagged variables, IV second stage.

	(1)	(2)	(3)	(4)
	Delay		Attendance	
	Boys	Girls	Boys	Girls
2011 Moved	−2.525**	1.176	0.230**	0.045
	(1.159)	(0.948)	(0.115)	(0.113)
2005 Delay	0.335***	0.709***		
	(0.084)	(0.130)		
2005 Attendance			0.020	−0.023
			(0.026)	(0.020)
2005 N. schools	−0.023	0.212	0.006	−0.020
	(0.147)	(0.133)	(0.013)	(0.015)
2011 N. schools	−0.249*	0.024	0.050***	0.014
	(0.130)	(0.091)	(0.016)	(0.010)
2005 Father ed	−0.785***	−0.749***	−0.018	0.010
	(0.257)	(0.204)	(0.022)	(0.016)
2005 Mother ed	−0.402	−0.505*	−0.009	0.004
	(0.361)	(0.258)	(0.034)	(0.022)
2005 N. adults	−0.357***	0.005	0.038**	0.009
	(0.137)	(0.086)	(0.015)	(0.009)
2005 N. children 5-17	0.019	0.024	−0.009	0.000
	(0.083)	(0.087)	(0.010)	(0.008)
2005 N. children 0-5	0.074	−0.368	0.017	−0.017
	(0.272)	(0.419)	(0.023)	(0.027)
2005 Expenditure Q1	0.507	−0.110	0.026	−0.021
	(0.523)	(0.516)	(0.057)	(0.054)
2005 Expenditure Q2	0.362	−0.168	0.058	0.055
	(0.467)	(0.380)	(0.054)	(0.038)
2005 Expenditure Q3	0.615	−0.661*	0.028	0.037
	(0.429)	(0.379)	(0.048)	(0.041)
2005 Expenditure Q4	0.559	−0.300	0.025	0.049
	(0.445)	(0.369)	(0.046)	(0.036)
2005 No parents/only one parent	−0.199	0.195	0.006	−0.017
	(0.349)	(0.277)	(0.032)	(0.038)
2005 Urban	0.259	−0.288	−0.056	−0.006
	(0.447)	(0.268)	(0.041)	(0.026)
2011 N. Adults	0.102*	−0.037	−0.014*	−0.005
	(0.059)	(0.067)	(0.007)	(0.009)
2011 N. Children 5-17	−0.015	−0.008	−0.001	−0.000
	(0.087)	(0.068)	(0.009)	(0.005)
2011 N. children 0-5	−0.026	0.108	−0.010	−0.029**
	(0.128)	(0.126)	(0.015)	(0.012)
2011 Expenditure Q1	0.338	0.573	−0.097*	−0.077**
	(0.498)	(0.401)	(0.051)	(0.035)
2011 Expenditure Q2	0.551	0.626*	−0.076*	−0.062**
	(0.459)	(0.369)	(0.044)	(0.026)
2011 Expenditure Q3	−0.045	0.355	−0.035	−0.006
	(0.397)	(0.331)	(0.037)	(0.018)
2011 Expenditure Q4	−0.439	0.392	0.037	−0.019
	(0.362)	(0.320)	(0.029)	(0.022)
2011 No parents/only one parent	0.079	−0.378	0.013	−0.002
	(0.316)	(0.279)	(0.036)	(0.036)
Constant	4.137***	1.636**	0.725***	0.971***
	(0.956)	(0.689)	(0.109)	(0.074)
Number of children	*351*	*369*	*417*	*427*
R-squared	0.125	0.222	0.015	0.085

Robust standard errors in parentheses.*** p < 0.01, ** p < 0.05, * p < 0.1
Clustered s.e. at household level.

Table A3. Delay in school – IV-FE model with two instruments.

	(1) Boys First Stage	(2) Second stage	(3) Girls First Stage	(4) Second stage
Moved to residence less than 5 yrs ago		−1.917**		0.878
N. of health facilities in community	0.028***		0.025***	
	(0.010)		(0.010)	
N. of other facilities	0.017***		0.015***	
	(0.003)		(0.003)	
N. of schools in community	−0.026***	−0.077*	−0.020**	−0.032
	(0.009)	(0.039)	(0.009)	(0.037)
N. of members >15 yrs old	0.007	0.008	0.016**	−0.031
	(0.007)	(0.039)	(0.007)	(0.035)
N. of children 5–17 yrs old	0.003	0.008	0.010	−0.012
	(0.007)	(0.035)	(0.007)	(0.034)
N. of children <5 yrs old	−0.008	0.036	0.008	0.042
	(0.011)	(0.055)	(0.010)	(0.050)
1st expenditure quintile	0.011	0.140	−0.123***	0.263
	(0.032)	(0.169)	(0.033)	(0.187)
2nd expenditure quintile	0.017	0.149	−0.045	0.113
	(0.030)	(0.159)	(0.032)	(0.158)
3rd expenditure quintile	0.032	0.131	−0.026	0.194
	(0.028)	(0.150)	(0.030)	(0.148)
4th expenditure quintile	0.032	0.025	−0.050*	0.049
	(0.026)	(0.139)	(0.028)	(0.142)
No parents/only one parent	−0.049*	0.046	0.070**	−0.116
	(0.029)	(0.156)	(0.030)	(0.155)
t_2011_father_ed	−0.127***	−0.769***	0.031	−0.847***
	(0.034)	(0.196)	(0.032)	(0.160)
t_2011_mother_ed	−0.013	−0.743***	0.005	−0.564***
	(0.040)	(0.210)	(0.039)	(0.191)
t_2011_urban	0.207***	−0.111	0.008	−0.209
	(0.041)	(0.261)	(0.047)	(0.227)
t_2010_father_ed	−0.162***	−0.735***	−0.035	−0.802***
	(0.036)	(0.224)	(0.036)	(0.175)
t_2010_mother_ed	−0.024	−0.917***	0.003	−0.289
	(0.042)	(0.224)	(0.042)	(0.206)
t_2010_urban	0.238***	0.374	0.056	−0.166
	(0.042)	(0.281)	(0.050)	(0.242)
t_2009_father_ed	−0.089***	−0.523***	−0.040	−0.511***
	(0.035)	(0.189)	(0.033)	(0.162)
t_2009_mother_ed	0.004	−0.674***	0.005	−0.317
	(0.041)	(0.211)	(0.040)	(0.195)
t_2009_urban	0.236***	0.370	0.092*	−0.310
	(0.044)	(0.283)	(0.049)	(0.240)
t_2009	0.030	2.723***	0.001	2.012***
	(0.037)	(0.196)	(0.034)	(0.166)
t_2010	0.132***	2.517***	0.063*	1.629***
	(0.039)	(0.249)	(0.036)	(0.191)
t_2011	0.132***	3.033***	0.050	2.043***
	(0.038)	(0.241)	(0.035)	(0.181)
Observations	*1,449*	*1,449*	*1,505*	*1,505*
R-squared		0.414		0.394
Number of children	*418*	*418*	*433*	*433*
Cragg-Donald weak identification F-statistic		23.93		21.57
Sargan statistic		1.583		0.524

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ Instrumented var.: Moved. Instruments: N. of health facilities in community, N. of other facilities.

Table A4. School attendance – IV-FE model with two instruments.

	(1) Boys First Stage	(2) Second stage	(3) Girls First Stage	(4) Second stage
Moved to residence less than 5 yrs ago		0.288		0.021
		(0.177)		(0.182)
N. of health facilities in community	0.028***		0.025***	
	(0.010)		(0.010)	
N. of other facilities	0.017***		0.015***	
	(0.003)		(0.003)	
N. of schools in community	−0.026***	0.014	−0.020**	−0.008
	(0.009)	(0.009)	(0.009)	(0.009)
N. of members >15 yrs old	0.007	−0.021**	0.016**	0.001
	(0.007)	(0.009)	(0.007)	(0.009)
N. of children 5–17 yrs old	0.003	−0.007	0.010	0.008
	(0.007)	(0.008)	(0.007)	(0.008)
N. of children <5 yrs old	−0.008	0.001	0.008	−0.017
	(0.011)	(0.013)	(0.010)	(0.012)
1st expenditure quintile	0.011	−0.066*	−0.123***	−0.049
	(0.032)	(0.040)	(0.033)	(0.046)
2nd expenditure quintile	0.017	−0.010	−0.045	−0.011
	(0.030)	(0.037)	(0.032)	(0.039)
3rd expenditure quintile	0.032	−0.034	−0.026	−0.036
	(0.028)	(0.035)	(0.030)	(0.036)
4th expenditure quintile	0.032	0.013	−0.049*	−0.005
	(0.026)	(0.033)	(0.028)	(0.035)
No parents/only one parent	−0.049*	0.019	0.070**	0.011
	(0.029)	(0.037)	(0.030)	(0.038)
t_2011_father_ed	−0.127***	0.060	0.031	−0.015
	(0.034)	(0.046)	(0.032)	(0.039)
t_2011_mother_ed	−0.013	−0.121**	0.005	−0.101**
	(0.040)	(0.049)	(0.039)	(0.047)
t_2011_urban	0.207***	−0.166***	0.008	−0.137**
	(0.041)	(0.061)	(0.047)	(0.056)
t_2010_father_ed	−0.162***	0.129**	−0.035	−0.001
	(0.036)	(0.053)	(0.036)	(0.043)
t_2010_mother_ed	−0.024	−0.120**	0.003	−0.107**
	(0.042)	(0.053)	(0.042)	(0.051)
t_2010_urban	0.238***	−0.202***	0.056	−0.146**
	(0.042)	(0.066)	(0.050)	(0.059)
t_2009_father_ed	−0.089***	0.067	−0.040	−0.019
	(0.035)	(0.045)	(0.033)	(0.040)
t_2009_mother_ed	0.004	−0.127**	0.005	−0.081*
	(0.041)	(0.050)	(0.040)	(0.048)
t_2009_urban	0.236***	−0.192***	0.092*	−0.130**
	(0.044)	(0.067)	(0.049)	(0.059)
t_2009	0.030	0.188***	0.001	0.323***
	(0.037)	(0.046)	(0.034)	(0.041)
t_2010	0.132***	0.170***	0.063*	0.306***
	(0.039)	(0.059)	(0.036)	(0.047)
t_2011	0.132***	0.187***	0.050	0.311***
	(0.038)	(0.057)	(0.035)	(0.045)
Observations	*1,449*	*1,449*	*1,506*	*1,506*
R-squared		0.173		0.205
Number of children	*418*	*418*	*433*	*433*
Cragg-Donald weak identification F-statistic		23.93		21.59
Sargan statistic		1.406		0.139

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ Instrumented var.: Moved. Instruments: N. of health facilities in community, N. of other facilities.