DRAFT

This paper is a draft submission to

Inequality—Measurement, trends, impacts, and policies

5–6 September 2014   Helsinki, Finland

THE IMPACT OF SCHOOL FEES ON THE INTERGENERATIONAL TRANSMISSION OF EDUCATION

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First draft: May 2014

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Abstract

In this paper, we simultaneously analyze patterns of intergenerational mobility in education distinguishing the effects of parental education as an indicator of investment on children at the household level and the abolition of school fees as an indicator of investment in children at higher economic levels. Using a large data set of about 1 million children from 67 developing countries, we find that both intergenerational transmissions of education as well as access to free primary education significantly increase the educational outcomes of children. Our results also indicate a significant gradient in mothers' education in the benefits of lifting school fees. This suggests that so initiatives that have made primary education free have not only raised the stock of total education in the economy, they have also improved the distribution since the gains have been largest for the least educated mothers whose children had the greatest starting disadvantage.

Key Words: Education, school fees, intergeneration mobility.

JEL: D30, I20, I24, I25, I30, J60, O10, O12

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1. Introduction

Reforms in education systems, investments in school infrastructure and the abolition of school fees have led to improvements in enrollment in primary and secondary education in many developing countries within the last decade (Moulton et al. 2002; UNESCO 2014). For example, net primary enrollment increased from around 60% in 2000 to 76% in 2011 in low-income countries (World Bank 2013). Despite these average improvements in many countries, the target of universal primary education (UPE) by 2015 is not likely to be met by most developing countries. Sub-Saharan Africa in the region that is still most behind the goal with around 22% of school-aged children not enrolled in primary education (UNESCO 2014). This paper analyzes determinants of how inequality in education can be reduced. In particular, we address addresses two topics, namely, the role intergenerational transmission of education and impact of school fees on educational outcomes.

Educated parents not only tend to invest more time and effort in the education of their children, they also tend to be wealthier. School fees and other costs of school attendance including the opportunity cost of time have been found to be a significant barrier to educational enrolments, deterring poorer parents from sending their children to school (e.g. World Bank, 2009). It follows that the intergenerational transmission of education can upon the institution or removal of user fees for education.

Most studies that analyze the intergenerational transmission of education focus on developed countries, while only few studies exist that for developing countries. Hertz et al. (2007) analyze trends in intergenerational persistence of educational attainment for 42 developing countries capturing a 50-year period. They find that the average correlation between parental education and education of children remained stable at around 0.4 across countries and over time. Agüero and Ramchandran (2010) find for Zimbabwe that more educated mothers have better-educated children than less-educated mothers.[4]

School fees, which have been introduced as a means to fund the school system, are of particular concern with respect to access to (primary) education for the poor population (Tinker et al. 2013). There is an ongoing trend of abolishing school fees in developing countries, particularly in Sub-Saharan Africa. However, limited financial resources to fund

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[4] One problem when analyzing intergenerational transmission in education is the potential „ability bias", which can overstate the effect of the educational outcomes of parents on their children. First, more "able" mothers may obtain more schooling. If this ability is genetically transmitted from mothers to their children, the intergenerational transition in education would only show that more able mothers who have more schooling, have more able children, who obtain more schooling bypassing any socioeconomic underlying factors. Second, more able mothers marry, on average, more educated men, meaning that also the effect of the father on could be overstated. Using a large data set for the United States on twins, Behrman and Rosenzweig (2002) take into account the possible "ability bias". They find that the positive association between parental and children's education can be biased upwards. However,, even when taking account a possible "ability bias" they identify a significant positive impact of the education of parents on the education of their children.

the education system remain one of the main challenges in developing countries (Kanyongo 2005).

Unfortunately, the data availability on school fees across developing countries and their development over time is very limited. Hence, there is limited empirical evidence on the impact of school fees and their abolition on children's education. A recent paper by Tinker et al. (2013) analyze the relationship between school fees for primary education and access to primary education for seven Sub-Saharan African countries that have been abolished school fees within in the last two decades. The authors estimate the impact of school fees at the macro level for the time period since the introduction of school fees. They find a strong negative and significant association between school fess in primary education and enrollment rates in primary education after controlling for indicators of health and income. Similar results are found by Al-Samarrai and Zaman (2000) for Malawi. The abolition of tuition fees lead to an increase in enrollment rates of primary education. In addition, these gains are identified to be higher for the poor population. Osili and Long (2008) investigate the impact of the Nigerian Universal Primary Education initiative between 1974 and 1982. They also found a strong positive impact on enrollment rates. Similar to the abolition of school fees, school construction programs also can have positive impacts on educational achievements of education. An example for such programs is the school construction program in Indonesia between 1973 and 1978, which had a large positive impact on children's education (Duflo 2001).

The main objective of the paper is to analyze patterns of intergenerational mobility in education distinguishing the effects of parental education as an indicator of investment on children at the household (micro) level and the abolition of school fees as an indicator of investment in children at higher (macro) economic levels.

While user fees for public services in developing countries have been much debated and there are some studies of their impact on outcomes (e.g. World Bank, 2004, 2009), this paper provides new evidence in two respects. First, we paint a broad-brush picture using a very large number of countries and years, drawing on the internationally comparable Demographic and Health Surveys. Second, we estimate not only the direct impact of school fees on attainment, but also their impact on the intergenerational transmission of education.

We use Demographic and Health Survey data for 67 developing countries and a sample size of about 1 million children to analyze the educational transmission of education. We overcome the problem of limited cross-country information on school fees by using information at the country level about whether countries have free primary education taking

into account the year when school fees have been abolished. In particular, two World Bank reports (World Bank 2006, 2009) provide a summary of whether developing countries have free or non-free primary education, which can be used for comparable cross-country study on the impact of free primary education on children's education.

Until today, there exists no previous comparable cross-country evidence on the impact of school fees in children's education at the micro level. Also, there exists no previous study that uses micro data. In addition, there exists no previous study that concentrates on an outcome indicator of education. Existing studies focus on the effect of school fees on input indicators such as enrolment rates and pupil-teacher ratios.

Our results indicate the extent to which user fees influence the intergenerational transmission of education and perpetuate educational inequality. In particular, we find that both intergenerational transmissions of education as well as access to free primary education significantly increase the educational outcomes of children. Our results also indicate a significant gradient in mothers' education in the benefits of lifting school fees. This suggests that so initiatives that have made primary education free have not only raised the stock of total education in the economy, they have also improved the distribution since the gains have been largest for the least educated mothers whose children had the greatest starting disadvantage.

The rest of the paper is organized as follows. In section 2, the methodological approach is explained. In section 3, the data sources to analyze the intergenerational mobility in education capturing also the effect of the abolition of school fees are described. In section, we present the results. Finally, in section 5, we conclude.

2. Methodology

The objective is to analyze patterns of educational mobility distinguishing the effects of mother's education and the impact of the abolition of school fees in primary education. For the estimation, we pool the individual data for children aged between 15 and 18 across countries and periods. The reason for pooling the data for these for years of age is twofold. First, we are interested in children that already are in their final stages of education to eliminate the effect of path dependency meaning that younger children automatically have less years of education than older children. Second, we do not only focus on the age groups of the 18 years old because we would like to keep the sample as large as possible taking into account the year where school fees have been abolished (it at all).

We use the following equation to estimate the intergenerational correlation of education, β:

$$C_{imjt} = \alpha + \beta_1 E_{mjt} + \beta_2 X'_{imjt} + \delta_{imjt} + \gamma_j + \upsilon_t + \varepsilon_{imjt} \tag{1}$$

Equation (1) serves as a baseline model. The dependent variable C_{imjt} refers to years of education of child i (aged between 15 and 18) born to mother m in country j in year t. E_{mjt} indicates the number of years of education of the mother. Here, we focus on mother's education since the education of the mother is identified as having a greater impact on children the education of the father (Behrman and Rosenzweig, 2002, Schultz, 1993, Thomas et al., 1996). We expect $\beta_1 > 0$ since mother's education tends to positively influence the educational achievements of her children.[5] X' is a vector of control variables including age of mother and sex of the child. δ_{imjt} indicate age fixed-effects for child i, γ_j indicates the country fixed-effects, and υ_t year fixed-effects (birth year of child) capturing time-varying unobservables. They will absorb average differences in years of education of children across countries and over time (Bhalotra and Rawlings 2011).

We then estimate a second equation to investigate the impact of tuition fees in primary education on years of education of children. For this, we introduce two different dichotomous variables F' indicating whether primary education is free or non-free at the age at which individual children in the sample were exposed to primary schooling:[6]

$$C_{imjt} = \alpha + \beta_1 E_{mjt} + \beta_2 X'_{imjt} + \beta_3 F_{imjt} + \delta_{imjt} + \upsilon_t + \varepsilon_{imjt} \tag{2}$$

We estimate a third equation in which we include an interaction term between user fees and mother's education, which our main conclusions draw from.

$$C_{imjt} = \alpha + \beta_1 E_{mjt} + \beta_2 X'_{imjt} + \beta_3 F_{imjt} + \beta_4 FxE_{imjt} + \delta_{imjt} + \upsilon_t + \varepsilon_{imjt} \tag{3}$$

Equation (3) allows us to address the very important whether school fees for primary education decreases children's educational achievement and whether this effect is at the same time related to the educational level of the mother. This is of particular importance if we can identify that countries whose have abolished school fees were able to increase the educational

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[5] All models are also estimated using years of education of the father as well as for both fathers and mothers education. Results are shown in the Appendix

[6] See the data section for the description of the indicators of free or compulsory education.

levels. To the extent that school fees particularly reduce educational enrolments of children from poorly educated mothers, lifting school fees should promote intergenerational mobility of education.

3. Data

To analyze intergenerational mobility in education, we use nationally representative Demographic and Health Survey (DHS) data sets. The DHS are undertaken by *Macro International Inc., Calverton, Maryland* (usually in cooperation with local authorities and funded by USAID) and the data are national surveys of women aged between 15 and 49. The average sample size is about 5,000 to 30,000 women. The DHS provide detailed information on population, health, nutrition, and education as well as on household's durables and quality of the dwelling.

The estimation sample consists of 190 surveys from 67 countries covering the period 1990 to 2012. For most countries more than one survey (up to 6) is available. Multiple country surveys are then pooled across survey rounds. A detailed description of the data sample is presented in Table A1 and A2 in the Appendix. In total, the sample contains information on 929,059 children aged between 15 and 18 born between 1972 and 1997. While the majority of surveys are available for African countries (105 surveys compared to 48 from Asia and 34 from Latin America, Asia provides the largest number of children (43 percent compared to 36 percent from Africa and 21 percent from Latin America), which is driven by large sample sizes of the surveys from Bangladesh, Indonesia, and India.

Using the DHS data provides us with several advantages for our analysis: First, the DHS allow us to link children to their biological and non-biological parents through birth history records and information on the relationship across household member living in the same households. [7] For 91 percent of the children, we are able linking the child to her/his biological parents, while for 9 percent we are only able to link children to non-biological parents, meaning that these children living in households without their parents (e.g. orphans or children living with other relatives than the parents). The sample of children linked to non-biological parents are of particular interest to take into account the potential "ability bias"

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[7] In particular, we use the household member recode for linking the children to their biological and non-biological parents of household members living in the same households. The data sets do not allow to link children to parents living in different households.

because no genetically transmitted ability of ability could influence the intergenerational transmission of education between, for example, foster parents and foster children.[8]

Second, using the DHS data sets, we are also able to identify children living in two- or three-generation households. This information provides us with the very special opportunity to track educational mobility across three generations, taking into account the educational attainment of the child's grandparents (i.e. the intergenerational mobility in education of grandparents to parents of the child).[9] Third, the DHS include a household member module and an individual module for women of reproductive age. At the individual level, the DHS provide rich information on educational achievements. At the household level, the DHS provide information on the structure of the household and socioeconomic characteristics. Fourth, although the DHS are not completely standardized across time and countries, the design and coding of variables (especially on educational achievements, assets and dwelling characteristics) are generally comparable. Fifth, the DHS data sets can be merged with country-level panel data by country and birth year of the child. This allows analyzing how educational mobility depends on changes in country-level economic and political indicators (i.e. user fees for primary education).

Since one of the main goals of the paper is to identify determinants of changes in intergenerational mobility in education over time, one focus is on the question to what extent barriers to educational participation affects outcomes in education. In particular, we examine what role school fees play in this context. An important question to address is whether school fees for primary education decreases children's educational achievement and whether this effect is related to the educational level of the parents. This is of particular importance if we can identify that countries whose have abolished school fees were able to increase the educational levels. To the extent that school fees particularly reduce educational enrolments of children from poorly educated mothers, lifting school fees should promote intergenerational mobility of education.

To analyze the impact of school fees (or free primary education in particular) on years of education of children, we use information on school fees for primary at the country level. The main challenge to overcome is that information on school fees is difficult to come by. An exception to this is a comprehensive World Bank report from the year 2006 (World Bank 2006) on school fees in primary education in developing countries, which we use as the main

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[8] Hence, as a robustness check, we also analyze the equation (1) to (3) only for the non-biological parents sample. The results confirm our main results indicating that the „ability bias" does no alter our results.
[9] In particular we also applied an IV approach where we use the education oft he grand parents as determinant oft he education oft he mother (father). The results oft he IV approach confirms the results where education of mothers (fathers) directly enters the regression equation.

source of school fees. In addition, a second World Bank report (World bank 2009) analyses the experiences Sub-Saharan African countries have been made during reforming their educational system by abolishing school fees for primary education. This report is used to complement the World Bank (2006) report. A detailed description on the existence of school fees and the year where fees have been abolished by country are presented in Table 1.

Using the World Bank (2006) report, we define a dummy variable taking the value one if primary education in the country is free, and zero otherwise. We also, and this is of particular relevance, take into account the year when school fees have been abolished. This means that our variable on the information on free primary education varies within countries, depending on a) whether primary education is free or not and b) whether the year children were born. In particular, if children were born after the abolition of the school fees plus the number of years reaching the country-specific age to begin primary education, children within a country could have be exposed to free primary education as well as to non-free primary education, depending on their date of birth. For example, in Bangladesh, school fees have been abolished in 2000. This means that children born after 1994 could benefit from free primary education since children start school with the age of six.

Table 1 shows that out of the 64 countries in our sample, 21 countries have been abolished school fee in primary education from which 16 countries are in Sub-Sahara Africa. For these 21 countries the year of abolition can be taken into account to provide also information on within country variations. However, since we focus on the age group 15 to 18, out of these 21 countries 8 countries within country variations in the free primary education dummy (Nigeria, Lesotho, Bangladesh, Cameroon, Uganda, Ethiopia, Malawi, Armenia) because the surveys include children aged 15 to 18 capturing the period before and after the abolition of the school fees in primary education. For the other countries both variable for free primary education show either the value zero or one at the country level.

4. Results and Discussion

Table 1 provides a summary of the information school fees in primary education obtained from the two World Bank reports (World Bank 2006, 2009). In 21 countries out of the 64 countries children have free access to primary education, while for 11 countries fees have been abolished with the last 15 years as a results of the increased understanding of the importance of education for poverty reduction and the initiative to promote universal primary education.

All tables and figures presenting the results are on the sample including two- and three-generation households. We also have analyzed differences in intergenerational mobility in education separately by two- and three-generation households but the differences are only very. Table 2 provides some descriptive statistics on education of children aged 15 to 18 as well as on the educational outcome of mothers and fathers. Table 2 already reveals five interesting outcomes. First, the large relatively large standard deviations indicate large variations in years of education between and within countries. While the mean years of education of children is 6.5 years, the standard deviation is 3.62. Second, considerable differences in years of education both for children as well as for mothers and fathers exist by region. Especially differences in children educational outcomes are observable. Children aged 15 to 18 in Africa lack behind, on average, of 1.6 years of education than children from Asia and more than 2.2 years of education than children from Latin America. Third, children's educational outcomes are increasing over time. Between the birth cohort of children born between 1972 and 1976 and born between 1992 and 1997, children gain, on average, 1.5 years of education. Fourth, we observe persisting differences in the education outcome between mothers and fathers. Mothers have, on average, more than 1 year of education less than fathers. However, when looking at the evolution over time, mothers educational have increased at a higher rate than years of education of fathers indicating a promising process of reducing inequality in education between women and men. Fifth, there exist only little difference between two- and three-generation households.

Figure 1 illustrates the differences in the development of years of education over time. Positively, we observe that educational outcomes of children increased steadily since the 80ies. However, although improvements have been made on all developing regions Figure 1 reveals large gaps between regions and shows that Africa remains persistently behind the Asia and Latin America. Growth rates in years of education have not been much higher in Africa than in other regions for the cohort 1992-1997.

Figure 2 shows the percentage of children aged 15-18 in our sample with access to free primary education by birth cohort. Interesting is the increase in the blue bar of children born in the early 1990ies, reflecting the efforts countries have been made to abolish their school fees. Since we focus on the age group 15 to 18, out of these 21 countries 8 countries within country variations in the free primary education dummy (Armenia, Nigeria, Lesotho, Bangladesh, Cameroon, Uganda, Ethiopia, and Malawi) because the surveys include children aged 15 to 18 capturing the period before and after the abolition of the school fees in primary

education. For the other countries the variable on free primary education show either the value zero or one at the country level.

Table 3 presents the estimation results for equation (1)-(3) of the impact of mother's education and school fees on educational outcomes of children aged between 15 and 18. [10] Table 3 shows that if we control for mother's age and sex of child as well as country-specific, country-birth year specific, age of the child-specific, and year specific effects, the coefficient of intergenerational transmission of education is about 0.32. This is to say that an additional year of the mother's education is associated with a 0.32 increase in the education years of the 15-18 year old child. This result is similar to the findings by Hertz et al (2008). The covariates are also worth noting. In our total sample, boys have about 0.32 years more education by 15-18 than girls. Children born to older mothers have (slightly) more education, possibly related to the greater maturity of the mother in her ability to invest in her child's education. Table 3 shows that, as expected, free primary education has a significant impact on the achieved years of schooling of 15-18 year olds in our data set. Further, Table 3 shows the impact of school fees on the intergenerational transmission of education. This is shown by interacting the mother's education with the free-schooling variable. Consider the estimates in column 3. The lifting of user fees for primary education has a direct effect on schooling, which for mothers with no education is 0.17 years. For every year of education that the mother has relative to none, the education return to lifting fees drops by 0.02 years. So for mothers with six years of primary education, it drops by 0.12 years and for mothers with a total of twelve years of primary and secondary education it drops by 0.24 years. This seems to be a small effect but remember that the average number of years of education is only about 5.

There are two interesting conclusions here. First, there is a significant gradient in mothers' education in the benefits of lifting school fees, so initiatives that have made primary education free have not only raised the stock of total education in the economy, they have also improved the distribution since the gains have been largest for the least educated mothers whose children had the greatest starting disadvantage. This is reflected in the intergenerational correlation of education declining by a significant 3.1% (0.01/0.32). Second, although the erosion of benefits for educated mothers is statistically significant, the children of mothers with twelve years of education are estimated to gain almost 2 years of education as a result of lifting fees, indicating substantial gains across the distribution. This may be relevant to the extent to which there is widespread political support for the introduction of reforms that make basic schooling free. Here we have spelt out how mother's education modifies the impact of

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[10] Table A3 shows the respective results for education of fathers and of both mothers and fathers.

user fees since our focus is upon policy initiatives that make education free. But estimates of the interaction between user fees and mother's education can also be expressed in terms of how user fees modify the intergenerational transmission of education.

The estimates presented in Table 3 also included age fixed-effects of the child to take into account that we use the age group 15 to 18. As a robustness check, we also did the estimation separately for each age 15 to 18, which are presented in Table A4. The results confirm our overall results. Without age fixed-effects, the size of free primary education on children's education is even larger.

Table 4 shows the results separately for Africa and Non-Africa (we do not distinguish between Asia and Latin America because we have no country from Latin America in the sample for which the is within country variation on the free primary education variable). Also here, the impact of free primary has a significant positive impact on the education of children, while the interaction between free primary education and the years of education of the mothers has a significant negative impact.

Table 5 presents the results for non-biological parents sample. Studying the effects of intergenerational transmission in education separately for children not living with their biological parents (e.g. orphans, foster children) allows us to take into account a possible ability bias in the intergenerational transmission of education. Table 5 confirms our previous findings showing a clear significant impact of mothers education on years of education of children aged 15 to 18. However, the size of the effect is smaller (0.2 compared to 0.3). What is very interesting is that the effect of lifting school fees has an even higher impact of children living with their non-biological parents or other relatives (0.64 compared to 0.17). This result seems to conform that biological parents tend to invest more in their own children than non-biological parents leaving a much greater leverage for the effect of reducing school costs.

Table 6 shows the results for countries where within country variations in the free primary education variable exists. Although some differences exist in the magnitude of effects, both education of mothers as well as free primary education have consistent strong effects on children education.

It would of course be also very interesting to analyze the impact of school fees in secondary education on educational outcomes of children. Unfortunately, information on whether secondary education is free or compulsory is even more limited than information on whether primary education is free or non-free. However, a recent database provided by the World Policy Analysis Center (2013) gives an interesting starting point. Using information from the database, we define two additional dummies whether beginning secondary education is free or compulsory. To analyze the effects of whether secondary education is free and/or

compulsory serves us a robustness check of our results. Using data on whether beginning secondary education is free and/or compulsory, we find a similar pattern of results. In countries where it is free or compulsory (and free), it raises educational levels and more so amongst children of less educated mothers (see Table A5)[11].

5. Discussion

These estimates need to be qualified for the following reasons. First, the specification we estimate assumes linearity in returns to the education of the mother, or that an additional year of education of the mother produces the same return irrespective of whether it takes the mother from 0 to 1, 6 to 7 or 12 to 13 years of education. We re-estimated equation (1) using a quadratic in years of education of the mother (father) (see Table A 3 columns 7 and 8). We find that the education of children increases at a decreasing rate in the mother's education).

Second, we have implicitly assumed that the introduction or removal of user fees is exogenous whereas if, for instance, user fees were removed earlier (or later) in countries with slow growth in education, then the coefficients are potentially biased. We think this is unlikely based upon our reading of the political and institutional context of the reforms in this sample, which followed largely from an international consensus driven by a growing understanding of the equity and efficiency benefits of education, which led UN organizations to initiate these reforms across countries irrespective of country-specific performance. We expect any potential bias is mitigated by the fact that the baseline level of education is absorbed by country fixed effects. To control for the possibility that pre-reform trends in education were different in reforming and non-reforming countries, we included country-specific linear and quadratic trends. These controls also largely take care of the possibility that the institution of reform coincides with other events, for instance, if user fees are lifted after a more pro-poor government comes to power, that government may have simultaneously introduced other reforms that impact upon educational outcomes, making it hard to attribute the estimated gains in education to the user fees reform.[12]

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[11] See Table A6 for the countries where beginning secondary education is tuition free or compulsory.
[12] Where education reform is the result of a change in government, it seems likely that health reform will also be implemented. However impacts of health reform on educational enrolment in primary school are most likely for health reforms conducted in the first year of life (Almond and Currie 2011, Bhalotra and Venkataramani 2013) while school reform is likely to be effective even when it arrives in the sixth year of life. This breaks the concert of timing of health as opposed to educational interventions.

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Table and Figures

Table 1: Information on School fees for primary education

Country	Free primary education	Year of free education introduction	Country	Free primary education	Year of free education introduction
Albania	Yes	1991	Liberia	No	-
Armenia	Yes	1991	Madagascar	Yes	2002
Bangladesh	Yes	2000	Malawi	Yes	1994
Benin	No	-	Maldives	No	-
Bolivia	No	-	Mali	No	-
Burkina Faso	No	-	Morocco	Yes	1963
Cambodia	No	-	Mozambique[a]	Yes	2004
Cameroon	Yes	2000	Namibia	No	-
CAR	No	-	Nepal	No	-
Chad	No	-	Nicaragua	No	-
Colombia	No	-	Niger	No	-
Comoros	No	-	Nigeria	Yes	1999
Cong, Rep.	No	-	Pakistan	No	-
Côte d'Ivoire	No	-	Paraguay	No	-
Congo, De. Rep.	No	-	Peru	No	-
Dominican Rep.	No	-	Philippines	No	-
Egypt	Yes	1999	Rwanda	Yes	2003
Ethiopia[a]	Yes	1995	Sao Tome and P.	No	-
Gabon	No	-	Senegal	No	-
Ghana[a]	Yes	2005	South Africa	No	-
Guatemala	No	-	Swaziland	Yes	2010
Guinea	No	-	Timor-Leste	No	-
Haiti	No	-	Togo	No	-
Honduras	No	-	Turkey	No	-
India	Yes	2006	Uganda	Yes	1996
Indonesia	No	-	Ukraine	No	-
Jordan	No	-	Uzbekistan	No	-
Kazakhstan	No	-	Tanzania	Yes	2001
Kenya	Yes	2003	Viet Nam	No	-
Kyrgyzstan	Yes	1990	Yemen, Rep.	No	-
Lao PDR	No	-	Zambia[b]	Yes	2002
Lesotho	Yes	1999	Zimbabwe	No	-

Note: The table lists countries for which DHS data is available. The table column presents information on whether primary education is tuition free or not based on World Bank (2006, 2009). The second column shows the years where tuition fees have been abolished. For selected countries, the information is updated based on a) World Bank (2009) and b) Tinker et al. (2013).
Source: World Bank (2006), World Bank (2009). Tinker et al. (2013).

Table 2: Descriptive Statistics

	Children (15-18)		Mother		Father	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Total	6.50	3.62	4.22	4.52	5.50	4.81
Africa	5.36	3.63	3.35	4.16	4.44	4.76
Asia	6.99	3.61	4.16	4.54	5.97	4.76
Latin America	7.59	3.03	5.83	4.64	6.41	4.68
Birth cohort of child						
1972-1976	5.65	4.00	2.71	3.80	4.42	4.53
1977-1981	6.08	3.68	3.63	4.20	5.07	4.67
1982-1986	6.19	3.65	3.96	4.42	5.40	4.77
1987-1991	6.78	3.64	4.46	4.67	5.71	4.93
1992-1997	7.16	3.15	5.34	4.66	6.23	4.82
Two-generation households	6.59	3.62	4.22	4.62	5.57	5.00
Three-generation households	6.27	3.61	4.22	4.26	5.35	4.40

Note: Total time period of birth years: 1972-1997. DHS sample time period: 1990-2012. Total number of children aged between 15 and 18: 929,059. See Table A1 for more detailed sample information. Children and parents refer both to biological parents as well as non-biological parents.
Source: Demographic and Health Surveys, calculations by the authors.

Figure 1: Trends in children's education by birth cohort and continent
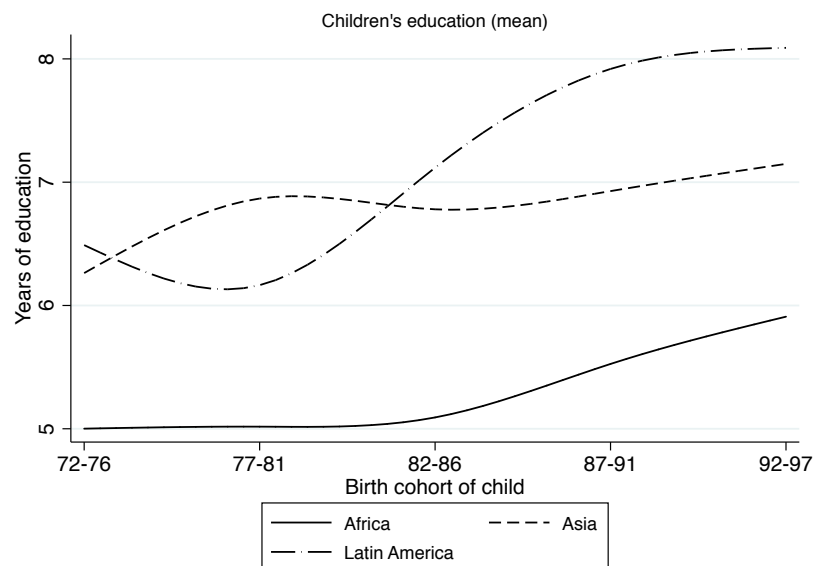
Source: Demographic and Health Surveys, calculations by the authors.

Figure 2: Percent of children with access to free primary education by birth cohort
(age group 15-18)
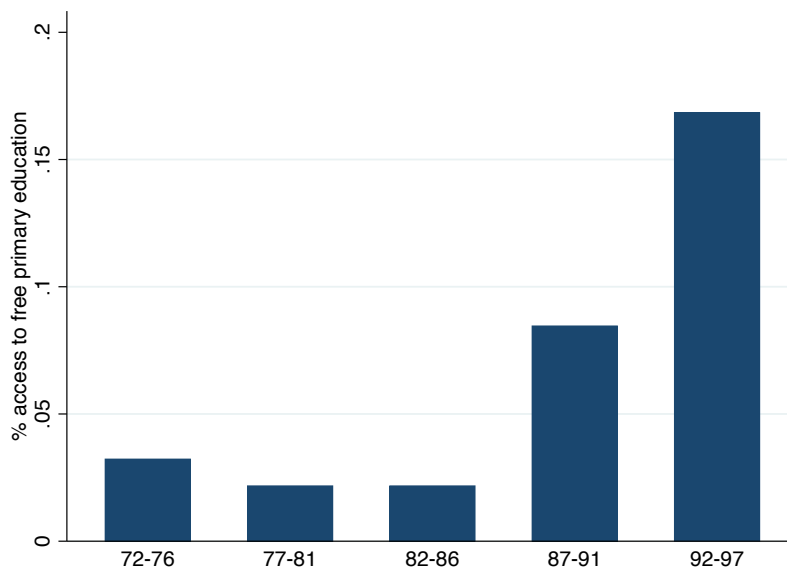
Source: World Bank (2006, 2009), Tinker et al (2013), (see Table 2), Demographic and Health Surveys, calculations by the authors.

Table 3: Impact of school fees on educational outcomes

	(1)	(2)	(3)
Years of education (mother)	0.321***	0.321***	0.322***
	(0.000756)	(0.000756)	(0.000765)
Sex of child (1=boy)	0.280***	0.280***	0.280***
	(0.00608)	(0.00608)	(0.00608)
Age of mother	0.0211***	0.0211***	0.0211***
	(0.000354)	(0.000354)	(0.000354)
Free primary (=1)		0.0866***	0.172***
		(0.0214)	(0.0277)
Free primary x years of education mother			-0.0212***
			(0.00362)
Observations	906,683	906,683	906,683
R-squared	0.849	0.849	0.849
Age FE	YES	YES	YES
Country FE	YES	YES	YES
Year FE	YES	YES	YES
Mean dep. var.	6.46		
Sd dep. var.	3.63		
Mean education mother	4.00		
Sd education mother	4.47		
Mean sex of child is male	.514		
Sd sex of child is male	.499		
Mean age of mother	41.9		
Sd age of mother	9.30		
Mean of free education		.046	.046
Sd of free education		.210	.210

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models include two- and three-generation households. All models include children from biological and non-biological parents. Year fixed-effects refer to birth year fixed effects of the child. Free primary education variable is based on World Bank (2006, 2009), Tinker et al. (2013) (see Table 1).
Source: World Bank (2006. 2009), Tinker et al. (2013), Demographic and Health Surveys. Calculations by the authors.

Table 4: Impact of school fees on educational outcomes by region

	(1)	(2)	(3)	(4)	(5)	(6)
	Africa	Africa	Africa	Non-Africa	Non-Africa	Non-Africa
Years of education (mother)	0.322***	0.323***	0.400***	0.321***	0.321***	0.378***
	(0.00140)	(0.00140)	(0.00141)	(0.000893)	(0.000893)	(0.000834)
Sex of child (1=boy)	0.267***	0.267***	0.271***	0.286***	0.286***	0.312***
	(0.0102)	(0.0102)	(0.0113)	(0.00756)	(0.00756)	(0.00784)
Age of mother	0.0214***	0.0214***	0.0279***	0.0212***	0.0212***	0.0262***
	(0.000523)	(0.000523)	(0.000565)	(0.000479)	(0.000479)	(0.000489)
Free primary (=1)		0.087***	0.339***		0.121***	0.380***
		(0.0078)	(0.0254)		(0.0380)	(0.0555)
Free primary x years of education mother			-0.102***			-0.103***
			(0.00426)			(0.00570)
Observations	321,405	321,405	321,405	585,278	585,278	585,278
R-squared	0.805	0.805	0.762	0.865	0.865	0.855
Age FE	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Mean dep. var.	5.42			7.04		
Sd dep. var.	3.63			3.50		
Mean education mother	3.32			4.38		
Sd education mother	4.16			4.59		
Mean sex of child is male	.522			.509		
Sd sex of child is male	.499			.499		
Mean age of mother	41.9			41.9		
Sd age of mother	10.1			8.79		
Mean of free education		.102	.102		.015	.015
Sd of free education		.303	.303		.124	.124

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models include two- and three-generation households. All models include children from biological and non-biological parents. Year fixed-effects refer to birth year fixed effects of the child. Free primary education variable is based on World Bank (2006, 2009), Tinker et al. (2013) (see Table 1).
Source: World Bank (2006, 2009), Tinker et al. (2013), Demographic and Health Surveys. Calculations by the authors.

Table 5: Impact of school fees on educational outcomes for children living without their biological parents

	(1)	(2)	(3)
Years of education (non-biological mother)	0.215***	0.215***	0.217***
	(0.00270)	(0.00270)	(0.00278)
Sex of child (1=boy)	0.309***	0.310***	0.309***
	(0.0238)	(0.0238)	(0.0238)
Age of mother	0.0156***	0.0156***	0.0156***
	(0.000872)	(0.000872)	(0.000872)
Free primary (=1)		0.415***	0.639***
		(0.0685)	(0.0845)
Free primary x years of education mother			-0.0455***
			(0.0101)
Observations	83,563	83,563	83,563
R-squared	0.769	0.769	0.769
Age FE	YES	YES	YES
Country FE	YES	YES	YES
Year FE	YES	YES	YES
Mean dep. var.	4.91		
Sd dep. var.	3.73		
Mean education mother	4.34		
Sd education mother	4.84		
Mean sex of child is male	.288		
Sd sex of child is male	.453		
Mean age of mother	42.1		
Sd age of mother	12.3		
Mean of free education		.053	.053
Sd of free education		.225	.225

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models include two- and three-generation households. All models include children from non-biological parents. Year fixed-effects refer to birth year fixed effects of the child. Free primary education variable is based on World Bank (2006, 2009), Tinker et al. (2013) (see Table 1).
Source: World Bank (2006, 2009), Tinker et al. (2013), Demographic and Health Surveys. Calculations by the authors.

Table 6: Impact of school fees on educational outcomes for selected countries

	(1) Armenia	(2) Bangladesh	(3) Cameroon	(4) Ethiopia	(5) Lesotho	(6) Malawi	(7) Nigeria	(8) Uganda
Years of education (mother)	0.542***	0.537***	0.448***	0.433***	0.336***	0.403***	0.377***	0.313***
	(0.0133)	(0.0144)	(0.00749)	(0.0131)	(0.0101)	(0.0147)	(0.00518)	(0.00737)
Sex of child (1=boy)	-0.0372	-0.129*	0.170***	0.590***	-1.529***	-0.386***	-0.128**	0.0622
	(0.0458)	(0.0722)	(0.0486)	(0.0494)	(0.0553)	(0.0893)	(0.0500)	(0.0444)
Age of mother	0.0713***	0.125***	0.0391***	0.0244***	0.0169***	0.0353***	0.0514***	0.0209***
	(0.00359)	(0.00167)	(0.00240)	(0.00249)	(0.00269)	(0.00476)	(0.00256)	(0.00235)
Free primary (=1)	0.742***	0.449***	0.362***	0.235**	0.829***	0.365***	0.413*	0.548***
	(0.080)	(0.0969)	(0.125)	(0.114)	(0.034)	(0.040)	(0.227)	(0.023)
Free primary x years of education mother	-0.341***	-0.174***	-0.0506***	-0.0843***	-0.054***	-0.0705***	-0.0325	-0.0327**
	(0.0164)	(0.0205)	(0.0134)	(0.0175)	(0.0267)	(0.0268)	(0.0217)	(0.0144)
Observations	5,346	6,529	10,503	15,050	6,237	2,956	17,224	12,297
R-squared	0.966	0.849	0.880	0.628	0.898	0.852	0.818	0.846
Age FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models include two- and three-generation households. All models include children from biological and non-biological parents. Year fixed-effects refer to birth year fixed effects of the child. Free primary education variable based on World Bank (2006, 2009), Tinker et al. (2013) (for more detailed information, see Table 1). For these countries the sample shows variation in access to tuition free primary education within the age group 15-18 depending on the birth year of the child and official age of school entry. This allows a country specific analysis of the impact of abolishing school fees on educational outcome. Year where primary education became free: 1991 (Armenia), 1994 (Malawi), 1995 (Ethiopia), 1996 (Uganda), 1999 (Lesotho, Nigeria) ,2000 (Bangladesh, Cameroon).
Source: World Bank (2006, 2009), Tinker et al. (2013), Demographic and Health Surveys. Calculations by the authors.

Appendix

Table A1: Sample information

Sample	Total sample		Africa		Asia		Latin America	
(age 15 -18)								
Period: 1990-2012	N	%	N	%	N	%	N	%
Biological parents	844'117	91	295'790	89	372'766	93	175'561	90
Non-Biological parents	84'942	9	37'442	11	27'044	7	20'456	10
Children in two-generation households	654'581	70	228'939	69	282'702	71	142'940	73
Children in three-generation households	274'478	30	104'293	31	117'108	29	53'077	27
Total number of children (aged 15-18)	929'059	100	333'232	36	399'810	43	196'017	21
Number of countries	67	100	38	57	19	28	10	15
Number of surveys	190	100	105	55	48	25	34	18

Table A2: Descriptive statistics by country and survey year

Country	Year	Children (15-18)	Father	Mother	Country	Year	Children (15-18)	Father	Mother
Albania	2009	9.11	9.51	9.92	Egypt	2005	8.03	4.16	6.07
Armenia	2000	9.28	11.49	11.58	Egypt	2008	8.17	4.70	6.63
Armenia	2005	8.01	8.93	9.13	Ethiopia	2000	1.89	0.71	1.40
Armenia	2010	9.64	11.48	11.29	Ethiopia	2005	3.20	0.96	1.94
Azerbaijan	2006	9.59	10.68	11.47	Ethiopia	2011	4.50	1.35	2.40
Bangladesh	1993	4.26	1.87	3.87	Gabon	2000	6.45	6.16	7.56
Bangladesh	1996	4.87	2.19	4.06	Gabon	2012	7.24	7.42	9.08
Bangladesh	1999	5.53	2.53	4.47	Ghana	1993	6.39	3.77	5.66
Bangladesh	2004	5.76	2.38	3.96	Ghana	1998	6.79	4.75	7.18
Bangladesh	2007	6.16	2.69	4.07	Ghana	2003	6.59	5.03	6.78
Bangladesh	2011	6.71	3.04	4.11	Ghana	2008	6.88	5.06	6.77
Benin	1996	2.74	1.14	2.37	Guatemala	1995	4.95	2.78	3.54
Benin	2001	3.85	1.83	3.36	Guatemala	1998	5.16	2.60	3.54
Benin	2006	4.99	1.61	3.32	Guinea	1999	2.49	1.33	2.43
Bolivia	1994	7.99	4.55	6.67	Guinea	2005	3.54	1.29	2.84
Bolivia	2003	8.67	5.70	7.40	Guyana	2005	11.09	9.65	9.49
Bolivia	2008	9.21	5.94	7.81	Guyana	2009	9.02	8.39	8.16
Brazil	1991	3.76	2.61	2.12	Haiti	1994	4.12	1.75	2.75
Brazil	1996	6.03	4.71	4.46	Haiti	2000	4.39	2.17	3.04
Burkina Faso	1992	1.86	0.75	1.07	Haiti	2005	5.01	2.62	3.45
Burkina Faso	1998	1.84	0.70	0.88	Haiti	2012	5.44	3.19	4.22
Burkina Faso	2003	2.35	0.87	1.19	Honduras	2005	6.94	4.99	4.56
Burkina Faso	2010	3.23	1.22	1.51	Honduras	2012	7.62	5.35	5.05
Cambodia	2000	4.55	2.29	4.18	India	1992	5.57	2.13	4.90
Cambodia	2005	5.87	2.90	4.47	India	1999	6.22	2.53	5.35
Cambodia	2010	6.81	3.45	5.10	India	2005	6.99	2.83	5.45
Cameroon	1991	5.33	2.62	3.73	Indonesia	1994	7.37	4.45	5.76
Cameroon	1998	5.92	3.73	4.97	Indonesia	1997	7.60	4.66	6.02
Cameroon	2004	6.03	4.60	5.64	Indonesia	2003	8.29	5.53	6.60
Cameroon	2011	6.68	4.95	6.00	Indonesia	2007	8.81	6.31	7.16
CAR	1994	3.20	1.75	3.61	Indonesia	2012	9.19	7.23	7.84
Chad	1996	1.78	0.50	1.60	Jordan	1997	9.71	5.25	7.80
Chad	2004	2.52	0.83	2.09	Jordan	2002	10.22	9.29	10.51
Colombia	1990	6.38	5.12	5.11	Jordan	2007	10.09	8.78	9.95
Colombia	1995	6.97	5.63	5.52	Jordan	2009	9.92	9.31	10.13
Colombia	2000	7.71	5.90	5.91	Kazakhstan	1995	9.65	9.83	10.28
Colombia	2005	8.02	6.69	6.37	Kazakhstan	1999	9.86	10.51	10.67
Colombia	2010	8.55	7.36	6.93	Kenya	1993	6.33	3.33	5.09
Comoros	1996	3.77	0.82	2.13	Kenya	1998	6.54	4.70	6.27
Congo, D. Rep.	2007	5.36	4.57	7.56	Kenya	2003	6.23	5.13	6.34
Congo, Rep.	2005	6.44	6.25	7.88	Kenya	2009	7.21	6.12	7.28
Congo, Rep.	2009	7.46	7.18	9.45	Kyrgyz .Rep.	1997	9.50	9.94	10.28
Congo, Rep.	2012	7.82	7.53	9.53	Lesotho	2004	6.12	6.46	4.24
Cote d'Ivoire	1994	3.96	1.96	3.65	Lesotho	2009	6.95	7.01	4.72
Cote d'Ivoire	1998	3.58	2.28	4.00	Liberia	2007	3.89	3.50	6.82
Cote d'Ivoire	2005	4.47	2.86	4.66	Madagascar	1992	0.24	0.28	0.47
Cote d'Ivoire	2011	4.78	2.89	4.62	Madagascar	1997	3.37	3.03	3.76
Dominican Rep.	1991	6.71	5.55	5.36	Madagascar	2004	4.22	4.35	4.97
Dominican Rep.	1996	6.95	5.74	5.78	Madagascar	2009	4.54	3.89	4.48
Dominican Rep.	1999	7.54	6.47	6.66	Malawi	1992	3.71	2.20	4.42
Dominican Rep.	2002	7.99	7.12	6.86	Malawi	2000	5.07	3.11	4.92
Dominican Rep.	2007	8.15	7.87	7.24	Malawi	2004	5.61	3.66	5.38
Egypt, Arab Rep.	1992	7.41	2.37	4.24	Malawi	2010	5.95	3.84	5.58
Egypt, Arab Rep.	1995	7.83	2.79	4.73	Maldives	2009	8.91	3.32	3.15
Egypt, Arab Rep.	2000	7.36	3.06	5.01	Mali	1995	1.75	1.09	1.69

Table continues on next page.

Table A2: (continued)

Country	Year	Children (15-18)	Father	Mother	Country	Year	Children (15-18)	Father	Mother
		Years of schooling					**Years of schooling**		
Mali	2001	2.30	1.60	2.34	Rwanda	1992	4.74	1.94	3.23
Mali	2006	2.99	1.29	1.91	Rwanda	2000	3.72	2.51	3.46
Moldova	2007	5.17	5.04	5.49	Rwanda	2005	3.50	2.65	3.48
Morocco	1992	4.16	0.88	1.90	Sao Tome a. P.	2009	6.48	4.31	5.70
Morocco	2003	5.74	1.41	2.91	Senegal	1992	2.74	1.08	1.84
Mozambique	1997	3.35	1.78	3.00	Senegal	2005	3.06	1.56	2.40
Mozambique	2003	2.97	2.02	3.68	Senegal	2011	4.09	1.77	2.58
Mozambique	2011	5.41	2.91	4.40	Sierra Leone	2008	4.82	2.18	3.84
Namibia	1992	5.40	4.27	4.06	South Africa	1998	8.46	6.87	7.28
Namibia	2000	6.85	5.83	5.37	Swaziland	2006	6.94	6.82	6.85
Namibia	2007	7.70	6.94	6.72	Tanzania	1992	5.50	2.43	3.57
Nepal	1996	4.27	0.75	2.82	Tanzania	1996	5.08	2.86	3.86
Nepal	2001	4.59	0.81	2.93	Tanzania	1999	4.60	2.82	3.94
Nepal	2006	7.61	5.72	7.32	Tanzania	2004	4.94	4.01	4.89
Nepal	2011	6.92	1.67	4.08	Tanzania	2008	6.00	4.55	5.44
Nicaragua	1997	5.99	4.24	4.57	Tanzania	2010	6.42	4.76	5.55
Nicaragua	2001	5.88	4.46	4.36	Timor-Leste	2009	7.22	3.02	4.16
Niger	1992	1.47	0.35	0.50	Togo	1998	3.89	1.56	3.53
Niger	1998	1.86	0.65	1.03	Turkey	1993	6.73	2.72	4.83
Niger	2006	2.05	0.83	1.20	Turkey	1998	7.22	3.29	5.44
Nigeria	1990	5.27	1.84	3.03	Turkey	2003	7.70	3.83	6.09
Nigeria	1999	6.86	3.65	5.25	Uganda	1995	4.61	2.73	4.75
Nigeria	2003	6.11	3.42	4.89	Uganda	2000	5.68	3.98	6.13
Nigeria	2008	7.10	4.79	5.94	Uganda	2006	5.73	3.71	5.80
Nigeria	2010	6.81	4.19	5.66	Uganda	2011	5.66	4.15	6.01
Pakistan	1991	4.36	1.07	3.40	Ukraine	2007	10.71	13.49	12.79
Pakistan	2007	5.32	1.69	4.75	Uzbekistan	1996	9.53	10.02	10.89
Paraguay	1990	6.63	5.00	5.30	Vietnam	1997	7.34	5.84	7.19
Peru	1992	7.63	5.63	7.13	Vietnam	2002	8.19	6.36	7.47
Peru	1996	7.24	5.45	6.93	Zambia	1992	5.53	4.01	5.39
Peru	2000	8.41	6.55	8.13	Zambia	1996	5.53	4.56	6.26
Peru	2004	8.99	7.19	8.59	Zambia	2001	5.70	4.96	6.60
Peru	2007	9.02	7.01	8.35	Zambia	2007	6.79	6.30	7.96
Peru	2009	9.10	6.92	8.12	Zimbabwe	1994	7.55	4.58	5.65
Peru	2011	9.28	7.59	8.67	Zimbabwe	1999	8.04	5.50	6.27
Peru	2012	9.14	7.42	8.58	Zimbabwe	2006	7.73	6.22	7.02
Philippines	1993	8.15	7.24	7.28	Zimbabwe	2011	8.51	7.18	7.74
Philippines	1998	8.05	7.99	7.96					
Philippines	2003	8.13	8.33	8.06					
Philippines	2008	8.22	8.62	8.24					

Source: Demographic and Health Survey. Calculations by the authors.

Table A3: Impact of school fees on educational outcomes (controlled for education of father and non-linearity in age of mother (father))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Years of education (mother)				0.166***	0.166***	0.166***	0.575***	
				(0.00107)	(0.00107)	(0.00108)	(0.00198)	
Years of education (father)	0.313***	0.313***	0.315***	0.221***	0.221***	0.221***		0.508***
	(0.000760)	(0.000760)	(0.000771)	(0.000984)	(0.000984)	(0.00100)		(0.00219)
Sex of child (1=boy)	0.319***	0.319***	0.319***	0.343***	0.343***	0.343***	0.281***	0.311***
	(0.00650)	(0.00650)	(0.00650)	(0.00650)	(0.00650)	(0.00650)	(0.00602)	(0.00646)
Age of mother				0.0210***	0.0210***	0.0210***	0.0284***	
				(0.000628)	(0.000628)	(0.000628)	(0.000358)	
Age of father	0.0142***	0.0142***	0.0142***	0.00704***	0.00703***	0.00702***		0.0191***
	(0.000281)	(0.000281)	(0.000281)	(0.000488)	(0.000488)	(0.000488)		(0.000284)
Free primary education (=1)		0.0738***	0.237***		0.123***	0.256***		
		(0.0235)	(0.0321)		(0.0236)	(0.0330)		
Free primary x years of education mother						-0.00827		
						(0.00535)		
Free primary x years of education father			-0.0312***			-0.0190***		
			(0.00370)			(0.00483)		
Years of education (mother)^2							-0.0200***	
							(0.000135)	
Years of education (father)^2								-0.0139***
								(0.000136)
Observations	771,058	771,058	771,058	752,349	752,349	752,349	906,683	771,058
R-squared	0.853	0.853	0.853	0.857	0.857	0.858	0.851	0.855
Age FE	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models include two- and three-generation households. All models include children from biological and non-biological parents. Year fixed-effects refer to birth year fixed effects of the child. Free primary education variable based World Bank (2006, 2009), Tinker et al. (2013) (for more detailed information, see Table 2).
Source: World Bank (2006, 2009), Tinker et al. (2013), Demographic and Health Surveys. Calculations by the authors.

Table A4: Impact of school fees on educational outcomes for ages 15 to 18

	(1) Age 15	(2) Age 15	(3) Age 15	(4) Age 16	(5) Age 16	(6) Age 16
Years of education (mother)	0.343*** (0.00120)	0.279*** (0.00126)	0.279*** (0.00128)	0.310*** (0.00141)	0.309*** (0.00141)	0.310*** (0.00142)
Sex of child (1=boy)	0.107*** (0.0112)	0.112*** (0.0104)	0.112*** (0.0104)	0.229*** (0.0115)	0.229*** (0.0115)	0.229*** (0.0115)
Age of mother	0.0203*** (0.000684)	0.0170*** (0.000639)	0.0170*** (0.000639)	0.0186*** (0.000698)	0.0186*** (0.000698)	0.0186*** (0.000698)
Free primary (=1)		0.698*** (0.0314)	0.705*** (0.0410)		0.725*** (0.0364)	0.796*** (0.0486)
Free primary x years of education mother			-0.00166 (0.00539)			-0.0178*** (0.00660)
Observations	237,824	237,824	237,824	231,619	231,619	231,619
R-squared	0.831	0.855	0.855	0.853	0.854	0.854
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
	(7) Age 17	(8) Age 17	(9) Age 17	(10) Age 18	(11) Age 18	(12) Age 18
Years of education (mother)	0.339*** (0.00158)	0.339*** (0.00158)	0.340*** (0.00159)	0.404*** (0.00170)	0.404*** (0.00170)	0.405*** (0.00171)
Sex of child (1=boy)	0.261*** (0.0131)	0.261*** (0.0131)	0.261*** (0.0131)	0.521*** (0.0137)	0.521*** (0.0137)	0.521*** (0.0137)
Age of mother	0.0241*** (0.000772)	0.0241*** (0.000772)	0.0241*** (0.000772)	0.0295*** (0.000697)	0.0294*** (0.000697)	0.0294*** (0.000697)
Free primary (=1)		0.612*** (0.0546)	0.739*** (0.0703)		0.852*** (0.0579)	0.990*** (0.0738)
Free primary x years of education mother			-0.0301*** (0.00914)			-0.0357*** (0.0103)
Observations	205,200	205,200	205,200	232,040	232,040	232,040
R-squared	0.858	0.858	0.858	0.831	0.831	0.831
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models include two- and three-generation households. All models include children from biological and non-biological parents. Year fixed-effects refer to birth year fixed effects of the child. Free primary education variable based World Bank (2006, 2009), Tinker et al. (2013) (for more detailed information, see Table 2).
Source: World Bank (2006, 2009), Tinker et al. (2013), Demographic and Health Surveys. Calculations by the authors.

Table A5: Impact of school fees controlling for whether secondary education is compulsory or free

	(1)	(2)	(3)	(4)
Years of education (mother)	0.321***	0.322***	0.321***	0.322***
	(0.000756)	(0.000765)	(0.000756)	(0.000765)
Sex of child (1=boy)	0.280***	0.280***	0.280***	0.280***
	(0.00608)	(0.00608)	(0.00608)	(0.00608)
Age of mother	0.0211***	0.0211***	0.0211***	0.0211***
	(0.000354)	(0.000354)	(0.000354)	(0.000354)
Beginning secondary educ. is tuition free (=1)	0.845***	1.210***		
	(0.0848)	(0.103)		
Free primary education (=1)	0.0866***	0.172***	0.0866***	0.172***
	(0.0214)	(0.0277)	(0.0214)	(0.0277)
Free primary x years of education mother		-0.0212***		-0.0212***
		(0.00362)		(0.00362)
Beginning secondary educ. is compulsory (=1)			0.265***	0.445***
			(0.102)	(0.105)
Observations	906,683	906,683	906,683	906,683
R-squared	0.849	0.849	0.849	0.849
Age FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models include two- and three-generation households. All models include children from biological and non-biological parents. Year fixed-effects refer to birth year fixed effects of the child. Information on whether secondary education is compulsory or free of tuition fees is taken from World Policy Analysis Center (2013) (see Table A2).
Source: World Policy Analysis Center (2013), Demographic and Health Surveys. Calculations by the authors.

Table A6: Information on School fees from World Policy Analysis Center

Beginning secondary education is Compulsory		Beginning secondary education is Tuition free	
Yes	**No**	**Yes**	**No**
Armenia	Bangladesh	Armenia	Bangladesh
Bolivia	Benin	Bolivia	Benin
Burkina Faso	Cameroon	Burkina Faso	CongoDR
Cambodia	CongoDR	Cambodia	Guinea
Chad	Ethiopia	Cameroon	Lesotho
Colombia	Guinea	Chad	Malawi
Comoros	Lesotho	Colombia	Mozambique
CongoBr	Malawi	Comoros	Pakistan
Cote D Ivoire	Mozambique	CongoBr	South Africa
Dominican Republic	Namibia	Cote D Ivoire	Tanzania
Egypt	Nepal	Dominican Republic	Togo
Ghana	Nicaragua	Egypt	Turkey
Haiti	Niger	Ethiopia	Uganda
Honduras	Pakistan	Ghana	Vietnam
India	Philippines	Haiti	Zambia
Indonesia	Rwanda	Honduras	Zimbabwe
Jordan	Senegal	India	
Kazakhstan	Tanzania	Indonesia	
Kenya	Turkey	Jordan	
Liberia	Uganda	Kazakhstan	
Madagascar	Vietnam	Kenya	
Maldives	Zimbabwe	Liberia	
Mali		Madagascar	
Moldova		Maldives	
Morocco		Mali	
Nigeria		Moldova	
Peru		Morocco	
Sao Tome and P.		Namibia	
Sierra Leone		Nepal	
South Africa		Nicaragua	
Timor-Leste		Niger	
Togo		Nigeria	
Ukraine		Peru	
Zambia		Philippines	
		Rwanda	
		Sao Tome and Principe	
		Senegal	
		Sierra Leone	
		Timor-Leste	
		Ukraine	

Source: World Policy Analysis Center (2013).