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## **Foreign aid and intergenerational mobility in Africa**

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**Abstract:** While there is extensive literature examining the growth and development effects of foreign aid, very little attention has been paid to its potential impact on social mobility. Thus, this paper provides the first empirical evidence on the effects of foreign aid on intergenerational educational mobility in Africa. Drawing on a sample of 28 countries over the period 1970–2010 and using the popular and well-known probit estimator, we find strong evidence that foreign aid raises the likelihood of experiencing upward educational mobility in the region, while the probability of downward educational mobility tends to be lower in countries that receive a high level of foreign aid. These effects mainly operate through increased financing for education, an improved education system, and policy, as well as improved education conditions. More interestingly, focusing on the sectoral decomposition of total aid received (i.e., education sector versus the rest of the economy), the study highlights that foreign aid to the education sector tends to increase the likelihood of upward educational mobility, contrary to aid allocated to the rest of the economy. Our finding suggests that foreign aid has contributed to improving social mobility in African countries.

**Key words:** foreign aid, intergenerational mobility, Africa, education sector, social mobility

**JEL classification:** C35, F35, I24, O55

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## 1 Introduction

At the end of World War II in the 1950s, official development assistance was deemed pivotal in fighting against poverty in the world with the work of authors such as Domar (1946), Makower (1953), and Rosenstein-Rodan (1943, 1961). According to these authors, capital accumulation promotes investment, which in turn promotes economic growth. Due to insufficient savings, this accumulation of capital in developing countries can be achieved through debt or foreign aid. These analyses justified several transfers of funds as foreign aid to help countries in need. Thus, several theoretical and empirical analyses have attempted to explore the effects of foreign aid on economic growth, poverty, inequalities, and many other aggregates (Arndt et al. 2010, 2015; Sachs 2005; Stiglitz 2007; Friedman 1958; Bauer 1976; Easterly 2003, 2008a, 2008b; Moyo 2009; Doucouliagos and Paldam 2006; Rajan and Subramanian 2008).

However, despite the very large and extensive existing literature, no study, to the best of our knowledge, has investigated the effects of foreign aid on intergenerational mobility. The issue of intergenerational mobility (IM), or social mobility, has been explored in some studies (Becker et al. 2018; Chetty and Hendren 2018; Narayan et al. 2018; Daude and Robana 2015; Checchi et al. 2013; Black and Devereux 2011; Causa and Johansson 2011; Azam and Bhatt 2015; Becker and Tomes 1979). IM is defined by the change in an individual's social position compared to that of their parents. This change in social position can be positive (upward mobility) or negative (downward mobility). The possibility for individuals to move up the income ladder, both throughout their life and related to their parents, plays an important role in the fight against poverty, in the reduction of inequalities, and even in economic growth (Narayan et al. 2018). As mentioned in Stuhler (2018), social mobility and inequalities are closely related. Yet income inequality has increased in many countries over the past decades, and research conducted in the 1990s and 2000s showed that these inequalities are much more persistent from one generation to the next. IM is thus one of the major concerns in developing countries, especially African countries.

Narayan et al. (2018) emphasized that social mobility is much lower, on average, in Africa. It is one of the regions with the lowest social mobility. Although the average IM has improved across developing economies since the 1950s, both absolute IM and relative IM have stagnated in Africa. In Africa, 35 per cent of people born in the 1980s show higher educational mobility than their parents, compared with approximately 60 per cent of the same generation in the average economy of East Asia, Latin America, or the Middle East (Narayan et al. 2018). IM is apprehended in the literature by several indices, among which is educational mobility (Stuhler 2018; Ouedraogo and Syrichas 2021). This is explained, on one hand, by the scarcity and imprecision of data concerning the level of income of individuals in several countries. On the other hand, the literature argues that education is one of the most important channels for social mobility given the close link between education and labour market participation under human capital theory. Thus, IM could be approximated by educational mobility. Alesina et al. (2021) find great heterogeneity between countries in upward and downward mobility. According to them, the probability that children born to parents with no education will complete primary schooling exceeds 70 per cent in South Africa and Botswana, while this rate is less than 20 per cent for Sudan, Ethiopia, Mozambique, Burkina Faso, and Malawi. Their analysis also reveals substantial differences within countries according to their administrative area (only 5 per cent in Turkana County, in the northwest of the country, and over 85 per cent in the Westlands). Likewise, Azomahou and Yitbarek (2021) find country heterogeneity, meaning that Nigeria, Guinea, Ghana, and Uganda experienced the highest intergenerational mobility in education, and the Comoros and Madagascar experienced the lowest.

The literature on the economic determinants of IM identifies factors such as capital market failure, credit constraints, and economic transformation (Narayan et al. 2018). Even if these different factors seem to have more or less a link with foreign aid, studies explicitly considering foreign aid as a determinant do not exist in the literature, to our knowledge. Yet, given the dependence of African countries on foreign aid, external aid could potentially influence IM in these countries. The volume of foreign aid, as well as foreign aid by sector, appear to be an important tool for economic policies on IM.

This paper aims to analyse the effects of foreign aid on intergenerational mobility. Specifically, it explores the effects of foreign aid on educational mobility, on one hand, and the effects of the different channels of aid on educational mobility, on the other hand. This paper uses household survey data from the Integrated Public Use Microdata Series (IPUMS) on 28 developing countries in Africa over the period 1970–2010. We estimate a dichotomous choice specification by using the probit models. We explore the channels through which foreign aid affects upward and downward educational mobility. We argue that foreign aid can affect educational achievements through three channels, including providing financing for education, helping to improve the education system and policy, and improving education conditions.

The results suggest that the higher the level of foreign aid in the percentage of gross domestic product (GDP), the higher the likelihood of experiencing upward educational mobility. Inversely, the probability of downward educational mobility tends to be lower in countries that receive high levels of foreign aid. The level of foreign aid to the education sector tends to increase (decrease) the likelihood of upward (downward) educational mobility, contrary to foreign aid allocated to the other sectors. The results also suggest that the spending channel holds; therefore, foreign aid affects educational mobility by increasing the government’s capacity to spend on the education sector. Also, the effects of foreign aid on educational mobility operates through the channel of social inclusion and equity. Education conditions appear to be a good transmission channel for upward educational mobility, contrary to downward mobility. The findings of the paper imply that foreign aid could be instrumental to move up the education ladder, which is key to reducing income inequalities and poverty in Africa.

The rest of this paper is organized as follows. Section 2 deals with data and methodology. Section 3 shows the results, and Section 4 concludes the paper.

## 2 Data and methodology

### 2.1 Methodology

Our objective is to examine the effects of foreign aid received on intergenerational social mobility in African states. To this end, we estimate the following equation:

$$SM_{ij,t} = \gamma + \zeta Aid_{ij,t} + \mathbf{X}_{ij,t}\delta + \eta_j + \kappa_t + \varepsilon_{ij,t} \quad (1)$$

Where  $SM_{ij,t}$  stands for the social mobility indicator for the survey conducted at time  $t$  for individual  $i$  in country  $j$ . Recall that  $SM_{ij,t}$  is a binary variable taking the value of 1 if the individual has experienced upward or downward educational mobility and 0 otherwise.  $Aid_{i,t}$  is the foreign aid in the percentage of GDP.  $\eta_j$  represents country fixed effects introduced to capture unobserved time-invariant country-level characteristics that are potentially correlated with employment mobility and to mitigate omitted variable bias.  $\kappa_t$  is included to control for time-

varying shocks that are likely to affect African countries, while  $\varepsilon_{ij,t}$  represents a standard error term.

$\mathbf{X}_{ij,t}$  is a vector of covariates including households' socio-economic and demographic characteristics. More specifically, these covariates include:

- Age: it represents the age of the individual at the time of the survey. We also added age square to capture any potential generational effects.
- Size of the family: this variable captures the number of individuals in the household.
- Gender status: it is a binary variable taking the value of 1 if the individual is female and 0 otherwise.
- Location: it represents the place of living. This variable is a 0-1 dummy, taking the value of 1 if the individual lives in a rural area and 0 otherwise.
- Access to infrastructure: it includes access to electricity and clean water, which are binary variables taking the value of 1 if the household has access to electricity or clean water and 0 otherwise.

$\mathbf{X}_{ij,t}$  also includes the level of development proxied by GDP per capita, the quality of institutions, and a binary variable taking the value of 1 if the country is in conflict and 0 otherwise. The quality of institution variable is a composite index constructed by taking the simple average of three governance indicators—regulatory quality, the rule of law, and corruption control.

To estimate our dichotomous choice specification given in equation (1), we rely on the popular and well-known probit estimator. This estimator is designed to fit empirical models with a binary dependent variable, assuming that the probability of a positive outcome is determined by the standard normal cumulative distribution function. Thus, we estimate separate probit models to assess the effects of foreign aid on the probability of upward or downward educational mobility in Africa. Table A2 in the Appendix summarizes the variables' definitions and sources.

## 2.2 Data

### *Data sources*

This study focuses on a panel of 28 African economies (i.e. Benin, Botswana, Burkina Faso, Cameroon, Egypt, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Liberia, Malawi, Mali, Mauritius, Morocco, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, South Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe) examined over the period 1970–2010 based on data availability. More precisely, the sample consists of around 23 million parent–child matched pairs across 28 African countries.

The data set is compiled from various sources. First, the variable of major interest in our study is foreign aid in the percentage of GDP, which is extracted from Organisation for Economic Co-operation and Development (OECD) databases. We also use sectoral aid data from the [AidData](#) project of William & Mary's Global Research Institute. This database has the specificity and advantage to quantify and provide reliable and accurate granular aid data from various donors covering an important period. More interestingly, the database provides data on foreign aid commitments by various economic sectors including agriculture, education, infrastructure, water supply, and sanitation, allowing specific sectoral aid-effect analyses.

Second, the dependent variable in this study is social mobility across generations in Africa, mainly captured here through educational attainment mobility.<sup>1</sup> We rely on the intergenerational educational mobility measure recently developed by Ouedraogo and Syrichas (2021) based on the Integrated Public Use Microdata Series (IPUMS) international data set—a project hosted at the University of Minnesota. Intergenerational mobility includes upward and downward mobility both considered in the analysis. For instance, upward IM refers to the case where a child is born or adopted from non-educated parents who have completed primary school, while a child born or adopted from educated parents who have not completed primary school indicates downward IM. Our dependent variable is a 0-1 dummy equaling 1 if the child experienced upward/downward mobility and 0 otherwise. Variables that capture households' socio-economic and demographic characteristics are also extracted from the IPUMS database. Furthermore, GDP per capita is from International Monetary Fund's (IMF's) World Economic Outlook, while the quality of institution variable is extracted from the World Bank's Worldwide Governance Indicators. Finally, our conflict variable is retrieved from the Uppsala Conflict Data Program (UCDP) provided by the Department of Peace and Conflict Research, Uppsala University.

### *Patterns of educational mobility in Africa*

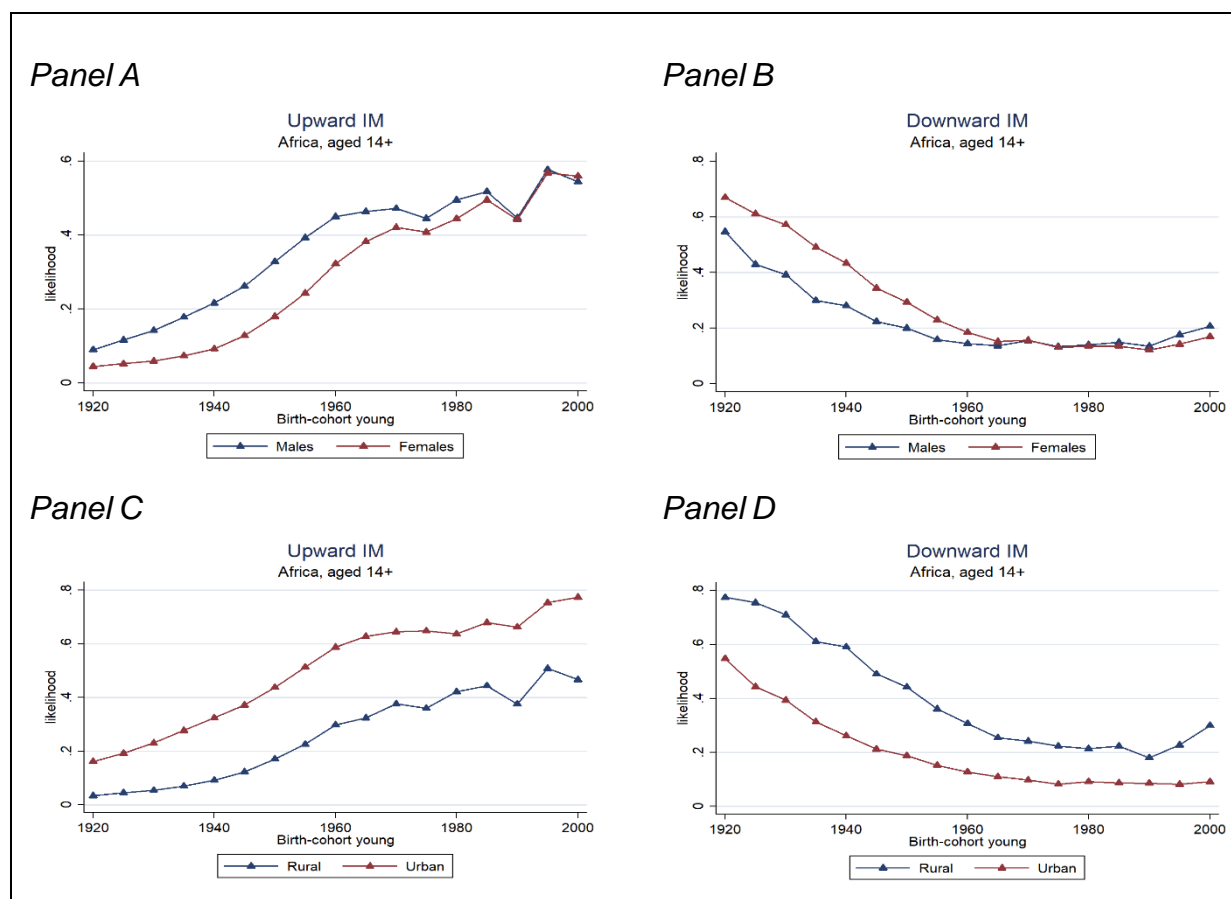
Drawing mainly on Ouedraogo's and Syrichas's (2021) analysis, interesting patterns and important heterogeneities emerge from educational mobility in Africa over the considered period of this study. First, educational mobility in Africa has significantly improved over the period.

Considering five-year intervals of birth cohorts, Figure 1 displays the average upward and downward intergenerational mobility in educational attainment across gender (Panels A and B) and household location (Panels C and D). It emerges that the probability of upward mobility increased over the birth cohorts, while the likelihood of downward mobility recorded a significant decrease, regardless of the gender and location of individuals. A deep dive analysis highlights that the probability of upward mobility reached up to 50 per cent for children born after the millennium (Panel A). In addition, the gender gap has considerably crumbled for first cohort kids, reflecting the decline in gender inequalities (Panels A and B). Moreover, focusing on the rural-urban divide, it came out that, on average, children living in rural regions have a 10 per cent lower probability of upward mobility than their urban regions' peers.

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<sup>1</sup> Occupational attainment is also considered as a measure of social mobility. See Ouedraogo and Syrichas (2021) for further discussion. Throughout the paper, we use social mobility to refer to educational mobility.

Figure 1: Intergenerational mobility evolution in Africa, education



Note: the left panel shows the pan African upward intergenerational mobility (IM up) and the right panel the downward intergenerational mobility (IM down). The sample consists of 28 countries and 76 censuses. The IM up (down) is the average probability of children, aged 14+, born from illiterate (literate) parents who fail to complete (complete) primary school. The x-axis corresponds to the birth year of the children in intervals of 5 years. The top panel distinguishes between boys and girls, while the bottom panel shows the intergenerational educational mobility between urban and rural residences.

Source: reproduced from part of Figure 2 in Ouedraogo and Syrichas (2021); with permission from IMF.

Table 1 presents the educational mobility indices for each country. It shows that less than 41 per cent of children from non-educated parents have completed primary education in Africa. Downward IM is considerable since one-quarter of children born with literate parents do not complete primary education. In addition, intergenerational educational mobility considerably contrasts across African countries on average. For instance, countries including Burkina Faso, Ethiopia, and South Sudan report upward IM likelihood of less than 15 per cent on average. At the same time, Botswana, Nigeria, South Africa, Mauritius, and Zimbabwe recorded upward IM of more than 60 per cent on average.

Table 1: Average intergenerational mobility in education by country

Country	Census years	Upward IM					Downward IM				
		All	Males	Females	Urban	Rural	All	Males	Females	Urban	Rural
Benin	1979,1992,2002,2010	0.31	0.36	0.24	0.45	0.25	0.22	0.17	0.26	0.18	0.31
Botswana	1981,1991,2001,2010	0.64	0.59	0.68	0.69	0.51	0.08	0.09	0.06	0.12	0.23
Burkina Faso	1996,2006	0.15	0.16	0.13	0.52	0.12	0.25	0.24	0.26	0.22	0.55
Cameroon	1976,1987,2005	0.47	0.50	0.43	0.69	0.43	0.13	0.13	0.13	0.08	0.25
Egypt	1986,1996,2006	0.54	0.59	0.47	0.63	0.48	0.10	0.09	0.11	0.09	0.14
Ethiopia	1984,1994,2007	0.15	0.16	0.13	0.58	0.08	0.28	0.28	0.29	0.15	0.67
Ghana	1984,2000,2010	0.49	0.54	0.45	0.64	0.44	0.15	0.13	0.17	0.11	0.22
Guinea	1983,1996,2014	0.26	0.30	0.21	0.53	0.15	0.29	0.24	0.35	0.24	0.51
Kenya	1989,1999,2009	0.53	0.53	0.52	0.65	0.51	0.18	0.19	0.17	0.11	0.21
Lesotho	1996,2006	0.48	0.38	0.61	0.66	0.46	0.24	0.31	0.18	0.13	0.30
Liberia	2008	0.32	0.37	0.27	0.45	0.25	0.44	0.41	0.46	0.36	0.58
Malawi	1987,1998,2008	0.21	0.24	0.17	0.39	0.20	0.46	0.46	0.46	0.30	0.54
Mali	1987,1998,2009	0.18	0.20	0.14	0.41	0.12	0.26	0.24	0.29	0.21	0.43
Mauritius	1990,2000,2011	0.87	0.88	0.86	0.90	0.86	0.03	0.03	0.02	0.02	0.03
Morocco	1982,1994,2004,2014	0.46	0.52	0.40	0.71	0.44	0.09	0.08	0.10	0.05	0.19
Mozambique	1997,2007	0.15	0.18	0.12	0.30	0.08	0.45	0.44	0.47	0.39	0.68
Nigeria	2006,2007,2008,2009,2010	0.67	0.67	0.67	0.77	0.65	0.06	0.06	0.07	0.04	0.08
Rwanda	2002,2012	0.30	0.30	0.29	0.42	0.28	0.46	0.47	0.45	0.25	0.52
Senegal	1988,2002,2013	0.28	0.30	0.26	0.46	0.18	0.22	0.21	0.24	0.21	0.37
Sierra Leone	2004	0.23	0.28	0.18	0.46	0.15	0.35	0.32	0.39	0.26	0.62
South Africa	1996,2001,2007,2011,2016	0.76	0.74	0.78	0.82	0.73	0.05	0.07	0.04	0.04	0.08
South Sudan	2008	0.07	0.09	0.05	0.15	0.06	0.65	0.63	0.68	0.60	0.70
Sudan	2008	0.20	0.18	0.21	0.52	0.13	0.28	0.30	0.27	0.22	0.40
Tanzania	1988,2002,2012	0.61	0.62	0.59	0.70	0.57	0.19	0.20	0.17	0.12	0.23
Togo	1970,2010	0.42	0.47	0.33	0.67	0.38	0.29	0.24	0.34	0.20	0.40
Uganda	1991,2002,2014	0.44	0.48	0.40	0.62	0.43	0.29	0.29	0.28	0.15	0.34
Zambia	1990,2000,2010	0.47	0.51	0.44	0.66	0.39	0.22	0.22	0.23	0.17	0.42
Zimbabwe	2012	0.75	0.75	0.75	0.92	0.72	0.12	0.13	0.10	0.04	0.16
<b>Average</b>		<b>0.41</b>	<b>0.42</b>	<b>0.39</b>	<b>0.59</b>	<b>0.36</b>	<b>0.24</b>	<b>0.24</b>	<b>0.25</b>	<b>0.18</b>	<b>0.36</b>

Note: the table demonstrates country-level estimates of IM up and IM down in education. Columns (1) to (5) measure the IM up, the likelihood that a child aged 14+ and born from illiterate parents finishes primary school. Columns (2) and (3) show the IM up for boys and girls, respectively, whereas in columns (4) and (5) the IM up is separated for urban and rural regions. Columns (6) to (10) measure the IM down, the likelihood that a child aged 14+ and born from literate parents fails to finish primary school. Columns (7) and (8) show the IM up for boys and girls, respectively, whereas columns (9) and (10) show the IM down separated for urban and rural regions. The last rows report simple unweighted averages across the 28 countries.

Source: Table 6 in Ouedraogo and Syrighas (2021); reproduced with permission from IMF.

### 3 Results

The baseline results, sectoral aid, transmission channels, and robustness checks are presented in this section.

#### 3.1 Baseline results

We report in Table 2 the baseline results. In columns (1)–(3), we use the likelihood of upward educational mobility as the dependent variable, while the likelihood of downward mobility is used in columns (4)–(6). The results show the coefficients associated with foreign aid are positive and strongly significant at the 1 per cent level in columns (1)–(3). This finding suggests that the higher the level of foreign aid in the percentage of GDP, the higher the likelihood of experiencing upward educational mobility. Based on column (1), an increase of foreign aid by 1 per cent of GDP is associated with an increase in the probability of upward educational mobility by 3.3 percentage points.<sup>2</sup> Inversely, the coefficient associated with foreign aid is negative and significant at the 1 per

<sup>2</sup>This is calculated as the marginal effect at mean values. The same applies to the other calculated probabilities in the next sections.



cent level in columns (4)–(6). This implies that the probability of downward educational mobility tends to be lower in countries that receive a high level of foreign aid. More precisely, an increase of foreign aid by 1 per cent of GDP is associated with a decline in the likelihood of downward educational mobility by 1.2 percentage points.

Table 2: Baseline results: effects of foreign aid on educational mobility

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Upward mobility			Downward mobility		
Foreign aid	0.0437*** (0.000)	0.0400*** (0.000)	0.0426*** (0.000)	-0.0052*** (0.001)	-0.0028*** (0.001)	-0.0052*** (0.001)
Family size	-0.0204*** (0.000)	-0.0206*** (0.000)	-0.0178*** (0.000)	0.0187*** (0.000)	0.0186*** (0.000)	0.0174*** (0.001)
Female	-0.0239*** (0.002)	-0.0241*** (0.002)	-0.0607*** (0.003)	0.0244*** (0.004)	0.0226*** (0.004)	0.0088** (0.004)
Rural	-0.3094*** (0.002)	-0.3089*** (0.002)	-0.2736*** (0.004)	0.2922*** (0.005)	0.2922*** (0.005)	0.2773*** (0.005)
Age	0.1456*** (0.001)	0.1453*** (0.001)	0.1656*** (0.002)	-0.1563*** (0.001)	-0.1559*** (0.001)	-0.1597*** (0.002)
Age square	-0.0023*** (0.000)	-0.0023*** (0.000)	-0.0028*** (0.000)	0.0025*** (0.000)	0.0025*** (0.000)	0.0027*** (0.000)
Electricity	0.4810*** (0.003)	0.4816*** (0.003)	0.4589*** (0.005)	-0.3446*** (0.006)	-0.3439*** (0.006)	-0.3274*** (0.006)
Water	0.2666*** (0.002)	0.2635*** (0.002)	0.2242*** (0.004)	-0.1836*** (0.005)	-0.1794*** (0.005)	-0.1596*** (0.005)
GDP per capita, Log	0.4064*** (0.005)	0.3558*** (0.005)	0.4549*** (0.007)	-0.4797*** (0.007)	-0.4427*** (0.007)	-0.5346*** (0.008)
Quality of institutions		0.1271*** (0.006)			-0.1409*** (0.008)	
Conflict			-0.0834*** (0.008)			0.1250*** (0.011)
Constant	-6.6425*** (0.049)	-6.1418*** (0.055)	-6.9639*** (0.091)	5.3566*** (0.183)	4.9454*** (0.184)	5.9176*** (0.201)
Observations	2,328,130	2,328,130	1,180,006	772,491	772,491	548,991
R2	0.18	0.18	0.19	0.17	0.17	0.16
Birth-cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: GDP, gross domestic product; FE, fixed effect; R2, R-squared. \*, \*\*, and \*\*\* denote statistical significance at 10, 5, and 1 per cent levels, respectively. Robust standard errors are reported in parentheses.

Source: authors' calculations.

Regarding the control variables, the results are broadly in line with expectations. The coefficients associated with family size, females, and rural areas are negative and positive in columns (1)–(3) and (4)–(6), respectively. Individuals from big families and rural areas tend to have a lower (higher) probability to experience upward (downward) educational mobility. The reason could be that financial constraints may restrict the ability of parents who have many children to send them to school, while the lack of schooling infrastructure and poverty are impeding educational mobility in rural areas. Being in rural areas is associated with a 9.1 per cent (7.2 per cent) lower (higher) probability to experience upward (downward) mobility. Regarding the female gender, the results imply that girls have a lower (upper) probability to upgrade (downgrade) in terms of educational achievements compared to men. It is widely documented that women and girls are poorly educated in sub-Saharan African compared to men (Klasen 1999; Kazandjian et al. 2016). Table 2 also shows that the coefficients associated with access to electricity and water are positive (negative) and

significant at the 1 per cent level in columns (1)–(3) (columns (4)–(6)). That said, having access to electricity and water is associated with a higher (lower) probability to experience upward (downward) educational mobility, thus underlining the importance of access to basic infrastructure.

In columns (2) and (5), we control for the quality of institutions, and the coefficient associated with them is positive and negative, respectively. Thus, individuals from countries with good quality institutions tend to have a higher (lower) probability to experience upward (downward) education mobility. As previous studies have shown, good institutions are instrumental for better educational outcomes (Meier 2004; Hallak and Poisson 2007). We also include conflict in columns (3) and (6). The results show that conflict is associated with a lower (higher) probability of upward (downward) educational mobility. In countries affected by conflict, it is difficult for children to attend school not only because schools are usually closed as confrontations are going on but also because the infrastructures are often destroyed, teachers left the neighborhood, and public services are absent (IMF 2019; Yamada and Matsushima 2020).

### **3.2 Sectoral aid**

We test whether sectoral foreign aid matters. In Table 3, we used total foreign aid as the percentage of GDP. However, one may consider that foreign aid allocated to the education sector could have a different effect compared to aid allocated to the other sectors of the economy. To test this assertion, we disaggregated total foreign aid into two categories: aid for the education sector and aid for non-education sectors. The results are reported in Table 3. We find that the disaggregation between education and other sectors matters. In fact, the coefficient associated with foreign aid allocated to the education sector is positive and strongly significant in column (1) where upward educational mobility is used as the dependent variable, while the coefficient associated with aid to non-education sectors is negative and significant at the 1 per cent level. That said, foreign aid to the education sector tends to increase the likelihood of upward educational mobility, contrary to foreign aid allocated to the other sectors.

Table 3: Results obtained using sectoral foreign aid

VARIABLES	(1)	(2)	(3)	(4)
	Upward mobility		Downward mobility	
Foreign aid, education sectors	1.3171*** (0.010)		-0.5846*** (0.016)	
Foreign aid, non-education sectors	-0.0046*** (0.000)		0.0041*** (0.000)	
Foreign aid, basic education		0.6589*** (0.009)		-0.1187*** (0.017)
Foreign aid, secondary and tertiary education		1.1715*** (0.020)		-0.9933*** (0.026)
Foreign aid, non-specified education sectors		2.9910*** (0.026)		-1.4160*** (0.039)
Family size	-0.0218*** (0.000)	-0.0222*** (0.000)	0.0191*** (0.000)	0.0198*** (0.000)
Female	-0.0282*** (0.002)	-0.0151*** (0.002)	0.0222*** (0.004)	0.0333*** (0.004)
Rural	-0.3073*** (0.002)	-0.3023*** (0.002)	0.2898*** (0.005)	0.2866*** (0.005)
Age	0.1452*** (0.001)	0.1468*** (0.001)	-0.1568*** (0.001)	-0.1570*** (0.001)
Age square	-0.0023*** (0.000)	-0.0023*** (0.000)	0.0025*** (0.000)	0.0025*** (0.000)
Electricity	0.5426*** (0.003)	0.5332*** (0.003)	-0.3897*** (0.006)	-0.3535*** (0.006)
Water	0.2700*** (0.002)	0.2813*** (0.002)	-0.1828*** (0.005)	-0.1773*** (0.005)
GDP per capita, Log	0.6003*** (0.005)	0.3742*** (0.005)	-0.6348*** (0.008)	-0.4229*** (0.007)
Constant	-8.1668*** (0.049)	-6.5253*** (0.050)	6.5624*** (0.184)	4.8858*** (0.184)
Observations	2,328,130	2,288,810	772,491	768,746
R2	0.18	0.17	0.17	0.17
Birth-cohort FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Note: GDP, gross domestic product; FE, fixed effect; R2, R-squared. \*, \*\*, and \*\*\* denote statistical significance at 10, 5, and 1 per cent levels, respectively. Robust standard errors are reported in parentheses.

Source: authors' calculations.

However, the coefficient associated with foreign aid to non-education sectors is very low, suggesting that its impact on upward educational mobility is marginal. An increase of foreign aid to the education sectors by 1 per cent of GDP would increase the probability of upward educational mobility by 7.2, while an increase of foreign aid to non-education sectors by the same magnitude of 1 per cent of GDP will reduce upward educational mobility by only 1.3 per cent. Inversely, the coefficients associated with aid to the education sector and non-education sectors are negative and positive in column (3), respectively, implying that foreign aid allocated to the education sector tends to reduce the likelihood of downward educational mobility, while foreign aid to non-education sectors is correlated with higher downward educational mobility. Yet, the impact of foreign aid to non-education sectors on downward educational mobility is marginal. An increase of foreign aid to the education sector by 1 per cent of GDP can reduce the probability of downward educational mobility by 3 percentage points, while a rise of aid to non-education by 1 per cent of GDP will increase the likelihood of downward mobility by only 1.1 percentage points.

Furthermore, we break down foreign aid allocated to the education sector into aid for basic education, aid for secondary and tertiary education, and non-specified education level. The latter includes foreign aid aiming to improve the education system as a whole. The results reported in

Table 3, columns (2) and (4), show that foreign aid allocated to any level of education tends to increase (decrease) the likelihood of upward (downward) educational mobility. The coefficients associated with foreign aid for basic, secondary and tertiary, and non-specified education levels are all positive and significant at the 1 per cent level in column (2) and negative and significant in column (4). However, we find that the coefficient associated with aid for basic education is lower than the one associated with secondary and tertiary education, suggesting foreign aid for the upper education level has a bigger effect than aid for the lower education level. For instance, an increase of foreign aid for basic education by 1 per cent of GDP is correlated with a reduction of the likelihood of downward educational mobility by 3.1 percentage points, against a decline of 6.8 percentage points when aid for secondary and tertiary education increases by 1 per cent of GDP. In addition, the results show that foreign aid for non-specified education levels has a higher impact on educational mobility than targeted foreign aid to basic, secondary, and tertiary education levels. This finding suggests that providing foreign aid aiming at improving the education system as a whole could yield many more substantial benefits than targeting some specific educational levels.

### 3.3 Transmission channels

In this section, we explore the channels through which foreign aid affects upward and downward education mobility. We argue that foreign aid can affect educational achievements through three channels, including providing financing for education, helping to improve the education system and policy, and improving education conditions. To investigate whether the three channels hold, we include them in the estimates. Compared to the baseline results, the inclusion of these variables can have three possible effects on the magnitude of the coefficient of foreign aid (leave it unchanged, decrease, or increase). If the coefficient of foreign aid does not change, this suggests that the impact of foreign aid on educational mobility is unrelated to the added variables (and thus they cannot be considered as channels). If the coefficient declines, then the effects of foreign aid on educational mobility operate through the added channels only. Finally, if the coefficient increases, then foreign aid has a bigger effect on educational mobility than just through the channels; that is, there is also a direct effect of foreign aid on educational mobility.

Regarding the spending channel, one would assume that foreign aid allows governments to increase spending on the education sector, which in turn is instrumental to building or maintaining school infrastructure or training centers, financing for teachers, and associated needs. To test the spending channel, we use total public spending for the education sector. The results are reported in Table 4, which should be compared to Table 2 (column (1) for upward mobility and column (4) for downward mobility). We include education spending in columns (1) and (4). We observe that the coefficient associated with foreign aid declines from 0.04 to 0.03 for upward educational mobility and from -0.005 to -0.002 for downward mobility. This finding suggests that the spending channel holds; therefore, foreign aid affects educational mobility by increasing the government's capacity to spend on the education sector.

As for the channel of education system and policy, we hypothesize that donors could help improve the education system by providing expertise or financing technical assistance necessary to define the education policies of beneficiary countries. Helping countries create reliable and robust education systems to plan the expansion of school systems and assessing teacher training needs is useful to improve education outcomes. To assess this transmission channel, we use the World Bank's CPIA index on social inclusion and equity. Given that there is no specific index for the education sector, we think that social policy is a good proxy as it includes the education sector and broadly human resources. In Table 4, we include the CPIA index for social inclusion and equity in columns (2) and (5). We find that the coefficient associated with foreign aid declines from 0.04 (column (1), Table 4) to 0.02 for upward educational mobility and is not statistically significant for

downward educational mobility. This result implies that the effects of foreign aid on educational mobility operate through the channel of social inclusion and equity.

Finally, we argue that donors help improve education conditions by providing direct project financing, which usually does not go to the government budget. These types of financing are non-fungible, and donors monitor and have control over the projects, contributing to building infrastructure and potentially improving education conditions and outcomes. We use the average pupil/teacher ratio as an indicator of education conditions. We include this pupil/teacher ratio in columns (3) and (6). Compared to columns (1) and (4) in Table 4, the results in Table 4 show that the coefficient associated with foreign aid declines for upward education mobility, while increasing for downward mobility (column (6)). Thus, education conditions appear to be a good transmission channel for upward educational mobility, contrary to downward mobility.

Table 4: Transmission channels

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Upward mobility			Downward mobility		
Foreign aid	0.0335*** (0.000)	0.0270*** (0.000)	0.0342*** (0.000)	-0.0022*** (0.001)	-0.0004 (0.001)	-0.0138*** (0.001)
Family size	-0.0163*** (0.000)	-0.0117*** (0.000)	-0.0191*** (0.000)	0.0175*** (0.000)	0.0118*** (0.001)	0.0177*** (0.001)
Female	-0.0381*** (0.002)	-0.1429*** (0.002)	-0.0348*** (0.002)	0.0207*** (0.004)	0.0384*** (0.004)	0.0240*** (0.004)
Rural	-0.3177*** (0.002)	-0.3622*** (0.003)	-0.3097*** (0.003)	0.2971*** (0.005)	0.2798*** (0.005)	0.2770*** (0.005)
Age	0.1438*** (0.001)	0.1104*** (0.001)	0.1421*** (0.001)	-0.1553*** (0.001)	-0.1455*** (0.001)	-0.1516*** (0.001)
Age square	-0.0022*** (0.000)	-0.0017*** (0.000)	-0.0022*** (0.000)	0.0025*** (0.000)	0.0023*** (0.000)	0.0024*** (0.000)
Electricity	0.4986*** (0.003)	0.5240*** (0.004)	0.5289*** (0.004)	-0.3519*** (0.006)	-0.3390*** (0.006)	-0.3157*** (0.006)
Water	0.2560*** (0.002)	0.2218*** (0.003)	0.2625*** (0.003)	-0.1796*** (0.005)	-0.1685*** (0.005)	-0.1669*** (0.005)
GDP per capita, Log	-0.1989*** (0.007)	-0.5696*** (0.016)	0.3970*** (0.006)	-0.2341*** (0.013)	-0.1690*** (0.021)	-0.8150*** (0.018)
Education spending	0.0052*** (0.000)			-0.0020*** (0.000)		
CPIA social policy		0.7646*** (0.025)			-0.1344*** (0.027)	
Pupil/teacher ratio			-0.0374*** (0.000)			0.0231*** (0.001)
Constant	-2.6989*** (0.062)	-0.1177 (0.099)	-5.5944*** (0.057)	3.7715*** (0.196)	3.4521*** (0.229)	7.0823*** (0.209)
Observations	2,328,130	1,663,699	2,220,231	772,491	555,438	659,671
R2	0.18	0.18	0.18	0.17	0.11	0.14
Birth-cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: GDP, gross domestic product; FE, fixed effect; R2, R-squared. \*, \*\*, and \*\*\* denote statistical significance at 10, 5, and 1 per cent levels, respectively. Robust standard errors are reported in parentheses.

Source: authors' calculations.

### 3.4 Robustness checks

We check the robustness of the results by employing different specifications. The results of these tests are reported in Table 5.

First, we use foreign aid per capita, which has also been used in some studies. The results are in columns (1) and (6). We still find that the coefficient associated with foreign aid per capita is positively associated with upward educational mobility and negatively correlated with downward mobility.

Table 5: Results: robustness checks

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Upward mobility					Downward mobility				
Aid per capita	0.0175*** (0.000)					-0.0021*** (0.000)				
Loans		0.4368*** (0.003)					-0.0520*** (0.006)			
Grants			0.0485*** (0.000)					-0.0058*** (0.001)		
Multilateral aid				0.1456*** (0.001)					-0.0173*** (0.002)	
Bilateral aid					0.0624*** (0.000)					-0.0074*** (0.001)
Family size	-0.0204*** (0.000)	-0.0204*** (0.000)	-0.0204*** (0.000)	-0.0204*** (0.000)	-0.0204*** (0.000)	0.0187*** (0.000)	0.0187*** (0.000)	0.0187*** (0.000)	0.0187*** (0.000)	0.0187*** (0.000)
Female	-0.0239*** (0.002)	-0.0239*** (0.002)	-0.0239*** (0.002)	-0.0239*** (0.002)	-0.0239*** (0.002)	0.0244*** (0.004)	0.0244*** (0.004)	0.0244*** (0.004)	0.0244*** (0.004)	0.0244*** (0.004)
Rural	-0.3094*** (0.002)	-0.3094*** (0.002)	-0.3094*** (0.002)	-0.3094*** (0.002)	-0.3094*** (0.002)	0.2922*** (0.005)	0.2922*** (0.005)	0.2922*** (0.005)	0.2922*** (0.005)	0.2922*** (0.005)
Age	0.1456*** (0.001)	0.1456*** (0.001)	0.1456*** (0.001)	0.1456*** (0.001)	0.1456*** (0.001)	-0.1563*** (0.001)	-0.1563*** (0.001)	-0.1563*** (0.001)	-0.1563*** (0.001)	-0.1563*** (0.001)
Age square	-0.0023*** (0.000)	-0.0023*** (0.000)	-0.0023*** (0.000)	-0.0023*** (0.000)	-0.0023*** (0.000)	0.0025*** (0.000)	0.0025*** (0.000)	0.0025*** (0.000)	0.0025*** (0.000)	0.0025*** (0.000)
Electricity	0.4810*** (0.003)	0.4810*** (0.003)	0.4810*** (0.003)	0.4810*** (0.003)	0.4810*** (0.003)	-0.3446*** (0.006)	-0.3446*** (0.006)	-0.3446*** (0.006)	-0.3446*** (0.006)	-0.3446*** (0.006)
Water	0.2666*** (0.002)	0.2666*** (0.002)	0.2666*** (0.002)	0.2666*** (0.002)	0.2666*** (0.002)	-0.1836*** (0.005)	-0.1836*** (0.005)	-0.1836*** (0.005)	-0.1836*** (0.005)	-0.1836*** (0.005)
GDP per capita, Log	0.4064*** (0.005)	0.4064*** (0.005)	0.4064*** (0.005)	0.4064*** (0.005)	0.4064*** (0.005)	-0.4797*** (0.007)	-0.4797*** (0.007)	-0.4797*** (0.007)	-0.4797*** (0.007)	-0.4797*** (0.007)
Constant	-6.6425*** (0.049)	-6.6425*** (0.049)	-6.6425*** (0.049)	-6.6425*** (0.049)	-6.6425*** (0.049)	5.3566*** (0.183)	5.3566*** (0.183)	5.3566*** (0.183)	5.3566*** (0.183)	5.3566*** (0.183)
Observations	2,328,130	2,328,130	2,328,130	2,328,130	2,328,130	772,491	772,491	772,491	772,491	772,491
R2	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17
Birth-cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: GDP, gross domestic product; FE, fixed effect; R2, R-squared. \*, \*\*, and \*\*\* denote statistical significance at 10, 5, and 1 per cent levels, respectively. Robust standard errors are reported in parentheses.

Source: authors' calculations.

Second, we use different coverage of total foreign aid by breaking it down into grants and loans. We find that the coefficients associated with both grants and loans are positive and strongly significant at the 1 per cent level in columns (2) and (3) and negative in columns (7) and (8). This finding suggests both grants and loans could increase the probability of upward educational mobility while reducing the likelihood of downward mobility. We also find that the coefficient associated with loans is higher than the one associated with grants.

Third, we split total foreign aid between multilateral aid and bilateral aid. The results are displayed in columns (4)–(5) and (9)–(10). Our findings do not change regardless of whether we use multilateral aid or bilateral aid. The coefficients associated with both multilateral and bilateral aid are positive and strongly significant in columns (4) and (5), respectively, while negative in columns (9) and (10), respectively. That said, higher multilateral and bilateral aid could increase the probability of upward educational mobility while reducing the likelihood of downward mobility. Furthermore, the coefficients associated with multilateral aid are around two times higher than those of bilateral aid.

## 4 Conclusion

Intergenerational mobility (upward and downward) has long occupied the debates on the economic and social levels as a way to reduce poverty and inequalities in developing countries. Foreign aid has also been recognized as a means of financing to help developing countries, particularly in social infrastructure such as education. This study attempted to unveil the potential effects of foreign aid on intergenerational mobility in education. Using survey data from the IPUMS international data set, covering 28 developing countries in Africa from 1970–2010, the results suggest that foreign aid raises the likelihood of experiencing upward educational mobility in the region, while the probability of downward educational mobility tends to be lower in countries that receive a high level of foreign aid. These effects mainly operate through increased financing for education, improved education system, and policy, as well as improved education conditions. More interestingly, focusing on the sectoral decomposition of total aid received (i.e. education sector versus the rest of the economy), the study highlights that foreign aid to the education sector tends to increase the likelihood of upward educational mobility, contrary to aid allocated to the rest of the economy. Our finding suggests that foreign aid has contributed to improving social mobility in African countries. In terms of policy implications, this study highlights the need for donors to channel much more aid to the education sector, which would contribute more to reducing poverty and inequality.

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## Appendix

Table A1: Country list

Benin, Botswana, Burkina Faso, Cameroon, Egypt, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Liberia, Malawi, Mali, Mauritius, Morocco, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, South Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe
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Source: authors' calculations.

Table A2: Variables, definitions, and sources

Variable	Definition	Source
Social mobility	Binary variable taking the value of 1 if the individual has experienced an upward or downward educational mobility and 0 otherwise	Ouedraogo and Syrichas (2021)
Aid	Foreign aid in the percentage of GDP	OECD databases and AidData project of William & Mary's Global Research Institute
GDP per capita	Gross domestic product per capita	International Monetary Fund's World Economic Outlook
Quality of institution index	Composite index constructed by taking the simple average of three governance indicators—regulatory quality, the rule of law, and corruption control	World Bank's Worldwide Governance Indicators
Conflict	Binary variable taking the value of 1 if the country is in conflict and 0 otherwise	Uppsala Conflict Data Program (UCDP)
Age	Age of individuals at the time of the survey	Integrated Public Use Microdata Series (IPUMS) database
Size of family	Number of individuals in a given household	
Gender	Binary variable taking the value of 1 if the individual is a female and 0 otherwise	
Location	Dummy variable indicating the place of living, which takes 1 if the individual lives in a rural area and 0 otherwise	
Infrastructure	Binary variable taking 1 if a household has access to basic infrastructure, i.e. electricity or clean water, and 0 otherwise	

Source: authors' calculations.