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Accounting for Intergenerational Social Mobility in Low- and Middle-Income Countries - Evidence from the Poorest in Ethiopia, India, Peru, and Vietnam

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# Accounting for Intergenerational Social Mobility in Low- and Middle-Income Countries

Evidence from the Poorest in Ethiopia, India, Peru, and Vietnam

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March 1, 2018

## Abstract

This study investigates intergenerational social mobility and its particular transmission mechanisms in low- and middle-income countries. Using data from Ethiopia, India, Peru, and Vietnam, we estimate the degree to which socioeconomic status persists across generations. We then analyze through which channels this persistence is mediated. Thereby we also consider channels that are of particular relevance in developing countries, such as the need to work in child labor or the time to school. The results illustrate that having a poor instead of a middle-class family background decreases the chances for a child to obtain the highest schooling degree by 20 per cent in the countries under study. Besides transmission factors also identified as determining social mobility in developed countries such as cognitive ability, we find that the time poorer children spend in child labor and the number of additional children living in the household account for large parts of the immobility observed.

JEL classification: I24, J62, O15

Keywords: Intergenerational Social Mobility, Transmission Channels, Low- and Middle-Income Countries, Child Labor

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# 1 Introduction

The intergenerational persistence of socioeconomic status has emerged at the center of public and economic discussions about inequality. Combating inequality is an international policy goal (World Bank, 2016), and the intergenerational transmission of socioeconomic status is a great contributor to economic inequality (see e.g., Corak, 2013). If family background determines individual's socioeconomic outcome, a society does not use its resources optimally in terms of human capital and it is at odds with the normative aim of ensuring equality of opportunities. The degree of intergenerational immobility and the reasons for its emergence has recently been subject to many economic studies. Many different ways of how exactly parental socioeconomic status influences the chances of the offsprings have been identified. This question about the particular mechanisms through which socioeconomic status is transmitted within families from one generation to the next is crucial to our understanding of the phenomenon, and in order to tailor-cut political solutions. While there is some evidence on the mechanisms of the intergenerational transmission in developed countries, little is known about these channels in emerging and developing economies. These are, however, likely to differ from those in developed economies, due to an absolutely higher level of parental poverty at the lower parts of the income distribution. Furthermore, in an environment of a weaker state, mechanisms that are alleviated by the provision of public goods such as schooling, social and childcare benefits, or an effective ban of child labor may instead come to the forefront in developing countries. Therefore, relatively poorer families in developing countries may face different obstacles to enabling a better life for their children than those in developed countries do.

We in this paper use longitudinal data surveying children from Ethiopia, India, Peru, and Vietnam in order to analyze the degree of intergenerational transmission of socioeconomic status in these countries and the particular mechanisms responsible for it. Our study is the first to our knowledge that identifies channels of the intergenerational transmission of income in developing countries. We, therefore, observe which factors of a child's development are influenced by parental income, and how these factors, in turn, influence the child's socioeconomic outcome, measured by the educational achievement as a young adult. We then decompose the influence of the different channels on the overall intergenerational immobility. The findings firstly indicate a considerable persistence of socioeconomic status across generations in low- and middle-income countries. We find that, *ceteris paribus*, having a poor family background compared to a middle-class background decreases the chances of obtaining a secondary schooling degree by 20 per cent. Investigating, secondly, the extent to which the different channels account for this degree of immobility yields that besides the inheritance of cognitive skills, the need to pursue child labor and family size play a significant role in the transmission of socioeconomic status across generations in the developing countries under study. The inheritance of cognitive skills accounts for 15 percent of the immobility in this pooled analysis of these countries while child labor and the number of siblings are responsible for 12 per cent, and 8 per cent, respectively. The time to school that children need and their health are affected by their family backgrounds. However, the time to school only slightly affects their schooling perspectives, while their lower health has no effect. They thus constitute no substantial pathway of the overall intergenerational immobility.

Following the pooled analysis over all countries, we split the sample to investigate differences by gender, country and level of parental wealth in the degree of intergenerational social immobility and its significant pathways. We find that the degree of social mobility is quite similar for boys and girls, and the transmission mechanisms of socioeconomic status differ insofar as aside from the channel of cognitive skills and the need to pursue child labor, sons from poorer households are specifically negatively affected by the larger number of siblings in poorer families. More distinct differences can be identified for different parts of the wealth distribution: differences in parental wealth matter more for educational outcomes between children from relatively richer backgrounds, and the child labor channel is more important among these. The channel of more siblings is in turn more important among the offsprings of relatively poorer families. The estimated degree of intergenerational social immobility is highest in Vietnam and smallest in India. Regarding the pathways, the countries differ in the significance concerning the number of children and child labor channel.

Our results have at least two important implications: First, they show that the correlation of ability with parental wealth plays an important role in the intergenerational transmission of socioeconomic status in developing countries as in developed countries. Secondly, they indicate that some channels that are assumed to contribute to the passing-on of the socioeconomic position from parents to their children in developing countries in particular indeed play a crucial role, while others do not. These mechanisms, furthermore, differ between boys and girls, and between relatively richer and poorer families, and countries. These subgroup specific results may be important in order to understand which policy measures could have the greatest effect in alleviating intergenerational social immobility and hence, enhancing equality of opportunity among children in developing countries.

The remainder of this paper is structured as follows: the next part embeds this study into the literature on intergenerational social mobility and its pathways. In the third section, the dataset used is briefly presented. Section 4 analyzes the degree of social immobility in the countries under study. In section 5, the channels of the intergenerational transmission of socioeconomic status are investigated. In a first step, we analyze the influence of parental income on different factors of childhood development, and the influence of these factors on the children's educational outcomes. Secondly, we apply and extend the method by Bowles and Gintis (2002) to decompose the transmission into different channels and estimate their relative weights. Section 6 extends the analysis by differentiating intergenerational mobility and the channels contributing to it by gender, wealth, and country. Section 7 concludes.

## 2 Literature Review

Economic research on the intergenerational transmission of income goes back on the seminal work by Becker and Tomes (1986). It demonstrates the importance of parents' ability to influence their children's socioeconomic status via investments in education, mental and physical health, and social development. The authors argue that the extent to which parents influence their children's status are determined by their preferences and constraints they face. Most of

the subsequent, mostly empirical, works concentrate on cross-country comparisons between or individual country analyses of high-income economies, showing a considerable heterogeneity in the degree of intergenerational social mobility between countries (e.g. Corak, 2006, Causa and Johansson, 2009, Black and Devereux, 2011). A common finding in these studies is that intergenerational mobility is lower for daughters than for sons and that it positively correlates with redistributive policies.

Latest improvements in data availability allowed research on this topic to grow in low- and middle-income countries. The results of the studies by Bossuroy and Cogneau (2013), for a sample of five African countries, Balán, Browning, and Jelin (2014) for Monterrey, Mexico, as well as Lambert, Ravallion, and van de Walle (2014), for Senegal, confirm the cross-country heterogeneity in the degree of intergenerational social mobility also within the group of developing countries.<sup>1</sup>

The presence of either high or low intergenerational mobility raises questions about the causal mechanisms responsible for the transmission of socioeconomic status from one generation to the next. Bowles and Gintis (2002) are among the first who attempted to identify the underlying channels of intergenerational mobility empirically. On the basis of survey data from the US, they find evidence for the importance of wealth, race, and schooling when investigating the intergenerational transmission of income and earnings. Contrary to their expectations, IQ is not identified as a major contributor. Adopting the approach by Bowles and Gintis (2002), Blanden, Gregg, and Macmillan (2007) evaluate the role of education, ability, non-cognitive skills and labor market experience in the transmission of parent's socioeconomic status, the family income, to their sons' earnings at age 30 in the UK. The authors are able to show that these factors account for half of the association between parents' and sons' socioeconomic status. Moreover, they highlight the dominant role of education in this context demonstrating the importance of cognitive and non-cognitive skills for the intergenerational transmission process of status. Similarly, Blanden, Haveman, Smeeding, and Wilson (2014) analyze several mechanisms in a study using data from the UK and the US. The study is the first to our knowledge that establishes the analysis of statistical significance of transmission pathways under study by bootstrapping standard errors. Illustrating relevant cross-country differences in the transmission mechanisms of income/ earnings, they find education to play a larger role in the US than in the UK. While it explains nearly 50 percent of the association between parents' income and children's earnings in the US, it accounts for less than 30 percent in the UK. Occupation, in turn, is a more dominant channel in the UK relatively to the US. Labor market attachment, health, and marital status display low explanatory power for explaining the link between parental and children's socioeconomic status in both countries. A recent study by Schad (2015) replicates the analysis undertaken by Blanden et al. (2014) for Germany, looking at the same age cohort. The author finds that education plays the largest role in explaining the parent-child link accounting for 20 percent of the transmission of status. Together with occupation, it explains even 40 percent of the mobility in Germany.

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<sup>1</sup>The results from Lambert et al. (2014), but also Hnatkovska, Lahiri, and Paul (2013) for India, suggest that periods of structural change generally increase intergenerational mobility.

We extend the empirical approach by Bowles and Gintis (2002) by the strategy employed in Blanden et al., 2014 and apply it to the context of low- and middle-income countries. Thereby, this work distinguishes from previous studies in at least two central aspects: Firstly, while ample evidence exists on intergenerational social mobility in high-income countries, little is known about its degree in less fortunate countries. We expand the existing literature by investigating the extent of intergenerational social mobility for a sample of countries from all major developing regions of the world, i.e. Africa, Asia, and Latin America, on the basis of an identical survey in all four countries. Secondly, this paper is the first to decompose the intergenerational transmission of socioeconomic status in low- and middle-income countries into different channels and to thereby identify mechanisms of special relevance in developing countries.

The structure of our data, as laid out in the subsequent sections, furthermore allows us to elicit the parental background at relatively young age of the children, where it is likely to exhibit the most considerable influence on their outcomes and the respective pathway characteristics. At the same time, we thus concentrate on education as the relevant outcome rather than earnings. This is due to better predicability of socioeconomic status at young adulthood, and is in line with a recent study on intergenerational mobility in Denmark and the US (Landersø & Heckman, 2017). This also allows us to directly compare the mobility measured in the developing countries under study with that in these developed countries.

### 3 Data

For our analysis, we use data retrieved from the Young Lives Dataset, which is a longitudinal and multi-dimensional survey investigating causes and consequences of childhood poverty. The dataset currently comprises four rounds across four countries – Ethiopia, India, Peru, and Vietnam. They have been selected to form the basis of the dataset as they represent “the four major regions of the developing world, both low- and middle-income countries, and diverse socioeconomic and political systems” (Young Lives, 2011a, p.1).<sup>2</sup>

The data consists of four waves, with the children from the first wave interviewed again in every subsequent wave. The first round was collected in 2002. From then onwards, interviews were repeated approximately every three years in 2006, 2009 and 2013. Children were selected to be surveyed via the application of a “‘pro-poor’ and multi-stage sampling proce-

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<sup>2</sup>Out of these four countries, Peru displays the highest GNI per capita (\$11,382.41 PPP adjusted constant 2011 international dollar, World Bank World Development indicators, all data for 2015), while Ethiopia is ranked the lowest (\$1,522.95). Vietnam (\$5,358.86) and India (\$5,663.79) take the middle positions. Being quite similar in terms of GNI per capita, India has a slightly higher level. Considering population size, the ranking changes significantly. Peru has the smallest population (31,376,670) while India exhibits the largest one (1,311,050,527). Vietnam (91,703,800) and Ethiopia (99,390,750) take the third and second rank respectively. Moreover, Ethiopia is exhibiting the highest percentage of the population living on less than 1.9 US dollar (2011 PPP) a day (33.5%) followed by India (21.2 %). In Vietnam (4.8 %) and Peru (4.7 %), the share is much lower.

dure” (Aurino & Burchi, 2014, p.7).<sup>3</sup>

The survey was repeatedly conducted with the same children and their families over these years and asks a range of questions on the socioeconomic background on the families and the life situation of the offsprings. In order to relate offsprings’ outcomes to family background, we use data on those children who were 7 or 8 years of age in the first observation period, and are hence 18 or 19 years old in the fourth and last wave, thus being the most advanced children in terms of their career in the sample. These are approximately 1,000 children per country, with four data points for each child.<sup>4</sup> However, due to different response rates between the countries on some of the survey items that we utilize in our analysis, the final sample for estimation is more imbalanced between countries, with 774 observations from India, 469 from Peru, 171 from Vietnam, and 130 from Ethiopia.<sup>5</sup>

The Young Lives survey is utilized due to several reasons. Firstly, it nicely allows to conduct an analysis representing the diversity of the developing world (Young Lives, 2011b, p.1). Secondly, survey questions are nearly universally harmonized across the four countries, a fact rendering the comparison between the countries easy and avoiding biases arising from how questions are framed. Lastly, attrition is “extraordinarily” low due to immense efforts to sentinel children across their lives (Aurino & Burchi, 2014, p.7).<sup>6</sup>

## 4 Degree of Social Mobility

In this section, we estimate the extent to which the outcome of children at the highest possible age (i.e. the last wave of the survey) is related to the family background when they were young (i.e. the first wave of the survey). In the next section, we seek to explain this link via some factors that are, based on the literature, reasonably to be assumed explanatory variables through which the family background may determine the outcome of the offsprings.<sup>7</sup>

In order to capture parents’ socioeconomic status, we employ the households’ wealth index in the first observation period as the main independent variable of interest. The first observation period is chosen since household wealth can then be assumed to be accumulated mainly by the parents since the children are only 7 or 8 years old at that time. The wealth index is constructed on the basis of three main components: indices for housing quality, consumer

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<sup>3</sup>Firstly, 20 sites were non-randomly predetermined for each country with the purpose of mostly covering rather poorer ones. Within these pre-chosen sites, children with a certain age were randomly selected. Although this leaves the dataset nationally unrepresentative, it has the advantage of capturing the diversity of children in each country and of comparing poor and better-off children.

<sup>4</sup>The original sample for Peru includes only 714 children for the first wave.

<sup>5</sup>The deleted observations do not differ significantly from the remaining ones along the observed dimensions. The missing responses concern particularly the item of cognitive ability of the children.

<sup>6</sup>From the first to the fourth observation round there is an attrition of 92 observations in Ethiopia, 56 observations in India, 79 observations in Peru, and 113 observations in Vietnam.

<sup>7</sup>Although we are making use of data from all four waves for individual observations, we are employing a cross-sectional approach.



durables and the access to services. A higher value indicates a higher socioeconomic status. The advantage of the wealth index compared to alternative proxies of socioeconomic status such as income or a household’s consumption expenditures is that it measures “long-term economic well-being of the family”, which is, following Corak (2006, p.6), necessary when aiming at quantifying the extent of social mobility, and that it reduces measurement error (Fakir, 2013).<sup>8</sup> We retrieve the wealth index for each household from the dataset by Boyden (2016).<sup>9</sup>

To measure children’s socioeconomic status, we take the children’s outcome variable from the last available observation period. The dataset does not allow utilizing commonly used outcome variables, such as children’s wages, since the surveyed children are on average only 19 years old in the last observation period and have in many cases not yet entered formal employment. Therefore, we employ information on children’s educational achievements as the measure in which their socioeconomic status outcome is best observable. Several studies show the close association between education and earnings (see, for instance, Mincer (1974)). Also earlier studies on the intergenerational transmission of income show that the educational outcome is a good predictor of later economic success (see e.g. Lambert et al. (2014)). In order to ease interpretation, we operationalize children’s educational outcome by a dummy variable assuming the value of one if a child has obtained the highest secondary school leaving certificate or if their current development indicates that they will do so in the near future, and zero otherwise. To ensure that the school degrees are comparable across the four countries under study, we follow the example of Blanden et al. (2014) and Schad (2015) and refer to the International Standard Classification of Education (ISCED). It is an international classification allocating educational programs to levels and fields equivalent across countries (United Nations Educational, Scientific and Cultural Education, 2016). An ISCED level of 3 roughly corresponds to the highest secondary school leaving certificate in all four countries. If a child has reached an ISCED level of 3 or higher we assign it with a value of one for its educational outcome variable.<sup>10</sup> With this dummy variable as the dependent variable, the estimation results can be easily interpreted as the *ceteris paribus* effects of the independent variables on the probability to obtain a secondary school degree.

In all estimations, we control for factors that may influence a child’s educational outcome without being influenced by parent’s socioeconomic status. These includes the sex of the child, the child’s birth rank, the age of the child’s father and a squared term of the father’s

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<sup>8</sup>By applying the wealth index as an indicator of the parental status, we follow various studies already conducted with the Young Lives dataset, which also use the wealth index as “the primary instrument [...] to measure socioeconomic status” (Kumra, 2008, p.8). Employing other measures of parental socioeconomic status, such as total or PPP-adjusted household consumption expenditures per household member doesn’t affect our qualitative results.

<sup>9</sup>The data by Boyden (2016) is part of the Young Lives Dataset distributed by the UK Data Service.

<sup>10</sup>The exact assignment of the different certificates across the four countries together with the respective ISCED classification can be found in Tables A1 to A4 in the appendix. If a child could not yet have reached the highest secondary school leaving certificate in its country in a standard amount of years due to its age but its current development indicates that it will do so in the near future, we assign it a value of one in its educational outcome variable. Our results are robust to this procedure. Also, employing a categorical variable that takes the value of the ISCED classification (i.e. 0 to 3) yields the same results in the subsequent analysis but complicates the interpretation slightly and marginally reduces the sample size.

age. All control variables are observed during the first round of interrogation. Table B1 of Appendix B displays descriptive statistics for the control variables. The child order, i.e. each child’s birth rank, is a categorical variable taking values of 1 up to 5 if child  $i$  is the first to fifth child respectively. The variable takes on a value 6 if the child is the sixth or higher rank born child by the mother. The birth order is taken into account since it has been shown theoretically and empirically that the level of children’s education differs in an intra-household comparison between the siblings who are born as one of the earlier children and those born as one of the later children (see, for instance, Ejr n s and P rtner (2004), and Black, Devereux, and Salvanes (2005) for developed countries). Following previous work on social mobility, we control for the age of a child’s father as well as the quadratic term of the father’s age. Employing the income of parents as the proxy for parents’ socioeconomic status, many studies control for the fact that income rises with age but with decreasing returns by including parental age and parental age squared (Blanden et al., 2007; Blanden et al., 2014; Schad, 2015). Controlling for the age of the children is not necessary since children in the sample have almost the same age due to the sampling design.

Table B2 in Appendix B reports descriptive statistics for the socioeconomic status variables at the top. Parental wealth, i.e. the wealth index, in the dataset has an average of 0.44. Such value, being less than 0.5 (which is by construction of the wealth index the population average for each country), reflects the ‘pro-poor’ sampling strategy employed by the Young Lives Dataset. The wealth index’s variation in the sample is quite high with a standard deviation of 0.21. A higher secondary school leaving certificate is achieved by 78 percent of the sample.

The effect of the wealth index on the outcome of children, controlling for the factors named above, gives us the overall degree of social immobility. Our baseline regression in order to elicit this degree hence reads:

$$Ed_{i,4}^C = \beta Wi_{i,1}^P + X_{i,1}'\zeta + \sum_{j=1}^4 \alpha_j d_{j,i} + \xi_i \quad (1)$$

with  $Ed_{i,4}^C$  being the educational outcome of child  $i$  in wave four and  $Wi_{i,1}^P$  the household’s wealth index in the first round.<sup>11</sup> Our coefficient of interest,  $\beta$ , is the measure of the degree of intergenerational immobility, representing the effect of ceteris paribus having the highest parental wealth background on the probability to obtain the highest secondary school degree compared to the lowest parental wealth. The vector  $X_{i,1}$  contains the control variables mentioned above. We furthermore employ country dummies,  $d_{j,i}$ , in order to capture country-wide effects, such as the overall level of schooling that cannot explain the *within-country* variation of socioeconomic status. Our results are hence to be read as the relative effect of a higher or lower socioeconomic background in a certain environment.  $\xi_i$  is the error term.

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<sup>11</sup> Although the notation used would be exclusive without the subscripts  $C$  and  $P$ , they are added to be in line with the standard literature on social mobility and underline the difference in the children’s and parental generation.

To estimate the coefficients of equation (1) we use a linear probability model (LPM), because our later analysis of the decomposition of the different pathways requires linear, hence, OLS estimation. Employing a Probit model yields the qualitatively same results for all intermediate steps encompassed in the decomposition.<sup>12</sup> The country fixed effects  $d_{j,i}$  in the cross section capture potential correlation of the error term within countries, which is why we only use heteroscedasticity robust standard errors without clustering them in our estimations.<sup>13</sup>

Estimation results for equation (1) are shown in Table 1.<sup>14</sup> The coefficient for the wealth index,  $\beta$ , is significant and positive, implying a considerable degree of social immobility. If the parental wealth, i.e. the wealth index, ceteris paribus increases by 0.1 units, the probability for their children to receive the highest secondary school leaving certificate increases by 3.9 percent. The estimates are comparable to those of Landersø and Heckman (2017) for Denmark and the US, which is the only study using comparable proxies for parental and children’s socioeconomic status, but at the upper margin. They imply that, for example, for a child coming from a very poor family background, the probability of achieving the highest secondary school certificate is on average 20 percent lower than for a child with the same characteristics but having a middle-class family background, i.e. parental wealth index of 0.5.<sup>15</sup>

Table 1 shows further that being female, father’s age and father’s age squared do not exhibit a significant effect on the average level of children’s educational achievement as a young adult. The estimated coefficients regarding the birth order imply that the first born child exhibits the highest probability to achieve a high level of education, while it declines almost gradually for children with a higher birth order.

After having estimated a considerable degree of social immobility, the next step of this study is to identify the mechanisms contributing to the social immobility in low- and middle-income countries.

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<sup>12</sup>The estimated average marginal effects of employing a Probit model yield only marginally different values compared to the coefficients estimated via an OLS estimation.

<sup>13</sup>Clustering at the country level is not only not necessary, but would also potentially bias our results, given that there are only four clusters. The alternative would be to cluster standard errors on the very fine-grained level of survey sites, which in turn leads to very few observations per cluster, again potentially biasing the estimations of the standard errors. See Cameron and Miller (2015) for a discussion. Nonetheless employing either clustering of standard errors on the country or site level doesn’t affect the results.

<sup>14</sup>The estimation is only based on 1544 observations. This is due to the fact that only those children are included who exhibit an observation for the socioeconomic status, the pathway factors and control variables.

<sup>15</sup>Relatively large estimations of intergenerational persistence are in line with the theoretical foundation by Becker and Tomes (1986) who predicts that countries with less smoothly functioning capital markets should exhibit a higher degree of social immobility since poorer parents cannot finance investments in their children via credit. Low- and middle-income countries are commonly characterized by less developed capital markets (Galor & Zeira, 1993; Basu & Pham, 1998; Emerson & Souza, 2003).

Table 1: Intergenerational Persistence of Socioeconomic Status

Dependent Variable	Children's Education
Parental Wealth	0.392*** (0.0476)
<b>Controls</b>	
Female	0.0177 (0.0199)
Father's Age	0.00618 (0.0117)
Father's Age <sup>2</sup>	-0.0000610 (0.000141)
Birth Order ( <i>Base: First Child</i> )	
Second Child	-0.0180 (0.0248)
Third Child	-0.0718** (0.0318)
Fourth Child	-0.0966** (0.0446)
Fifth Child	-0.000414 (0.0510)
Sixth Child or more	-0.125** (0.0502)
<b>Country Dummies</b>	
ET	0.237 (0.232)
IN	0.560** (0.231)
PE	0.503** (0.229)
VN	0.355 (0.233)
Observations	1544
Adjusted R <sup>2</sup>	0.804

*This table shows the results from estimating equation (1). The dependent variable is a dummy variable that reflects whether a child has obtained a secondary school degree at the age of 18/19. The parental wealth variable is an index of housing, durable consumption and access to services retrieved when the child was 7 or 8 years old. Robust standard errors are reported in parentheses (\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).*

## 5 Transmission Mechanisms

Family background may influence offsprings' outcome through various channels. Some of these pathways may be particularly prominent in a developing country setting. To be considered a pathway, a variable needs to correlate with parents' socioeconomic status and causally related to their children's socioeconomic status (Bowles & Gintis, 2002, p.9). We identify four such developing country specific variables for which we have data available: (i) Relatively poor families may have a need to also have their children work instead of going to school. (ii) Poorer families may be less able to take care of their children's health, which may in turn negatively influence the educational outcome. (iii) In an environment of poor access to public education and infrastructure, the distance to school that a child needs to cover each day may influence the likelihood of it attending and being successful in school. (iv) Poorer families may be inclined to get more kids, be it for reasons of poor knowledge or access to contraception or rational economic reasons. The number of siblings a child has may in turn have a negative effect on its individual outcomes. We lay out a more detailed rationale for the choice of these variables and their data basis in the following.

(i) *Child labor*: Child labor is an issue affecting all four countries under consideration. Ethiopia is the country among these four with the highest percentage of children between 7 and 14 years in employment (26.1 %) closely followed by Peru (20.7 %) whereas it is somewhat lower in Vietnam (13%). India displays the lowest level of child employment according to the data from the World Bank (2.5 %) (World Bank, 2017).<sup>16</sup> However, these official numbers do not include children working in their households or family businesses, which is found to be as adverse to educational success as paid work outside the home (Putnick & Bornstein, 2015). Therefore, actual numbers are likely to be even higher.<sup>17</sup>

Appendix C provides a short theoretical argument why it is likely that relatively poorer families have a higher probability of sending their children to pursue child labor. We can see from our data that while working a few hours does not reduce the time a child attends school, this trade-off becomes strongly visible for children that work more than 2 hours a day. Figure 7 in Appendix B shows this relationship in our data, which is consistent with previous findings (Putnick & Bornstein, 2015).

Our measurement of child labor follows the example of Krutikova (2009) and is the average of the hours of household chores, caring for others, the hours spend working in the own farm business and hours spend in a paid activity for a company/person not related to the child on a typical day. We denote those averaged hours spend in child labor of child  $i$  with  $Cl_i$ . We retrieve data on the four types of child labor from the second observation period

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<sup>16</sup>Values are either from 2010 or 2011 regarding the percentage of children in employment and regarding poverty depending on the availability of data across countries.

<sup>17</sup>The definition of child labor is consistently under hot debate in the literature (Edmonds, International Labour Office, & ILO International Programme on the Elimination of Child Labour, 2008). The UN Convention on the Right of the Child does include all work that is "likely [...] to interfere with the child's education" (United Nations, 1989, Article 32). Evidence for India shows that together with a better control and regulation on child labor, the character of actual child labor is changing towards domestic work (see UNICEF (2018)).

(ages 12 to 13) because it is not available for all countries in the first period, and it is most likely, that this has the additional advantage that the measured child labor does not directly increase the wealth index measured in period one.<sup>18</sup> Figures from the third round cannot be used since with an age of 15 it cannot generally be considered as child labor anymore (International Labor Organization, 2017). The average hours a child spends in child labor per day amounts to approximately one hour and a half in our sample. The maximum hours a child spends working are 10 hours while some children do not spend any time in child labor.

The high level of child labor in the four countries of interest raises questions about the underlying educational systems. Primary education is for free and compulsory for all Indian children with ages between 6 and 14 (British Council India, 2014). The Peruvian government requires all children from the age of 6 onwards, to go to school for 6 years of primary education and two consecutive years of lower secondary education (Informationsportal für ausländische Berufsqualifikationen, 2016). Primary education in Vietnam consists of five grades starting when children reach the age of 6 (United Nations Educational, Scientific and Cultural Education, 2016). The entrance age for compulsory primary education for children in Ethiopia is 7 years, and it takes 8 years for the primary education level to be completed (D’Aprile, 2013). Thus, although children in these countries are legally obliged to go to school for a considerable amount of time, child labor is still a relevant issue and substitutes for school attendance.

*(ii) Childhood Health:* Recent literature on children’s health suggests that childhood health should be investigated as a further factor responsible for the transmission of parents’ socioeconomic status to their children. Previous works show that a lower health status of children correlates with a poorer family background. For example, Woodhead, Dornan, and Murray (2014, p.13) find on the basis of data from the younger cohort of the Young Lives Dataset that “[...] in Peru over 50 percent of the children from households in the poorest quintile were stunted in 2006, compared to just under 10 percent in the wealthiest quintile”. Childhood health is, in turn, found to affect children’s educational attainment. Case, Fertig, and Paxson (2005, p.371) analyze the development of habitants in Great Britain. They illustrate that “on average, each childhood [health] condition at age 7 is associated with a 0.3 reduction in the number of O-levels passed [at the age of 16]”. We therefore examine its transmitting effect of socioeconomic status also in developing countries.

The variable, we employ to measure childhood health, is the height-for-age z-score of child  $i$  at the age of 8 (first observation period), denoted  $He_i^C$ . Being one of the most commonly used anthropometric indices, the height-for-age index reflects children’s body height relative to chronological age. Thereby, it captures “the long term cumulative effects of health throughout childhood” (Cummins, 2013). Anthropometric values are expressed in relation to a well-nourished, healthy reference population of children via the z-score system.<sup>19</sup> Children’s values are given as the number of standard deviations below or above the median value of

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<sup>18</sup>It cannot be guaranteed that the children already worked before the wealth index was measured and hence has made the family appearing to be economically better off. However, this would only downward bias the results since the negative parental wealth child labor link would appear less weak.

<sup>19</sup>Interchanging the height for age z-score with the weight for age z-score in the estimations yields the same qualitative results.

the reference population. In our sample, the mean of the height-for-age index is negative, which illustrates that, on average, childhood health in the sample is worse than the health condition of the reference population of children in the US, implying a generally lower health level in the sample of developing countries than in the developed world.

(iii) *Time to School:* Empirical studies on low- and middle-income countries have shown that the distance to school is crucial for explaining differences in education within populations. Using data on children in Ghana from 1998-99, Vuri (2008, p.29) demonstrates that “[...] the further the school the less likely children are to attend [primary] school [...]”. Moreover, Kazeem, Jensen, and Stokes (2010) provide evidence for a higher distance to the primary as well as to the secondary school reducing the odds of school attendance when analyzing data from Nigeria. Also due to a higher number of observations, we do not employ the distance to school but the time to school for each child as a potential transmission mechanism. While time to school is positively correlated with distance to school, time to school seems to be the more appropriate variable to constitute a pathway of intergenerational income transmission. Since children with a rich parental background are likely to have better access to transportation, time to school for those children would be limited to a certain extent even at a larger distance. In contrast, the very poor cannot afford or can only afford cheaper means of transportation.

Time to school is measured in minutes, denoted as  $Ts_i^C$  for child  $i$ . Data is retrieved from the second observation round instead of the first round since caregivers only provided information on the travel time to school from the second interrogation round onwards. On average, children need 16 minutes to school while the highest amount of time needed in the sample is three hours.

(iv) *Number of Children:* Furthermore, the number of children living in each household is considered to be a pathway of the persistence of socioeconomic status across generations. Parental wealth can impact the number of children a household conceives in various ways: Children can be used as a retirement provision, particularly for poor households (Cai, Giles, & Meng, 2006). Especially in regions with less developed capital markets, the relationship might, however, go in the opposite direction. When there is no possibility to save money for retirement, parents are likely to 'invest' their funds into their children expecting to live off their children's outcome when they retire (van Ginneken, 2003). To secure a certain living standard during retirement, it might be useful to 'diversify the investment' by having more children. If this is the case, it can be expected that parental wealth correlates positively with a household's number of children since wealthy parents can afford to raise more children. However, especially wealthy parents may rather secure their children reaching at least the same socioeconomic status and therefore 'invest' all resources in the quality instead of the quantity of the offsprings (Goodman, Koupil, & Lawson, 2012). A further reason could be that the poor are less educated concerning sexual matters (Darroch & Singh, 2013).<sup>20</sup> While

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<sup>20</sup>The potentially ambiguous relationship between the parental wealth, the number of children, and children's outcomes was already noted by Becker and Tomes (1986, p.32), who note that "the degree of intergenerational mobility in earnings is also determined by the number of children in different families. Additional children in a family reduce the amount invested in each one when investments must be financed by the

the direction of the effect has to be investigated, it seems likely that parental wealth influences fertility decisions and hence the number of children in a household.

A higher number of children, i.e. a greater family, in turn, is likely to influence the educational outcome of each child. Black et al. (2005, p.669) hypothesize that a “greater family size may negatively affect child outcomes through resource dilution or because the average maturity level in the household is lower”. They find affirmative evidence analyzing data on the Norwegian population between the age 16 to 74 from 1986 until 2000. Thus, due to the likely correlation between the parental wealth and the number of offsprings as well as its impact on each child qualitative outcome, the number of children in a household is investigated as a further transmission mechanism of socioeconomic status across generations.

The pathway number of children includes the number of additional children in each household who are 12 years old or younger excluding the child interrogated by the Young Lives Dataset. Thereby, it is accounted for direct siblings of child  $i$ , half siblings and further children living in the household with the latter being especially relevant in less developed countries (Banerjee & Duflo, 2007, p.3). Data on the number of children is retrieved from the second observation round. Therefore the majority of additional children is younger than the observed child  $i$  who has an average age of 12 years during the second observation period. We construct the categorical variable number of children in a ‘non-exclusive’ way, creating three dummy variables ‘at least one additional child in household’, ‘at least two additional children’, and ‘at least three additional children’ in the household which we denote by  $Nc1_i^C$ ,  $Nc2_i^C$ , and  $Nc3_i^C$  respectively. No further variables are constructed to capture households higher numbers of additionally children since their presence in the sample is limited. The dummy variables are constructed to be non-exclusive since “if exclusive dummies were used, this would lead to ambiguity in the expected relationship between parental [wealth] and the middle [category] when estimating [the relationship between the parental wealth and the number of children in the decomposition applied in the following section]” (Blanden et al., 2014, p.432). Over the whole sample, approximately 67 percent have at least one additional child while around 27 percent have at least two additional children. Approximately 9 percent of the sample have three or more additional children living in the household.

The four variables laid out above are potential channels of how the socioeconomic situation of the household in which a child grows up can determine its educational outcome, particularly in developing countries. However, as captured in depth in the ‘nature vs. nurture debate’ which has been subject to many studies in many contexts mainly for high-income countries (see, for example, Sacerdote (2011)), not only the environment is what parents give their children on their way. Also, offsprings inherit their parents genes, including cognitive skills. If better cognitive skills determine the socioeconomic position of parents, and children inherit these skills, these are a common determinant of both parents’ and children’s success. The inheritance of cognitive skills from parents to their children is well documented by the “[...]

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family. Consequently, a negative relation between family size and the earnings of parents also reduces the intergenerational mobility of earnings.", but also that "consumption and total resources in richer families that do leave bequests to children regress down to the mean, mainly because fertility is positively related to parents' wealth."



similarity of parents’ and offsprings’ scores on cognitive tests [...]” (Bowles & Gintis, 2002, p.10). In our data, we can only observe children’s cognitive skills, which we thus introduce as a further pathway. We use the Raven’s CPM test as our measure for cognitive skills of the offspring, as given in the survey data and denote it as  $Cs_i$  for child  $i$ . Raven’s CPM is the most common measure of fluid intelligence. This is of special relevance in this context as it captures the “ability to reason and to solve new problems independently of previously acquired knowledge” while most IQ tests attempt to measure not only fluid but also crystalized intelligence (Jaeggi, Buschkuehl, Jonides, & Perrig, 2008, p.6829). Since we can only elicit the children’s cognitive ability at the age of eight, any influence of parents’ actions before that age that has a direct effect on the children’s cognitive ability other than genetic inheritance will also be captured by this variable.<sup>21</sup> Children in the sample have reached on average a Raven’s score of 21 points with 0 and 36 being the lowest and highest possible achievement. Descriptive statistics on the pathway variables are provided in Table B2 of Appendix B.<sup>22</sup>

We consider each of these characteristics of children as a pathway because they are potentially influenced by parental wealth and also likely to affect the probability of achieving a higher educational degree. In order to test the relevance of each pathway in the transmission of parental wealth on children’s educational outcome, we test each of these relationships separately. In a first step, we hence ask whether the household wealth in the first period influences each of the pathway variables. The respective regression equation reads:

$$PW_i^C = \lambda_{PW}Wi_i^P + X_i'\zeta_{PW} + \sum_{j=1}^4 \alpha_{PW,j}d_{i,j} + e_{PW,i} \quad (2)$$

We estimate separate regressions of equation (2), one with each pathway variable, child labor ( $Cl_i^C$ ), childhood health ( $He_i^C$ ), time to school ( $Ts_i^C$ ), number of children in the household ( $Nc1_i^C$ ,  $Nc2_i^C$ ,  $Nc3_i^C$ ) and cognitive skills ( $Cs_i^C$ ), as dependent variable  $PW_i^C$ .  $\alpha_{PW,j}$  gives the pathway specific country effects for country  $j$ . The employed control variables  $\mathbf{X}_i$  from equation (1) are also included in all further regressions.

The results of estimating equation (2) are shown in Table 2. They show that each of the hypothesized pathway variables is indeed influenced by parental wealth, and the coefficients have the expected signs. The literature outlined before was, however, ambiguous on the prediction of the relationship between parental wealth and the number of children in the household. Our results indicate that wealthier parents decide to raise fewer children while less wealthy families have more children in the context of the developing countries under study. The results in Table 2 also rationalize our choice of pathways analyzed.

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<sup>21</sup>Since the common variation of both, parental wealth, and children’s cognitive ability is determined by the parental cognitive ability, we can use both variables from the first period of observation.

<sup>22</sup>The figures given in Table B2 for child labor are the hours averaged over the four different kinds of child labor: household chores, caring for others, work on the family farm/business and work for a non-family-owned company. Therefore a value of 0.5 in the table amounts to 2 hours spend in child labor per day over all four kinds of child labor.

Table 2: Correlation between Parental Wealth and the Pathways

Dependent Variable	Child Labor	Health	Time to School	At Least 1 Child	At Least 2 add. Children	At Least 3 add. Children	Cognitive Skills
Parental Wealth	-0.406*** (0.0412)	1.071*** (0.130)	-8.807*** (2.046)	-0.0995* (0.774)	-0.312*** (0.0531)	-0.184*** (0.0363)	8.205*** (2.500)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1544	1544	1544	1544	1544	1544	1544
Adjusted R <sup>2</sup>	0.613	0.684	0.577	0.719	0.333	0.130	0.926

*This table shows the results from estimating the relationship between parental wealth and different child characteristics as dependent variables, as given by equation (2). The dependent variables are elicited between the childrens' ages of 7 and 13. The parental wealth variable is an index of housing, durable consumption and access to services retrieved when the child was 7 or 8 years old. Robust standard errors are reported in parentheses (\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).*

Having established the effect of parental wealth on the potential pathway variables under study, we want to see in a second step whether each of the pathway factors in turn also exhibits an influence on the probability of the child to obtain the highest educational degree. Therefore, we run the following regression:

$$\begin{aligned}
 Ed_i^C = & \rho_{Cl}Cl_i^C + \rho_{He}He_i^C + \rho_{Ts}Ts_i^C + \rho_{Nc1}Nc1_i^C + \rho_{Nc2}Nc2_i^C + \rho_{Nc3}Nc3_i^C \\
 & + \rho_{Cs}Cs_i^C + \gamma_{Wi}Wi_i^P + X_i'\tau + \sum_j \omega_j d_{j,i} + v_i
 \end{aligned} \tag{3}$$

where the different  $\rho_{PW}$  indicate the influence of the each pathway on the child  $i$ 's educational outcome variable and  $\gamma_{Wi}$  represents the direct impact of parental wealth on child  $i$ 's educational outcome which cannot be explained via the included pathway factors.

Table 3 shows the results from estimating the effect of the pathways on children's educational outcome in the fourth observation round, as given by equation (3). The estimated coefficient for parental wealth amounts to 0.232. This constitutes the direct effect of parental wealth on children's educational outcome. Table 3 shows further that of the considered pathway variables, cognitive skills, time spent in child labor and the number of children in the household exhibit a significant influence on the probability of attaining a higher educational degree for the children. One more daily hour of child labor decrease this probability by 48%, living in a household with 3 additional children decreases it by 16%.<sup>23</sup> Interestingly, only at least three additional children living in the household during the youth of a child have an effect on the child's educational outcome when it is older. Therefore, the problem of the "resource dilution or the lower level of average maturity in a household" affecting the children's quality outcome negatively arises only for large households. Important to notice in this regard is

<sup>23</sup>The non-exclusivity of the dummy variables indicating the number of additional children implies a change in the interpretation of the respective coefficients in Table 3. The effect of 3 additional children compared to having no siblings is the sum of all three coefficients.

that we yield these results concerning the number of children pathway while controlling for the birth order of children. By doing so, we take into account the critique by Black et al. (2005) that often negative relationships between the educational attainment and family size are encountered which vanish when including the birth order.

Table 3: The Effect of the Pathways on Children’s Educational Outcome

	Children’s Education
Parental Wealth	0.232*** (0.0526)
<b>Pathways</b>	
Child Labor	-0.119*** (0.0337)
Health	0.0110 (0.00975)
Time to School	-0.00126* (0.000711)
At Least 1 add. Child	-0.0131 (0.0242)
At Least 2 add. Children	-0.0131 (0.0288)
At Least 3 add. Children	-0.133*** (0.0442)
Cognitive Skills	0.00720*** (0.00169)
Controls	Yes
Country Dummies	Yes
Observations	1544
Adjusted R <sup>2</sup>	0.811

*This table shows the results from estimating equation (3). The dependent variable is a dummy variable that reflects whether a child has obtained a secondary school degree at the age of 18/19. The parental wealth variable is an index of housing, durable consumption and access to services retrieved when the child was 7 or 8 years old. The pathway variables represent characteristics of the children between the ages 7 and 12. Robust standard errors are reported in parentheses (\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).*

Having established the effect of parental wealth on different pathway variables, and the effect of the pathway variables on the educational outcome, we now want to analyze whether the overall effect is relevant in determining the dependency of children’s educational outcome on parental wealth, and how much each pathway contributes to overall social immobility. We therefore apply the decomposition approach by (Bowles & Gintis, 2002), and extend it as Blanden et al. (2014) and Schad (2015) do in order to analyze statistical significance of each pathway via bootstrapping. For this approach, we multiply the estimated effect  $\lambda_{PW}$  of parental wealth on the pathway variables from equation (2) with the estimated effect  $\rho_{PW}$  of the pathway variables on the educational outcome from equation (3). This way we yield

Table 4: Decomposition

Explained components of total $\beta$	(1) Part of total $\beta$	(2) Percent of total $\beta$
Child Labor	0.0483*** (0.0143)	0.123*** (0.0394)
Health	0.0118 (0.0116)	0.0300 (0.0313)
Time to School	0.0111* (0.00637)	0.0284* (0.0170)
Number of Children	0.0300*** (0.0107)	0.0764*** (0.0292)
Cognitive Skills	0.0591*** (0.0149)	0.151*** (0.0419)
Explained component of $\beta$	0.160*** (0.0267)	0.409*** (0.0844)
Unexplained component of $\beta$	0.232*** (0.0525)	0.591*** (0.0844)
Total $\beta$	0.392*** (0.0479)	

*This table shows the results from a decomposition approach, as laid out in Appendix 7. Thereby, the respective coefficients from estimating (2) and (3), as given in Tables 2 and 3, are multiplied to elicit the mediating effect of the pathway variables in the transmission of the overall effect of parental wealth on the children's educational outcome (Total  $\beta$ ). The dependent variable is a dummy variable that reflects whether a child has obtained a secondary school degree at the age of 18/19. The parental wealth variable is an index of housing, durable consumption and access to services retrieved when the child was 7 or 8 years old. The pathway variables represent characteristics of the children between the ages 7 and 12. Column (1) gives the absolute, Column (2) the relative share of the pathway variables in the total  $\beta$ . Bootstrapped standard errors are reported in parentheses (\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).*

calculated coefficients for each pathway for which we bootstrap the respective standard errors with 1000 replications. A more formal derivation is shown in Appendix D.

The resulting calculated coefficients for each pathway under study and its fraction of the estimated degree of social immobility, are displayed in Table 4. Bootstrapped standard errors are shown in parentheses. The last row reiterates the significant overall degree of social immobility  $\beta = 0.392$  from estimating equation (1). Column (1) shows the product of the estimated  $\lambda_{PW}$  coefficient with the corresponding  $\rho_{PW}$ . The second column provides the fraction to which a certain pathway attributes to the overall extent of social immobility, i.e.  $\beta$ . The explained component of  $\beta$  displays the extent to which the pathways together can account for the observed degree of social immobility. The unobserved component of  $\beta$  is the residual part of the persistence of socioeconomic status, which cannot be explained by the included pathway mechanisms, hence the direct effect which was already observable in Table 3. Thereby this decomposition procedure combines the estimation results of the two first steps to a joint result.

Of the five pathways under consideration, we find strong evidence for three of them as sig-

nificantly contributing to the overall effect of parental income on the socioeconomic outcome as transmitted by educational outcome. The channel child labor can explain 12 per cent of the intergenerational persistence of socioeconomic status while the number of children jointly accounts for eight per cent. Higher cognitive skills of economically better off children account for the largest part of the social immobility with 15 per cent. In aggregate, the time a child needs to get to school plays a small, but statistically significant role in the transmission of socioeconomic status, with three per cent. This last effect, however, disappears in different specifications of the estimation.<sup>24</sup> There is still a part of  $\beta$  which cannot be explained via the investigated transmission mechanisms, and the direct effect of parental wealth on children’s outcome. However, 40 percent of the observed persistence of socioeconomic status can be explained by the five pathways under study.

## 6 Subsample Analysis

The above results are derived from a relatively diversified sample of children in developing countries. In the following, we analyze whether intergenerational mobility and its transmission channels differ for particular groups of children or between settings. We therefore conduct our estimation of these on subsamples of the data. While our estimation follows the path laid out in the previous sections, we here only report the results of the decomposition. For reasons of exposure and the restricted overall number of observations, we conduct one subsample analysis at a time. While this is a worthwhile exercise, it has to be noted that statistical inference is impeded due to the relatively low number of observations for subsamples and results should be taken with caution. We in our interpretation concentrate on those results that hold across different specifications of the model.

In a first step, we look at whether across the sample, overall transmission and its pathways differ by gender of the child. Columns (1) and (2) of Table 5 show the results of the decomposition for the subsample of female and male children, respectively. We see that the overall level of intergenerational mobility ( $\beta$ ) is very similar whether the child is a boy or a girl, and, consequently, for each similar to what we observe in the whole sample. Equally, for both, immobility is mediated through the higher probability of poor children to pursue child labor, although the type of child labor that is conducted differs by gender. (Relatively poorer) boys are more inclined to be involved in the caring of others, while (relatively poorer) girls tend to do more household chores.<sup>25</sup> However, the effect that the greater number of children in poor households negatively affects the child’s perspectives on a secondary school degree seems to only (statistically significant) be relevant for sons.

In a second step, we analyze whether the effect of higher parental wealth on the chances of obtaining the highest school leaving certificate is particularly pronounced in the lower or the

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<sup>24</sup>If we instead employ a binary variable with a threshold at a way to school of 15 minutes or more instead of the continuous time to school as a pathway, this pathway is highly significant throughout all estimations. This indicates that particularly long ways to school, which are more likely for children of poorer backgrounds, negatively affect schooling outcomes.

<sup>25</sup>Consequently, the results for either gender critically depend on the inclusion of the respective type of child labor in the child labor variable.

Table 5: Decomposition for Subsamples I

Subsamples	Female Children	Male Children	Lower Family Background	Higher Family Background
Explained parts of total $\beta$				
Child Labor	0.0383* (0.0202)	0.0440** (0.0201)	0.0343* (0.0207)	0.0694** (0.0333)
Health	-0.00295 (0.0183)	0.0167 (0.0132)	-0.0000619 (0.00699)	0.0107 (0.0191)
Time to School	0.00742 (0.00776)	0.0125 (0.0103)	0.00344 (0.00966)	0.0209 (0.0174)
Number of Children	0.0240 (0.0163)	0.0347** (0.0166)	0.0771** (0.0340)	-0.00560 (0.0140)
Cognitive Skills	0.0672*** (0.0219)	0.0500** (0.0200)	0.0367* (0.0223)	0.0526** (0.0263)
Explained component of $\beta$	0.134*** (0.0358)	0.158*** (0.0361)	0.151*** (0.0507)	0.148*** (0.0508)
Unexplained component of $\beta$	0.277*** (0.0735)	0.222*** (0.0766)	0.220 (0.159)	0.392*** (0.116)
Total $\beta$	0.411*** (0.0668)	0.380*** (0.0682)	0.372** (0.155)	0.540*** (0.105)
Observations	756	788	774	770

*This table shows the results from a decomposition approach, as laid out in Appendix 7, separately for the subsamples of female and male children (Columns (1) and (2)), and parental wealth above and below the median (Columns (3) and (4)), respectively. Thereby, for each subsample, the respective coefficients from estimating (2) and (3), are multiplied to elicit the mediating effect of the pathway variables in the transmission of the overall effect of parental wealth on the children's educational outcome (Total  $\beta$ ). The dependent variable is a dummy variable that reflects whether a child has obtained a secondary school degree at the age of 18/19. The parental wealth variable is an index of housing, durable consumption and access to services retrieved when the child was 7 or 8 years old. The pathway variables represent characteristics of the children between the ages 7 and 12. The results give the part of the overall immobility, total  $\beta$ , that is mediated by each pathway variable. Bootstrapped standard errors are reported in parentheses (\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).*

upper end of the wealth distribution. We therefore split the sample at the median of parental wealth (in the first observation period) and conduct our decomposition analysis for the poorer and the richer subsample, respectively. The results are reported in columns (3) and (4) of Table 5. We see that social immobility is much higher in the richer part of the parental wealth distribution. This indicates that in the developing country setting, while more wealth is generally increasing the chances of obtaining the highest school level certificate, this effect is particularly strong at very high relative levels of parental wealth. As for the channels, the results show that the pathway of more child labor is relevant for both poor and rich, it is even more so for the richer half of the population, as measured by parental wealth. This indicates that already in the upper part of the parental wealth distribution, child labor kicks in in alleviating educational perspectives, which is particularly less of a problem for children of very rich background. The larger number of siblings, on the other hand, relatively strongly impedes perspectives for very poor children.

Lastly, we undertake separate analyses for each country under study. Table 6 shows the results. It should be noted, however, that the estimations for Ethiopia and Vietnam suffer from a particular low number of observations, so that statistical inference and establishing statistical significance is inhibited for these two countries and the results can only give a tendency. For India and Peru, however, the numbers of available observations are reasonable in order to establish meaningful results.

The results indicate that intergenerational mobility is generally higher in India than in the other countries.<sup>26</sup> The existing immobility in India can in a significant part be attributed to the channel of child labor.<sup>27</sup> In Peru, in turn, the larger number of siblings of poor households seems to particularly contribute to intergenerational immobility. The findings imply that not only the degree of intergenerational social immobility, but also the pathways contributing to the transmission of socioeconomic status differ considerably between countries, also in the setting of developing countries.

## 7 Conclusion

There has been little previous research on intergenerational social mobility and in particular its transmission channels in developing countries. Using the newest wave of the Young Lives Dataset, we analyze social mobility in developing countries, including some developing country specific channels. We find that children from poor households have a 20 percent

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<sup>26</sup>The finding of an also relatively low level of immobility in Peru can not be confirmed for other definitions of children’s socioeconomic outcome.

<sup>27</sup>An additional interesting extension for the estimation on the full sample would be to weight the observations according to the actual country size in order to obtain a “globally” more representative sample. This would of course still only be representative of the four countries for which data is available. However, since India has a so much larger population (both in adults and children, ca. 85 per cent of the combined population of all four countries) that observations from India would dominate the estimation even more than they do already (with ca. 53 per cent of observations). The results of the by actual population weighted estimation thus looks very similar to those of the Indian subsample, i.e. Column (2) of Table 6. We do not report it separately.

Table 6: Decomposition for Subsamples II

Subsamples	Ethiopia	India	Peru	Vietnam
Explained parts of total $\beta$				
Child Labor	0.195 (0.126)	0.0338** (0.0159)	0.0226 (0.0281)	0.0166 (0.0385)
Health	-0.000136 (0.0449)	0.0121 (0.0122)	-0.00595 (0.0276)	0.0301 (0.0434)
Time to School	-0.00617 (0.0503)	0.00753 (0.00907)	0.0176 (0.0128)	0.0867 (0.0618)
Number of Children	0.0383 (0.0896)	0.00241 (0.00968)	0.0909*** (0.0331)	0.0301 (0.0449)
Cognitive Skills	0.0387 (0.0816)	0.0322** (0.0141)	0.111*** (0.0357)	0.0582 (0.0596)
Explained component of $\beta$	0.266 (0.194)	0.0880*** (0.0264)	0.236*** (0.0630)	0.222** (0.0958)
Unexplained component of $\beta$	0.306 (0.364)	0.191*** (0.0705)	0.193** (0.0880)	0.615*** (0.207)
Total $\beta$	0.572* (0.334)	0.279*** (0.0628)	0.429*** (0.0798)	0.836*** (0.182)
Observations	130	774	469	171

*This table shows the results from a decomposition approach, as laid out in Appendix 7, separately for each country in the sample. Thereby, for each country subsample, the respective coefficients from estimating (2) and (3), are multiplied to elicit the mediating effect of the pathway variables in the transmission of the overall effect of parental wealth on the children's educational outcome (Total  $\beta$ ). The dependent variable is a dummy variable that reflects whether a child has obtained a secondary school degree at the age of 18/19. The parental wealth variable is an index of housing, durable consumption and access to services retrieved when the child was 7 or 8 years old. The pathway variables represent characteristics of the children between the ages 7 and 12. The results give the part of the overall immobility, total  $\beta$ , that is mediated by each pathway variable. Bootstrapped standard errors are reported in parentheses (\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).*



lower chance to obtain a secondary school degree than children from households of average wealth. We, furthermore, find that lower cognitive ability of poorer children accounts for 15 percent of this immobility, while the need to pursue child labor and the larger number of children in poor households account for 12 per cent, and 8 per cent, respectively. The time to school has almost no significant impact of 3 percent. While we do find that children in poorer households also have on average a lower health status, this does not significantly affect their educational outcomes.

The pathways contributing to the intergenerational social immobility slightly differ for different groups of children. While the need to substitute educational achievement by engaging in child labor is equally relevant for boys and girls (although different kinds of child labor), boys particularly suffer from greater household sizes in poorer families. Furthermore, in the developing country setting, the effect of parental wealth on educational achievements is particularly strong in the upper part of the income distribution, so that children from very rich households have especially better chances to obtain a secondary school degree than their slightly less fortunate born counterparts. This is particularly driven by a lower need to pursue child labor for children of relatively very rich households, while the effect of greater parental wealth on socioeconomic outcomes among relatively poorer families is driven by the different number of siblings that the children grow up with.

Overall, 40 percent of the observed persistence of socioeconomic status can be explained by the pathways under study. Other studies find personality, i.e. non-cognitive skills, to be a further pathway of intergenerational social immobility, which is missed by our analysis (Schad, 2015). Further research has to verify whether personality is another factor which can explain the immobility also in developing countries.

Also, greater data availability covering more countries would allow for a more in-depth analysis of the interaction between the institutional environment and intergenerational social immobility and the particular channels. The results of this paper show that there are considerable differences both in the degree of intergenerational social immobility and the relevant transmission mechanisms also between developing countries. Future research could explore the underlying reasons which could lead to more precise policy designs aiming at decreasing intergenerational social immobility.

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## Appendix A: Educational Outcomes in the Four Countries

Table A1: Coding Children's Educational Outcome - Ethiopia

Dependent Variable	Child's Highest Grade/Degree Completed	Corresponding ISCED Level
0	None	0
	Others	0
	Religious education	0
	Primary (Grade 1-6)	1
	Grade 8 completion certificate (Grade 7-8)	2
	Ethiopian general secondary education (Grade 9-11)	2
	Adult literacy program	n.a.
1	Ethiopian higher education entrance certificate (Grade 12)	3
	Post-secondary, vocational	3
	University	6, 7 or 8

Table A2: Coding Children's Educational Outcome - India

Dependent Variable	Child's Highest Grade/Degree Completed	Corresponding ISCED Level
0	None	0
	Religious education	0
	Primary certificate	1
	Upper primary certificate	2
	Adult literacy program	n.a.
1	Matriculation certificate (Grade 10-11)	3
	Senior secondary school leaving certificate (Grade 12)	3
	Senior secondary school leaving certificate, vocational	3
	Degree	6
	Post-graduate degree	7 or 8

Table A3: Coding Children’s Educational Outcome - Peru

Dependent Variable	Child’s Highest Grade/Degree Completed	Corresponding ISCED Level
0	None	0
	Some sort of preschool	0
	Primary education certificate (Grade 1-6)	1
	Lower secondary certificate (Grade 7-10)	2
	CETPRO (incomplete)	2
	CETPRO (complete)	2
	Adult literacy program	n.a.
1	Upper secondary certificate (Grade 11)	3
	Technical pedagogical institute (incomplete)	6
	Technical pedagogical institute (complete)	6
	University (incomplete)	6
	University (complete)	6
	Masters or doctoral at university	7 or 8

*Note: Information on Centros de educación tecnico-productiva (CETPRO) in Peru taken from Clark (2015).*

Table A4: Coding Children’s Educational Outcome - Vietnam

Dependent Variable	Child’s Highest Grade/Degree Completed	Corresponding ISCED Level
0	None	0
	Religious education	0
	Primary education completion certificate	1
	Lower secondary completion certificate	2
	Adult literacy program	n.a.
1	Upper secondary education graduation diploma	3
	Elementary vocational education completion certificate	3
	Intermediate vocational training completion diploma	3
	Professional technical secondary education diploma	4
	Professional vocational secondary education diploma	4
	College degree	5
	Collegiate vocational training completion diploma	5
	Bachelor’s degree	6
	Master’s or doctoral degree	7 or 8

*Note: Due to the low amount of responses in Vietnam to the household questionnaire, we enrich the data for Vietnam by data from the individual questionnaire answered by the child under study herself/himself. First, we set the educational outcome variable to one if the answer to “What is the highest qualification/certificate you have attained (including school leaving certificates/transcripts/report)” is answered with either general education diploma (completion of upper secondary school), diploma for completion of professional secondary school or diploma for college education, university diploma and zero otherwise. Thereby, we can produce an educational outcome variable for almost every child. 310 of the observations from the individual questionnaire take on a value of zero. However its respondents has not reached the age of 19 at the point of the interview yet. Therefore, the zero value could be due to the age of the respondents since individuals are usually 19 years old when graduating from the upper secondary school in Vietnam. We account for that by using data on the education history for each child in the Young Lives Dataset. However, the last entrance in that education history is for the academic year 2012-2013. We took this data, adjusted it for the missing years, and changed for 6 children from the 310 observations the value of their educational outcome variable to one.*

## Appendix B: Descriptive Statistics

Table B1: Descriptive Statistics: Control Variables

	N	Mean	SD	Min.	Max.	Observation Round
Sex ( <i>Male</i> )						
Female	1544	0.4896	0.5001	0	1	1
Father's Age	1544	37.5531	7.3364	24	80	1
Father's Age <sup>2</sup>	1544	1464.023	617.2858	576	6400	1
Birth Order ( <i>First Child</i> )						
Second Child	1544	0.2992	0.4581	0	1	1
Third Child	1544	0.1723	0.3777	0	1	1
Fourth Child	1544	0.08614	0.2807	0	1	1
Fifth Child	1544	0.0622	0.2416	0	1	1
Sixth child or more	1544	0.0855	0.2797	0	1	1

*Note: Descriptive statistics are based on the reduced sample which is employed in the estimations. For categorical variables, the base category is displayed in parentheses.*



Table B2: Descriptive Statistics: Socioeconomic Status and Pathways

	N	Mean	SD	Min.	Max.	Observation Round
Parental Wealth	1544	0.4435	0.2071	0.0079	0.9722	1
Children's Education ( <i>None</i> )						
Secondary School Leaving Certificate	1544	0.7811	0.4136	0	1	4
<b>Pathways</b>						
Child Labor	1544	0.4044	0.377	0	2.5	2
Childhood Health	1544	-1.453	1.0489	-10.02	2.18	1
Time to School in Min.	1544	16.3517	14.4393	0	180	2
Number of Children ( <i>No add. child</i> )						
At Least One Additional Child	1544	0.6671	0.4714	0	1	2
At Least Two Additional Children	1544	0.2668	0.4425	0	1	2
At Least Three Additional Children	1544	0.0907	0.2872	0	1	2
Cognitive Skills	1544	21.2455	6.592	0	36	1

*Note: Descriptive statistics are based on the reduced sample which is employed in the estimations. For categorical variables, the base category is displayed in parentheses.*

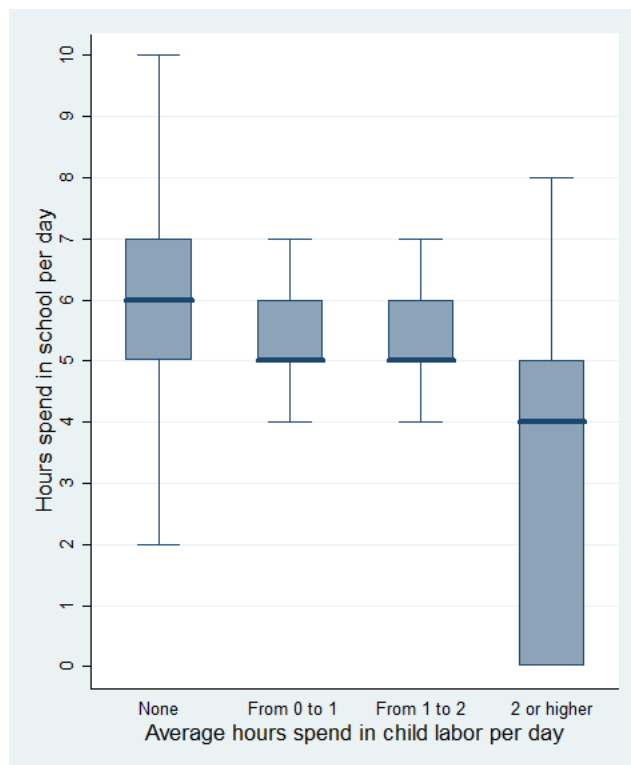


Figure B1: Trade-off between Time Spend in Child Labor and in School

*Note: Outliers are excluded. The first group with children not working includes 708 observations, the second 1784 observations, the third 859 observations, and the fourth 283 observations.*

## Appendix C: A Simple Model: Parental Income and Child Labor

Considering child labor as a pathway for the transmission of socioeconomic status across generations can be explained by the following theoretical thoughts: We simplify the theoretical model by Emerson and Souza (2003). They developed a theoretical model of the ‘intergenerational child labor trap’ building on the work by Galor and Zeira (1993) and Basu and Pham (1998).

Credit markets in low- and middle-income countries are assumed to be imperfect (i.e. poor families cannot borrow against future earnings of their children). A household consists of two agents in each period; a child and a parent. The parent decides at the beginning of each period whether the child will be sent to work or can go to school. The parent is altruistic towards his or her child and gains utility from household consumption  $c$  and time the child spends at school  $ed_C$  in a certain period. Since each individual is endowed with one unit of time for each period,  $ed_C$  lies between 0 and 1. The parent’s utility function is denoted as

$$U = U(c, ed_C) = c^\alpha ed_C^{1-\alpha} \quad (4)$$

with  $\alpha \in (0, 1)$ . The parental income,  $I_P$ , is exogenously given and fix. With the child’s wage per period being normalized to one, the child contributes the following income from spending time in labor to the household income:

$$I_C = 1 - ed_C. \quad (5)$$

Figure B1 illustrates the trade-off between the time spend working and the time spend at school for children in the the Young Lives Dataset. It divides all individuals from the older cohort of the Young Lives Dataset into four different groups by the amount they work as a child. The amount of child labor is defined by the hours worked at the age of approximately 11 on the family’s farm, in a non-family-owned business and doing household chores on a typical day. The average over the three activities is calculated, and four groups are differentiated accordingly. The first group does not work any hours at all. The second group works up to one hour, while the third group works more than one and up to two hours on average. The last group works two or more hours on average per day. The boxplots for each group show how much time the majority of these groups spends in school on a typical day. The median number of hours spend in school decreases gradually with more hours spend in child labor. Hence, this provides empirical justification for the trade-off assumption by Emerson and Souza (2003).

Consumption of the family is financed by the income of the child and the parent such that

$$c \leq I_P + I_C = I_P + 1 - ed_C. \quad (6)$$

Efficiency implies that all resources are used due to which equality can be assumed. Inserting the budget constraint into the utility function yields

$$U = (I_P + 1 - ed_C)^\alpha ed_C^{1-\alpha}. \quad (7)$$

The parent maximizes his or her utility by deciding each period between the level of family's consumption  $c = I_P + 1 - ed_C$  and the time its child spends at school  $ed_C$ . Since  $I_P$  is assumed to be fixed, the parent maximizes his or her utility via the decision on the amount of  $ed_C$ .

To simplify the derivation, we logarithmize the utility function which does only affect the quantitative result but not the resulting qualitative implications. The logarithmic utility function has the shape of

$$\ln U = \alpha \ln (I_P + 1 - ed_C) + (1 - \alpha) \ln(ed_C). \quad (8)$$

Maximizing with respect to  $ed_C$  yields

$$\frac{\partial \ln U}{\partial ed_C} = \alpha \frac{1}{I_P + 1 - ed_C} (-1) + (1 - \alpha) \frac{1}{ed_C} = 0. \quad (9)$$

The optimal amount of schooling for an interior solution of the maximization problem is  $ed_C^* = (I_P + 1)(1 - \alpha)$ .<sup>28</sup> Taking the derivative of  $ed_C^*$  with respect to parental income  $I_P$  reveals that the time spend at school of the child increases with the income of its parent ( $\frac{\partial ed_C^*}{\partial I_P} > 0$ ). Using equation (5) together with the optimal time spend in school  $ed_C^*$ , it becomes apparent that the amount of child labor negatively correlates with the parental income ( $\frac{\partial(1-ed_C^*)}{\partial I_P} < 0$ ). Hence, parental income, i.e. parental wealth, seems to be negatively correlated with the time the child spends working. Child labor, in turn, reduces children's level of education and is therefore considered as a possible pathway of the intergenerational transmission of socioeconomic status in this study.

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<sup>28</sup>The possible corner solutions of  $ed_C = 0$  or  $ed_C = 1$  are not considered here since it does not yield further insights into the connection between parental income and children's education we want to show at this point.

## Appendix D: The Decomposition Approach

The decomposition approach is based on the following insight, which reveals itself when inserting equation (2) for each pathway into equation (3):

$$\begin{aligned}
 Ed_i^C &= Wi_i^P(\rho_{Cl}\lambda_{Cl} + \rho_{He}\lambda_{He} + \rho_{Nc1}\lambda_{Nc1} + \rho_{Nc2}\lambda_{Nc2} + \rho_{Nc3}\lambda_{Nc3} \\
 &\quad + \rho_{Ts}\lambda_{Ts} + \rho_{Iq}\lambda_{Iq} + \gamma_{Wi}) + X_i'\zeta + \sum_j \alpha_j d_{j,i} \\
 &= \beta Wi_i^P + X_i'\zeta + \sum_j \alpha_j d_{j,i} + \xi_i,
 \end{aligned} \tag{10}$$

with explicit forms of  $\zeta$  and  $\alpha_j$  now given by

$$\begin{aligned}
 \zeta &= \rho_{Cl}\kappa_{Cl} + \rho_{He}\kappa_{He} + \rho_{Nc1}\kappa_{Nc1} + \rho_{Nc2}\kappa_{Nc2} + \rho_{Nc3}\kappa_{Nc3} + \rho_{Ts}\kappa_{Ts} + \rho_{Cs}\kappa_{Cs} + \tau, \text{ and} \\
 \alpha_j &= \rho_{Cl}\alpha_{Cl,j} + \rho_{He}\alpha_{He,j} + \rho_{Nc1}\alpha_{Nc1,j} + \rho_{Nc2}\alpha_{Nc2,j} + \rho_{Nc3}\alpha_{Nc3,j} + \rho_{Ts}\alpha_{Ts,j} + \rho_{Cs}\alpha_{Cs,j} + \omega_j.
 \end{aligned}$$

This allows now to decompose the intergenerational immobility coefficient  $\beta$  into:

$$\beta = \rho_{Cl}\lambda_{Cl} + \rho_{He}\lambda_{He} + \rho_{Nc1}\lambda_{Nc1} + \rho_{Nc2}\lambda_{Nc2} + \rho_{Nc3}\lambda_{Nc3} + \rho_{Ts}\lambda_{Ts} + \rho_{Cs}\lambda_{Cs} + \gamma_{Wi} \tag{11}$$

with the latter coefficient  $\gamma_{Wi}$  constituting the direct effect of parental wealth on educational outcome that is not transmitted by any of the pathway variables used here, while and the other terms of  $\beta$  representing the effect each pathway variable exhibits on the intergenerational transmission of socioeconomic status. The impact of each pathway factor is calculated via the product of the estimated  $\hat{\lambda}_{Pathway}$  and  $\hat{\rho}_{Pathway}$  coefficients. The resulting coefficients are then used to derive the different fractions to which extent each pathway can explain the overall social immobility,  $\beta$ . The formula used for calculating the extent to which the transmission of parental wealth influences the educational outcome of their children via child labor for instance is given by

$$\begin{aligned}
 fraction_{Cl} &= \frac{\hat{\lambda}_{Cl}\hat{\rho}_{Cl}}{\hat{\rho}_{Cl}\hat{\lambda}_{Cl} + \hat{\rho}_{He}\hat{\lambda}_{He} + \hat{\rho}_{Nc1}\hat{\lambda}_{Nc1} + \hat{\rho}_{Nc2}\hat{\lambda}_{Nc2} + \hat{\rho}_{Nc3}\hat{\lambda}_{Nc3} + \hat{\rho}_{Ts}\hat{\lambda}_{Ts} + \hat{\rho}_{Cs}\hat{\lambda}_{Cs} + \hat{\gamma}_{Wi}} \\
 &= \frac{\hat{\lambda}_{Cl}\hat{\rho}_{Cl}}{\hat{\beta}}.
 \end{aligned} \tag{12}$$

The overall effect of having more than the one child is the sum of the coefficients for having at least one, at least two or at least three additional children living in the household (Blanden et al., 2014, p.432). Thus, the extent to which the number of children is responsible for the social immobility is calculated via

$$\begin{aligned}
 fraction_{Nc} &= \frac{\hat{\lambda}_{Nc1}\hat{\rho}_{Nc1} + \hat{\lambda}_{Nc2}\hat{\rho}_{Nc2} + \hat{\lambda}_{Nc3}\hat{\rho}_{Nc3}}{\hat{\rho}_{Cl}\hat{\lambda}_{Cl} + \hat{\rho}_{He}\hat{\lambda}_{He} + \hat{\rho}_{Nc1}\hat{\lambda}_{Nc1} + \hat{\rho}_{Nc2}\hat{\lambda}_{Nc2} + \hat{\rho}_{Nc3}\hat{\lambda}_{Nc3} + \hat{\rho}_{Ts}\hat{\lambda}_{Ts} + \hat{\rho}_{Cs}\hat{\lambda}_{Cs} + \hat{\gamma}_{Wi}} \\
 &= \frac{\hat{\lambda}_{Nc1}\hat{\rho}_{Nc1} + \hat{\lambda}_{Nc2}\hat{\rho}_{Nc2} + \hat{\lambda}_{Nc3}\hat{\rho}_{Nc3}}{\hat{\beta}}.
 \end{aligned} \tag{13}$$

Following Blanden et al. (2014) and Schad (2015), we bootstrap standard errors with 1,000 replications in order to derive significance levels for the calculated pathway coefficients as well as for their share of the degree of the social immobility.

Despite presupposing linearity, the decomposition is subject to a further assumption. It assumes that the error term  $v_i$  from equation (3) and the error terms  $e_{PW,i}$ 's from equations 2 are uncorrelated. Otherwise, the coefficients for the pathway factors in equation (3) are inconsistent (Blanden et al., 2014, p.434). Hirvonen (2010), who criticizes the decomposition approach in the context of the work by Blanden et al. (2007), states that the assumption of no correlation is unlikely to be met in reality. She declares that, for example, ability and luck are likely to influence all error terms at the same time. While we control for ability via the pathway mechanism cognitive skills, error terms could still be correlated via the factor luck. However, Hirvonen (2010) herself demonstrates that the bias caused by the correlation of error terms decreases with the number of pathways considered.