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Intergenerational Transmission of Poverty and Inequality: Young Lives

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Abstract

Parents play major roles in determining the human capital of children, and thus the income of children when they become adults. Models of investments in children's human capital posit that these investments are determined by parental resources (financial and human capital) and child endowments within particular market and policy environments. Many empirical studies are consistent with significant associations between parental resources and investments in their children. And there is considerable emphasis in the scholarly and the policy literatures on the degree of intergenerational mobility and the intergenerational transmission of economic opportunities, and therefore the intergenerational transmission of poverty – or of affluence. Therefore policies or other developments that affect the extent of poverty and/or inequality in the parents' generation are likely to have impacts on the extent of poverty and/or inequality in the children's generation. However the extent of these intergenerational effects is an empirical question that this paper explores using the Young Lives data to estimate intergenerational associations between parental resources and investments in human capital of children and then, under the assumption that these associations reflect causal effects, to simulate what impacts changes in poverty and inequality in the parents' generation have on poverty and inequality in the children's generation. The results suggest that reductions in poverty and in inequality in the parents' generation reduce poverty and inequality in the children's generation some, but not much.

Disciplines

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Intergenerational Transmission of Poverty and Inequality: Young Lives*

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Abstract: Parents play major roles in determining the human capital of children, and thus the income of children when they become adults. Models of investments in children's human capital posit that these investments are determined by parental resources (financial and human capital) and child endowments within particular market and policy environments. Many empirical studies are consistent with significant associations between parental resources and investments in their children. And there is considerable emphasis in the scholarly and the policy literatures on the degree of intergenerational mobility and the intergenerational transmission of economic opportunities, and therefore the intergenerational transmission of poverty – or of affluence. Therefore policies or other developments that affect the extent of poverty and/or inequality in the parents' generation are likely to have impacts on the extent of poverty and/or inequality in the children's generation. However the extent of these intergenerational effects is an empirical question that this paper explores using the Young Lives data to estimate intergenerational associations between parental resources and investments in human capital of children and then, under the assumption that these associations reflect causal effects, to simulate what impacts changes in poverty and inequality in the parents' generation have on poverty and inequality in the children's generation. The results suggest that reductions in poverty and in inequality in the parents' generation reduce poverty and inequality in the children's generation some, but not much.

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1. Introduction:

Parents are thought to affect substantially child outcomes through a wide range of mechanisms, importantly including human capital investments in their children. There are considerable literatures in the social sciences on various dimensions of these processes: modeling how parents decide how much to invest in the human capital of their children versus direct transfers of physical and financial estimates based on parental resources (human capital, financial) and child endowments, empirical estimates of the associations between parental resources and investments in children's human capital, and empirical estimates of the extent of intergenerational mobility in terms of schooling and income.[1] Claims are widespread, based in part on these literatures, that there is considerable intergenerational transmission of poverty and of affluence. It also is widely-assumed that that alleviating parental poverty or improving parental human capital will have benefits in the form of increasing the human capital of the children and improving their life-time welfare as reflected in part in their adult consumption.

The empirical question of *to what extent* changing the distribution of parental resources affects the distribution of children's human capital and consumption, however, has hardly been explored. In this study we undertake such an exploration using the rich Young Lives younger cohort data from Ethiopia, India, Peru and Vietnam. We consider for various distributions for both the parents and the children both (1) "poverty head counts" (proportions of individuals below some "poverty threshold" cutoff) and (2) inequalities of various distributions (as represented by Gini coefficients).[2] The poverty head counts are of particular interest because we are particularly interested in those in the left tails of various distributions. We use both of these measures for both the parents' and the children's generations both for distributions of per capita consumption and for distributions of human capital variables. That is we are interested in characterizing "poverty headcounts" in the sense of the proportions below some threshold and inequalities for human capital variables as well as for per capita consumption.

We begin with a simple standard human capital investment framework to help structure our investigation. We then summarize our data, methods, results and conclusions. Our basic findings are that reductions in poverty headcounts and inequalities in the parents' generation of course, given our approach, carry over to the distributions of human capital and per capita adult consumption for the children's generation. But the impacts are not very large. Therefore, while reducing poverty and possibly inequality in the parents' generation probably is desirable in itself in terms of improving welfare among current adults particularly if poverty reduction is weighted relatively heavily in the appropriate

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[1] Models of how parents decide to invest in the human capital of their children versus other forms of intergenerational transfers include Becker (1967, 1991), Becker and Tomes (1976), Behrman, Pollak and Taubman (1982, 1995). In these models parents maximize welfare that is dependent in part on child income or earnings subject to budget constraints, production functions for income or earnings dependent on human capital investments, child endowments, and prices and policies. There are many empirical estimates of the associations between parental human capital and financial resources on one hand and investments in children's human capital on the other hand, as well as many estimates of intergenerational mobility in terms of schooling attainment and, to a lesser extent, occupation, earnings and income. Appendix A reviews some of the relevant empirical literature.

[2] There are a number of alternative measures of poverty and inequality that are used in the literature (e.g., the Foster, Greer and Thorbecke (1984) class of poverty measures), but we limit our presentation to the poverty headcount and Gini inequality measures because we are presenting such measures for a number of simulations and these are the most common and best-known measures.

social welfare function, it is not likely to have large impacts on reducing poverty and inequality in the next generation. To reduced poverty and inequality in the next generation is likely to require much policies directed explicitly towards the children.

2. Human Capital Investment Framework

A simple standard human capital investment framework, as in the well-known Becker (1967) Woytinksy Lecture, suffices for the purpose of this study. Consider Figure 1 in which the expected private marginal benefits and expected private marginal costs are measured on the vertical axis and schooling investments in children are measured on the horizontal axis (though the same points hold for any human capital investments, including those in health and nutrition). The expected private marginal benefits are downward-sloping[3] as schooling increases in the relevant range due to diminishing marginal returns to fixed abilities and pre-schooling investments. The expected private marginal costs are increasing due to increasing private opportunity costs of more schooling in terms of other time use options (e.g. working on family farms, caring for younger siblings) and possibly increasing marginal costs of financing current schooling investments given imperfect or missing capital markets for such investments. The equilibrium private investment in schooling S* is given by the intersection of the expected private marginal benefits and expected private marginal private costs curves as for the solid lines in Figure 1, with the equilibrium expected private marginal benefits and expected private marginal costs equal to r*.

How do increased parental financial resources affect the equilibrium human capital investments in children? If capital markets for human capital investments were perfect, then increasing parental financial resources would not be likely to change the equilibrium investment in the schooling or human capital of the children. But, particularly for developing country contexts such as under investigation in this study, capital markets for human capital are thought to be quite imperfect and the private components of the marginal costs of such investments are generally thought to be primarily self-financed. As a result if parental financial resources are increased, the private marginal cost curve is likely to shift down, and the equilibrium investment in child schooling is likely to increase.

How does increased parental human capital affect the equilibrium human capital investments in children? Underlying the expected private marginal benefit curve in Figure 1 is a production function for

[3] There is some evidence suggesting that, at least over a range, the marginal benefit curve may be upward sloping. For instance, Atemnkeng and Noula (2011) estimate that the marginal benefit in primary and secondary schooling is increasing for the middle-income group in Cameroon and Psacharopoulos (1994) reports estimates that the marginal private return from primary to secondary schooling for Zimbabwe; and primary to secondary and secondary to tertiary schooling for Malawi and Lesotho are up-ward sloping. However, these studies do not control for unobserved abilities, motivations and family connections. If, as is suggested by the models of familial human capital investment in children noted above and seems plausible, students with greater abilities, higher motivation and better family connections both have greater schooling and higher post-schooling incomes because of their abilities, motivations and family connections, then these estimates are biased upward more for higher levels of schooling in a way that may obscure the declining returns to students with fixed abilities, motivations, and family connections. Finally we note that though presentations such as Figure 1 usually are drawn as if there are declining expected private marginal benefits with more schooling, there could be a stable equilibrium with increasing expected private marginal benefits as long as the slope of the increasing expected private marginal benefits curve is less than the slope of the increasing expected private marginal cost curve in the neighborhood of the equilibrium.

earnings (or whatever outcomes are of interest) that includes as an input child schooling. But familial inputs are also likely to be important, including *inter alia* the quality of parental time spent in child stimulation particularly in early life and in help with homework when the children are of school age. If these familial inputs are complementary with time in school as generally is thought to be the case, then greater parental human capital in the form say of greater parental schooling attainment is likely to shift the expected private marginal benefit curve to the right, thus increasing the equilibrium investment in children's schooling.

Thus this simple framework predicts that increased parental financial and human capital resources in the contexts under consideration lead to increased investment in children's human capital.

Further, of course, decisions to invest in the children's human capital are made in a particular community context, where the population size and the availability of related educational and health services may affect the equilibrium human capital investment in children. More accessible public schools and health services, for example, are likely to shift the expected private marginal cost curves down, and induce higher equilibrium investments in children. Higher quality public schools and health services are likely to enter the production function underlying the expected private marginal benefit curves and be complementary with time in school, thus shifting the expected marginal benefits curve upwards and induce greater human capital investments in children.

Finally, it is important to note that this simple framework also points to an estimation problem in ascertaining the impact of increased parental financial and human capital resources (and possibly community factors) on investments in children's human capital. Underlying the expected private marginal benefits curve also are child endowments, ranging from innate abilities and health to family connections for job and marriage markets, that are likely to enter directly into the production function determining the expected private marginal benefits. If there are intergenerational correlations in such endowments, if such endowments in the parental generation are likely to be positively correlated with parental income and human capital, if such endowments are likely to be complementary with schooling in producing expected child marginal benefit, and if parental investments in children are likely to reinforce endowments, then the estimated relations between both parental financial and human capital resources on one hand and investments in children's human capital on the other hand is likely to be upward biased unless these endowments can be controlled in the estimation. While there are a number of "ifs" in the previous sentence, systematic studies and causal observations suggest that these conditions probably tend to hold.[4] For the present study we are not able to control for endowments in our estimation of the impacts of parental resources on investments in children. For this reason our estimates probably are upwardly biased estimates of the true causal effects of parental resources on investments in children.

3. Data

[4] For example, studies that estimate whether human capital investments tend to reinforce or compensate for endowment differentials generally find reinforcement (Behrman, Taubman and Pollak 1982; Behrman 1988a, b; Behrman, Rosenzweig and Taubman 1994; Pitt, Rosenzweig and Hassan 1990, 2012; Behrman and Rosenzweig 2004).

We use data on 5,763 children from Young Lives, a cross-national cohort study on poverty and child well-being conducted in Ethiopia, India, Peru and Vietnam. We study the younger cohort, enrolled in 2002 at ages 6-17.9 months (round 1). Sampling details are at http://www.younglives.org.uk; comparisons with representative data suggest that the samples represented a variety of contexts in each of the countries studied, though not of the highest part of the income distributions. Subsequent data collection occurred in 2006 when the younger cohort was about 5 years old (round 2) and in 2009 when these children were about 8 years old (round 3). We include all children for whom there were data available on three cognitive scores as well as the parental resource and control variables, and who were between the target ages of 6 to 17.9 months at the time of first round. Cognitive scores were available for all three exams for 1,885 of the observations in Ethiopia, 1,930 in India, 1,942 in Peru, and 1,961 in Vietnam. Of these observations, complete data on all relevant variables are available for 73.6% in Ethiopia, 83.1% in India, 85.7% in Peru, and 83.4% in Vietnam, leaving a total sample size of 1,109 in Ethiopia, 1,559 in India, 1,493 in Peru, and 1,602 in Vietnam. Excluded observations in Ethiopia and India had higher cognitive scores and parental schooling than included observations, while the opposite was true for Peru and Vietnam. Mothers' height was higher in the included observations for all countries, and in most countries (except Vietnam) included observations are more likely to be male; included observations are also more likely to be urban in Ethiopia and Peru, and varied on presence of hospital and community wealth (table A1).

Children's Human Capital Variables: We represent children's human capital at age 8 years (round 3) by nutritional status (height-for-age z scores, or HAZ) and three cognitive test scores. HAZ at age 8 is based on the World Health Organization (WHO) 2007 standard for school-aged children (de Onis et al. 2007). The three cognitive exams at age 8 years are:

(1) The Peabody Picture Vocabulary Test (PPVT) uses items consisting of a stimulus word and a set of pictures and is commonly used to represent child cognitive and intellectual ability in developing countries (Walker et al. 2000, Walker et al. 2005). The Spanish PPVT (125 items) was used in Peru while the PPVT III (204 items) was used in Ethiopia, India, and Vietnam. The PPVT was adapted and standardized by Young Lives researchers in each country. We also control for the language in which the exam was conducted and an indicator for whether the exam was in the child's native language.

(2) A mathematics test with 29 items on counting, number discrimination, knowledge of numbers, and basic operations with numbers in which interviewers read the questions aloud to avoid bias resulting from poor reading skills.

(3) The Early Grade Reading Assessment (EGRA) from the World Bank Living Standards Measurement Study to assess verbal achievement (Glewwe 1991). This test is typically administered orally and is used to evaluate the most basic skills for literacy acquisition in early grades, including pre-reading skills such as listening comprehension. The Young Lives adaptation of the EGRA explored the child's ability to identify familiar words, read and comprehend a small text, and to understand a small text read to them. The Young Lives study team tested the psychometric characteristics of the mathematics and EGRA scores and corrected some scores for items with poor indicators of reliability and validity (Cueto and Leon, 2012).

In addition we control for age in months and the sex of each child.

Table 1 shows descriptive statistics for the sample.[5] The average PPVT score is highest for Vietnam (95.4), and lowest for India (57.5); the standard deviation is highest for Ethiopia (43.0) and lowest for Peru (16.5). For math, the highest average is also for Vietnam (18.6) and lowest for Ethiopia (6.7), with the standard deviation highest for India (6.2) and lowest for Ethiopia (5.2). The average for EGRA is again highest for Vietnam (10.1) and lowest for Ethiopia (5.3), with the standard deviation lowest for Vietnam (2.5) and highest for India (3.4). The average height at age 8 years is highest for Vietnam (121.2 cm) and lowest for India (118.6), with the standard deviation varying from 5.9 for Peru to 6.6 for Ethiopia. The percentage of children who are female, finally, varies from 45 for Ethiopia to 49 for Peru,

Parental Resources: We use total per capita daily consumption, averaged over rounds 2 and 3 (the two rounds for which consumption data were collected), to characterize the parental household financial resource position. Consumption is generally considered to be a better indicator of the longer-run resource constraints than income for the same time periods because of the substantial transitory components income, particularly for poorer households in rural environments that are subject to considerable weather-related fluctuations. Household consumption per capita is calculated using adult respondents' estimation of food and non-food items with a recall period ranging from 15 days for food to 12 months for clothing. The total expenditures were first converted to real monthly expenditures and divided by household size (adult equivalent in Ethiopia). We then convert the total monthly expenditures to daily consumption in 2006 USD. For parental human capital, we use continuous measures of maternal and paternal schooling attainment in grades and mothers' height (we do not use fathers' height because of too many missing observations). We also control for mothers' age to capture lifecycle patterns.

Per capita consumption per day in USD is highest for Peru (US$2.11) and lowest for Ethiopia (US$0.60).[6] The same is true for mothers' schooling (8.4 grades for Peru and 3.0 grades for Ethiopia) and fathers' schooling (9.5 grades for Peru and 4.8 grades for Ethiopia). On the other hand, mothers' height is highest for Ethiopia (158 cm) and lowest for Peru (150 cm).

Community Characteristics: The community variables we use include an indicator for whether communities in which children lived have hospitals[7], an indicator for urban residence, community wealth (constructed separately by country across three rounds as an asset-based index of the first principal component of 19 indicators of household durables, housing quality, and available services (e.g., safe water sources and electricity) (Filmer and Scott 2012), the proportion of adults in the community (other than the parents) that have secondary or higher schooling attainment, community population in hundreds, and an indicator for whether children moved to different communities after round 1, when much of the community data were collected.

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[5] Appendix Table B gives parallel descriptive statistics for children not included in the analysis of this paper.

[6] Per capita consumption in Ethiopia is actually per adult equivalent, which means this value slightly over-represents consumption compared to values for the other three countries in this table.

[7] We do not include primary care facilities because there is no variation in Vietnam for this measure.

The percentage of children t living in an urban residence varies from 18 (Vietnam) to 73 (Peru), the percentage who had moved over the time of the study varies from 9 in India to 50 in Peru, and the percentage living in a community with a hospital varied from 32 in Ethiopia to 90 in Vietnam. The average community wealth index is lowest in Ethiopia and highest in Vietnam, and the percentage of other (surveyed) adults with secondary schooling living in the community varies from 19.8% in Ethiopia to 58% in Peru.

4. Methods

We are interested in characterizing poverty and inequality in per capita consumption and human capital among the parents' generation, the associations between key parental variables and child human capital investments, and poverty and inequality in the children's generation both in terms of human capital among children and in expected per capita consumption as adults – all in the presence of persistent unobserved family and child effects. We then use these relations to simulate how changing the distribution of human capital or resources as reflected in per capita consumption and schooling attainment of the parents would affect the distribution of the children's human capital and their expected per capita consumption.

We begin with the following relation for the per capita consumption (C_p) in the parents' generation (subscript p) as dependent (presumably through their income) on father's and mother's schooling attainment (H_{p1} and H_{p2}), maternal age (A_p), maternal height (M_p) and an unobserved family factor (U_f) related to unobserved income-generating factors that are assumed to be uncorrelated with H_{p1}, H_{p2}, M_p and A_p:

$$(1)\ ln(C_p) = \beta_0 + \beta_{Hp1}(H_{p1}) + \beta_{Hp2}(H_{p2}) + \beta_{Mp}(M_p) + \beta_{Ap}(A_p) + \beta_{Ap2}(A_p\text{^}2) + U_f$$

We use this relation to obtain estimates of $\beta_0, \beta_{Hp1}, \beta_{Hp2}, \beta_{Mp}, \beta_{Ap}, \beta_{Ap2},$ and U_f that we assume carry over to the children's generation.

We next estimate how children's human capital (H_{c8}) at age 8 years is determined by parental financial resources as represented by C_p, parental schooling attainment H_{p1} and H_{p2}, other family characteristics (F_c), and community (V_f for village) characteristics for that family, as well as uncorrelated child-specific factors (U_c):

$$(2)\ H_8 = \gamma_0 + \gamma_{Cp}C_p + \gamma_{Hp1} H_{p1} + \gamma_{Hp2} H_{p2} + \boldsymbol{\gamma_{Ff} F_f} + \boldsymbol{\gamma_{Vf} V_f} + U_c.$$

Other family characteristics (F_c) include sex and age (in months) of the child, mother's height, mother's age, and, for the cognitive exams, whether the child took the exam in his or her native language and dichotomous variables for the language of the exam. Community characteristics (V_f) include urban residence, community population, community wealth, whether there is a hospital in the community, the percentage of individuals living in surveyed households (other than for that observation) within the community that have attained secondary schooling, and, to control for changes for households who no longer live in the community in which these data were collected, whether the family moved after round 1. We include splines in mother's and father's schooling, as well as consumption, to allow the coefficients to vary by whether schooling attainment was less than or more than 9 grades, and whether the family consumed less than or more than the 20th percentile of per capita consumption.

We use this relation to obtain estimates of γ_0, γ_{Cp}, γ_{Hp1}, γ_{Hp2}, $\boldsymbol{\gamma_{Ff}}$, $\boldsymbol{\gamma_{Vf}}$, and U_c that we then use to simulate the impact on the distribution of child human capital at age 8 of changes in parental financial resources and human capital and village characteristics.

We also use the estimates of relations (1) and (2) to simulate the impact on the distribution of per capita consumption when the child becomes an adult of changes in parental resources and human capital and village characteristics. To do so we make the additional assumptions that (1) the consumption relation in (1) is stable across the generations (including the unobserved family factor U_f), (2) that the human capital distribution for the children when they become adults is the same as for their parents (except that the schooling attainment distribution is shifted up by two grades to reflect the secular intergenerational change in schooling) and (3) that the child's percentile position in the human capital distribution at age 8 persists and determines that child's place in the percentile distribution in the adult schooling attainment distribution for the child's generation. Furthermore, we assume that (4) children's height when they are adults will follow the same distribution as maternal height (except shifted up by 3 cm to reflect the secular intergenerational increase in height), and that (5) the child's percentile position in height at age 8 persists to adulthood and determines his or her place in the percentile distribution in adult height for the child's generation. We estimate future consumption at age 40 years.

To obtain the child's percentile position in the cognitive skills distribution at age 8, we use the simple average of the percentile position in the distributions (by country) on the three cognitive measures, PPVT, Math, and EGRA. That is, a child who scored in the 50th percentile on average for the three exams, for example, is assigned the 50th percentile of schooling attainment based on the parents in the sample. Similarly, we mapped child height at age 8 years to parental height, so that a child at the 50th percentile in height is assigned to the 50th percentile of maternal height as an adult.

Using β_0, β_{Hp1}, β_{Hp2}, β_{Mp}, β_{Ap}, β_{Ap2}, and U_f, we then plug into equation (1) the estimated parental schooling and maternal height of the child's future household to predict children's future household consumption at (maternal) age 40 years.

To characterize inequality in household consumption, parental schooling, and mothers' height, we calculate the Gini coefficient for the parents' generation, as well as for the expected household consumption for the child's generation, by country. We also calculate the poverty headcount for both generations, with the poverty line defined by households at the 20th percentile of per capita consumption in the parents' generation and by 5 grades of schooling attainment.

Using the coefficients and residuals estimated in equation (2), we then plug in hypothetical values of maternal and paternal schooling, consumption, and community wealth in order to simulate what the cognitive scores and height at age 8 years would be under such scenarios under the assumption that our estimates in relation (2) represent a causal relationship.[8] The scenarios we consider include:

[8] In these simulations we assume that the effects of parental schooling are the direct effects as estimated for relation (2) but not in addition indirect effects through per capita household consumption.

1. Increased parental schooling attainment to completed primary schooling (6 grades in Peru, 5 grades in India and Vietnam, and 4 grades in Ethiopia) for all parents who did not complete primary schooling.
2. Increased parental schooling attainment to 5 grades for all parents who did not complete 5 grades of schooling.
3. Increased parental schooling attainment to 9 grades for all parents who did not complete 9 grades of schooling.
4. Increased per capita household consumption to the 20th percentile of per capita household consumption for all households below the 20th percentile in the parental generation.
5. Increased per capita household consumption to the 40th percentile of per capita household consumption for all households below the 40th percentile in the parental generation.
6. Increased per capita household consumption to $1US per day for all households with per capita daily consumption below $1US.
7. Increased community wealth to the 20th percentile of community wealth for all children in communities with community wealth below the 20th percentile.
8. Increased community wealth to the 40th percentile of community wealth for all children in communities with community wealth below the 40th percentile.
9. Increased parental schooling attainment to 5 grades for all parents who did not complete 5 grades of schooling **and** increased per capita household consumption to the 20th percentile of per capita household consumption for all households below the 20th percentile in the parents' generation.
10. Increased parental schooling to 9 grades for all parents with less than 9 grades of schooling, **and** increased per capita household consumption to the 40th percentile of per capita household consumption for all households below the 40th percentile in the parents' generation, **and** increased community wealth to the 40th percentile of community wealth for all children in communities with community wealth below the 40th percentile.

After predicting the values of cognitive scores and height at age 8 years under these scenarios, we then calculate the Gini coefficients and poverty headcount under these scenarios to characterize inequality in these simulations, with the "poverty" line defined as the 20th percentile of scores in the non-simulated distribution of parental per capita consumption.

Finally, in order to examine how these scenarios might impact future adult household per capital consumption for the children, we then mapped their new cognitive scores to new levels of schooling using the percentiles of cognitive scores and schooling from the original distribution. That is, a child who previously obtained an average score that was in the 14th percentile in the original distribution, who then obtained an average score in the 50th percentile under one of the hypothetical scenarios, would then be mapped to parental schooling at the 50th percentile to then estimate simulated future per capita consumption under that scenario. (The maximum change in average cognitive score percentile placing ranged from a 39 percentage point increase in percentile in Ethiopia to 54 in Vietnam; the average change ranged from a 7 percentage point increase in percentile in Peru and Ethiopia to a 9 percentage point increase in percentile ranking in Vietnam.)

5. Results

5.1 Poverty Headcounts and Gini Coefficients for Baseline Distributions

Table 2 gives the Gini coefficients and the poverty headcount in the distributions for per capita consumption, parental schooling, and mother's height for the parents' generation. Parental resources are most unequally distributed in Ethiopia, with Gini coefficients of 0.34 for per capita consumption, 0.31 for mothers' schooling attainment, and 0.31 for fathers' schooling attainment. Fathers' schooling is most equally distributed in Peru, with a Gini coefficient of 0.21, and mother's schooling is most equally distributed in Vietnam with a Gini coefficient of 0.24. With the "poverty" threshold for schooling set at 5 grades of schooling attainment, the majority of both mothers (74.7%) and fathers (63.5%) in Ethiopia, and the majority of mothers (62.3%) in India fall below this threshold. Peru, on the other hand, has the lowest percentage of mothers (18.8%) and fathers (9.0%) below this threshold. On the other hand, mothers' height is distributed remarkably equally among all four samples.

After plugging in the estimated schooling and height levels for the children into equation (1) and assuming a secular increase of 2 grades of schooling and 3 cm of height for the next generation, we obtain the expected future consumption for the children (table 3). The values shift upwards due to the assumption of secular increases. For example, the average per capita consumption per day iss 0.60 USD (2006) in Ethiopia for parents, and the expected future household per capita consumption per day for the households of the children is 0.65 USD. In Peru, these values are 2.11 USD and 2.67 USD, respectively.

In table 4, we see that the distributions of the expected human capital levels have similar Gini coefficients to those in the parents' generation, though slightly elevated. Mothers' schooling becomes more unequal in Ethiopia and India, but less unequal in Vietnam. The poverty headcount values are substantially reduced in all cases for the children's generation, due to the secular increases we assume in schooling levels.

5.2 Estimates of the Associations of Child Human Capital Outcomes with Parental Family and Community Characteristics

Table 5 lists the full set of estimated coefficients from the regressions of outcomes at age 8 years. ADD INFO HERE ON REGRESSION.

5.3 Simulations of Ten Scenarios Regarding Improving the Left Tails of the Distributions of Parental Per Capita Consumption and Schooling Attainment and Community Wealth

We now turn to the ten simulations described in the previous section. In order to underscore the magnitude of change implied by these simulations, we show the Gini coefficients and poverty headcounts for parental schooling and per capita consumption under these scenarios in table 6. The Gini coefficient for schooling under these scenarios is greatly reduced – increasing mothers' schooling to a minimum of primary level, the Gini coefficient for mothers' schooling in Ethiopia goes from 0.31 to 0.19, in India from 0.25 to 0.16, in Peru from 0.25 to 0.19 and in Vietnam from 0.24 to 0.03. Of course, in all but two cases (for schooling in Ethiopia, where primary schooling is 4 grades), the percentage of individuals below the "poverty threshold" of 5 grades of schooling and the 20th percentile of schooling in the actual distribution is zero.

Table 7 gives the impacts on the child human capital measures at age 8 years. The percentage increase in the PPVT score in the primary schooling scenario ranges from 2.5 in Peru to 9.5 in India; in the most generous scenario with increased schooling, consumption, and community wealth, the percentage increase in the PPVT score ranges from 12.0 in Vietnam to 22.7 in India.

Table 8 gives the Gini coefficients for the predicted values of the age 8 outcomes under the ten scenarios.[9] Under each of these scenarios in which parental schooling and resources are increased for the left side of the distribution, of course inequality is reduced. For example, the Gini coefficient for PPVT in Ethiopia falls from 0.301 to 0.29 in the first hypothetical scenario, when all parents with less than primary schooling are assigned primary schooling, and falls to 0.26 in the last hypothetical scenario, when all parents with less than 9 years of schooling are assigned 9 years of schooling, communities are assigned community wealth at the 40th percentile of the original distribution of community wealth, and households with less than the 40th percentile in the original distribution for consumption are assigned the 40th percentile of consumption. Similarly, in India, the Gini coefficient for PPVT falls from 0.269 in the original distribution to 0.245 in the primary schooling scenario and to 0.222 in the last scenario. While reductions in inequality occur across the board for the cognitive outcomes, the reductions are not large in magnitude.

Table 9 gives the poverty headcount, or measure of children performing below a certain threshold. Under these hypothetical scenarios, the lower end of the distribution performs better, as expected given positive intergenerational associations in human capital. For example, the threshold of the 20th percentile in the original distribution of PPVT scores in Ethiopia is met by 19.1% of the sample in the original distribution,[10] but falls to 17.6% in all parents have at least primary school, to 10.4 % if all parents have at least nine grades of school, to 19.2% if parental per capita consumption is increased to the 40th percentile for all households below that level and, in the most generous hypothetical scenario, to only 8.3% left below the poverty level. These numbers are similar in general terms, though the degree of simulated change varies, for the other three countries.

Finally, Table 10 gives the implications of the greater child human capital under the ten scenarios for future household per capita consumption. The changes in the Gini coefficients are quite small, even under the most generous scenarios. In fact only for one country, Peru, in only one scenario (the most generous one) does the Gini coefficient drop by as much as 0.01.[11] Only small changes are detected because changes in the cognitive scores under these scenarios are also small (table 7), and since parental schooling is measured in integers, and there are large numbers of parents concentrated at the low end of the distribution, it would take a large change in cognitive scores to shift the child's equivalent position in the parental distribution of schooling to higher levels, except in the higher part of the distribution. Thus fairly substantial changes in inequality in the parents' generation are simulated to have fairly small impacts on inequality in per capital consumption in the children's generation.

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[9] Since the Gini coefficient may only be calculated using nonzero values, we coded any scores of 0 (possible for the EGRA and Math scores) to 0.4. While this is an arbitrary value, it is rounds off to zero and allows for the Gini coefficient to be calculated for the full sample of scores.

[10] The poverty headcount is less than 0.20 in many cases since only those performing lower than the 20th percentile are measured as being below the "poverty line."

[11] In a number of cases the simulated drop in the Gini coefficients is so small that the rounding error in the calculations makes it appear as if the Gini coefficients increase slightly.

On the other hand, the changes to the poverty headcount for the children's per capita consumption as adults are in some cases simulated to be larger. For example, if the lower bound on parental schooling of completing primary school is imposed, the poverty headcounts are simulated to drop from 18.6% to 15.9% for Ethiopia, 12.6% to 10.6% in India, 11.9% to 10.3% in Peru and 10.7% to 8.1%. Similarly if the lower bound on parental per capita consumption at the 20th percentile is imposed, the poverty headcounts are simulated to drop from 18.6% to 15.7% for Ethiopia, 12.6% to 11.5% in India, 11.9% to 9.6% in Peru and 10.7% to 8.2% in Vietnam. And, of course, there are even larger drops in the most generous scenario -- from 18.6% to 12.4% for Ethiopia, 12.6% to 8.4% in India, 11.9% to 6.8% in Peru and 10.7% to 5.3% in Vietnam.

6. Conclusions

Theoretical models, empirical estimates, and policy prescriptions place considerable emphasis on the importance of the family on the life chances of children. We find, for the four Young Lives countries, significant associations between parental financial and human capital resources on one hand and children's human capital on the other. Under the assumptions that these relations are causal, which probably overestimates their true effects, our simulations of the intergenerational impacts of increasing to lower bounds parental per capita consumption and schooling attainment have some notable effects on the human capital of their children. Nevertheless, the simulated impacts on the per capita consumption of the adults when they become adults indicate only small or moderate effects on poverty headcounts and almost no effects on inequality.

Figure 1: Expected Private Marginal Benefits and Costs for Investment in Children's Schooling from Becker's (1967) Woytinsky Lecture

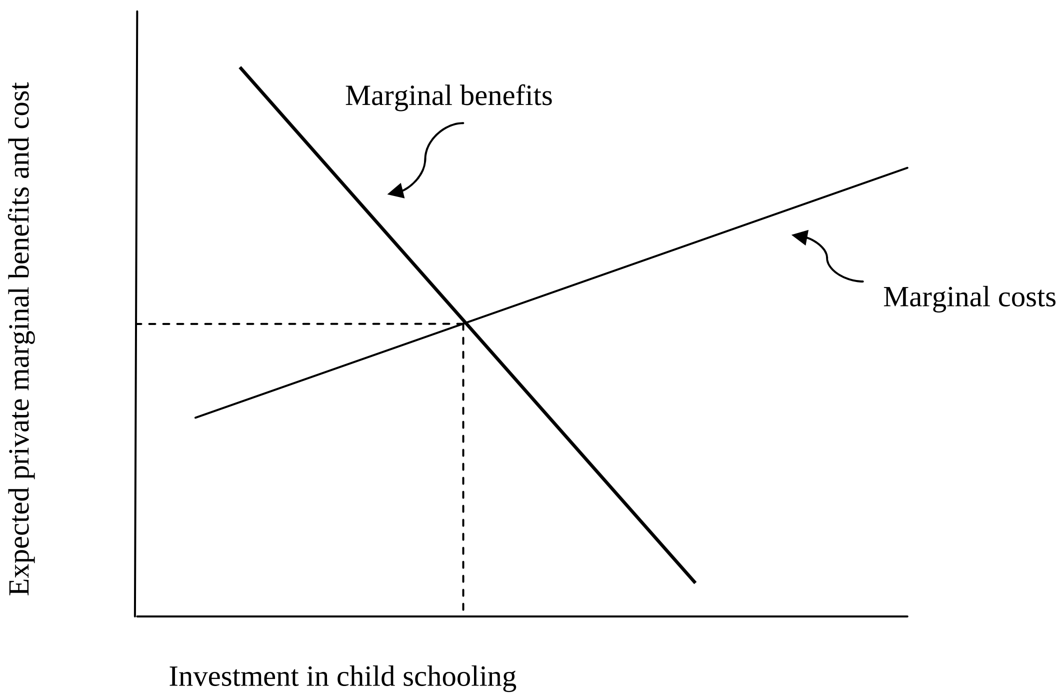

Table 1. Descriptive statistics

	Ethiopia			India			Peru			Vietnam		
	n	Mean/percent	SD	n	Mean/percent	SD	N	Mean/percent	SD	n	Mean/percent	SD
PPVT	1,109	78.3	43.0	1,559	57.5	30.0	1,493	61.3	16.5	1,602	95.4	27.4
Math	1,109	6.7	5.3	1,559	12.0	6.4	1,493	14.9	5.6	1,602	18.6	5.6
EGRA	1,109	5.3	3.0	1,559	5.4	3.4	1,493	8.5	3.1	1,602	10.1	2.5
Consumption per day	1,109	.60	.45	1,508	.62	.31	1,492	2.11	1.38	1,602	1.00	.77
Mother's schooling	1,109	3.0	3.9	1,559	3.6	4.4	1,493	8.4	4.2	1,602	7.2	3.8
Father's schooling	1,109	4.8	4.3	1,559	5.5	4.9	1,493	9.5	3.7	1,602	7.8	3.9
Mother's height	1,109	158.5	6.2	1,559	151.5	6.1	1,493	150.3	5.5	1,602	152.4	5.6
Female	1,109	45.0		1,559	45.8		1,493	49.4		1,602	48.8	
Urban	1,109	38.1		1,559	21.9		1,493	72.8		1,602	18.0	
Moved	1,109	21.8		1,559	9.0		1,493	50.4		1,602	15.0	
Community wealth	1,109	-3.2	1.8	1,559	-0.2	2.0	1,493	1.3	2.5	1,602	2.2	2.3
Hospital	1,109	31.6		1,559	45.9		1,493	37.6		1,602	89.8	
Percent with secondary schooling	1,109	19.8	18.7	1,559	32.6	18.7	1,493	58.0	23.6	1,602	36.4	18.7

Table 2. Gini coefficient and poverty headcount (PH), parents' generation

	Ethiopia		India		Peru		Vietnam	
	Gini	PH	Gini	PH	Gini	PH	Gini	PH
Consumption	0.342	0.199	0.243	0.173	0.319	0.200	0.318	0.200
	0.009	0.012	0.005	0.010	0.007	0.010	0.009	0.010
Mother's schooling	0.308	0.747	0.251	0.623	0.246	0.188	0.240	0.213
	0.007	0.013	0.006	0.012	0.005	0.010	0.005	0.010
Father's schooling	0.314	0.635	0.258	0.451	0.212	0.090	0.237	0.181
	0.006	0.014	0.006	0.013	0.004	0.007	0.005	0.010
Mother's height	0.021		0.021		0.021		0.020	
	0.001		0.001		0.000		0.000	

Notes: Poverty line is 20th percentile of original distribution for consumption per capita, and is 5 years of schooling for mother's and father's schooling

Table 3. Consumption per capita per day, 2006 USD (average over rounds 2 and 3)

Country	Generation	Mean	SD	Minimum	Maximum	n
Ethiopia	Parents (actual)	0.60	0.45	0.09	4.32	1,109
	Children (expected)	0.65	0.49	0.10	4.94	1,109
India	Parents (actual)	0.62	0.31	0.17	2.67	1,559
	Children (expected)	0.70	0.34	0.18	2.91	1,559
Peru	Parents (actual)	2.11	1.38	0.17	14.90	1,493
	Children (expected)	2.67	1.76	0.20	21.52	1,493
Vietnam	Parents (actual)	1.00	0.77	0.15	13.69	1,602
	Children (expected)	1.20	0.83	0.17	12.93	1,602

Table 4. Gini coefficient and poverty headcount (PH), next generation

	Ethiopia		India		Peru		Vietnam	
	Gini	PH	Gini	PH	Gini	PH	Gini	PH
Estimated consumption	0.350	0.186	0.252	0.126	0.324	0.119	0.307	0.107
	0.008	0.012	0.005	0.008	0.008	0.008	0.008	0.008

Estimated mother's schooling	0.370	0.624	0.393	0.604	0.191	0.068	0.160	0.059
	0.005	0.015	0.003	0.012	0.004	0.007	0.004	0.006
Estimated father's schooling	0.313	0.295	0.356	0.377	0.144	0.016	0.153	0.039
	0.006	0.014	0.005	0.012	0.003	0.003	0.004	0.005
Estimated mother's height	0.020		0.020		0.020		0.020	
	0.000		0.000		0.000		0.000	

Notes: Poverty line is 20th percentile of parents' distribution for consumption per capita, and is 5 grades for mother's and father's schooling attainment.

Table 5. Regressions for children's human capital outcomes at age 8 years

	PPVT				Math			
	Ethiopia	**India**	**Peru**	**Vietnam**	**Ethiopia**	**India**	**Peru**	**Vietnam**
Consumption per capita per day (<20 percentile)	84.60***	-2.97	15.57***	19.02**	6.56**	8.59	4.75***	5.17**
	[29.87]	[20.41]	[3.09]	[9.08]	[2.98]	[5.33]	[1.20]	[2.21]
Consumption per capita per day (>=20 percentile)	9.48***	8.67***	0.67***	2.48**	0.80**	0.42	0.34***	0.38
	[3.20]	[3.16]	[0.23]	[0.95]	[0.34]	[0.60]	[0.09]	[0.29]
Mother's schooling (<9 years)	0.59	1.01***	0.44**	1.95***	0.02	0.34***	0.20***	0.31***
	[0.39]	[0.25]	[0.19]	[0.33]	[0.03]	[0.05]	[0.07]	[0.06]
Mother's schooling (>=9 years)	0.33	1.98*	1.36***	1.88***	0.32**	0.39***	0.44***	0.12
	[2.02]	[1.08]	[0.26]	[0.43]	[0.13]	[0.15]	[0.10]	[0.07]
Father's schooling (<9 years)	0.72*	0.65***	0.88***	0.95***	0.19***	0.11**	0.31***	0.29***
	[0.37]	[0.25]	[0.25]	[0.26]	[0.04]	[0.04]	[0.08]	[0.06]
Father's schooling (>=9 years)	1.31	1.21*	0.51**	-0.27	0.13*	0.38***	0.11	0.12
	[1.07]	[0.68]	[0.22]	[0.56]	[0.07]	[0.12]	[0.10]	[0.08]
Child is female	2.07	-4.84***	-1.24*	0.46	0.32	-0.16	-0.64**	0.38*
	[1.98]	[1.52]	[0.65]	[1.16]	[0.27]	[0.30]	[0.26]	[0.21]
Age in months in R3	2.54***	0.61**	0.66***	1.54***	0.21***	0.27***	0.36***	0.52***
	[0.30]	[0.25]	[0.11]	[0.20]	[0.04]	[0.04]	[0.04]	[0.06]
Mother's height	-0.03	0.09	-0.05	0.12	0.00	0.06**	0.00	0.05**
	[0.18]	[0.12]	[0.07]	[0.12]	[0.02]	[0.03]	[0.02]	[0.02]
Mother's age	0.24*	0.19	0.07	-0.09	0.03*	0.01	0.02	-0.02
	[0.13]	[0.14]	[0.05]	[0.08]	[0.02]	[0.03]	[0.02]	[0.02]
Moved	-2.30	0.08	1.71*	-6.40	0.09	-1.34**	0.43	0.04
	[2.87]	[2.63]	[0.90]	[4.46]	[0.35]	[0.60]	[0.42]	[0.57]
Urban residence	-14.18	-16.98**	2.52	6.02	-0.06	-7.34***	0.57	-2.05
	[8.75]	[7.47]	[1.57]	[6.67]	[1.01]	[1.42]	[0.68]	[1.22]
Community population	-0.01	0.11***	-0.05***	-0.11***	0.00	0.02**	-0.01***	0.01
	[0.06]	[0.03]	[0.01]	[0.04]	[0.00]	[0.01]	[0.00]	[0.01]
Average wealth of other individuals in given community (R1)	1.45	2.87	2.18***	2.75*	2.03***	1.27***	0.56**	0.82***
	[3.98]	[1.95]	[0.52]	[1.45]	[0.45]	[0.43]	[0.23]	[0.17]
Hospital in community	24.84***	-4.43	-2.00*	-5.49**	0.38	0.57	-0.58	1.88*
	[3.37]	[3.11]	[1.09]	[2.63]	[0.45]	[0.62]	[0.40]	[1.02]
Percent in community with secondary education or greater	0.94***	0.17	-0.04	0.11	-0.08*	-0.01	-0.03	-0.05**
	[0.33]	[0.17]	[0.06]	[0.10]	[0.04]	[0.04]	[0.03]	[0.02]
Exam in native language	11.01**	-6.37	5.00*	-1.11	0.02	-1.59*	0.75	-1.55***
	[4.46]	[4.80]	[2.84]	[2.35]	[0.65]	[0.84]	[0.81]	[0.42]
Exam other language 1	24.57***	-17.37***	-18.81***	8.10**	1.58**	-1.99**	-4.95***	-4.42***
	[8.45]	[5.96]	[6.36]	[3.57]	[0.63]	[0.81]	[1.72]	[0.72]

Exam other language 2	-6.62*	13.09**	2.95		-2.42***	-8.85***		
	[3.26]	[5.65]	[5.95]		[0.52]	[2.38]		
Exam other language 3	24.23				2.13			
	[17.63]				[4.25]			
Constant	-235.35***	-21.14	-31.01**	-93.64***	-9.72	-25.58***	-28.70***	-46.63***
	[56.78]	[33.79]	[14.17]	[26.74]	[6.09]	[6.91]	[5.66]	[6.38]
Observations	1,109	1,559	1,493	1,602	1,109	1,559	1,493	1,602
R-squared	0.446	0.159	0.406	0.315	0.440	0.219	0.291	0.350

Robust standard errors in brackets; *** p<0.01, ** p<0.05, * p<0.1

Table 5. Regressions for children's human capital outcomes at age 8 years

	EGRA				Height			
	Ethiopia	**India**	**Peru**	**Vietnam**	**Ethiopia**	**India**	**Peru**	**Vietnam**
Consumption per capita per day (<20 percentile)	3.38	-0.48	2.47***	3.13**	17.00	1.30	2.67**	8.01***
	[1.99]	[3.12]	[0.75]	[1.16]	[11.24]	[3.43]	[1.16]	[2.74]
Consumption per capita per day (>=20 percentile)	0.48*	0.14	0.14***	0.08	0.57*	1.87***	0.16	0.38*
	[0.27]	[0.34]	[0.04]	[0.07]	[0.29]	[0.50]	[0.11]	[0.21]
Mother's schooling (<9 years)	0.03	0.12***	0.09**	0.18***	0.07	0.16***	0.21***	0.15**
	[0.03]	[0.03]	[0.04]	[0.03]	[0.09]	[0.05]	[0.07]	[0.06]
Mother's schooling (>=9 years)	0.07	0.28***	0.22***	0.05	0.01	0.26	0.24**	0.29**
	[0.08]	[0.09]	[0.04]	[0.04]	[0.14]	[0.16]	[0.11]	[0.11]
Father's schooling (<9 years)	0.08*	0.02	0.20***	0.05*	0.20***	0.04	0.22**	0.1
	[0.04]	[0.03]	[0.04]	[0.03]	[0.07]	[0.05]	[0.09]	[0.06]
Father's schooling (>=9 years)	0.02	0.22***	0.00	0.02	-0.09	-0.03	0.00	0.14*
	[0.06]	[0.07]	[0.04]	[0.04]	[0.14]	[0.11]	[0.10]	[0.08]
Child is female	0.30	0.03	0.16	0.42***	0.31	-0.28	-0.84***	-0.34
	[0.19]	[0.16]	[0.12]	[0.13]	[0.34]	[0.27]	[0.24]	[0.22]
Age in months in R3	0.05*	0.10***	0.10***	0.13***	0.32***	0.37***	0.41***	0.45***
	[0.03]	[0.02]	[0.02]	[0.03]	[0.05]	[0.03]	[0.04]	[0.04]
Mother's height	-0.01	0.01	0.00	0.02*	0.23***	0.24***	0.34***	0.32***
	[0.01]	[0.01]	[0.01]	[0.01]	[0.03]	[0.03]	[0.02]	[0.03]
Mother's age	0.01	-0.01	0.02	-0.02**	0.07*	0.04	0.04**	-0.05***
	[0.01]	[0.02]	[0.01]	[0.01]	[0.04]	[0.03]	[0.02]	[0.02]
Moved	-0.15	-0.48	0.15	0.13	-0.72	0.31	0.01	-0.65
	[0.24]	[0.38]	[0.18]	[0.49]	[0.51]	[0.54]	[0.41]	[0.54]
Urban residence	-0.05	-4.37***	0.31	1.31	-1.04	0.52	0.33	1.65
	[0.75]	[0.93]	[0.38]	[0.88]	[1.15]	[0.74]	[0.48]	[1.03]
Community population	-0.01	0.01***	-0.01***	0.00	0.00	-0.01	-0.01	0.00

	[0.00]	[0.01]	[0.00]	[0.00]	[0.00]	[0.01]	[0.01]	[0.01]
Average wealth of other individuals in given community (R1)	0.83**	0.56**	0.45***	0.12	0.13	0.38*	0.69***	0.31
	[0.31]	[0.24]	[0.10]	[0.14]	[0.44]	[0.22]	[0.19]	[0.22]
Hospital in community	1.09**	0.06	-0.36*	-0.94**	1.47***	1.46***	-0.08	0.79*
	[0.39]	[0.35]	[0.19]	[0.41]	[0.36]	[0.33]	[0.65]	[0.45]
Percent in community with secondary education or greater	-0.02	0.02	-0.03**	-0.02***	0.00	0.01	-0.03*	-0.02
	[0.03]	[0.02]	[0.01]	[0.01]	[0.03]	[0.02]	[0.02]	[0.02]
Exam in native language	-1.00**	-0.07	1.95***	-0.13				
	[0.42]	[0.57]	[0.45]	[0.20]				
Exam other language 1	2.06***	-1.88***						
	[0.48]	[0.63]						
Exam other language 2	-0.65*							
	[0.36]							
Constant	3.81	-5.75	-6.53*	-6.99*	45.19***	43.04***	25.29***	23.70***
	[3.75]	[3.93]	[3.42]	[3.49]	[9.11]	[4.96]	[5.18]	[5.18]
Observations	1,109	1,559	1,493	1,602	1,109	1,559	1,493	1,602
R-squared	0.309	0.16	0.252	0.191	0.132	0.274	0.344	0.317

Robust standard errors in brackets; *** p<0.01, ** p<0.05, * p<0.1

Table 6. Estimated inequality in distribution of hypothetical scenarios for schooling and consumption, parents' generation

			Mothers' schooling			
	MS=P	***MS=5y***	***MS=9y***	***MS=P***	***MS=5y***	***MS=9y***
		Gini			**Poverty headcount**	
Ethiopia	0.191	0.135	0.027	0.747	0.000	0.000
	0.007	0.007	0.003	0.000	0.000	0.000
India	0.166	0.166	0.033	0.000	0.000	0.000
	0.005	0.004	0.002	0.000	0.000	0.000
Peru	0.187	0.212	0.094	0.000	0.000	0.000
	0.002	0.002	0.002	0.000	0.000	0.000
Vietnam	0.204	0.204	0.065	0.000	0.000	0.000
	0.003	0.003	0.003	0.000	0.000	0.000
			Fathers' schooling			
	MS=P	***MS=5y***	***MS=9y***	***MS=P***	***MS=5y***	***MS=9y***
		Gini			**Poverty headcount**	
Ethiopia	0.254	0.195	0.057	0.635	0.000	0.000
	0.006	0.006	0.004	0.000	0.000	0.000
India	0.218	0.218	0.068	0.000	0.000	0.000
	0.003	0.003	0.003	0.000	0.000	0.000
Peru	0.178	0.193	0.101	0.000	0.000	0.000
	0.002	0.003	0.002	0.000	0.000	0.000
Vietnam	0.206	0.206	0.078	0.000	0.000	0.000
	0.002	0.003	0.002	0.000	0.000	0.000
			Consumption			
	MC=20p	***MC=40p***	***MC=$1d***	***MC=20p***	***MC=40p***	***MC=$1d***
		Gini			**Poverty headcount**	
Ethiopia	0.318	0.267	0.056	0.000	0.000	0.000
	0.009	0.008	0.007	0.000	0.000	0.000
India	0.228	0.182	0.028	0.000	0.000	0.000
	0.005	0.005	0.003	0.000	0.000	0.000
Peru	0.288	0.232	0.298	0.000	0.000	0.000
	0.006	0.007	0.006	0.000	0.000	0.000
Vietnam	0.292	0.241	0.159	0.000	0.000	0.000
	0.009	0.009	0.010	0.000	0.000	0.000

Notes: MS= minimum schooling, MC=minimum consumption, MCW = minimum community wealth, P=primary, 5y=5 years, 9y=9 years, 20p= 20^{th} percentile, 40p=40^{th} percentile

Table 7. Percentage increases in children's human capital, simulated scenarios

	MS=P	*MS=5y*	*MS=9y*	*MC=20p*	*MC=40p*	*MC=$1d*	*MCW=20p*	*MCW=40p*	*MS=P &MC=20p*	*MS=9 &MC=40p, CW40p*
PPVT										
Ethiopia	4.0	5.7	13.3	2.1	2.7	9.9	0.3	0.3	7.8	16.3
India	9.5	9.5	20.0	-0.1	0.5	7.6	2.2	2.2	9.4	22.7
Peru	2.5	1.7	6.5	3.4	3.7	2.4	4.9	4.9	5.1	15.1
Vietnam	2.5	2.5	9.1	0.6	0.7	1.2	2.2	2.2	3.0	12.0
Math										
Ethiopia	9.2	13.6	34.1	2.7	3.6	13.9	0.5	7.5	16.3	45.2
India	19.4	19.4	38.8	2.4	2.6	4.8	2.8	7.1	21.7	48.5
Peru	3.2	2.2	9.3	3.8	4.3	2.6	1.1	4.5	5.9	18.1
Vietnam	3.1	3.1	10.9	0.9	1.1	1.5	1.4	4.2	4.1	16.1
EGRA										
Ethiopia	4.4	6.5	16.0	1.2	1.7	7.2	0.2	2.7	7.7	20.4
India	10.0	10.0	20.6	0.0	0.0	1.3	2.0	5.3	9.8	25.8
Peru	3.2	2.2	9.1	3.3	3.7	2.3	1.7	6.5	5.5	19.3
Vietnam	1.8	1.8	6.8	0.9	0.9	1.1	0.3	0.8	2.7	8.5
Height										
Ethiopia	0.3	0.5	1.2	0.2	0.2	0.4	0.0	0.0	0.6	1.4
India	0.4	0.4	0.9	0.0	0.1	0.6	0.0	0.1	0.5	1.1
Peru	0.2	0.1	0.6	0.1	0.1	0.1	0.1	0.4	0.3	1.2
Vietnam	0.1	0.1	0.5	0.2	0.2	0.2	0.0	0.2	0.3	0.8

Notes: MS= minimum schooling, MC=minimum consumption, MCW = minimum community wealth, P=primary, 5y=5 years, 9y=9 years, 20p= 20^{th} percentile, 40p=40^{th} percentile

Table 8. Gini coefficients, simulated scenarios

Outcome	Country	Gini Coefficient										
		none	*MS=P*	*MS=5y*	*MS=9y*	*MC=20p*	*MC=40p*	*MC=$1d*	*MCW=20p*	*MCW=40p*	*MS=P &MC=20p*	*MS=9 &MC=40p, CW40p*
PPVT	Ethiopia	0.301	0.290	0.285	0.268	0.295	0.293	0.276	0.300	0.300	0.280	0.261
		0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.003
Math	Ethiopia	0.432	0.413	0.403	0.363	0.427	0.425	0.404	0.431	0.415	0.398	0.344
		0.007	0.006	0.006	0.006	0.007	0.006	0.006	0.007	0.007	0.006	0.005
EGRA	Ethiopia	0.308	0.298	0.294	0.274	0.306	0.305	0.293	0.308	0.301	0.291	0.264
		0.006	0.005	0.005	0.005	0.006	0.005	0.005	0.006	0.006	0.006	0.005
Height (8)	Ethiopia	0.029	0.028	0.028	0.028	0.028	0.028	0.028	0.029	0.029	0.028	0.028
		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PPVT	India	0.269	0.245	0.245	0.226	0.270	0.268	0.252	0.263	0.263	0.245	0.222
		0.004	0.004	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Math	India	0.302	0.264	0.264	0.237	0.297	0.297	0.293	0.295	0.286	0.261	0.224
		0.005	0.004	0.004	0.004	0.006	0.005	0.005	0.005	0.005	0.004	0.003
EGRA	India	0.344	0.322	0.322	0.301	0.344	0.344	0.342	0.339	0.333	0.323	0.292
		0.005	0.006	0.005	0.005	0.006	0.006	0.006	0.006	0.005	0.006	0.005
Height (8)	India	0.028	0.028	0.028	0.027	0.028	0.028	0.028	0.028	0.028	0.027	0.027
		0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
PPVT	Peru	0.147	0.141	0.143	0.132	0.139	0.139	0.142	0.135	0.135	0.136	0.117
		0.004	0.003	0.003	0.003	0.004	0.004	0.003	0.003	0.004	0.004	0.003
Math	Peru	0.212	0.204	0.206	0.190	0.203	0.202	0.206	0.209	0.202	0.197	0.175
		0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
EGRA	Peru	0.208	0.200	0.203	0.188	0.200	0.199	0.202	0.203	0.193	0.195	0.170
		0.004	0.004	0.005	0.004	0.004	0.004	0.005	0.005	0.004	0.004	0.004
Height (8)	Peru	0.027	0.027	0.027	0.026	0.027	0.027	0.027	0.027	0.026	0.027	0.025
		0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
PPVT	Vietnam	0.157	0.148	0.148	0.134	0.156	0.155	0.154	0.151	0.151	0.147	0.130
		0.003	0.002	0.003	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.002
Math	Vietnam	0.171	0.162	0.162	0.146	0.168	0.168	0.167	0.167	0.160	0.159	0.138
		0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
EGRA	Vietnam	0.134	0.130	0.130	0.122	0.132	0.132	0.132	0.134	0.133	0.128	0.120
		0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Height (8)	Vietnam	0.028	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.026
		0.000	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.001	0.000

Notes: Standard errors below coefficient estimates; zeros coded to 0.4. MS= minimum schooling, MC=minimum consumption, MCW = minimum community wealth, P=primary, 5y=5 years, 9y=9 years, 20p= 20th percentile, 40p=40th percentile

Table 9. Poverty headcount, simulated scenarios

Outcome	**Country**	**Poverty Headcount**										
		none	*MS=P*	*MS=5y*	*MS=9y*	*MC=20p*	*MC=40p*	*MC=$1d*	*MCW=20p*	*MCW=40p*	*MS=P &MC=20p*	*MS=9 &MC=40p, CW40p*
PPVT	Ethiopia	0.191	0.176	0.159	0.104	0.192	0.187	0.133	0.197	0.197	0.146	0.083
		0.012	0.011	0.011	0.009	0.012	0.012	0.010	0.012	0.012	0.011	0.008
Math	Ethiopia	0.131	0.131	0.105	0.062	0.130	0.129	0.122	0.131	0.131	0.102	0.033
		0.010	0.010	0.009	0.007	0.010	0.010	0.010	0.010	0.010	0.009	0.005
EGRA	Ethiopia	0.149	0.149	0.149	0.130	0.149	0.149	0.149	0.149	0.149	0.149	0.116
		0.011	0.011	0.011	0.010	0.011	0.011	0.011	0.011	0.011	0.011	0.010
PPVT	India	0.180	0.078	0.078	0.040	0.185	0.180	0.101	0.155	0.155	0.080	0.033
		0.010	0.007	0.007	0.005	0.010	0.010	0.008	0.009	0.009	0.007	0.005
Math	India	0.164	0.115	0.115	0.053	0.163	0.163	0.162	0.158	0.148	0.105	0.042
		0.009	0.008	0.008	0.006	0.009	0.009	0.009	0.009	0.009	0.008	0.005
EGRA	India	0.192	0.192	0.192	0.131	0.192	0.192	0.192	0.189	0.187	0.192	0.128
		0.010	0.010	0.010	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.008
PPVT	Peru	0.182	0.186	0.189	0.153	0.182	0.179	0.190	0.166	0.166	0.173	0.114
		0.010	0.010	0.010	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.008
Math	Peru	0.182	0.171	0.175	0.146	0.169	0.167	0.175	0.177	0.165	0.159	0.104
		0.010	0.010	0.010	0.009	0.010	0.010	0.010	0.010	0.010	0.009	0.008
EGRA	Peru	0.154	0.148	0.150	0.125	0.148	0.146	0.150	0.152	0.135	0.135	0.074
		0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.007
PPVT	Vietnam	0.195	0.167	0.167	0.079	0.207	0.198	0.187	0.170	0.170	0.159	0.062
		0.010	0.009	0.009	0.007	0.010	0.010	0.010	0.009	0.009	0.009	0.006
Math	Vietnam	0.151	0.137	0.137	0.091	0.149	0.149	0.149	0.145	0.125	0.130	0.063
		0.009	0.009	0.009	0.007	0.009	0.009	0.009	0.009	0.008	0.008	0.006
EGRA	Vietnam	0.147	0.143	0.143	0.130	0.147	0.147	0.147	0.147	0.147	0.140	0.119
		0.009	0.009	0.009	0.008	0.009	0.009	0.009	0.009	0.009	0.009	0.008

Notes: Poverty line is the 20^{th} percentile of the actual distribution of scores. MS= minimum schooling, MC=minimum consumption, MCW = minimum community wealth, P=primary, 5y=5 years, 9y=9 years, 20p= 20^{th} percentile, 40p=40^{th} percentile

Table 10. Gini coefficient and poverty headcount under simulated scenarios, estimated future household consumption, children's generation

Gini Coefficient

Country	*none*	*MS=P*	*MS=5y*	*MS=9y*	*MC=20p*	*MC=40p*	*MC=$1d*	*MCW=20p*	*MCW=40p*	*MS=P &MC=20p*	*MS=9 &MC=40p, CW40p*
Ethiopia	0.350	0.351	0.351	0.350	0.350	0.349	0.346	0.351	0.351	0.349	0.345
	0.008	0.009	0.008	0.009	0.008	0.010	0.008	0.008	0.010	0.008	0.009
India	0.252	0.251	0.251	0.249	0.252	0.252	0.249	0.252	0.251	0.251	0.247
	0.005	0.005	0.005	0.005	0.005	0.006	0.005	0.005	0.005	0.005	0.005
Peru	0.324	0.323	0.324	0.322	0.320	0.319	0.322	0.322	0.321	0.319	0.309
	0.008	0.007	0.006	0.007	0.007	0.007	0.007	0.008	0.006	0.007	0.007
Vietnam	0.307	0.308	0.308	0.303	0.308	0.308	0.307	0.308	0.307	0.305	0.298
	0.008	0.009	0.008	0.008	0.009	0.008	0.008	0.008	0.007	0.008	0.007

Poverty Headcount*

Country	*none*	*MS=P*	*MS=5y*	*MS=9y*	*MC=20p*	*MC=40p*	*MC=$1d*	*MCW=20p*	*MCW=40p*	*MS=P &MC=20p*	*MS=9 &MC=40p, CW40p*
Ethiopia	0.186	0.159	0.156	0.142	0.157	0.156	0.152	0.161	0.161	0.153	0.124
	0.012	0.011	0.011	0.010	0.011	0.011	0.011	0.011	0.011	0.011	0.010
India	0.126	0.106	0.106	0.092	0.115	0.114	0.108	0.110	0.108	0.105	0.084
	0.008	0.008	0.008	0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.007
Peru	0.119	0.103	0.104	0.094	0.096	0.095	0.100	0.100	0.094	0.093	0.068
	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.007
Vietnam	0.107	0.081	0.081	0.067	0.082	0.079	0.081	0.084	0.082	0.072	0.053
	0.008	0.007	0.007	0.006	0.007	0.007	0.007	0.007	0.007	0.006	0.006

Notes: Poverty line is the 20th percentile of consumption in the parents' generation. MS= minimum schooling, MC=minimum consumption, MCW = minimum community wealth, P=primary, 5y=5 years, 9y=9 years, 20p= 20^{th} percentile, 40p=40^{th} percentile

References

Atemnkeng, T. J. and A. G. Noula. 2011. “Gender and Increased Access to Schooling in Cameroon: A Marginal Benefit Incidence Analysis.” Journal of International Women Studies. 12:1.

Becker, Gary S. 1967. "Human Capital and the Personal Distribution of Income: An Analytical Approach." University of Michigan, Woytinsky Lecture republished in Gary S. Becker, *Human Capital*, New York: NBER, 2nd edition 1975, 94-117.

Becker, Gary S. 1991. *A Treatise on the Family*. Cambridge, MA: Harvard University Press.

Becker, Gary and Nigel Tomes. 1976. "Child Endowments and the Quantity and Quality of Children." *Journal of Political Economy*, 84, S143-62

Behrman, Jere R. 1988a. "Intrahousehold Allocation of Nutrients in Rural India: Are Boys Favored? Do Parents Exhibit Inequality Aversion?" *Oxford Economic Papers*, 40:1(March), 32-54.

Behrman, Jere R. 1988b. "Nutrition, Health, Birth Order and Seasonality: Intrahousehold Allocation among Children in Rural India." *Journal of Development Economics*, 28(1), 43-62.

Behrman, Jere R., Robert A. Pollak and Paul Taubman. 1982. "Parental Preferences and Provision for Progeny." *Journal of Political Economy*, 90:1(February), 52-73.

Behrman, Jere R., Robert A. Pollak and Paul Taubman. 1995. "The Wealth Model: Efficiency in Education and Distribution in the Family," J. R. Behrman, R. A. Pollak and P. Taubman, *From Parent to Child: Intrahousehold Allocations and Intergenerational Relations in the United States.* Chicago: University of Chicago Press, 113-38.

Behrman, Jere R and Mark R Rosenzweig. 2004. "Returns to Birthweight." *The Review of Economics and Statistics*, 86(2), 586-601.

Behrman, Jere R., Mark R. Rosenzweig and Paul Taubman. 1994. "Endowments and the Allocation of Schooling in the Family and in the Marriage Market: The Twins Experiment." *Journal of Political Economy*, 102:6(December), 1131-74.

Cueto S, Leon J. Psychometric characteristics of cognitive development and achievement instruments in round 3 of Young Lives. Oxford: Young Lives (England); 2012 47 p. Technical Note No. 15.

de Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. *Bull World Health Organ*. 2007;85 (9):660

Filmer, D., & Scott, K. (2012) Assessing asset indices. Demography, 49: 359-392.

Foster, James E., Joel Greer and Erik Thorbecke. 1984. "A Class of Decomposable Poverty Measures." *Econometrica*, 52(May), 761-6.

Glewwe P. Schooling, skills, and the returns to government investment in education: an exploration using data from Ghana. Washington, D.C.: World Bank (USA); 1991 69 p. Working Paper No. 76.

Pscharopoulos, George. 1994. “Return to Education: A Global update.” World Development. 22: 9. 1325-1343.

Pitt, Mark M., Mark R. Rosenzweig and M.N. Hassan. 1990. "Productivity, Health and Inequality in the Intrahousehold Distribution of Food in Low-Income Countries." *American Economic Review*, 80:5(December), 1139-56.

Pitt, Mark M., Mark R. Rosenzweig and M.N. Hassan. 2012. “Human Capital Investment and the Gender Division of Labor in a Brawn-Based Economy.” *American Economic Review* 102:7 (December), 3531-3560.

Walker SP, Chang SM, Powell CA, Grantham-McGregor SM. Effects of early childhood psychosocial stimulation and nutritional supplementation on cognition and education in growth-stunted Jamaican children: prospective cohort study. Lancet 2005;366:1804–07.

Walker SP, Grantham-McGregor SM, Powell CA, Chang SM. Effects of growth restriction in early childhood on growth, IQ, and cognition at age 11 to 12 years and the benefits of nutritional supplementation and psychosocial stimulation. J Pediatr 2000;137:36–41.

Appendix A. Literature Review

Child human capital includes a range of health and schooling outcome variables such as, nutritional status, school enrollment status, completed grades of schooling, relative grade attainment, primary school completion, high school completion, grade repetition, test scores, and age at enrollment. The determinants of child human capital have been examined extensively and include measures of parental schooling, household income, household composition, and household's demand for child labor.

Household income is found to be a key determinant of schooling outcome. Income captures household's access to resources in the long-run and the associated impact on schooling. Behrman and Knowles (1999) report results from their earlier review of 42 studies covering 21 countries and find that, three-fifth's of the schooling indicators used in these studies showed a significant association between household income and schooling. Measures of income and accumulated wealth are associated with: higher enrollment probabilities (Dostie and Jayaraman, 2006), lowering delays in schooling enrollment (Glewwe and Jacoby, 1995), higher levels of schooling completion (King and Lillard, 1987), lowering school withdrawal (Glick and Sahn, 2000) and improved test scores (Brown and Park, 2002). Empirically, it is often difficult to obtain the causal effect of household income on schooling due to the presence of household specific time-invariant unobservables such as household's perceived preferences towards schooling that are likely to bias the estimated coefficient on income. The presence of random measurement error in household income is also likely to bias the OLS estimate on income. Glewwe and Jacoby (1995), Alderman et. al (1996), Tansel (1998), Pal (2004), and Chaudhury et. al (2006), address this endogeneity problem using instrumental variables such as unearned rental income, transfers from abroad, measure of land ownership, characteristics of the head of the household, household demographic composition, and other measures of household assets. Among papers that report both OLS and IV estimation results, the IV estimates on household income are almost always larger than the OLS estimate.

Parents make choices on whether to send the child to school, length of school participation and also on the kind of school inputs to invest that determine their child's human capital. Hence parents play a crucial role in determining the evolution of their child's human capital. Parents schooling is an important determinant of this schooling choice process. Parents directly affect children's schooling outcomes through time spent teaching at home and indirectly through the choice of schooling inputs such as textbooks, school uniforms, and quality of schooling (private vs. public). Preschool nutritional status is also an important determinant of schooling outcomes and test scores, where preschool nutrition is evolved by the choice of deworming pills, breastfeeding practices, nutrition, immunization etc., all of which are further influenced by parental schooling [Barrera 1990, Strauss and Thomas 1998, and Fedorov and Sahn 2005]. Parental schooling in a reduced form demand function captures the net effect (direct plus indirect effects) on child schooling in comparison to production functions that are able to parse out the different channels through which parental schooling affects children's schooling. However, the estimation of production function is complicated by data availability on limited inputs and the endogenous nature of inputs making OLS estimates of inputs inconsistent. For all these reasons, the majority of the studies use a reduced form demand side formulation to understand the impact of parental schooling on child schooling. It is not surprising that researchers, therefore, have found measures of parental schooling to be positively associated with better schooling of their children from different contexts and countries [Parish and Willis (1993), Behrman and Wolfe (1984), Schultz (1988), Singh (1992), Strauss and Thomas (1995), Behrman (1997), Tansel (1997), Alderman et. al (2001), Brown and Park (2002), Schaffner (2004), Orazem and King (2008)]. Some studies in the literature specifically find that mother's schooling has a greater impact on children's education outcomes compared to father's education [Singh (1992), Alderman et. al (2001), Dostie and Jayaraman (2006)].

Empirically, it is difficult to capture the causal effect of parental schooling outcomes on children's schooling due to the presence of common intergenerational unobservables that affect both children's and parental schooling outcomes, commonly referred to as the "ability bias". Mothers and fathers' schooling outcomes are also influenced by their initial endowments, which are likely to be correlated due to non-random matching at the time of marriage. Women with higher ability are likely to have spouses who are more able resulting in potential correlation between mother and father's schooling. A third source of bias in measures of parental schooling arises from the presence of random measurement error bias, which is likely to attenuate the impact of parental schooling on child schooling. Behrman and Rosenzweig (2002) find that addressing these issues significantly reduces the impact of mother's schooling on children's schooling attainments changing the sign of the coefficient estimate on mother's schooling from positive to negative, while keeping the impact of father's schooling positive and significant. Lillard and Willis (1993) explicitly account for the correlation between parent specific unobservables and child specific unobservables and find that almost two-thirds of the impact of parental education on their child's schooling appears to be a direct or indirect consequence of parental schooling, while only one-third can be attributed to unmeasured factors. However, even after addressing these different sources of bias, the effects of parental schooling never fade away completely, except for mother's schooling in Behrman and Rosenzweig (2002). So the estimates reported here may be seen as upper bound estimates on parental schooling if omitted variables bias exceeds measurement error bias and lower bound estimates if measurement error bias in parental schooling exceed omitted variables bias.

Children's opportunity cost of time at both market and non-market work also affects children's schooling outcomes [Rosenzweig and Evenson (1977), Rosenzweig (1990), Singh (1992), and Pal (2004)]. Other determinants of schooling include household composition variables such as number of siblings or children in the household, which have some effect on schooling outcomes, but the sign and significance remain inconclusive [Singh (1992), Parish and Willis (1993)]. Some of the differences in schooling outcomes are also explained through age and sex specific differences in schooling investments.

It is important to note that the effect of these determinants on children's test scores is much less known than that of completed grades of schooling or enrollment. In studies that have examined cognitive skills, the impact of parental schooling and family background seem to be more indirect. For example, Glick and Sahn found that while number of years of schooling was strongly associated with cognitive skills, household income and parental schooling had only small effects on test performance when adjusting for years of school (2009).

References for Appendix A

Alderman, H., J.R. Behrman, D.R. Ross and R. Sabot. 1996. Decomposing the Gender Gap in Cognitive Skills in a Poor Rural Economy. The Journal of Human Resources, 31(1):229-254.

Alderman, H., J.R. Behrman, and R. Menon. 2001. Child Health and School Enrollment: A longitudinal analysis. The Journal of Human Resources, 56: 185-205.

Barrera, A. 1990. The role of maternal schooling and it's interaction with public health programs in child health production function. Journal of Development Economics, 32: 69-91.

Behrman, J.R. and B.L. Wolfe. 1984. The Socioeconomic Impact of Schooling in a Developing Economy. Review of Economics and Statistics, 66(2): 296-303.

Behrman, Jere R. 1997. "Women's Schooling and Child Education: A Survey." Mimeo, University of Pennsylvania.

Behrman, J.R. and J.C. Knowles. 1999. Household Income and Child Schooling in Vietnam. The World Bank Economic Review, 13(2): 211-256.

Behrman, J.R. and M.R. Rosenzweig. 2002. Does Increasing Women's Schooling Raise the Schooling of the Next Generation? American Economic Review, 92: 323-334.

Brown, P.H. and A. Park. 2002. Education and Poverty in Rural China. Economics of Education Review, 21: 523-41.

Chaudhury, N., L. Christiansen and M. Asadullah. 2006. School, Household Risks and Gender: Determinants of Child Schooling in Ethiopia, working paper, World Bank.

Dostie, B. and R. Jayaraman. 2006. Determinants of School Enrollment in Indian villages. Economic Development and Cultural Change, 54: 405-421.

Fedorov, L. and D. Sahn. 2005. Socioeconomic determinants of children's health in Russia: A longitudinal survey. Economic Development and Cultural Change, pp 479-500.

Glewwe, P. and H. Jacoby. 1995. An Economic Analysis of Delayed Primary School Enrollment in a Low Income Country: The Role of Early Childhood Nutrition. The Review of Economics and Statistics, 77: 156-69.

Glick, P. and D. Sahn. 2000. Schooling of Girls and Boys in a West African Country: The Effects of Parental Education, Income, and Household Structure. Economics of Education Review, 19(1):63-87.

Glick, P. and D. Sahn. 2009. Cognitive skills among children in Senegal: Disentangling the roles of schooling and family background. Economics of Education Review, 28(2), 178-188.

King, E.M. and L.A. Lillard. 1983. Determinants of Schooling Attainment and Enrollment Rates in the Philippines. A Rand Note, Santa Monica: Rand Corporation.

King, E.M. and L.A. Lillard. 1987. Education Policy and Schooling Attainment in Malaysia and the Philippines. Economics of Education Review, 6(2):167-181.

Lillard, L. and R.J. Willis. 1994. Intergenerational Educational Mobility: Effects of Family and State in Malaysia. The Journal of Human Resources, 29(4): 1126-66.

Orazem, P.F. and E.M. King. 2008. Schooling in Developing Countries: The Roles of Supply, Demand and Government Policy. Handbook of Development Economics, Volume 4, edited by T. P. Schultz and J. Strauss.

Pal, S. 2004. How Much of the Gender Difference in Child School Enrollment can be Explained? Evidence from Rural India. Bulletin of Economic Research, 56(2): 0307-3378.

Parish, W.L. and R.J. Willis. 1993. Daughters, Education, and Family Budgets: Taiwan Experiences. Journal of Human Resources, 28(4): 863-98.

Rosenzweig, M.R. 1990. Population Growth and Human Capital Investments: Theory and Evidence. Journal of Political Economy, 98:S38-S70.

Rosenzweig, M.R. and R.E. Evenson. 1977. Fertility, Schooling and the Economic Contribution of Children in Rural India. Econometrica, 45:1065-1079.

Schultz, T.P. 1988. Educational Investments and Returns. In H. Chenery and T.N. Srinivasan (eds.) Handbook of Development Economics, Volume 1, Amsterdam: North Holland Press.

Schaffner, J. 2004. Determinants of Schooling Investments among Primary School aged Children in Ethiopia. Africa Region Human Development, working paper series.

Singh, R.D. 1992. Underinvestment, Low Economic Returns to Education, and the Schooling of Rural Children: Some Evidence from Brazil. Economic Development and Cultural Change, 40(3): 645-664.

Strauss, J. and D. Thomas. 1995. Human Resources: Empirical Modeling of Household and Family Decisions. Handbook of Development Economics, vol. 3, edited by Jere R. Behrman and T.N. Srinivasan.

Strauss, J. and D. Thomas. 1998. Health, Nutrition and Economic Development, Journal of Economic Literature, 36(2): 766-817.

Tansel, A. 1997. Schooling Attainment, Parental Education, and Gender in Cote d'Ivoire and Ghana. Economic Development and Cultural Change, vol. 45(4):825-856.

Tansel, A. 1998. Determinants of School Attainment of Boys and Girls in Turkey, working paper, Economic Growth Center, Yale University.

Appendix Table B. Descriptive statistics of excluded observations

	Ethiopia			India			Peru			Vietnam		
	n	Mean/percent	SD	n	Mean/percent	SD	n	Mean/percent	SD	n	Mean/percent	SD
PPVT	624	79.3	45.9	241	62.6*	32.6	260	47.7*	18.3	132	80.9*	34.8
Math	578	6.3*	5.6	244	12.1	6.6	300	11.2*	5.9	204	17.9	6.9
EGRA	295	5.9	3.3	216	5.4	3.4	166	7.9*	3.5	198	9.5*	3.2
Consumption, R2	878	154.2	111.4	233	681.4	416.4	353	159.3	133.1	235	371.1	329.0
Consumption, R3	774	136.2	95.2	243	749.7	379.4	353	179.9	141.0	235	573.5	637.8
Mother's schooling	873	3.9*	4.2	448	5.2*	4.8	546	6.6*	4.7	383	6.3*	4.2
Father's schooling	796	5.9*	4.4	449	5.9	5.1	497	8.1*	4.0	344	7.3*	4.2
Mother's height	748	142.6*	62.4	420	149.8*	21.8	476	146.1*	31.3	381	150.3*	19.4
Female	890	49.9*		452	47.8		562	51.4		398	47.5	
Urban	890	31.1*		452	36.1*		562	48.4*		398	28.1*	
Moved	648	18.5		266	25.9*		357	40.6*		235	18.3	
Community wealth	648	-3.3	2.0	265	0.4*	2.7	356	-0.1*	2.6	235	2.0	3.3
Hospital	560	32.7		224	57.6*		357	21.0*		235	89.8	

Note: consumption R2 and consumption R3 measures are identical in the raw data for Ethiopia; question is out to the country team.

* indicates statistically significant differences between the included and excluded observations for whom there are data available.