YOUNG LIVES STUDENT PAPER

Decomposing the Urban-Rural Schooling Gap in Ethiopia (2006-2013)

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The data used come from Young Lives, a longitudinal study of childhood poverty that is tracking the lives of 12,000 children in Ethiopia, India (in the states of Andhra Pradesh and Telangana), Peru and Vietnam over a 15-year period. **www.younglives.org.uk**

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Contents

List of Tables

List of Figures

1. Introduction

In 1994 Ethiopia adopted a new constitution, and the following year the first multiparty elections were held. The new government was established after almost two decades of military government, two severe famines, and a civil war. When democracy was first established, the gross primary school enrollment was 25 percent and the adult literacy rate was 27 percent.[1] The new government took several steps toward providing better access to education: i) Proclamation 41, in 1993, defined the responsibilities of the central and regional governments, decentralizing the role of government in the provision of education services; ii) in 1994, the Education and Training Policy and the Education Sector Strategy were adopted; iii) in 1995, the Constitution stated that education should be provided without religious, political and cultural considerations, and that the state has the obligation to allocate resources to provide educational services; and iv) in 1995, the Teacher's Career Structure was established (Unesco, 2006). Twenty years later, in 2014, the gross primary school enrollment was above 100 percent and the adult literacy rate reached 49 percent.[2]

Since 1994, a new structure of the education system has been implemented. It changed the number of years of primary and secondary school education,[3] provided access to primary education in the student's mother tongue, and adopted a new structure of fiscal relations. The latter implied that each level of government would be responsible for providing different education services, for instance the *woredas*[4] are responsible of

[1] Data from the World Development Indicators. http://data.worldbank.org/data-catalog/world-development-indicators
[2] Idem.
[3] From 1962 to 1994, the education system followed a 6-2-4 structure; with the implementation of the 1994 Education and Training Policy and Education Sector Strategy, the system was restructured to a 4-4-2-2 structure (two 4-year cycles of primary education and two 2-year cycles of secondary school education).
[4] Ethiopia is divided in nine regions; the regions are subdivided into 68 zones. A *woreda* is a smaller subdivision, followed by *kebele* which is the smallest geographical subdivision. There are 800 *woredas* and 15,000 *kebeles* (5,000 urban and 10,000 rural).
http://www.ethiopia.gov.et/regional-states

provision of primary education (World Bank, 2005). All these changes have resulted in an improvement in indicators of access to education.

Currently, more than 80 percent of the population resides in rural areas, and the country has a low level of rural-urban migration due to land tenure regulations. In addition, the average household size in rural areas in 5.2, while in urban areas it is 3.7. In rural areas, 46.4 percent of the population is between 0-14 years. In contrast, in urban areas that share is 29.4 (CSA and World Bank, 2017). Taking into account these factors, educational gaps between the urban and rural populations of the country should be analyzed, and the main contributors to those gaps should be identified in order to formulate policies that can benefit the vast majority of the population, particularly the rural population. This Chapter estimates the urban-rural schooling gap and decomposes it between the gap that can be explained by differences in endowments (explained portion) and differences due to the coefficients (unexplained portion).

The rest of this paper is organized as follows. Section 2 presents the urban-rural education differentials in Ethiopia. Section 3 provides a brief review of the literature. Section 4 describes the conceptual framework. In section 5, the data of used in the empirical analysis is described. Section 6 presents the main results of the empirical analysis, and section 7 concludes.

2. Urban-Rural Education Differentials in Ethiopia

Evidence on the urban-rural education gap in Ethiopia is scarce. Two reports that compiled different education indicators for 2000 and 2015 are summarized in Tables 1a-b (World Bank, 2005; CSA and World Bank, 2017). The data show that in 2000 there was a large education gap between rural and urban children. The first set of indicators included in Table 1a indicate the gross enrollment rate for rural and urban populations widens as the level of education increases. For instance, gross enrollment rates in grades 1-4 were 122.9 percent for urban areas and 65.3 percent for rural areas in 2000, while enrollment rates for secondary education were 76.3 percent in urban areas and 0.4 percent

in rural areas. The low enrollment rates for secondary education in rural areas could reflect the lack of school facilities in rural areas. The Ministry of Education Annual Report (2015) reports that in 2013 the country had 32,048 primary schools (27,597 in rural areas) and 2,329 secondary schools (693 in rural areas).[5] Although the enrollment rates have increased, the secondary education enrollment rate is still low, and the urban-rural gap persists in 2015; as shown in Table 1b, enrollment in secondary school of children aged 7-18 for boys was only 2.7 percent in rural areas, compared to 22.5 percent in urban areas (large towns), and for girls they were 2.6 and 21.7, respectively. The Ministry of Education Annual Report (2015) reports that in 2013 out of the 1'969,576 students enrolled in secondary school, less than 20 percent were students enrolled in rural areas (368,918).[6]

In 2000, there was a significant difference in a set of student flow indicators reported in Table 1a. The percentage of the cohort ever enrolled in Grade 1 in rural areas was almost half of the one for urban areas (45.3 percent vs. 90 percent). Another indicator is related to distance to the nearest primary school: as the distance increases, enrollment decreases, but the differences between urban and rural areas are evident. For example, urban children living between 1-2 kms from the closest primary school have a school enrollment rate of 83.1 percent while the enrollment rate for children in rural areas living at the same distance to the closest primary school was 38.8 percent. Finally, the urban rural differences in enrollment are evident by the child's mother tongue group too.

Data for 2015 confirm that the urban-rural educational gap continues to persist. Table 1b shows that the youth and adult literacy rates have increased for the newer generations, but there are still large rural and urban differences. For example, 32.5 percent of children aged 7 to 18 years residing in rural areas are not enrolled in school, while this percentage drops to 19 in small towns and 16.4 in large towns.

[5] The number of schools in the five regions included in the Young Lives survey were: had 29,291 primary schools (25,509 in rural areas) and 2,078 secondary schools (611 in rural areas).
[6] The gender disaggregation of the number of students enrolled in secondary school in 2013 is: 1,041,855 boys (196,262 in rural areas) and 927,721 girls (172,656 in rural areas). Tables 5.17.1 and 5.17.5.

Evidence on the urban-rural test score gap in Ethiopia is even more scarce. Using Young Lives data, Figures 1-8 show the distributions of language and mathematics test scores for children ranging from ages 8 to 15. Figures 1 and 2 show that both the distribution of the vocabulary (PPVT) and mathematics test scores of children residing in rural areas are skewed to the left (the same pattern is observed for the mathematics test score for children aged 12 years old and 15 years, as shown in Figures 4 and 8). Figure 1 shows that children residing in urban areas have a more uniform distribution of their test scores. For children aged 12 years old, vocabulary test scores distributions are shown in Figure 3 and 5, in both cases the distribution of test scores of children residing in rural areas seem to follow a normal distribution, while in the case of children residing in urban areas the distribution is skewed to the right. Section 5.2 describes the test score gap between urban and rural Ethiopian children.

3. Literature Review

School achievement disparities for children for different comparison groups have been studied in developed and developing countries. Most of these studies used the Blinder-Oaxaca decomposition (described in section 4). Ammermueller (2007) estimates the PISA test score gap between children in Germany and Finland. He finds that better performance of Finnish students is mainly explained by the differences in observable characteristics (which is often referred to as the explained portion). Additionally, he concludes that the role of school types is ambiguous. Myers et al (2004) estimated the racial test score gap in Minnesota and concluded that school and student's characteristics do not explain most of the test score gap, therefore, the gap can be attributed to racial differences in coefficients (often referred to as the unexplained portion).

In developing countries, the educational attainment (measured by years of education) gender gap was studied in India by Kingdon (2002), who concluded that the main factors contributing to the gap were parental background, wealth, individual ability, age-at-marriage and quality of primary school attended. Twenty-five percent of the

gender gap was explained by student, household and school characteristics, thus most of the gap is attributed to gender differences in coefficients. Nieto and Ramos (2014) decompose the PISA test score gaps by income groups[7] for 10 middle income and 2 high income countries. Their results suggest that the explained portion of the test score gap is around 50 percent. Within the explained portion of the gap, individual characteristics have lower explanatory power than school and teacher quality variables.

The educational gap between children residing in urban and rural areas has been studied in different developing countries. Hannum (1999) describes the trends in enrollment rates of the urban and rural populations of China between 1949 and 1990 and shows how the political context of the country was linked to the rural-urban education inequalities. The "Great Cultural Revolution" raised education levels in rural areas and narrowed the urban-rural educational differentials.[8] Note, however, that the reduction of the gap was not entirely driven by an increase of educational attainment in rural areas; it was also due to a decrease of educational attainment in urban areas. Lounkaew (2013) estimated the PISA test score urban-rural gap in Thailand. His estimations were calculated for different points on the achievement distributions, and he concluded that school characteristics explained a lower proportion of the gap (12-15 percent) for lower performing students than for higher performing students (61-69 percent of the gap). In addition, he found that the unexplained portion of the gap is higher for boys than for girls. Rural-urban decompositions estimated for test scores in Colombia and Zambia show that the explained portion of the gap is larger than the unexplained portion (Ramos et al., 2016; Burger, 2011). In the case of Colombia, Ramos et al. found that most of the differential is explained by family characteristics instead of school characteristics.

There are no studies decomposing the school achievement gap between urban and rural Ethiopian children. As discussed in section 1, with the vast majority of the population reside in rural areas, with some internal migration from rural to urban areas.

[7] They compared test scores for the top and bottom quartiles of the economic, social and cultural status index.

[8] Measured through number of schools, student enrollment and progression ratios.

Given that Ethiopia has one of the largest returns to education (as reported in Montenegro and Patrinos, 2014) it is important to investigate the main drivers of the urban-rural educational gap, to serve as a diagnosis for future education policies in the country. In addition, none of the studies referenced in this section have examined how the gap evolves over time for a specific cohort of children, which can be used to investigate whether urban-rural education disparities are narrowing or broadening in the country. Therefore, this paper contributes to the existing literature by estimating the school achievement gap between urban and rural children of Ethiopia for the first time, and it shows how this achievement gap changes over time for the same children.

4. Conceptual Framework

This section presents the empirical strategy used in this paper to decompose the urban-rural academic achievement gap in Ethiopia. I follow Orazem and Gunnarson's (2004) model of the human capital production function. The structural relationship is given by the following production function:

$$H_{ij} = H(L_{ij}, X_{ij}, Z_j, H_{0ij}) \qquad (1)$$

where H_{ij} stands for a measure of academic achievement of child i in household j, child labor is captured by L_{ij}; X_{ij} is a vector with different child characteristics, Z_j includes attributes of the child's parents and household, and H_{0ij} is the past accumulation of human capital. For this Chapter, the dependent variable H_{ij} is a test score. Equation (2) shows a linear specification of equation (1).

$$H_i = \alpha_0 + \beta_1 Mkt_i + \beta_2 Dom_i + \sum_{k=1}^{n} \rho_k X_{ki} + \sum_{l=1}^{n} \gamma_l Z_{li} + \theta H_{0i} + \tau_C + \varepsilon_i \qquad (2)$$

Test scores are a function of the daily hours allocated to market and domestic work ($Mrkt$ and Dom), a vector of child characteristics X (gender and age in months), a vector of parent and household characteristics Z (caregiver's educational attainment, absence of one or both parents and household composition), and past accumulation of

human capital (H_{0i}). The variable τ_C allows for Region[9] fixed effects and ε_i is an error term. Region-specific fixed effects represent the unobserved differences among the different Regions of the country that influence education, such as school and teacher's quality. Equation (2) includes all the variables of the production function, thus the error term represents measurement error of the dependent or control variables. As discussed in Cuesta (2017, chapter 2), child work and school attendance are jointly determined outcomes of a child's time allocation within the household: this implies that estimation of the effect of child work could be endogenous. Building on the empirical strategy used in Cuesta (2017, chapter 2), the estimates presented in this paper will also use instrumental variables to correct for endogeneity.

The results presented in Cuesta (2017, chapter 2) showed a significant difference between urban and rural test scores for children. Therefore, the goal of this paper is to decompose the urban-rural academic achievement gap, and explore how much each factor contributes to the gap. The decomposition follows the Blinder-Oaxaca method which is explained in the following sub-section.

4.1 Blinder-Oaxaca Model

The Blinder-Oaxaca model has been widely used to analyze differences in labor market outcomes between two groups: male vs. female, white vs African Americans, etc. (Blinder, 1973; Darity and Mason, 1998; Ñopo, 2008; Oaxaca, 1973; Oaxaca and Ransom, 1994; O'Neill and O'Neill, 2006, Reimers, 1983). The method allows one to decompose group differences into an explained portion (differences in the magnitudes of the determinants) and an unexplained portion (differences in the effects of those determinants). For example, in the context of this paper, rural children could have a lower academic achievement not only because they spend more hours of their day working, but also because the effect of that time on academic achievement is larger.

[9] This analysis includes five (out of nine) regions of Ethiopia: Addis Ababa; Amhara; Oromia; Tigray; and the Southern Nations, Nationalities, and People's Region (SSNP). These are the regions included in the Young Lives data, and the population of these regions represent approximately 90 percent of the country's population.

In the context of the human capital production function described in equation (2), the differences between urban and rural outcomes can be expressed as follows:

$$H^U - H^R = \sum \beta_k^U x_k^U - \sum \beta_k^R x_k^R \qquad (3)$$

where H^U corresponds to the mean of the human capital outcome for children living in urban areas and H^R denotes the same outcome but for children residing in rural areas. In this case. the vectors of β parameters include intercepts and the vector of determinants x includes those groups of determinants included in equation (2): child work, child's characteristics, parent and household attributes, and past accumulation of human capital. Building on the model and empirical strategy followed in Cuesta (2017, chapter 2), the human capital production function is estimated using instrumental variables estimation to correct for endogeneity.[10]

To clearly show the different components of the Blinder-Oaxaca decomposition, equation (3) can be expressed as follows:

$$H^U - H^R = \sum \beta_k^U x_k^U - \sum \beta_k^U x_k^R - \sum \beta_k^R x_k^R + - \sum \beta_k^U x_k^R \qquad (4)$$

$$H^U - H^R = \sum \beta_k^U \Delta x_k - \sum \Delta \beta_k x_k^R \qquad (5)$$

where

$$\Delta x_k = x_k^U - x_k^R \text{ and } \Delta \beta_k = \beta_k^U - \beta_k^R$$

Equation (5) corresponds to the gap in academic achievement, the first term on the right hand side of equation (5) corresponds to the portion of the gap is attributable to differences in the magnitudes of the determinants (x), the explained portion, and the

[10] For more detail on the model, see section 2.3 of Cuesta (2017, chapter 2). For a discussion of the instrumental variables see subsections 2.3.3 and 2.4.2 of Cuesta (2017, chapter 2).

second term on the right hand side of equation (5) corresponds to the portion of the gap that is attributable to differences in the parameters (β), the unexplained portion.[11]

In equation (5) the differences in the magnitudes of the determinants are weighted by the coefficients of the urban group, while the differences in coefficients are weighted by the x's of the rural group. Following O'Donnell et al. (2008, pp150), equation (5) is a special case of a more general decomposition:

$$H^U - H^R = \sum \beta_k^R \Delta x_k - \sum \Delta \beta_k x_k^R + \sum \Delta x \Delta \beta \qquad (6)$$

where

$$\sum \beta_k^R \Delta x_k = E$$

$$\sum \Delta \beta_k x_k^R = C$$

$$\sum \Delta x \Delta \beta = CE$$

Therefore, the gap could be decomposed into a gap in endowments (E), a gap in coefficients (C), and a gap that comes from the interaction between endowments and coefficients.

5. Data

5.1 The Young Lives Study in Ethiopia

This Chapter uses data from the Young Lives study,[12] a research program at Oxford University that studies childhood poverty. The Young Lives study follows 12,000 children since 2002 in four developing countries: Ethiopia, India (in the state of Andhra Pradesh), Perú, and Vietnam. Two cohorts have been followed in each country: a younger

[11] There are some other ways to present this decomposition. This way to present it was chosen to emphasize the rural areas.
[12] http://www.younglives.org.uk/

cohort (children born in 2000-01, approximately 2,000 children per country) and an older cohort (children born in 1994/95, approximately 1,000 children per country). Currently, four rounds of the survey data are available for Ethiopia (2002, 2006, 2009, and 2013). This paper uses data from both cohorts; data from Rounds 2 and 3 are used for the older cohort, and data from Rounds 3 and 4 is used for the younger cohort. These children were surveyed when they were 8 years old (younger cohort, Round 3), 12 years old (older cohort Round 2, and younger cohort, Round 4), and 15 years old (older cohort, Round 3).

By using different ages at different rounds off the survey, the analysis aims to understand the evolution of the urban-rural academic achievement gap. As mentioned in section 2, the urban-rural education gap becomes wider at higher levels of schooling, therefore it is expected that the test score gaps will be larger for older than for younger children.

The Young Lives study in Ethiopia surveyed children residing in five out of nine regions of the country, where more than 96 percent of the population lives: Amhara, Oromia, SNNP[13], and Tigray, plus the capital city Addis Ababa (see Figure 9). In each region, three to five *woredas* were selected for the sample. This selection process took into consideration having a balance of poor and less poor households and a balance of urban and rural areas. In addition, within the urban areas, there is a variety of urban site types: cities, intermediate cities and small urban areas. Twenty sentinel sites were included in the sample. As the study focuses on poverty, the sentinel sites are in food deficit *woredas* and the households included in the study are poorer than the average Ethiopian household (Young Lives, 2014). Table 2 provides a detailed description of the different sentinel sites included in the Ethiopian Young Lives sample.

Tables 3a-d report the summary statistics for the final samples by survey round, cohort, and separately for children residing in urban and rural areas. Columns 1 and 2 report the means and standard deviations of the all variables included in the analysis.

[13] Southern Nations, Nationalities, and People's Region.

Columns 3 and 4 show the means and standard deviations for children residing in urban areas. Summary statistics for children residing in rural areas are reported in columns 5 and 6. As shown in Tables 3a-d, 61 percent of the younger cohort children resided in rural areas in 2009 (53 percent in 2013)[14], while 61 percent of children of the older cohort lived in rural areas when surveyed in 2006 (62 percent in 2009). These proportions do not reflect the reality of the country, where more than 80 percent of the population still resides in rural areas. The results have to be interpreted with caution, given that the Young Lives data oversamples the poor population, therefore the urban-rural gaps estimated in this paper are specific to the poor population of Ethiopia and are not representative of the country as a whole.

5.2 Schooling Outcomes

The outcome of interest is academic achievement, which is measured by cognitive test scores: the Peabody Picture Vocabulary Test (PPVT) and the Mathematics Achievement Test. This section discusses the raw test scores, but the statistical analysis is performed using standardized test scores.

The PPVT is a vocabulary test which was administered in all rounds to children in both cohorts. The test consists of selecting a picture that best represents the meaning of a word presented orally by the examiner. For Rounds 2 and 3 it included 204 words and for each correct answer the child received one point (Cueto and Leon, 2012). As shown in Tables 3a-d, for the younger cohort in Round 3, the average test score was 79.7; for the older cohort, in Round 2 the average score was 75.5 and for Round 3, the average score was 149.9. For Round 4, the PPVT test that was administered to the younger cohort included only 55 words, and the average score was 39.3. For all Rounds and cohorts, the average test score for children residing in urban areas is higher than the average test

[14] The reduction in the percentage of children who lived in rural areas reflects a tendency for children who migrate to more urban areas. An analysis for the sample of 905 children that were surveyed in Rounds 3 and 4 of the younger cohort made by Gavonel (2017), shows that from the 298 children that reported moving to another location, 37 percent moved within the rural areas, 23 percent moved from rural to urban areas, 12 percent moved from urban to rural areas and the remaining 28 percent moved to within urban areas.

scores of children living in rural areas. For example, the difference in test scores for children aged 8 years old is 44.75 points (107 urban vs. 62.25 rural). In Ethiopia, this test could be taken in fifteen different languages.

The format of the Mathematics Achievement Test for the younger cohort in Round 3 included 29 items, divided into two sections. The first section included nine questions on basic quantitative and number notions, while the second section used 20 questions to measure the ability to perform basic mathematics operations with numbers (see Cueto and Leon, 2012, for further details). The average test score for this cohort in Round 3 round was 6.5 (10.1 urban vs. 4.2 rural). The format of the test was similar in Round 4 but included 28 items divided into a first section that was comprised of 19 items dealing with addition, subtraction, multiplication, division, and square roots; the second section included 9 items on mathematics problem solving. The average test score for the younger cohort in Round 4 was 10.8. Columns 3 and 5 of Tables 3b show that children who lived in urban areas had higher average mathematics test scores (13.9 vs. 8.1).

For the older cohort, the format of the Mathematics Achievement Test differed from Round 2 to Round 3. In Round 2, the test consisted of 10 items evaluating topics of number and number sense (Cueto, Leon, and Munoz, 2009). The average test score for this round was 4.9 (5.7 urban vs. 4.4 rural). In Round 3, the test consisted of 30 items divided into two sections. The first section was comprised of 20 items dealing with addition, subtraction, multiplication, division, and square roots; the second section included 10 items on mathematics problem solving. (Cueto and Leon, 2012).[15] The average test score was 5.9 (7.7 urban vs. 4.7 rural).

The test scores were standardized by round and cohort; therefore, the results of all estimations are presented in standard deviations.

5.3 Additional variables

[15] The last 10 questions of the Mathematics Achievement Test for the older cohort in Round 3 were multiple choice.

The Young Lives data include detailed information about each child and his/her household and community. The empirical analysis includes a set of variables used as the determinants of the test scores. These variables are grouped into characteristics of the child (sex, age in months, and child work), characteristics of the parents (highest educational attainment of the parents[16] and absence of the parents from the household), household characteristics (number of household members, number of siblings, wealth index), and geographic location (Addis Ababa is the reference category).

In relation to the child work variables, Edmonds (2007) emphasized the importance of analyzing urban-rural differences; children in rural areas tend to work more often, and for longer hours. In this paper, child work is captured by hours performing domestic and market activities. For a detailed explanation of these variables, please refer to subsection 2.4.1.2 of Cuesta (2017, chapter 2). For the purposes of this analysis, child work is measured by two variables: market work (paid work outside the household and unpaid labor force work for the household) and domestic work (domestic chores and time spent caring for other household members). Building on the results and discussion of Cuesta (2017, chapter 2), I will instrument child work to control for bias due to reverse causality. The selected instruments can be grouped in the following categories: sibling composition, household shocks, and environmental shocks.

Tables 3a-d show the descriptive statistics for these variables by cohort and Round. There are significant differences between urban and rural areas on the number of hours that children spend performing market work. For example, younger cohort children living in rural areas spend more than two additional hours on market work per day (i.e. for Round 3: 2.5 hours rural vs. 0.2 hours urban). For the older cohort, the difference is

[16] For children without data on the highest level of education attained by the parents, the information on the educational attainment of the caregiver was used. Educational attainment is divided into four categories: parents with 0 years of education, parents with 1-3 years of education (corresponds to lower primary level not completed), parents with 4-7 years of education (corresponds upper primary level completed), parents with more than 8 years of education (corresponds to incomplete secondary education or more). Only in Round 2 the Young Lives questionnaire include a question on parental education for a parent is not present in the household.

smaller, but still significant: children residing in rural areas spend at least 1.5 hours performing market work.

In addition, there are significant differences in parental education. For example, for the younger cohort in Round 3, 27 percent of urban parents had no years of education, but 62 percent of rural parents had no education. Moreover, 43 percent of urban parents had more than eight years of education, but just six percent of rural parents had the same level of education.

5.4 Resulting sample

For the younger cohort's empirical analysis, 1,875 children were interviewed in Round 4. Of those 1,875 children, 274 did not complete the PPVT test and 291 children did not complete the Mathematics test in Round 4. [17] For Round 3, 165 children did not complete the PPVT test and 211 children did not complete the mathematics test. In addition, 172 children were dropped from the Round 3 sample because of missing data on the control variables (201 for Round 4). As the PPVT and Mathematics estimations are performed separately, the total number of children included in the analysis ranges from 1,316 to 1,423.

From the 1,000 children included at the beginning of the study for the older cohort, 29 children were not interviewed in Rounds 2 and 3. Of the remaining 971 children in Round 3, 35 children did not complete the Mathematics Achievement Test and 10 did not complete the PPVT test in either round. For Round 2, 26 children did not complete the PPVT test and 31 children did not complete the mathematics test. Finally, 96 children were dropped from the sample because of missing data on the control variables. As the PPVT and Mathematics estimations are performed separately, the total number of children included in the analysis ranges from 713 to 728.

[17] For Round 4, 90 percent of the children that did not complete the tests could not read the language in which the test was administered.

6. Results

The urban-rural academic achievement gap decompositions for the Young Lives children in Ethiopia are presented in Tables 4-7. Each table corresponds to a test score for the younger or older cohort. The tables provide estimates for each age-group of children, both for all children and disaggregated by gender. In addition, each table reports results for both OLS and IV specifications of the model. Test scores were standardized; thus, the estimated impacts are measured in terms of the standard deviations of the test score variable.

Each table consists of two sections: section "a" presents the decomposition of the total academic achievement, reporting the explained and unexplained portions. In addition, section "a" of each table reports the contribution of each set of variables (child, parents, and household characteristics, and regional fixed effects) to the explained portion of the gap. Section "b" reports the contribution of each individual variable to the explained portion of the gap (differences in endowments).

The discussion will focus on the IV specifications for all children; in most of the cases the conclusions of the decompositions for the full sample is similar to the results for boys and girls separately. When there are gender differences, they will be highlighted in the discussion.

6.1 Tests Score Decomposition for the Younger Cohort

Table 4a summarizes the PPVT decomposition results for children in the younger cohort who were 8 and 12 years old at the time of the survey. The test score gap was one standard deviation in Round 3 and 1.12 in Round 4. Most of the gap is explained due to differences in endowments (58.7 percent for Round 3 and 51.9 percent for Round 4). The child and household characteristics are the ones that contribute most to the explained portion of the gap, and in most cases the regional fixed effects contribution has a negative sign. Table 4b reports the variables with the largest magnitudes that significantly contribute to the differences in endowments are: the socioeconomic level of the

household "wealth index" (0.18 in Round 3, 0.50 in Round 4), the proportion of parents that have more than eight years of education (0.10 in Round 3), hours of market work (0.24 in Round 3, 0.62 in Round 4), and hours of domestic work (-0.12 in Round 4); all of them are significant at least at the 10 percent level. These variables represent 88 percent of the explained portion of the test score gap in Round 3, and 172 percent in Round 4.[18] Although the results show that the PPVT test score gap widens for the same cohort as they get older, it important to be cautious with the interpretation given that the PPVT test differs from Round 3 to Round 4.

Table 4 also present results separately for boys and girls. The results are similar; the test score gap increases from age 8 to age 12, the main contributors to the explained portion are the child and household characteristic (regional fixed effects have a negative contribution), although the significance levels decrease for parental education and hours of market work.

The decomposition results for the mathematics test scores are summarized in Table 5a. In this case, the test score gap narrows from Round 3 to Round 4 (1.10 standard deviations in Round 3 to 0.97 in Round 4). The explained portion of the test score gap increases from Round 3 (49.6 percent) to Round 4 (60.2 percent). In the case of Round 4, similar to the PPVT results, child and household characteristics are the main contributors to the explained portion of the gap; while for Round 3 child, parent, and household characteristics contribute to the explained portion of the gap in similar proportions. Differences in the socioeconomic level "wealth index" (0.20 in Round 3 and 0.31 in Round 4), and the initial level of human capital (0.04 in Round 3 and 0.08 in Round 4), have a significant contribution to the explained portion of the test score gap in both rounds, and proportion of parents with more than 8 years of education (0.14 in Round 3), also has a significant contribution in Round 3. This set of variables represents 70 percent of the explained portion in Round 3 and 67 percent in Round 4.

[18] In the case of Round 4, the region fixed effects contribute with -0.464 to the explained portion of the gap.

The results for boys and girls are similar. The test score gap decreases from Round 3 to Round 4, the portion of the test score gap explained by differences in endowments increases for the case of girls (and slightly decreases for the case of boys), and the main contributors to the explained portion of the gap are the socioeconomic level and the proportion of parents with more than 8 years of education (this one for Round 3). In the case of boys, hours of market and domestic work and initial level of human capital also contribute to the explained portion of the test score gap.

In 2012, Young Lives added a school survey as part of its data collection. The school survey was conducted for a sub-sample of the younger-cohort children studying in Grades 4 and 5 in all the sentinel sites. The selected schools had to be located within the geographic boundary of the sentinel site. The survey included data about the Young Lives child, his/her peers (20 children per class), class teacher, head teacher and school.[19] While these school variables have the potential to provide additional information on urban-rural education gaps, they are available for only a small sub-sample of the children; analysis of the PPVT includes only 458 children and analysis of the mathematics score includes only 462 children. Some additional regressions, including teacher's characteristics,[20] were estimated for this sub-samples, but the results are generally insignificant due to the small sample size. Moreover, few significant results were somewhat unusual and may reflect random variation in the data. For example, having a teacher who specialized in language had a negative effect on the PPVT test score, but having a teacher who specialized in mathematics had a positive effect on the PPVT test score. Because of these difficulties, the exploratory regressions using the school survey are not included in this chapter.

6.2 Tests Score Decomposition for the Older Cohort

Table 6a summarizes the PPVT decomposition results for children in the older cohort who were 12 and 15 years old at the time of the survey. The test score gap was

[19] http://www.younglives.org.uk/content/ethiopia-school-survey

[20] The teacher's characteristics that were considered included gender, number of years teaching, whether the teacher is specialized on language/mathematics instruction and his/her educational attainment.

0.96 standard deviations in Round 2 and 0.94 in Round 3. In both rounds, most of the gap is explained by differences in endowments (61.6 percent in Round 2 and 163.5 percent in Round 3). Hours in market work is the only variable that has a statistically significant contribution to the explained portion of the gap (0.51 in Round 2, significant at the 10 percent level; 1.42 in Round 3, significant at the 5 percent level). This represents 86.7 percent of the explained portion of the gap in Round 2 and 92.7 percent in Round 3. As shown in Table 3d, children residing in rural areas were working on average 5.7 hours per day and 86 percent were enrolled in school, in contrast to their urban counterparts who worked on average 3.6 hours per day and 99 percent were enrolled in school. Data from Round 3 show that the two main reasons why children do not attend school are: they were needed for domestic or agricultural work (21 percent), and they had to do paid work to earn money (17 percent).[21] Children aged 15 should be attending grades for which education is not free, so this could also be contributing to the differences in enrollment rates.

The PPVT decompositions for the older cohort boys and girls are also presented in Table 6a. The test score gap increases slightly from one round to another in the case of boys (0.89 in Round 2 and 0.91 in Round 3) and decreases slightly for the case of girls (1.02 in Round 2 and 0.97 in Round 3). The proportion of the test score explained by differences in endowments significantly increases for boys (66.4 percent to 127.8 percent) and girls (16.6 percent to 107.4 percent). Differences in hours spend on market work are significant for boys and girls and in both rounds, and in the case of girls, differences in hours of domestic work, also have a significant contribution in Round 3.

Table 7a summarizes the decomposition results for the mathematics test scores for the older cohort. The test score gap increases from Round 2 to Round 3 (0.48 standard deviations in Round 2 to 0.59 in Round 3). The explained portion of the test score gap increases from round to round, going from -6.7 percent of the test score gap in Round 2 to 84.6 percent in Round 3. Differences in the socioeconomic level “wealth index” have a

[21] This reason was reported by one of the parents or the main caregiver.

significant contribution to the explained portion to the test score gap in Round 2 (0.29, significant at the 5 percent).

The results for boys and girls are similar to those for all children. The test score gap increases between rounds, and the portion of the test score gap explained by differences in endowments decreases (in Round 3 it is less than a third of the total gap). The main contributor to the explained portion of the test score gap for boys in Round 3 is hours of market work. For girls, the socioeconomic level is the main contributor to explained portion of the test score gap, which is off-set by a negative and significant effect of parental education in Round 3.

7. Conclusion

The results of this analysis show that there is a wide test score gap between children residing in urban and rural areas of Ethiopia. This test score gap widens as the children age. The test score gap is generally around one standard deviation, with the exception of the mathematics test score gap of the older cohort of children, which is 0.48 standard deviations in Round 2 and 0.59 standard deviations in Round 3.

The explained portion of the PPVT is always positive and contributes more than 50 percent of the test score gap. For the mathematics test score, the explained portion is mainly positive and contributes more than 40 percent of the test score gap, with the exception of the older cohort in Round 2, where the explained portion of the gap is -6.7 percent. In general, the explained portion of the gap is higher for boys than for girls.

The analysis included in this paper could not incorporate data on school and teacher's characteristics, i.e. school quality. Among the variables considered in the analysis, the characteristics that consistently contribute to the explained portion of the gap are: hours of work, parental education and the socioeconomic status of the family, which is in line with the findings of Kingdon (2002) and Ramos et al. (2016), who

concluded that child, parent, and household characteristics are the main determinants of the urban-rural educational gaps in India and Colombia, respectively.

Leaving aside policies that can improve the provision of educational services, such as construction of new schools to teacher training, policies that affect hours of work, parental education and socioeconomic status are needed. One example is short-term policies directing at decreasing child work, such as Conditional Cash Transfers programs, which would increase children's academic performance, especially in rural areas where children spend twice as much time as their urban counterparts performing domestic and market work. In fact, a recent evaluation of the Social Cash Transfer Pilot Programme in the Tigray region Berhane et al. (2015), found that this program increased the likelihood on enrollment by 13.3 percentage points and grade attainment by half of a grade. It also showed that the program helped reduce the hours that children spend on farm and family chores by over one hour per day. These effects could potentially translate into more time available for attending school and studying, which can contribute to higher test scores and educational attainment and thus reduce rural-urban education gaps.

8. Figures

Figure 1 – PPVT Score Distribution - Younger Cohort, Round 3 (8 years)

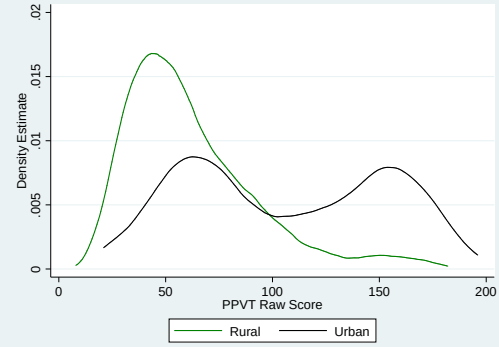


Figure 2 – Math Test Score Distribution Younger Cohort, Round 3 (8 years)

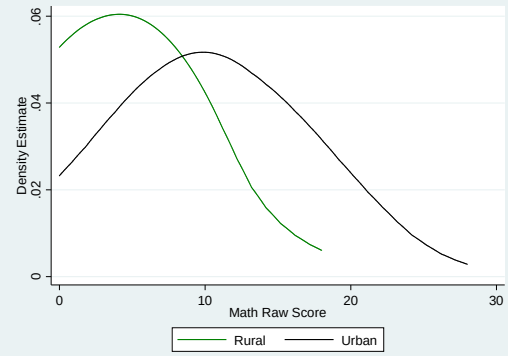


Figure 3 – PPVT Score Distribution- Younger Cohort, Round 4 (12 years)

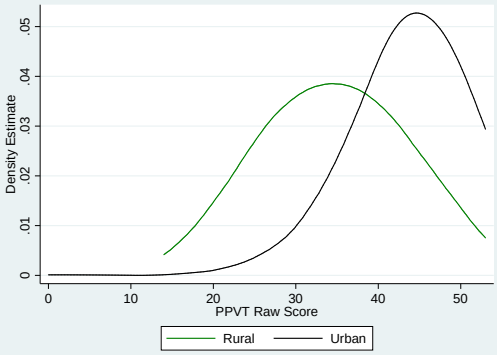


Figure 4 – Math Test Score Distribution Younger Cohort, Round 4 (12 years)

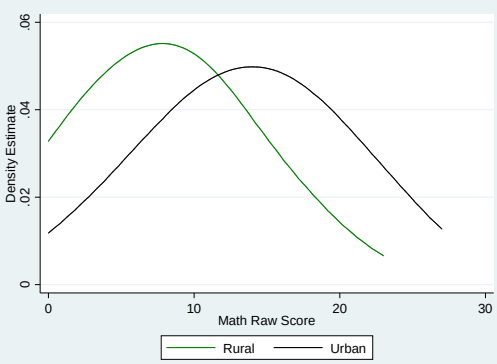


Figure 5 – PPVT Score Distribution Older Cohort, Round 2 (12 years)

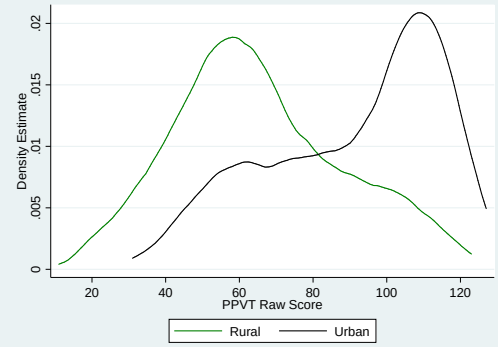


Figure 6 – Math Test Score Distribution Older Cohort, Round 2 (12 years)

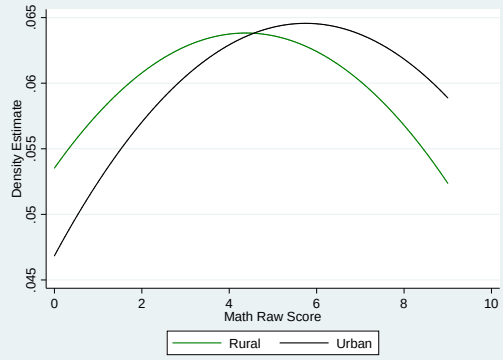


Figure 7 – PPVT Score Distribution Older Cohort, Round 3 (15 years)

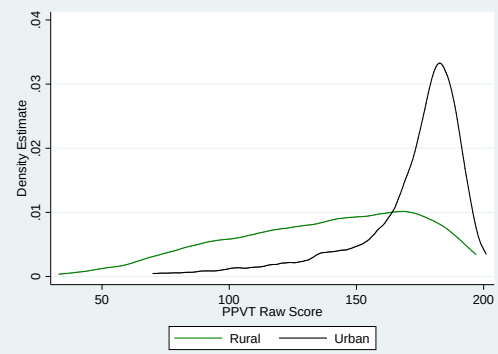


Figure 8 – Math Test Score Distribution Older Cohort, Round 3 (15 years)

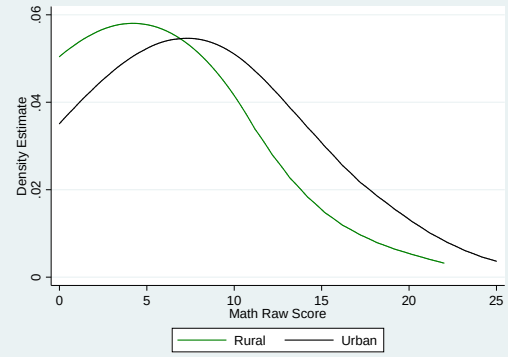
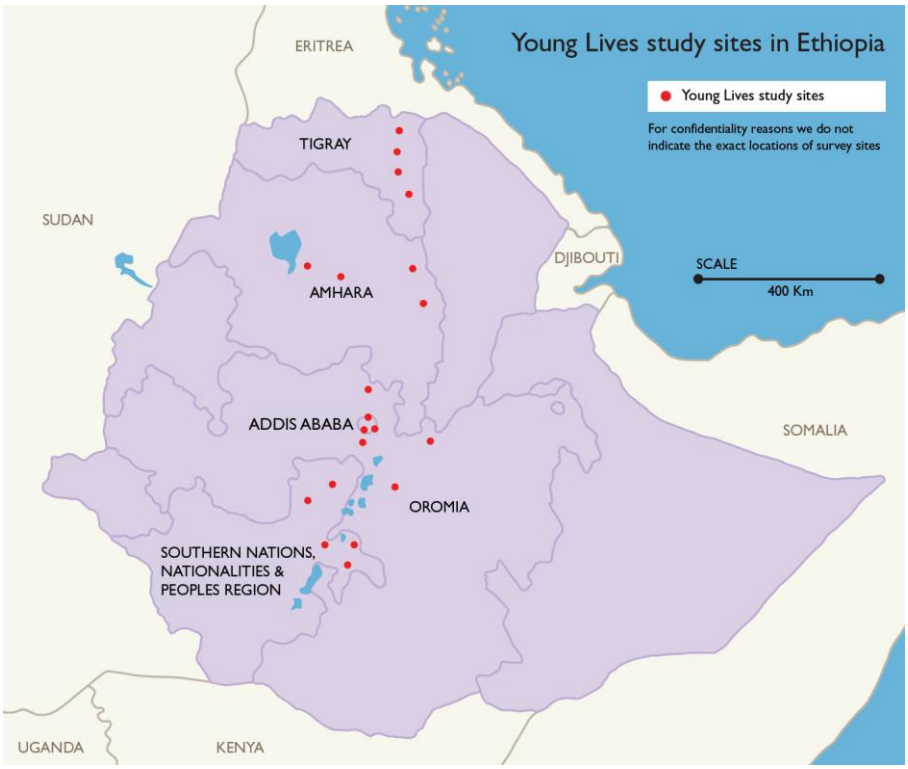


Figure 9 – Young Lives Study communities in Ethiopia



Source: Young Lives

9. Tables

Table 1a – Selected Education Indicators by Area of Residence -Ethiopia 2000

	Urban	Rural	Index (urban = 1)
Gross Enrollment Rates			
Primary Education			
Grades 1-8	111.6	46.2	0.41
Grades 1-4	122.9	65.3	0.53
Grades 5-8	101.1	22.0	0.22
Secondary Education			
Grades 9-12	76.3	0.4	0.01
Higher Education	3.7	0.02	0.01
Student Flow Indicators			
Percentage of cohort ever enrolled in grade 1	90.0	45.3	0.50
Composite cohort survival rate from grade 1			
To grade 4	76.9	55.3	0.72
To grade 8	79.8	19.7	0.25
School Participation Rates by Distance to Nearest Primary School			
Distance from home to nearest primary school			
Less than 1 km.	85.5	43.6	0.51
1-2 km.	83.1	38.8	0.47
3-4 km.	78.9	32.6	0.41
+5 km.	71.0	19.8	0.28
Percentage of Children Ages 7-14 Years registered for school, by mother's native language			
Amrigna	88.1	31.5	0.36
Ormigna	83.7	25.1	0.30
Tigrigna	85.5	24.8	0.29
Somaligna	35.7	11.4	0.32
Afarigna	-	12.9	-
Other	69.6	27.7	0.40

Source: World Bank (2005). Tables 4.2, 4.5, 4.9, and 4.10; using data from 1999-2000 Ethiopia Welfare Monitoring Survey, Ethiopia Household Income and Consumption Expenditure Survey, Education Management Information System Panel (Ministry of Education), and 2000 Demographic and Health Survey.

Table 1b – Selected Education Indicators by Area of Residence - Ethiopia 2015

	Rural	Small town (Urban)	Large town (Urban)
Literacy[A] Rates			
Males			
All	58.5	76.2	90.0
15-19	80.9	86.9	98.2
20-29	76.7	92.4	96.8
30+	51.1	73.1	90.9
Females			
All	39.0	62.1	79.7
15-19	77.5	90.0	95.8
20-29	45.9	77.4	92.6
30+	14.0	39.0	64.2
School Enrollment (ages 7-18)			
Males			
Not Enrolled	32.5	19.0	16.4
Primary	64.8	63.1	61.1
Secondary	2.7	18.0	22.5
Females			
Not Enrolled	33.0	16.4	17.7
Primary	64.4	68.9	60.7
Secondary	2.6	14.7	21.7
School Type			
Government	99.0	94.7	71.6
Non Government	1.0	5.3	28.4

Source: CSA and World Bank (2017). Tables 2.5, 2.6, and 2.7 ; using data from the Ethiopia Socioeconomic Survey 2015-2016.

A: Literacy is self-reported and is defined as the ability to read and write in any language.

Table 2 – Young Lives Sentinel Sites

Cluster ID	District	Anonymised name*	Short description
1	Addis Ababa	Bertukan	An overcrowded area in the centre of the capital city, Addis Ababa
2	Addis Ababa	Duba	An industrial area in the southern part of the city Addis Ababa
3	Addis Ababa	Menderin	A slum area in the capital city, Addis Ababa
4	Amhara	Kok	A tourist town in the Amhara region, with some extremely poor neighbourhoods
5	Amhara	Muz	A poor rural community in the Amhara region
6	Amhara	Enkoy	A rural area near Lake Tana in the Amhara region
7	Amhara	Tach-Meret	A rural food-insecure area in the Amhara region
8	Oromia	Leki	A rural area near lake Ziway in the Oromia region
9	Oromia	Loki	A drought-prone rural area in the Oromia region
10	Oromia	Ananas	A fast-growing town in the Oromia region
11	Oromia	Dinich	A relatively rich rural area in the outskirts of Debrezeit town in the Oromia region
12	SNNP	Timatim	A densely populated rural area growing enset (false banana) in the SNNP region
13	SNNP	Shenkurt	A densely populated town in the SNNP region
14	SNNP	Leku	A fast-growing business and tourist town in the SNNP region
15	SNNP	Buna	A coffee-growing rural area in the SNNP region
16	SNNP	Weyn	A poor and densely populated rural community in the SNNP region
17	Tigray	Zeytuni	A drought-prone rural area highly dependent on government support in the Tigray region
18	Tigray	Selata	An extremely poor rural area dependent on the Productive Safety Net Scheme and other government support in the Tigray region
19	Tigray	Gomen	A small, very poor town in the Tigray region
20	Tigray	Beles	A model rural area in the Tigray region known for its success in soil and water conservation

*Note: Pseudonyms are used for all site names in order to protect the children's anonymity.

Source : http://www.younglives-ethiopia.org/files/country-reports/ethiopia-r4-survey-design

Table 3a – Descriptive Statistics Younger Cohort Round 3 - (8-year-old)

	All Children		Urban		Rural	
	Mean	SD	Mean	SD	Mean	SD
Test Scores						
Currently enrolled in school	0.80	*0.40*	0.90	*0.30*	0.73	*0.44*
PPVT Test Score	79.70	*43.97*	107.00	*47.18*	62.25	*31.10*
Mathematics Test Score	6.54	*5.31*	10.14	*5.55*	4.24	*3.61*
Cognitive Test Score Round 2	-0.02	*1.00*	0.38	*0.94*	-0.27	*0.96*
Child's Characteristics						
Female	0.46	*0.50*	0.47	*0.50*	0.45	*0.50*
Age in Months	97.36	*3.70*	97.58	*3.62*	97.23	*3.75*
Total hours of domestic work per day	1.60	*2.24*	0.24	*0.82*	2.46	*2.42*
Total hours of market work per day	2.42	*1.92*	1.97	*1.63*	2.70	*2.04*
Parents' Characteristics						
Highest educational level of the parents:						
No education	0.48	*0.50*	0.27	*0.45*	0.62	*0.49*
1-3 years	0.14	*0.35*	0.09	*0.29*	0.17	*0.38*
4-8 years	0.17	*0.38*	0.21	*0.41*	0.15	*0.36*
More than 8 years	0.20	*0.40*	0.43	*0.50*	0.06	*0.23*
One Parent Absent	0.15	*0.36*	0.22	*0.42*	0.11	*0.31*
Both Parents Absent	0.01	*0.11*	0.01	*0.08*	0.02	*0.13*
Household Characteristics						
Number of household members	6.22	*1.96*	5.85	*2.07*	6.45	*1.85*
Number of siblings living at home	3.39	*2.13*	2.53	*2.03*	3.95	*2.01*
Wealth Index	0.33	*0.17*	0.47	*0.15*	0.24	*0.12*
Area of Residence						
Addis Ababa	0.14	*0.34*	0.35	*0.48*	0.00	*0.00*
Amhara	0.23	*0.42*	0.13	*0.33*	0.29	*0.45*
Oromia	0.21	*0.41*	0.15	*0.36*	0.25	*0.43*
SNNP	0.21	*0.41*	0.24	*0.43*	0.19	*0.40*
Tigray	0.21	*0.41*	0.13	*0.34*	0.27	*0.44*
Rural	0.61	*0.49*				
Observations	1300		507		793	

Table 3b – Descriptive Statistics Younger Cohort Round 4 - (12-year-old)

	All Children		Urban		Rural	
	Mean	SD	Mean	SD	Mean	SD
Test Scores						
Currently enrolled in school	0.97	*0.17*	0.99	*0.09*	0.95	*0.22*
PPVT Test Score	39.29	*8.32*	43.93	*6.01*	35.16	*7.91*
Mathematics Test Score	10.83	*6.01*	13.87	*5.74*	8.13	*4.84*
Cognitive Test Score Round 2	0.08	*0.98*	0.42	*0.93*	-0.22	*0.93*
Child's Characteristics						
Female	0.46	*0.50*	0.47	*0.50*	0.46	*0.50*
Age in Months	145.55	*3.90*	145.69	*3.82*	145.43	*3.97*
Total hours of domestic work per day	1.54	*2.10*	0.43	*1.16*	2.53	*2.25*
Total hours of market work per day	2.21	*1.61*	2.07	*1.53*	2.33	*1.66*
Parents' Characteristics						
Highest educational level of the parents:						
No education	0.39	*0.49*	0.21	*0.41*	0.56	*0.50*
1-3 years	0.13	*0.33*	0.08	*0.26*	0.18	*0.38*
4-8 years	0.17	*0.37*	0.19	*0.39*	0.14	*0.35*
More than 8 years	0.31	*0.46*	0.52	*0.50*	0.12	*0.33*
One Parent Absent	0.23	*0.42*	0.30	*0.46*	0.16	*0.37*
Both Parents Absent	0.09	*0.28*	0.13	*0.33*	0.06	*0.23*
Household Characteristics						
Number of household members	5.71	*1.90*	5.37	*1.95*	6.02	*1.81*
Number of siblings living at home	3.52	*2.21*	2.64	*2.01*	4.30	*2.08*
Wealth Index	0.40	*0.17*	0.50	*0.16*	0.30	*0.12*
Area of Residence						
Tigray	0.25	*0.43*	0.15	*0.36*	0.34	*0.47*
Amhara	0.24	*0.43*	0.14	*0.35*	0.32	*0.47*
Oromia	0.23	*0.42*	0.17	*0.38*	0.28	*0.45*
SNNP	0.11	*0.31*	0.17	*0.38*	0.06	*0.23*
Other	0.00	*0.04*	0.00	*0.06*	0.00	*0.00*
Addis Ababa	0.17	*0.38*	0.36	0.48	0.00	0.00
Rural	0.53	*0.50*				
Observations	1263		597		672	

Table 3c – Descriptive Statistics Older Cohort Round 2 - (12-year-old)

	All Children		Urban		Rural	
	Mean	SD	Mean	SD	Mean	SD
Test Scores						
Currently enrolled in school	0.97	*0.17*	0.98	*0.13*	0.96	*0.19*
PPVT Test Score	75.49	*25.82*	90.19	*23.69*	66.18	*22.61*
Mathematics Test Score	4.88	*2.42*	5.66	*2.17*	4.39	*2.45*
Child's Characteristics						
Female	0.50	*0.50*	0.51	*0.50*	0.49	*0.50*
Age in Months	145.21	*3.75*	145.29	*3.63*	145.15	*3.82*
Total hours of domestic work per day	1.52	*1.91*	0.49	*1.27*	2.17	*1.97*
Total hours of market work per day	2.70	*1.82*	2.70	*1.88*	2.69	*1.79*
Parents' Characteristics						
Highest educational level of the parents:						
No education	0.54	*0.50*	0.31	*0.46*	0.69	*0.46*
1-3 years	0.14	*0.35*	0.14	*0.35*	0.14	*0.35*
4-8 years	0.16	*0.37*	0.22	*0.41*	0.12	*0.33*
More than 8 years	0.16	*0.36*	0.33	*0.47*	0.05	*0.21*
One Parent Absent	0.15	*0.35*	0.20	*0.40*	0.11	*0.31*
Both Parents Absent	0.02	*0.14*	0.03	*0.17*	0.01	*0.12*
Household Characteristics						
Number of household members	6.55	*2.06*	6.03	*2.03*	6.89	*2.02*
Number of siblings living at home	3.84	*2.12*	3.10	*2.04*	4.30	*2.04*
Wealth Index	0.29	*0.17*	0.44	*0.14*	0.20	*0.11*
Area of Residence						
Addis Ababa	0.14	*0.35*	0.36	*0.48*	0.00	*0.00*
Amhara	0.18	*0.38*	0.12	*0.32*	0.21	*0.41*
Oromia	0.22	*0.41*	0.15	*0.35*	0.26	*0.44*
SNNP	0.24	*0.43*	0.26	*0.44*	0.23	*0.42*
Tigray	0.22	*0.42*	0.11	*0.32*	0.30	*0.46*
Rural	0.61	*0.49*				
Observations	707		274		433	

Table 3d – Descriptive Statistics Older Cohort Round 3 - (15-year-old)

	All Children		Urban		Rural	
	Mean	SD	Mean	SD	Mean	SD
Test Scores						
Currently enrolled in school	0.91	*0.29*	0.99	*0.12*	0.86	*0.35*
PPVT Test Score	149.86	*36.90*	170.87	*24.13*	137.02	*37.47*
Mathematics Test Score	5.85	*4.88*	7.68	*5.03*	4.72	*4.43*
Child's Characteristics						
Female	0.49	*0.50*	0.51	*0.50*	0.48	*0.50*
Age in Months	180.32	*3.48*	180.62	*3.38*	180.13	*3.53*
Total hours of domestic work per day	1.74	*2.48*	0.76	*1.77*	2.35	*2.65*
Total hours of market work per day	3.18	*1.96*	2.85	*1.62*	3.38	*2.12*
Parents' Characteristics						
Highest educational level of the parents:						
No education	0.56	*0.50*	0.31	*0.46*	0.71	*0.45*
1-3 years	0.13	*0.34*	0.13	*0.34*	0.13	*0.34*
4-8 years	0.16	*0.36*	0.22	*0.42*	0.12	*0.32*
More than 8 years	0.15	*0.36*	0.34	*0.47*	0.04	*0.20*
One Parent Absent	0.19	*0.40*	0.26	*0.44*	0.15	*0.36*
Both Parents Absent	0.01	*0.12*	0.02	*0.15*	0.01	*0.10*
Household Characteristics						
Number of household members	6.43	*2.02*	6.00	*2.06*	6.70	*1.95*
Number of siblings living at home	4.12	*2.17*	3.25	*2.05*	4.66	*2.07*
Wealth Index	0.34	*0.16*	0.48	*0.14*	0.26	*0.12*
Area of Residence						
Addis Ababa	0.14	*0.35*	0.37	*0.48*	0.00	*0.00*
Amhara	0.19	*0.39*	0.12	*0.32*	0.24	*0.42*
Oromia	0.22	*0.41*	0.14	*0.35*	0.26	*0.44*
SNNP	0.23	*0.42*	0.25	*0.44*	0.22	*0.42*
Tigray	0.22	*0.41*	0.12	*0.33*	0.28	*0.45*
Rural	0.62	*0.49*				
Observations	704		267		437	

Table 4a - PPVT Score Decomposition between Rural and Urban Children, Younger Cohort (Round 3 – 8-year-olds, Round 4 – 12-year-olds)

	All Children				Males				Females			
	OLS		IV		OLS		IV		OLS		IV	
	R3	R4	R3	R4	R3	R4	R3	R4	R3	R4	R3	R4
Decomposition:												
Mean Test Score (Urban)	0.612	0.609	0.612	0.609	0.646	0.62	0.646	0.620	0.573	0.597	0.573	0.597
Mean Test Score (Rural)	-0.391	-0.513	-0.391	-0.513	-0.413	-0.469	-0.413	-0.469	-0.364	-0.564	-0.364	-0.564
Raw differential (R) {Urban-Rural}:	1.003	1.122	1.003	1.122	1.059	1.089	1.059	1.089	0.937	1.161	0.937	1.161
- due to endowments (E):	0.692	0.595	0.589	0.583	0.713	0.688	0.638	0.839	0.398	0.522	0.327	0.702
- due to coefficients (C):	-0.127	0.397	0.099	0.555	-0.39	0.411	0.105	0.597	-0.017	0.448	0.032	0.533
- due to interaction (CE):	0.438	0.131	0.315	-0.016	0.737	-0.01	0.316	-0.347	0.557	0.191	0.578	-0.074
	0	0			0	0			0	0		
Unexplained (U){C+(1-D)CE}:	0.311	0.527	0.414	0.539	0.346	0.401	0.421	0.250	0.539	0.639	0.610	0.459
Explained (V) {E+D*CE}:	0.692	0.595	0.589	0.583	0.713	0.688	0.638	0.839	0.398	0.522	0.327	0.702
% unexplained {U/R}:	31.0	47.0	41.288	48.074	32.7	36.8	39.8	23.0	57.6	55.0	65.1	39.5
% explained (V/R):	69.0	53.0	58.712	51.926	67.3	63.2	60.2	77.0	42.4	45.0	34.9	60.5
Endowments:												
Child's Charactristics	0.194	0.269	0.317	0.549	0.262	0.349	0.395	0.624	0.142	0.174	-0.013	0.340
Parents' Characteristics	0.094	-0.078	0.091	-0.081	0.087	-0.062	0.079	-0.059	0.104	-0.097	0.115	-0.089
Household Characteristics	0.272	0.570	0.207	0.578	0.240	0.531	0.185	0.430	0.295	0.599	0.357	0.563
Region Fixed Effects	0.133	-0.166	-0.027	-0.464	0.078	-0.083	-0.021	-0.156	-0.144	-0.154	-0.131	-0.112
Observations	1349	1423	1349	1423	730	760	730	760	619	663	619	663

Notes :

R : Raw differential
E : Raw differential due to endowments
C: Raw differential due to coefficients
CE: Raw differential due to interaction

D: Matrix of weights. For the case presented here D = 0

Table 4b – Endowment Contributions to the PPVT Score Decomposition, Younger Cohort (Round 3 – 8-year-olds, Round 4 – 12-year-olds)

	All Children				Males				Females			
	OLS		IV		OLS		IV		OLS		IV	
	R3	R4	R3	R4	R3	R4	R3	R4	R3	R4	R3	R4
Endowments:												
Child's Charactristics												
Female	0.000	-0.003	-0.003	-0.017								
Age in Months	**0.022***	**0.010***	**0.022***	0.005	0.014	0.007	0.013	0.007	**0.035***	0.013	**0.032***	0.010
Cognitive Test Score Round 2	**0.055*****	**0.059*****	**0.058*****	**0.060****	**0.087*****	**0.072****	**0.092*****	**0.063****	0.032	0.045	0.029	**0.055***
Total hours of domestic work	0.012	0.004	0.003	**-0.117***	0.008	-0.003	0.024	-0.021	0.016	0.010	-0.026	-0.013
Total hours of market work	**0.104*****	**0.199*****	**0.237****	**0.618*****	**0.153*****	**0.273*****	**0.265****	**0.574***	**0.058***	**0.106*****	-0.047	**0.288****
Parents' Characteristics												
Parents Education: 1-3 years	-0.003	-0.011	-0.002	0.001	0.002	-0.011	0.002	-0.013	-0.011	-0.012	-0.012	-0.011
Parents Education: 4-8 years	0.001	0.001	0.001	-0.014	0.003	-0.001	0.003	0.000	-0.001	0.003	0.000	0.002
Parents Education: more than 8 years	**0.107*****	-0.048	**0.104****	-0.052	**0.114****	-0.031	**0.107****	-0.024	**0.106***	-0.068	**0.118***	-0.074
One Parent Absent	-0.011	-0.006	-0.012	-0.014	**-0.032****	0.003	**-0.033****	-0.007	0.012	-0.016	0.010	-0.003
Both Parents Absent	0.001	-0.014	0.000	-0.002	0.000	**-0.022***	0.000	-0.015	-0.001	-0.005	-0.001	-0.003
Household Characteristics												
Number of household members	0.008	**0.031****	0.007	0.026	0.008	0.012	0.006	0.004	0.003	**0.051****	0.003	0.040
Number of siblings living at home	0.030	**0.059****	0.020	0.049	0.031	**0.087****	0.025	**0.077***	0.030	0.035	0.044	0.035
Wealth Index	**0.234*****	**0.480*****	**0.181****	**0.503*****	**0.201*****	**0.433*****	**0.154****	**0.349*****	**0.262*****	**0.513*****	**0.311*****	**0.488*****
Observations	1349	1423	1349	1423	730	760	730	760	619	663	619	663

*** p<0.01, ** p<0.05, * p<0.1

Table 5a – Mathematics Test Score Decomposition between Rural and Urban Children, Younger Cohort (Round 3 – 8-year-olds, Round 4 – 12-year-olds)

	All Children				Males				Females			
	OLS		IV		OLS		IV		OLS		IV	
	R3	R4	R3	R4	R3	R4	R3	R4	R3	R4	R3	R4
Decomposition:												
Mean Test Score (Urban)	0.665	0.540	0.665	0.540	0.715	0.526	0.715	0.526	0.608	0.557	0.608	0.557
Mean Test Score (Rural)	-0.433	-0.428	-0.433	-0.428	-0.419	-0.416	-0.419	-0.416	-0.451	-0.443	-0.451	-0.443
Raw differential (R) {Urban-Rural}:	1.098	0.969	1.098	0.969	1.134	0.942	1.134	0.942	1.059	0.999	1.059	0.999
- due to endowments (E):	0.428	0.478	0.545	0.583	0.461	0.608	0.651	0.526	0.313	0.317	0.322	0.529
- due to coefficients (C):	0.163	0.336	0.305	0.443	-0.011	0.301	0.250	0.447	0.333	0.324	0.387	0.408
- due to interaction (CE):	0.507	0.155	0.249	-0.058	0.683	0.033	0.233	-0.032	0.413	0.359	0.351	0.062
Unexplained (U){C+(1-D)CE}:	0.670	0.491	0.553	0.385	0.672	0.334	0.482	0.416	0.746	0.683	0.738	0.470
Explained (V) {E+D*CE}:	0.428	0.478	0.545	0.583	0.461	0.608	0.651	0.526	0.313	0.317	0.322	0.529
% unexplained {U/R}:	61.0	50.7	50.4	39.8	59.3	35.4	42.5	44.1	70.4	68.3	69.6	47.1
% explained (V/R):	39.0	49.3	49.6	60.2	40.7	64.6	57.4	55.9	29.6	31.7	30.4	52.9
Endowments:												
Child's Charactristics	0.158	0.211	0.150	0.183	0.237	0.270	0.369	0.164	0.103	0.160	-0.037	0.264
Parents' Characteristics	0.122	0.037	0.129	0.038	0.135	0.032	0.138	0.031	0.117	0.025	0.125	0.026
Household Characteristics	0.199	0.280	0.188	0.322	0.138	0.342	0.064	0.381	0.242	0.200	0.301	0.191
Region Fixed Effects	-0.052	-0.050	0.079	0.040	-0.049	-0.035	0.080	-0.050	-0.148	-0.068	-0.067	0.048
Observations	1316	1388	1316	1388	714	747	714	747	602	641	602	641

Notes :

R : Raw differential
E : Raw differential due to endowments
C: Raw differential due to coefficients
CE: Raw differential due to interaction
D: Matrix of weights. For the case presented here D = 0

Table 5b – Endowment Contributions to the Mathematics Test Score Decomposition, Younger Cohort (Round 3 – 8-year-olds, Round 4 – 12-year-olds)

	All Children				Males				Females			
	OLS		IV		OLS		IV		OLS		IV	
	R3	R4	R3	R4	R3	R4	R3	R4	R3	R4	R3	R4
Endowments:												
Child's Charactristics												
Female	0.000	0.000	-0.002	-0.003								
Age in Months	0.007	0.005	0.007	0.004	0.002	0.003	0.002	0.003	0.015	0.006	0.013	0.005
Cognitive Test Score Round 2	**0.045*** **	**0.076*** **	**0.043** **	**0.080*** **	**0.074*** **	**0.083*** **	**0.078*** **	**0.084*** **	0.023	**0.070** **	0.021	**0.074** **
Total hours of domestic work	**0.033*** **	**0.014***	0.004	-0.059	**0.023** **	0.000	0.001	0.001	**0.039***	**0.044***	0.022	0.050
Total hours of market work	**0.074*** **	**0.116*** **	0.098	0.162	**0.137*** **	**0.185*** **	**0.288***	0.077	0.025	0.040	-0.093	0.135
Parents' Characteristics												
Parents Education: 1-3 years	0.003	-0.008	0.004	-0.003	0.004	-0.005	0.004	-0.004	0.001	-0.012	-0.002	-0.011
Parents Education: 4-8 years	-0.002	0.001	-0.002	0.000	-0.004	0.000	-0.002	-0.001	0.000	0.001	0.001	0.001
Parents Education: more than 8 years	**0.135*** **	0.053	**0.140*** **	0.053	**0.159*** **	0.049	**0.166*** **	0.045	**0.115***	0.049	**0.127** **	0.047
One Parent Absent	-0.011	-0.002	-0.011	-0.005	**-0.025***	-0.006	**-0.030** **	-0.001	0.006	-0.003	0.003	-0.001
Both Parents Absent	-0.002	-0.007	-0.002	-0.007	0.000	-0.005	0.000	-0.009	-0.005	-0.010	-0.005	-0.012
Household Characteristics												
Number of household members	0.015	0.003	0.016	0.008	0.013	0.002	0.009	0.006	0.014	0.004	0.012	-0.001
Number of siblings living at home	-0.022	0.002	-0.027	0.003	0.000	0.035	-0.009	0.038	-0.042	-0.041	-0.023	-0.038
Wealth Index	**0.206*** **	**0.275*** **	**0.198*** **	**0.311*** **	**0.125***	**0.305*** **	0.065	**0.337*** **	**0.270*** **	**0.236*** **	**0.313*** **	**0.230*** **
Observations	1316	1388	1316	1388	714	747	714	747	602	641	602	641

*** p<0.01, ** p<0.05, * p<0.1

Table 6a - PPVT Score Decomposition between Rural and Urban Children, Older Cohort (Round 2 – 12-year-olds, Round 3 – 15-year-olds)

	All Children				Males				Females			
	OLS		IV		OLS		IV		OLS		IV	
	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3
Decomposition:												
Mean Test Score (Urban)	0.544	0.548	0.544	0.548	0.531	0.610	0.531	0.610	0.557	0.488	0.557	0.488
Mean Test Score (Rural)	-0.411	-0.389	-0.411	-0.389	-0.362	-0.300	-0.362	-0.300	-0.463	-0.487	-0.463	-0.487
Raw differential (R) {Urban-Rural}:	0.955	0.937	0.955	0.937	0.892	0.910	0.892	0.910	1.021	0.974	1.021	0.974
- due to endowments (E):	0.269	0.695	0.588	1.532	0.212	0.813	0.592	1.162	0.249	0.695	0.169	1.046
- due to coefficients (C):	0.289	0.521	0.330	0.524	0.371	0.533	0.422	0.539	0.337	0.541	0.332	0.552
- due to interaction (CE):	0.398	-0.279	0.038	-1.118	0.309	-0.436	-0.122	-0.792	0.434	-0.262	0.519	-0.625
Unexplained (U){C+(1-D)CE}:	0.686	0.242	0.367	-0.595	0.680	0.097	0.300	-0.253	0.771	0.279	0.851	-0.072
Explained (V) {E+D*CE}:	0.269	0.695	0.588	1.532	0.212	0.813	0.592	1.162	0.249	0.695	0.169	1.046
% unexplained {U/R}:	71.9	25.8	38.4	-63.5	76.2	10.6	33.6	-27.8	75.6	28.7	83.4	-7.4
% explained (V/R):	28.1	74.2	61.6	163.5	23.8	89.4	66.4	127.8	24.4	71.3	16.6	107.4
Endowments:												
Child's Charactristics	0.171	0.158	0.520	1.671	0.191	0.204	0.643	0.826	0.101	0.134	-0.028	0.636
Parents' Characteristics	0.045	0.180	0.061	0.247	-0.008	0.118	0.020	0.196	0.146	0.278	0.161	0.208
Household Characteristics	0.142	0.447	0.067	-0.095	0.030	0.492	-0.023	0.241	0.127	0.372	0.162	0.254
Region Fixed Effects	-0.089	-0.089	-0.060	-0.291	-0.001	-0.001	-0.047	-0.101	-0.124	-0.089	-0.126	-0.051
Observations	728	728	728	728	368	370	368	370	360	358	360	358

Notes :

R : Raw differential

E : Raw differential due to endowments
C: Raw differential due to coefficients
CE: Raw differential due to interaction
D: Matrix of weights. For the case presented here D = 0

Table 6b – Endowment Contributions to the PPVT Score Decomposition, Older Cohort (Round 2 – 12-year-olds, Round 3 – 15-year-olds)

	All Children				Males				Females			
	OLS		IV		OLS		IV		OLS		IV	
	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3
Endowments:												
Child's Charactristics												
Female	-0.005	-0.009	-0.006	-0.037								
Age in Months	0.005	0.005	0.005	0.019	-0.010	0.007	-0.008	0.011	0.020	-0.017	0.020	-0.017
Total hours of domestic work	0.003	0.018	0.012	0.265	-0.020	0.000	-0.043	-0.005	-0.003	**0.094***	-0.019	**0.385***
Total hours of market work	**0.168*****	**0.144*****	**0.510***	**1.423****	**0.222*****	**0.197*****	**0.693****	**0.820****	**0.083****	**0.057****	-0.029	**0.268***
Parents' Characteristics												
Parents Education: 1-3 years	0.000	0.000	0.000	-0.001	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.000
Parents Education: 4-8 years	0.007	**0.035****	0.015	0.037	-0.001	0.019	0.012	0.029	0.021	**0.053***	0.021	0.039
Parents Education: more than 8 years	0.043	**0.133****	0.043	0.153	0.015	0.079	0.021	0.106	0.131	0.213	0.151	0.145
One Parent Absent	0.003	0.019	0.009	0.057	0.013	0.037	0.012	0.053	-0.006	0.013	-0.010	0.027
Both Parents Absent	-0.008	-0.007	-0.007	0.001	-0.034	-0.018	-0.025	0.008	-0.002	-0.002	-0.002	-0.002
Household Characteristics												
Number of household members	-0.028	0.022	-0.042	-0.010	-0.072	0.031	**-0.113***	0.001	0.030	0.008	0.028	0.021
Number of siblings living at home	0.039	0.054	0.042	-0.007	0.089	0.077	**0.112***	0.061	-0.038	0.011	-0.027	-0.027
Wealth Index	0.130	**0.372*****	0.067	-0.078	0.014	**0.385*****	-0.022	0.179	0.135	**0.353****	0.161	0.260
Observations	728	728	728	728	368	370	368	370	360	358	360	358

*** p<0.01, ** p<0.05, * p<0.1

Table 7a – Mathematics Test Score Decomposition between Rural and Urban Children, Older Cohort (Round 2 – 12-year-olds, Round 3 – 15-year-olds)

	All Children				Males				Females			
	OLS		IV		OLS		IV		OLS		IV	
	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3
Decomposition:												
Mean Test Score (Urban)	0.309	0.354	0.309	0.354	0.359	0.499	0.359	0.499	0.261	0.215	0.261	0.215
Mean Test Score (Rural)	-0.169	-0.236	-0.169	-0.236	-0.107	-0.082	-0.107	-0.082	-0.229	-0.389	-0.229	-0.389
Raw differential (R) {Urban-Rural}:	0.478	0.591	0.478	0.591	0.466	0.581	0.466	0.581	0.490	0.604	0.490	0.604
- due to endowments (E):	0.302	0.239	-0.032	0.499	0.364	0.091	0.344	0.413	0.239	0.173	0.232	0.199
- due to coefficients (C):	-0.152	0.020	-0.127	0.062	-0.022	0.097	-0.062	0.179	-0.419	-0.109	-0.283	-0.070
- due to interaction (CE):	0.328	0.332	0.637	0.029	0.125	0.393	0.185	-0.011	0.670	0.539	0.542	0.475
Unexplained (U){C+(1-D)CE}:	0.176	0.352	0.510	0.091	0.102	0.49	0.123	0.168	0.251	0.431	0.259	0.405
Explained (V) {E+D*CE}:	0.302	0.239	-0.032	0.499	0.364	0.091	0.344	0.413	0.239	0.173	0.232	0.199
% unexplained {U/R}:	36.8	59.6	106.7	15.4	22	84.3	26.3	28.9	51.2	71.4	52.8	67.1
% explained (V/R):	63.2	40.4	-6.7	84.6	78	15.7	73.7	71.1	48.8	28.6	47.2	32.9
Endowments:												
Child's Charactristics	0.032	0.148	-0.280	0.533	0.160	0.244	0.125	0.764	-0.067	0.070	-0.046	0.150
Parents' Characteristics	0.082	-0.021	0.009	-0.006	0.123	0.081	0.117	0.137	-0.015	-0.313	-0.022	-0.312
Household Characteristics	0.211	0.125	0.267	0.009	0.095	-0.131	0.100	-0.310	0.373	0.383	0.376	0.381
Region Fixed Effects	-0.022	-0.014	-0.028	-0.036	-0.014	-0.102	0.001	-0.177	-0.052	0.034	-0.076	-0.021
Observations	714	713	714	713	352	353	352	353	362	360	362	360

Notes :

R : Raw differential
E : Raw differential due to endowments
C: Raw differential due to coefficients
CE: Raw differential due to interaction
D: Matrix of weights. For the case presented here D = 0

Table 7b – Endowment Contributions to the Mathematics Test Score Decomposition, Older Cohort (Round 2 – 12-year-olds, Round 3 – 15-year-olds)

	All Children				Males				Females			
	OLS		IV		OLS		IV		OLS		IV	
	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3
Endowments:												
Child's Charactristics												
Female	0.000	-0.002	-0.002	-0.004								
Age in Months	0.001	0.006	0.001	0.008	-0.006	0.002	-0.006	0.002	0.004	-0.006	0.003	-0.006
Total hours of domestic work	0.000	**0.028***	-0.007	0.093	-0.016	-0.004	-0.009	-0.011	-0.007	0.032	-0.020	0.111
Total hours of market work	0.031	**0.116*****	-0.272	0.435	**0.182***	**0.247*****	0.141	**0.772****	-0.064	**0.044****	-0.029	0.045
Parents' Characteristics												
Parents Education: 1-3 years	-0.001	0.000	-0.001	-0.001	0.001	0.002	0.001	0.002	-0.005	-0.002	-0.004	-0.002
Parents Education: 4-8 years	-0.005	-0.008	-0.027	-0.003	-0.007	-0.012	-0.009	0.005	0.000	0.002	-0.001	-0.005
Parents Education: more than 8 years	0.084	-0.014	0.029	-0.017	0.080	0.056	0.077	0.066	0.000	**-0.309****	-0.007	**-0.299****
One Parent Absent	0.012	0.011	0.009	0.026	0.048	0.035	0.049	**0.064***	-0.007	-0.002	-0.006	-0.002
Both Parents Absent	-0.008	-0.010	-0.002	-0.012	-	0.000	0.000	0.000	-0.003	-0.003	-0.003	-0.003
Household Characteristics												
Number of household members	-0.035	0.022	-0.036	0.021	-0.067	-0.013	-0.065	-0.029	-0.031	0.021	-0.031	0.026
Number of siblings living at home	0.030	-0.027	0.016	-0.052	0.062	0.028	0.061	-0.005	0.035	-0.037	0.029	-0.055
Wealth Index	**0.216****	0.130	**0.287****	0.041	0.100	-0.146	0.104	**-0.275***	**0.369****	**0.399****	**0.378****	**0.410*****
Observations	714	713	714	713	352	353	352	353	362	360	362	360

*** p<0.01, ** p<0.05, * p<0.1

Bibliography

Ammermueller, A. (2007). PISA: What makes the difference? *Empirical Economics*, *33*(2), 263-287.

Berhane et al. (2015). "Evaluation of the Social Cash Transfer Pilot Programme. Tigray Region, Ethiopia. Endline Report." Evaluation Report. https://www.unicef.org/evaldatabase/files/UNICEF_Tigray_Endline_Report_FINAL_Ethiopia_2015-051.pdf

Blinder, A. S. (1973). Wage Discrimination: Reduced Form and Structural Estimates. *Journal of Human Resources*, 436-455.

Burger, R. (2011). School effectiveness in Zambia: The origins of differences between rural and urban outcomes. *Development Southern Africa*, *28*(2), 157-176.

Central Statistical Agency of Ethiopia (CSA) and World Bank (2017). "LSMS – Integrated Surveys of Agriculture Ethiopia Socioeconomic Survey (EES) 2015/2016". Survey Report. http://microdata.worldbank.org/index.php/catalog/2783/download/39555

Cuesta, A. (2017) *Essays in Development Economics and Applied Microeconomics*. (PhD diss, University of Minnesota).

Cueto, S., and Leon, J. (2012). "Psychometric characteristics of cognitive development and achievement instruments in Round 3 of Young Lives". *Young Lives Technical Note, 25.*

Cueto, S., Leon, J., Guerrero, G., and Muñoz, I. (2009). "Psychometric characteristics of cognitive development and achievement instruments in Round 2 of Young Lives". *Young Lives Technical Note, 15.*

Darity Jr, W. A., and Mason, P. L. (2004). Evidence on discrimination in employment: Codes of color, codes of gender. In *African American Urban Experience: Perspectives from the Colonial Period to the Present* (pp. 156-186). Palgrave Macmillan US.

Edmonds, E. V. (2007). "Child labor". *Handbook of Development Economics*, *4*, 3607-3709.

Gavonel, M. (2017) "Patterns and Drivers of Internal Migration Among Youth in Ethiopia, India, Peru and Vietnam". *Young Lives Working Paper, 169.*

Hannum, E. (1999). Political change and the urban-rural gap in basic education in China, 1949-1990. *Comparative Education Review*, *43*(2), 193-211.

Kingdon, G. (2002). The gender gap in educational attainment in India: How much can be explained? *Journal of Development Studies*, *39*(2), 25-53.

Lounkaew, K. (2013). Explaining urban–rural differences in educational achievement in Thailand: Evidence from PISA literacy data. *Economics of Education Review*, *37*, 213-225.

Ministry of Education (2015). *Education Statistics Annual Abstract – 2006 E.C. (2013/2014).* Education Management Information System and ICTDirectorate, Ministry of Education, Federal Democratic Republic of Ethiopia. Addis Ababa, Ethiopia.

Montenegro, C. E., and Patrinos, H. A. (2014). "Comparable estimates of returns to schooling around the world". *Policy Research working paper*; no. WPS 7020. Washington, DC: World Bank Group.

Myers Jr, S. L., Kim, H., and Mandala, C. (2004). The Effect of School Poverty on Racial Gaps in Test Scores: The case of the Minnesota Basic Standards Tests. *Journal of Negro Education*, 81-98.

Nieto, S., and Ramos, R. (2014). Decomposition of Differences in PISA Results in Middle Income Countries. *IREA Institute of Applied Economics, Working Paper 2014/08, Regional Quantitative Analysis Research Group, Working Paper 2014/04.*

Ñopo, H. (2008). Matching as a Tool to Decompose Wage Gaps. *The Review of Economics and Statistics*, *90*(2), 290-299.

O'Donnell, O., Van Doorslaer, E., Wagstaff, A., and Lindelow, M. (2008). *Analyzing Health Equity Using Household Survey Data*. Washington, DC: World Bank.

O'Neill, J. E., and O'Neill, D. M. (2006). What do wage differentials tell about labor market discrimination? In *The Economics of Immigration and Social Diversity* (pp. 293-357). Emerald Group Publishing Limited.

Oaxaca, R. (1973). Male-female Wage Differentials in Urban Labor Markets. *International Economic Review*, 693-709.

Oaxaca, R. L., and Ransom, M. R. (1994). On Discrimination and the Decomposition of Wage Differentials. *Journal of Econometrics*, *61*(1), 5-21.

Orazem, P. F., and Gunnarsson, V. (2004). *Child Labor, School Attendance and Performance: A Review*. Iowa State University, Department of Economics.

Ramos Lobo, R., Duque, J. C., and Nieto, S. (2016). Decomposing the rural-urban differential in student achievement in Colombia using PISA microdata. *Estudios de Economía Aplicada, 2016, vol. 34, num. 2, p. 379-412*.

Reimers, C. W. (1983). Labor Market Discrimination against Hispanic and Black Men. *The Review of Economics and Statistics*, 570-579.

UNESCO (2006). *World Data on Education.: Ethiopia.* 6th Edition.

World Bank (2005) *Education in Ethiopia: Strengthening the Foundation for Sustainable Progress*. World Bank Country Study. Washington, DC.

World Development Indicators. World Bank. http://data.worldbank.org/data-catalog/world-development-indicators

Young Lives. (2014). *Young Lives Survey Design and Sampling in Ethiopia. Preliminary Findings from the 2013 Young Lives Survey (Round 4).* University of Oxford.