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BACKGROUND PAPER TO THE 2007 WORLD DEVELOPMENT REPORT

Child labor across the developing world: Patterns and correlations[*]

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Abstract.

The aim of this study is two-fold. First, based on summary data at the country-level for an unusually large set of developing countries originally obtained from household sample surveys conducted between 1993 and 2003, we construct a detailed profile of child economic activity and child labor, attempting, wherever the data permit, to identify similarities and differences across regions and between genders. Second, we link our country-level data on child economic activity and child labor to country-level indicators of the state of economic and social development in the same time period in order to (1) ascertain if cross-country correlations previously identified in the literature are found in our data and (2) illumine other possible correlations that may exist. As part of this exercise, we examine one important relationship that has thus far not been directly investigated in the literature, namely, the cross-country correlation between child labor, agriculture and poverty.

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I. Introduction

By most indications, child labor appears to be a phenomenon of major proportions in the developing world. The International Labour Organization (ILO) estimates that around 190 million children between 5-14 years of age were economically active in 2004 (ILO 2006).[1] This figure represents slightly less than 16 percent of all children in this age group.

The extent of the phenomenon across the developing world in general and in certain regions and countries in particular, as well as concerns that child labor may largely be an undesirable economic or social outcome, have motivated a substantial amount of research into understanding the causes and effects of child labor as well as the effects of changing economic conditions and various policy and project interventions designed to address the issue.

The aim of this study is two-fold. First, based on summary data at the country-level for an unusually large set of developing countries originally obtained from household sample surveys conducted between 1993 and 2003, we construct a detailed profile of child economic activity and child labor, attempting, wherever the data permit, to identify similarities and differences across regions and between genders. Second, we link our country-level data on child economic activity and child labor to country-level indicators of the state of economic and social development in the same time period in order to (1) ascertain if cross-country correlations previously identified in the literature are found in our data and (2) illumine other possible correlations that may exist. As part of this exercise, we examine one important relationship that has thus far not been directly investigated in the literature, namely, the cross-country correlation between child labor, agriculture and poverty.

In the next section, we describe the definition of children's economic activity and child labor. Section III describes the cross section patterns, the sectoral and gender distribution of children's work. Section IV briefly summarizes the evidence on the consequences of child labor on human capital accumulation. Section V presents evidence on the relationship between child labor, income constraints and the structure of the economy measured by the share of the agriculture sector. We conclude in section IV.

II. Measuring Child Labor: Definitions and pitfalls

There is no universally agreed upon measure of child labor. Definitions of the relevant age of the child and the type of work vary across studies and surveys.[2] Three basic categories are identified: economic activity, child labor, and hazardous work. Severe limitations characterize these indicators. They are hard to measure, exclude important activities that children undertake in own household (chores), and are subject to important seasonal variations.

The data allows us to examine child economic activity and child labor. Child economic activity is defined as all paid work and certain forms of unpaid work (e.g., unpaid work in own-household enterprises). In line with the international definition of employment, the child is

[1] The 29 countries were selected with probability proportional to size from a sample of countries stratified on the basis of geographic region and the country's child population (5-17 years of age) size. Several adjustments were made to harmonize the child work data across different dimensions. These adjustments are delineated in ILO 2002.
[2] The ICLS 2008 is expected to agree on a definition of child labor.

classified as economically active if the child performs such work for at least one hour in a stipulated reference week during the regular school year.

Child labor as defined by the ILO comprises of (i) all children between 5-11 years of age who are economically active, (ii) children between 12-14 years of age who work in an economic activity for 14 or more hours per week, and (iii) children between 12-17 years of age who work in an economic activity that is classified as belonging to the "worst forms of child labor." The "worst forms of child labor" as established by ILO Convention No. 182 enacted in 1999, comprises of (i) slavery or economic activity in slave-like conditions, (ii) prostitution or pornography, (iii) illicit activities such as drug production and trafficking, and (iv) economic activities that are likely to harm the health, safety, or morals of the child. The ILO classifies the first three types as "unconditional worst forms of child labor."

It is important to be aware that domestic work performed by children in their *own* households, irrespective of the specific characteristics of such work (e.g., the number of hours or the level of hardship), is considered a non-economic activity and hence children who perform such work exclusively are not classified as child workers, that is, they are not counted among the economically active. Basu and Tzannatos (2003), among others, have argued that the exclusion of own-household domestic work from the set of work activities that constitute child work leads to the more serious undercounting of girls relative to boys among child workers. Insofar as girls are disproportionately found among children engaged in own-household domestic work exclusively, this will certainly be the case. Furthermore, it may very well be that counting children engaged in own-household domestic work among the economically active eliminates the male-bias in the gender gap found in economic activity rates. However, due to the acute sparsity of data on children's participation in non-economic activities across countries, this claim is not, at least at present, verifiable. Regardless, the question of whether to include own-household domestic work under the rubric of economic activity and hence in the positive determination of child work remains. We will however not comment on this issue here.

UNICEF Multiple Indicators Cluster Survey (MICS) has included measures of domestic activities in its concept of child labor. According to this definition, a child is involved in child labor under the following classification: (i) children 5-11 years of age who did at least one hour of economic activity or at least 28 hours of domestic work during the week preceding the survey, and (ii) children 12-14 years of age who did at least 14 hours of economic activity or at least 28 hours domestic work during the week preceding the survey. The hour thresholds for both economic and domestic work reflect the level of children activity beyond which work is judged to adverse implication on children human capital and social development.

Most measures used to estimate child labor are based on cross sectional surveys which have the advantage of providing information for a large set of children. They capture a snapshot of children's work experience based on a reference week but are not designed to measure intermittent work. A reference period of one week is too short because it is unable to take account of the phenomenon of frequent labor force entry and exit of children. In fact, a longer reference period that can capture part of the frequent transitions in and out of work is more appropriate to produce accurate estimates of child labor. At the same time, the greater the prevalence of intermittency, the greater is the undercount of total child workers. According to

estimates from Brazil, the intermittency multiplier could raise the global estimates of child labor by as much as 94 percent.[3]

III. Cross-country patterns in child economic activity and child labor

In this section, we discuss cross-country patterns that we observe in child economic activity rates and child labor rates for children aged 7-14 years in a large set of developing countries. We also discuss cross-country patterns that we observe in the distribution of economically active children by sector of economic activity and in the relationship between the share of children economically active and the share of children economically active *and* not attending school. These patterns are examined for the sample as a whole as well as disaggregated by region and/or gender.

The child labor statistics for this study were obtained from Understanding Children's Work (UCW), an ILO-UNICEF-World Bank inter-agency research organization. Depending on the country, the original source of the data is typically one of the following three nationally-representative household sample surveys: the ILO's Statistical Information and Monitoring Programme on Child Labour (SIMPOC) survey, the UNICEF's Multiple Indicators Cluster Survey (MICS), or the World Bank's Living Standards Measurment Study (LSMS) survey (see Table 1 for the original data source for each country). In terms of the survey year, the surveys were conducted between 1994-2003; the majority of the surveys were conducted between 1999 and 2001 (again, see Table 1).

Before presenting these statistics, we bring attention to two issues, one, methodological and other, data-related. First, where appropriate, all summary statistics are calculated by weighting each country's child labor statistic by the country's child population for the corresponding age group. Thus, larger countries influence the summary statistics more than smaller countries (such as small island countries). Second, the small number of country observations for three regions, namely, EAP, MNA and SAR, seriously impair our statistical comparisons across regions. We however hazard such an exercise, but caution the reader from placing undue weight on our findings with respect to these regions.

Child economic activity rates by region

To begin, the mean child economic activity rate across the 65 countries in our sample is 21.3 percent, that is, a little more than 1 in 5 children between 7-14 years of age appear to be working. Our estimate is remarkably consistent with ILO (2002) estimates of the economic activity rate among children, sitting in-between their estimate of 17.6 percent for children between 5-14 years of age and 23.0 percent for children between 10-14 years of age. Furthermore, although the regional classifications differ somewhat between our study and the ILO's, the findings on mean economic activity rates by region are broadly in agreement. Africa (AFR) appears to have the highest mean child economic activity rate, with slightly more than 1 out every 3 children working, whereas Latin America and the Caribbean (LAC) and Middle East and North Africa (MNA) have the lowest mean economic activity rates, with a little more than 1 out of every 10 children working (see Table 2).

The mean child economic activity rate reported above masks substantial variation in child economic activity rates across countries; child economic activity rates range from 4 percent in

[3] See Duryea et. al. Forthcoming

Trinidad and Tobago to 74 percent in Sierra Leone (see Figure 1). For the sample as a whole, we estimate a standard deviation of 16.7 percentage points, yielding a coefficient of variation of 78.4 percent. We also find that the coefficient of variation in child economic activity rates varies markedly between regions, ranging from less than 40 percent in LAC and MNA to over 80 percent in Easter Europe and Central Asia (ECA) and East Asia and Pacific region (EAP).

How much of the total spatial variation in child economic activity rates in our sample can we separately attribute to variation *within* and *between* regions? Undertaking a one-way analysis of variance, we find that roughly 37 percent of the variation in economic activity rates across countries is attributable to between-region variation, while the remaining 63 percent is attributable to within-region variation, suggesting that the latter is a relatively more important factor in explaining total variation. This result however does not imply that mean child economic activity rates do not differ between regions. In fact, the differences in mean child economic activity rates across regions are highly statistically significant.[4] Delving into which particular regional differences in mean economic activity rates are behind this result, we find that AFR stands out in most pairwise comparisons between regions. Specifically, the evidence suggests that the mean economic activity rate for AFR is larger the corresponding statistics for LAC, MNA, and EAP (see Table 3 for results from Bonferroni multiple comparison tests).[5]

Economic activity rates by gender

First, we find that, in general, boys are much more likely to be economically active than girls. In approximately 85 percent of the sample (or in 55 out of the 65 countries), the economic activity rates for boys exceed those of girls (see Figure 2).[6] Interestingly, the few country cases where the economic activity rates of girls exceed those of boys are not scattered at random but are instead concentrated in certain regions. We find that 7 out of the 10 cases are in AFR, while no cases are present in EAP, ECA, or LAC (see Table 4). Second, the mean economic activity rate among boys is 23.9 percent while the corresponding rate among girls is 18.9 percent. The difference in these means is statistically significant.[7]

In examining gender disparities in child economic activity rates by region, measured either in terms of *mean difference* in child economic activity rates between genders or the gender *difference in mean* child economic activity rates, we find differences in both the magnitude and direction of gender disparities across regions (see Table 5). LAC appears to have the highest gender disparity in child economic activity rates—across both measures, we obtain an identical estimate of 7.2 percentage points in favor of boys. On the other hand, across both measures, MNA appears to be the only region where the gender disparity in child economic activity rates is

[4] A test of the equality of log mean economic activity rates between regions yielded a *F*-statistic of 8.78 with a *p*-value of 0.0000.

[5] We also conducted Scheffe and Sidak multiple comparison tests. The results from these two test adjustment methods were in agreement with the Bonferroni adjustment.

[6] The exceptions are Burkina Faso, Central African Republic, Cameroon, Egypt, Malawi, Nepal, Comoros, Guinea, Guinea-Bissau, and Yemen.

[7] A test of the equality of mean log economic activity rates between genders yielded a *F*-statistic of 5.59 with a *p*-value of 0.020.

in favor of girls. We, however, find that the gender disparities in mean child economic activity rates between regions are not statistically significant.[8]

For 40 of the 65 countries, we have data that allow us investigate the gender distribution of economically active children. In so doing, we find that in 90 percent of the sample (or in 36 out of the 40 countries), boys outnumber girls among the economically active child population. Similar to our earlier finding on the relative incidence of work by gender, the only exceptions to this largely uniform pattern are found in AFR.[9] Furthermore, we find that the mean share of boys among economically active children is 58.7 percent, with a standard deviation of 8.9 percentage points. Thus, as expected, the gender gap found in economic activity rates continues to be displayed in the gender distribution of the economically active child population.

Sectoral distribution of child economic activity

Consistent with the findings of Ashagrie (1997), we find that the mean share of economically active children employed in agriculture is largest (70 percent), followed, in decreasing order, by services (21 percent), and manufacturing (7 percent). This rank-order of agriculture, services, and manufacturing with respect to the sectoral distribution of child economic activity is almost uniformly valid across countries—the share of economically active children in agriculture exceeds the respective shares in services and manufacturing in all countries in our sample, while the share of economically active children in services exceeds the share in manufacturing in all but one country.[10]

Furthermore, the sectoral rank-order established above applies practically in equal degree to both boys and girls across the vast majority of countries.[11] Notwithstanding, as Figure 3 shows, it appears that economically active boys are more likely to be employed in agriculture than economically active girls, and vice versa for services, probably reflecting the documented preference for girls in hired domestic work, among other things (see, for example, …). However, we find that the gender differences in the mean shares of economically active children in agriculture and services are not statistically significant.

In examining the sectoral distribution of economically active children across regions, as Table 6 shows, we find that AFR and MNA have the largest shares of economically active children employed in agriculture (87.6 and 75.6 percent, respectively), while LAC and EAP have the largest shares in services (32.9 and 27.2 percent, respectively), and ECA and SAR the largest shares in manufacturing (14.6 and 10.9 percent, respectively). The differing relative importance of the various sectors in child employment across regions is largely consistent with the sectoral distribution of employment for workers in general, reflecting, inter alia, differences in the trajectories and states of economic development between regions (need to cite).

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[8] We could not reject the null hypothesis that the gender differences in mean log economic activity rates were equal across regions. The male-region interaction terms in a least squares regression of log economic activity rates across countries on gender and region were jointly statistically insignificant (F-statistic=1.53, p-value=0.1843).

[9] The 4 cases are Burundi, the Central African Republic, Cameroon, and the Democratic Republic of Congo.

[10] The exception is Turkey, where 15.9 and 6.7 percent of economically active children are employed in manufacturing and services, respectively.

[11] The two exceptions to this pattern are Turkey, where the shares of economically active girls and boys in manufacturing are larger than their respective shares in services, and Morocco, where the share of economically active girls in manufacturing is larger than the share in services.

Relationship between the share of children working and the share of children working only
In examining the relationship between the share of children working (which we had previously referred to as the child economic activity rate) and the share of children working *and* not attending school, we find a positive relationship between the two variables, suggesting that countries with higher rates of children working also have higher rates of children working *and* not attending school (see Figure 5). As evidence of the strength of the linear association between the two variables, we estimate a correlation coefficient of 0.85. Further examining the relationship between the two variables separately by gender, we find that the correlation coefficient is slightly larger among girls than among boys (0.86 vs. 0.84). However, we cannot reject that null hypothesis of equality of correlation coefficients between genders at standard significance levels.

Child labor rates by region
Child labor statistics are available for 59 of the 65 countries in our sample. As mentioned before, the definition of child labor proposed by the ILO is more stringent than their definition of child economic activity; the child labor definition takes into account weekly hours of work and the type of work activity in relation to the child's age. Specifically, the ILO defines the child as being engaged in child labor if (i) the child is between 5-11 years of age and is economically active, or (ii) the child is between 12-14 years of age and works in an economic activity for 14 or more hours per week.

Based on the above child labor definition, across the 59 countries for which we have child labor information, the child labor rate among 7-14 year olds is 12.4 percent, that is, roughly 1 in 8 children are engaged in child labor (see Table 11). This statistic is roughly 4.8 percentage points (or 51 percent) lower than the mean economic activity rate for the equivalent sample. Disaggregating the sample by region, we find, as expected, that the rank ordering of regions with respect to child labor rates are consistent with the rank ordering of regions with respect to child economic activity rates. Specifically, we find that AFR has the highest child labor rate, with roughly 1 in 5 children engaged in child labor, while LAC and MNA have the lowest child labor rates, with roughly 1 in 16 children engaged in child labor (see Table 11 and Figure 6).

As mentioned above, examining the percent difference between the child economic activity rate and the child labor rate, we find that, for the sample as a whole, the mean child labor rate is roughly one-half of the mean child economic activity rate. As Figure 7 shows, the percent gap appears to be larger in AFR than in other regions, though the influence of country outliers potentially matters.

The cross-country variation in child labor rates, both for the sample as a whole as well as in each of the region samples, is typically higher the equivalent statistics with respect to child economic activity rates. For example, for the sample as a whole, we estimate a standard deviation of 11.7 percentage points, yielding a coefficient of variation of 94.4 percent. Disaggregating the sample by region, we find that the coefficient of variation is highest in EAP and lowest in SAR.

Undertaking a one-way analysis of variance, we find that roughly 27 percent of the variation in child labor rates across countries is attributable to between-region variation, while the remaining 73 percent is attributable to within-region variation. This finding is broadly consistent with the finding from the analogous decomposition from the total cross-country variation in economic

activity rates, although the proportion explained by within-region variation is higher with respect to child labor rates than with respect to child economic activity rates.

Notwithstanding, the difference in mean child labor rates across regions is highly statistically significant.[12] Delving into which particular regional differences in mean child labor rates matter, we find that the mean child labor rate for AFR is significantly different from the corresponding statistics for ECA and LAC (see Table 12).[13]

Child labor rates by gender

Consistent with finding for child economic activity rates, we find that in general boys are more likely to be engaged in child labor than girls. In 51 out of the 59 sample countries, the child labor rate for boys exceeds that of girls (see Table 13 and Figure 8). Exceptions to this rule are found by and large in AFR.[14] The mean child labor rate for boys is 14.2 percent, while the corresponding statistic for girls is 10.6 percent. This difference in means is statistically significant.[15]

Disaggregating the total sample by region, we find that the rank order of regions based on the male-female difference in mean child labor rates differs from the rank order based on the male-female difference in mean economic activity rates. Here, SAR has the highest difference (7.9 percentage points), while MNA has the lowest (1 percentage point). We, however, find that the gender differences in mean child labor rates between regions is not statistically significant.[16] Finally, the *mean* male-female difference in child labor rates across regions is similar to the male-female difference in *mea*n child labor rates across regions (see Table 14).

Summary

To conclude this section, we briefly summarize our main findings. Beginning with child economic activity rates, on average, roughly 1 in 5 children work, though there exists significant variation in child economic activity rates across countries. The regional breakdown reveals that, compared to most regions, AFR is unique; the region has the highest child economic activity rate with roughly 1 in 3 children working. The gender breakdown reveals that, in the vast majority of countries, boys are more likely to work than girls. The exceptions to this general rule are predominately found in AFR. On average, roughly 1 in 4 boys and 1 in 5 girls work. Examining the relationship between the share of children working (i.e., the economic activity rate) and the share of children working and not attending school, the two appear to be strongly and positively associated across countries.

[12] A test of the equality of log mean economic activity rates between regions yielded a *F*-statistic of 5.18 with a *p*-value of 0.0006.

[13] We also conducted Scheffe and Sidak multiple comparison tests. The results from these two test adjustment methods are in agreement with the Bonferroni adjustment.

[14] The exceptions are Cameroon, Central African Republic, Comoros, Democratic Republic of Congo, Malawi, Tanzania in AFR, Egypt in MNA, and Nepal in SAR.

[15] A test of the equality of mean log child labor rates between genders yielded a *F*-statistic of 7.64 and a *p*-value of 0.0067.

[16] W could not reject the null hypothesis that the gender differences in mean log economic activity rates were equal across regions. The male-region interaction terms in a least squares regression of log economic activity rates across countries on gender and region were jointly statistically insignificant (*F*-statistic=1.36, *p*-value=0.2457).

Turning now to the distribution of economically active children, in terms of gender, in most countries, boys outnumber girls. On average, the ratio of working boys to working girls is 3 to 2. Next, in terms of sector of activity, in virtually all countries, most working children are in agriculture, followed by services and then manufacturing. On average, out of every 10 working children, roughly 7 are in agriculture, 2 in services, and 1 in manufacturing. The gender breakdown reveals that these two results apply more or less equally to both genders. The regional breakdown reveals differences in the relative importance of the three sectors, but these differences were not testable owing to small sample sizes.

In terms of child labor, on average, roughly 1 in 8 children are engaged in child labor, although there is substantial variation across the sample countries, most of it intra-regional rather than inter-regional. The patterns for child labor are largely consistent with the patterns for child economic activity. The child labor rate is highest in AFR, with roughly 1 in 5 children engaged in child labor. Across countries, the child labor rate for boys tends to be higher than for girls. Further, the mean child labor rate for boys is higher than for girls.

IV. Consequences of child labor on human capital accumulation

One of the most worrisome consequences of child labor is its effect on human capital accumulation at time when children mostly needed it. Recently completed research has improved our understanding of the consequences of child labor.[17] In nine Latin American countries, a sample of 3rd and 4th graders who worked longer hours outside the home performed were found to perform more poorly in school on both mathematics and language exams in every country studied.[18] Evidence from Pakistan and Ghana found similar adverse effects of work on schooling outcomes.[19] A negative association between work and the test scores of 8th graders is found in a majority of countries.[20] Finally, as the international community rallies around the MDGs, particularly achieving universal primary education, EFA efforts are hindered by the high incidence of child labor in several countries.

Children's economic activities and school enrollment

To start we look at the relationship between children's economic activities and school attendance across countries. Figure 9 shows a clear negative correlation between economic activities and school attendance for both boys and girls. Countries with low incidence of economic activity have also high levels of school attendance among boys and girls. While the differences are not very large in most countries between boys and girls, this negative correlation looks stronger among boys, while a flatter association is observed for girls.

School participation rates among economically active children

A claim often made by researchers—many of them intending to correct what they consider is a popular misconception held mainly in the West—is that most economically active children in the developing world seem to combine work with school. Looking at the sample as a whole, this

[17] Basu and Tzannatos (2003).
[18] Gunnarsson et al (2005)
[19] Rosati and Rossi (2001), Heady (2003)
[20] Post and Pong (2000).

assertion appears to be empirically supported—we find here that the mean school participation rate among economically active children is 61.1 percent. However, what is less known, certainly less documented, is that this overall mean rate conceals regional cases where the assertion holds weakly or in fact does not hold at all.

As Table 6 clearly shows, in all the sample countries in MENA, economically active children are more likely to *not* attend school. Similarly, albeit to a lesser extent, in over 40 percent of the sample countries in AFR, economically active children are more likely to not attend school. The regions where the assertion appears to hold strongly are EAP, ECA, and LAC. Thus, the evidence seems to call for a more nuanced characterization along regional lines regarding the extent to which economically active children combine work with school. One broad cut of the data that appears to work in this regard is dividing the 6 regions into two groups, one where the putative stylized fact obtains strong support, comprised of EAP, ECA and LAC, and the other where it obtains considerably weaker support, comprised of AFR, MENA, and SAR.

The evidence presented above largely underpins the evidence on the mean school participation rate among economically active children by region. We find marked differences in the mean school participation rate among economically active children between regions.[21] As Table 7 shows, MENA and SAR appear to have the lowest school participation rates among economically active children (34.4 and 41.1 percent, respectively), while LAC and EAP have the highest (78.8 and 84.6 percent, respectively). While it is apparent that differences do exist between regions, not all such observed differences are found to be statistically significant. Tests of the equality of means between individual pairs of regions suggest that the mean school participation rate among economically active children is larger in LAC than AFR or MENA, and in EAP than MENA (see Table 8 for the results from the Bonferroni multiple comparison tests).

Dividing the regions into two groups along the lines proposed above, namely AFR, MENA, and SAR on one side and EAP, ECA, and LAC on the other, appears to be a useful partition when we examine school participation rates among economically active children separately by gender as well. As Table 9 shows, the incidence of country cases where the school participation rate among economically active girls exceeds that of boys is significantly higher in EAP, ECA, and LAC compared to AFR, MENA, and SAR. This difference in the incidence of such cases between the two regional groups largely explains the pattern we observe in mean school participation rates among economically active children by gender between the two regional groups (see Figure 4). Specifically, we find that in AFR, MENA, and SAR, the mean school participation rate among economically active boys exceeds that of girls (48.3 *vs.* 44.3 percent), while in EAP, ECA, and LAC, the mean rate for girls exceeds that of boys (81.6 *vs.* 78.7 percent). However, the gender differences in the school participation rates of working children within regional groups are not statistically significant.[22]

V. Understanding children's work

[21] A test for the equality of mean shares of economically active children attending school across all regions yielded a *F*-statistic of 8.82 with a *p*-value of 0.0000.

[22] A test of the equality of mean shares of economically active children attending school between genders in AFR, MENA, and SAR yielded a *F*-statistic of 0.57 with a *p*-value of 0.4539. Similarly, a test of the equality of mean squared shares of economically active children attending school between genders in EAP, ECA, and LAC yielded a *F*-statistic of 0.42 and a *p*-value of 0.5214. In the latter case, the shares were squared before conducting the test as tests of normality of the original variable indicated that the distribution was skewed to the left.

The common model featured in this literature identify the household decision making process in determining child labor as subject to existing incentives and constraints the household is facing. A simple economic framework, following Betcherman et. al (2005), hypothesizes that children work instead of going to school because of some combination of the following: [23]

- *Incentives* favor work, and
- *Constraints* compel children to work.

The incentives problem arises when the economic benefits of a child working will be greater than expected benefits of schooling. In these cases, then, parents can be making economically rational decisions in sending their children to work. This situation – in effect, where the ratio of the net returns to education relative to work is negative -- will typically arise where education is too costly or offers little benefit. High costs can refer to either direct or opportunity costs of education. Opportunity costs may be high when children are needed for non-school activities that are critical for household welfare (e.g., helping with the harvest, fetching water).

Even when expected returns to education are favorable, and parents have an economic incentive to send their children to school, they might not be able to afford the current costs of schooling (including opportunity costs stemming from the income losses for children not working). Parents may be constrained from sending their children to school because of poverty or insurmountable short-term economic concerns. The direct costs of schooling may simply be unaffordable for chronically poor families or for families that are in a situation of transitory poverty because of a shock (e.g., job loss of a parent, drought, etc.). For many poor households, child labor constitutes the only mechanism for intertemporal allocation of resources (i.e., using child labor to borrow from the future for present consumption).

The incidence of child labor is high in Sub-Saharan Africa and South Asia regions, characterized mostly by low income countries (see figure 1). But this relationship is not linear and indicates that at very low levels of income, the effect of changes in per capita income on the incidence of child labor is the highest. There is also significant variation in the incidence of child labor even at similar levels of income, which indicates that factors besides poverty could increase or reduce the incidence of child labor. Some families and children have low perceived returns to education, while others face borrowing (and other) constraints to finance their children's schooling. Microanalysis for Burkina Faso and Guatemala show that that the incidence of child labor increases when poor families are faced with income shocks.[24]

Is the inverse relationship between incomes and the likelihood of child labor observed at the household-level within countries borne out, as we would expect it should, when we examine average incomes and the extent of child labor at the country-level?

The effect of income constraints and poverty.

[23] This framework is an adaptation of models presented in Bhalotra (2000) and Bhalotra and Tzannatos (2003)
[24] Guarcello.Lorenzo, Mealli, and Rosati (2003) and Parent (2006).

A number of researchers have examined the bivariate relationship between average living standards, measured using real GDP per capita in PPP US$ terms, and the incidence of child labor force participation across regions and countries (see, Krueger 1996, Dehejia and Gatti 2002, Gunnersson *et al* 2005, and Edmonds and Pavcnik 2005). The evidence appears to be unusually clear-cut: across various model specifications of the relationship between the two variables, and irrespective of the time period under consideration or whether the relationship is conditioned on other covariates or not, the literature consistently finds a strong negative convex relationship between child economic activity rates and per capita national incomes, that is, child economic activity rates appear to be decreasing at a decreasing rate with per capita national incomes.

Furthermore, GDP per capita appears to be an especially strong correlate of child labor force participation rates across countries. For example, using data for 1990, Edmonds and Pavcnik (2005) estimate the relationship between child economic activity rates and a cubic polynomial of GDP per capita via ordinary least squares and find that 73 percent of the cross-country variation in child economic activity rates is explained by the cross-country variation in GDP per capita. Similarly, Gunnersson *et al* (2005) report a simple correlation coefficient of -0.82 between child economic activity rates and GDP per capita across countries.

As a starting point, mainly to check if we can reproduce the findings from these previous studies, we examine the cross-country relationship between per capita national incomes and child economic activity rates. As the scatter plot of country observations in Figure 11 suggests, the share of children working appears to inversely related to GDP per capita.

This finding is reinforced by the predicted curve from estimating an unconditional linear regression model of log child economic activity rates as a quadratic function of GDP per capita using ordinary least squares.[25] To be precise, GDP per capita appears to have a diminishing negative effect on the share of children working up to around $5,800 after which GDP per capita appears to have an increasing positive effect on the share of children working. However, this upturn in the predicted curve in the upper quartile of the GDP per capita distribution can be overlooked given the size of the prediction interval.[26] In terms of the magnitude of the effect, at the 25th percentile of GDP per capita (roughly at $1,200), a $100 increase in GDP per capita is associated with a 4.7 percent decrease in the share of children working, while at the 75th percentile of GDP per capita (roughly at $4,600), a $100 increase in GDP per capita is associated with a 1.3 percent decrease in the share of children working.

[25] In order to determine whether we should specify GDP per capita in level or logarithmic form, we conduct a test of non-nested models with identical dependent variables using the method proposed by Davidson and MacKinnon (1981). The test results indicate that neither model can be rejected at standard significance levels. Comparing adjusted *R*-squared statistics from estimating the two models however suggests that the logarithmic form of GDP per capita fits our data better. We also test what order polynomial of log GDP per capita fits the data best. Results from the Ramsey (1969) test of functional form suggests that a second order of log GDP per capita belongs in the model specification but that higher order terms do not contribute anything additional. In light of these results, we specify child economic activity rate as a quadratic function of log real GDP per capita. This specification of the relationship between child economic activity rates and GDP per capita is in line with Dehejia and Gatti (2002) and Gunnersson *et al* (2005).

[26] The upturn in the predicted function appears to be due to use of the child population weights in the estimation. The predicted function obtained from estimating an unweighted regression model is negatively sloped over the entire range of GDP per capita.

We also estimate regression models of the share of female and male children working and not attending school across countries. Beginning with the unconditional model where the log share of children working and not attending school is specified as quadratic function of GDP per capita, we find that GDP per capita has a diminishing negative effect over the entire range of the data (see Figure 12). In terms of the magnitude of the effect, at the 25th percentile of GDP per capita, a $100 increase in GDP per capita is associated with a 6.1 percent decrease in the share of children working and not attending school, while at the 75th percentile of GDP per capita, an equivalent increase in GDP per capita is associated with a 3.1 percent decrease in the share of children working and not attending school.

It is important to realize that a given percentage point decrease in the share of children working and not attending school may not necessarily result in an equivalent percentage point decrease in the share of children working as some or all of the decline can come about from working children enrolling in school. In fact, a decrease in the share of children working again does not necessarily translate in the increase in the share of children attending school, as again many of these children may just transition from economic activities to non-economic activities or to what is categorize as the idleness category.

The effect of economic structure: The size of agriculture sector

We showed earlier that large shares of children who work are found in the agriculture sector. In most countries, both girls and boys seem to be engaged in activities on family farms as well as in other agricultural activities. Across countries we find similar patterns. Figure 10 shows the incidence of children's economic activity across countries with different magnitude of agriculture share in the economy. As the share of agriculture increase, the incidence of children's work also rises. The correlation is strong and significant, for both boys and girls. As we have seen earlier, for all shares of agriculture in the economy, the incidence of work among boys is higher than that among girls. The differences are larger at low level of agriculture activities, yet not likely to be statistically significant. The difference disappears in countries with a very large agriculture share, where the incidence of work among both girls and boys is observed to be very high.

This association might mask other factors at work. Replicating the empirical strategy of Gunnersson *et al* (2005), we estimate a conditional regression model of the share of children working where we include the share of agriculture in GDP, GDP per capita, and the adult illiteracy rate as covariates. The share of agriculture in GDP appears to have a statistically significant effect on the share of children working even after controlling for income and illitracy. We find that, *ceteris paribus*, a 1 percentage point increase in the share of agriculture in GDP is associated with a 3.2 percent increase in the share of children working.

VI. Concluding Remarks

Roughly 1 in 5 children work, though there exists significant variation in child economic activity rates across countries. Compared to most regions, AFR is unique; the region has the highest child economic activity rate with roughly 1 in 3 children working. Boys are more likely to work than girls. The exceptions to this general rule are predominately found in AFR. The share of children working (i.e., the economic activity rate) and the share of children working and not attending school appear to be strongly and positively associated across countries.

On average, the ratio of working boys to working girls is 3 to 2. Most working children are in agriculture, followed by services and then manufacturing. On average, out of every 10 working children, roughly 7 are in agriculture, 2 in services, and 1 in manufacturing. In terms of child labor, on average, roughly 1 in 8 children are engaged in child labor, although there is substantial variation across the sample countries, most of it intra-regional rather than inter-regional. The patterns for child labor are largely consistent with the patterns for child economic activity. The child labor rate is highest in AFR, with roughly 1 in 5 children engaged in child labor. Across countries, the child labor rate for boys tends to be higher than for girls. Further, the mean child labor rate for boys is higher than for girls.

Across countries, a negative correlation between child labor and income is found. But this relationship is not linear and indicates that at very low levels of income, the effect of changes in per capita income on the incidence of child labor is the highest. There is also significant variation in the incidence of child labor even at similar levels of income, which indicates that factors besides poverty could increase or reduce the incidence of child labor. The relationship between the incidence of child work and the share of the agriculture sector in the GDP is positive and significant. Even after controlling for income levels and illiteracy in the economy, the size of the agriculture sector in the economy remains strongly associated with the incidence of child work.

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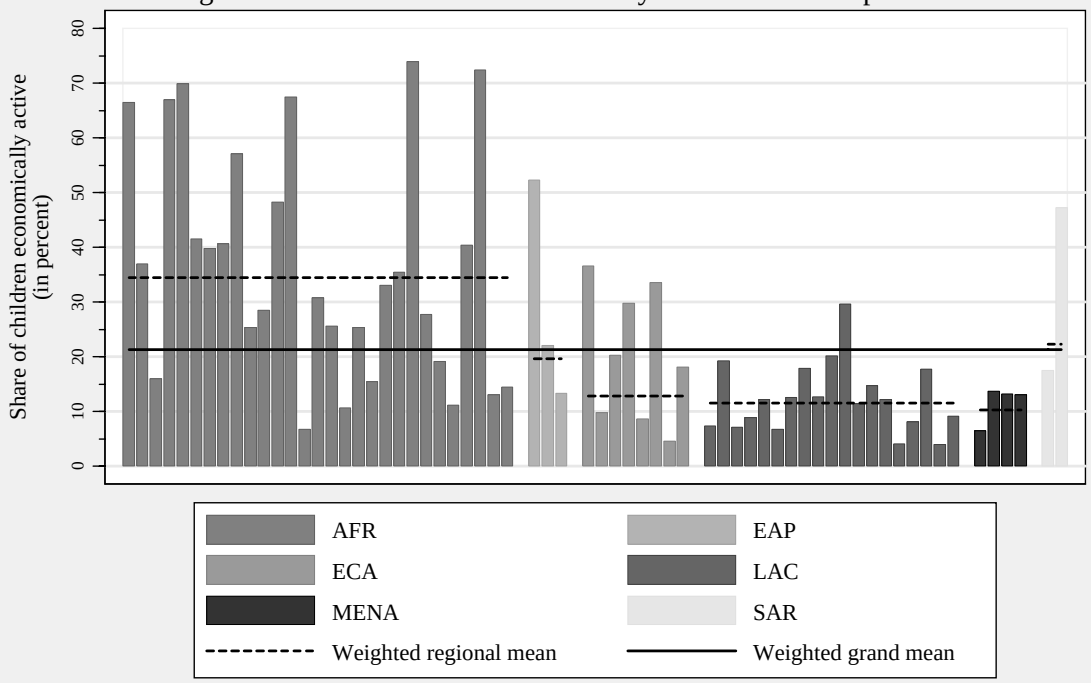
Appendix

Table 1
Original data sources for child labor statistics

Country	Survey type	Survey name	Survey year
Albania	MICS	Multiple Indicator Cluster Survey	2000
Azerbaijan	MICS	Multiple Indicator Cluster Survey	2000
Bangladesh	SIMPOC	National Child Labour Survey	2002-2003
Belize	SIMPOC	Child Activity Survey	2001
Bolivia	LSMS	Encuesta Continua de Hogares	2000
Bosnia	MICS	Multiple Indicator Cluster Survey	2000
Brazil	PNAD	Pesquisa Nacional por Amostra de Domicilios	2003
Burkina Faso	Priority Survey	Enquête prioritaire	1998
Burundi	MICS	Multiple Indicator Cluster Survey	2000
Cambodia	SIMPOC	National Child Labour Survey	2001
Cameroon	Priority Survey	Enquête Camerounaise Auprès des Ménages II	2001
Chad	MICS	Multiple Indicator Cluster Survey	2000
Chile	SIMPOC	Encuesta Nacional sobre las actividades de ninos y adolescentes	2003
Colombia	SIMPOC	Encuesta Nacional de Trabajo Infantil	2001
Comores	MICS	Multiple Indicator Cluster Surveys	2000
Dem. Rep. of Congo	MICS	Multiple Indicator Cluster Survey	2000
Costa Rica	SIMPOC	Encuesta de hogares de propositos mòltiples	2002
Cote d'Ivoire	MICS	Multiple Indicator Cluster Survey	2000
Dominican Republic	MICS	Multiple Indicator Cluster Survey	2000
Ecuador	SIMPOC	Encuesta de Empleo, Desempleo, Subempleo y Empleo Infantil" – ENEMDUR	2001
Egypt	LMS	Labor Market Survey	1998
El Salvador	SIMPOC	Enquesta de hogares de propositos multiples (MECOVI)	2003
Ethiopia	NLF	Child Labour Force	2001
Gambia	MICS	Multiple Indicator Cluster Surveys	2000
Ghana	SIMPOC	Child Labour Survey	2000
Guatemala	LSMS	Encuesta de Condiciones de Vida (ENCOVI	2000
Guinea	Integrated/LSMS	Enquete integrale sur les conditions de Vie des Menages	1994
Guinea-Bissau	MICS	Multiple Indicator Cluster Survey	2000
Guyana	MICS	Multiple Indicator Cluster Survey	2000
Honduras	Simpoc	National Child Labour Survey	2002
Iraq	MICS	Multiple Indicator Cluster Surveys	2000
Kazakhstan	LSMS	Living Standard Measurement Survey	1996
Kenya	SIMPOC	Integrated Labour Force Survey	1999
Kyrgyz Republic	LSMS	Living Standard Measurement Survey	1998
Lesotho	MICS	Multiple Indicator Cluster Surveys	2000
Madagascar	Priority Surveys	Enquete prioritaire aupres des menages	2001
Malawi	DHS	Demographic and Health Survey	1997
Mali	DHS	Demographic and Health Survey	2001
Mexico	ENIGH	Encuesta Nacional de Ingreso y Gasto de los Hogares	1996
Moldova	MICS	Multiple Indicator Cluster Surveys	2000
Mongolia	MICS	Multiple Indicator Cluster Surveys	2000
Morocco	LSMS	Enquete sur les niveaux de vie des menages	1998-99
Namibia	SIMPOC	Namibia Child Activities Survey (NCAS)	1999
Nepal	SIMPOC	Labour Force Survey	1999
Nicaragua	LSMS	Encuesta nacional de hogares sobre medicion de niveles de vida	2001
Panama	SIMPOC	Encuesta del Trabajo Infantil,	2000
Paraguay	LSMS	Encuesta de Hogares	1999
Peru	LSMS	Encuesta Nacional de Hogares sobre mediciones de niveles vida	1994
Philippines	SIMPOC	Labour Force Survey	2001

Portugal	SIMPOC	Labour Force Survey	2001
Central African Rep.	MICS	Multiple Indicator Cluster Survey	2000
Rwanda	MICS	Multiple Indicator Cluster Survey	2000
Senegal	MICS	Multiple Indicator Cluster Survey	2000
Sierra Leone	MICS	Multiple Indicator Cluster Survey	2000
South Africa	SIMPOC	Survey of Activities of young people	1999
Sudan	MICS	Multiple Indicator Cluster Survey	2000
Swaziland	MICS	Multiple Indicator Cluster Surveys	2000
Tanzania	SIMPOC	Integrated Labour Force Survey	2001
Togo	MICS	Multiple Indicator Cluster Survey	2000
Trinidad and Tobago	MICS	Multiple Indicator Cluster Survey	2000
Turkey	SIMPOC	Labor Force Survey	1999
Uganda	Multipurpose Survey	National Household Survey UNHS-2	2202-2003
Uzbekistan	MICS	Multiple Indicator Cluster Surveys	2000
Venezuela	LSMS	Encuesta de Hogares por Muestreo	2003

Figure 1: Share of children economically active across sample countries



Notes: Regional and grand means are calculated by weighting country child economic activity rates by country child population (0-14 years) sizes.

Table 2
Summary statistics of child economic activity rates by region, 7-14 year olds

Region	*N*	Mean (in %)	Standard deviation (in % points)	CV (in %)
Sub-Saharan Africa	29	34.4	19.4	56.4
East Asia and the Pacific	3	19.6	17.3	88.3
Europe and Central Asia	8	12.8	10.7	83.6
Latin America and the Caribbean	19	11.5	4.4	38.3
Middle East and North Africa	4	10.2	4.0	39.2
South Asia	2	22.2	15.4	69.4
All regions	65	21.3	16.7	78.4

Notes: CV: coefficient of variation. Statistics are calculated by weighting each country's child economic activity rate by the country's child population (0-14 years) size.

Table 3
Bonferroni multiple comparison tests of mean log economic activity rates across regions, 7-14 year olds

	Row mean – Column mean (*p*-value)				
	AFR	EAP	ECA	LAC	MENA
EAP	-0.53 (1.000)				
ECA	-1.11 *** (0.000)	-0.57 (1.000)			
LAC	-0.97 *** (0.000)	-0.44 (1.000)	0.13 (1.000)		
MNA	-1.09 *** (0.010)	-0.55 (1.000)	0.02 (1.000)	-0.11 (1.000)	
SAR	-0.33 (1.000)	0.21 (1.000)	0.78 (1.000)	0.65 (1.000)	0.76 (1.000)

Notes: * statistically significant at the 10% level; ** at the 5% level; at the 1% level.

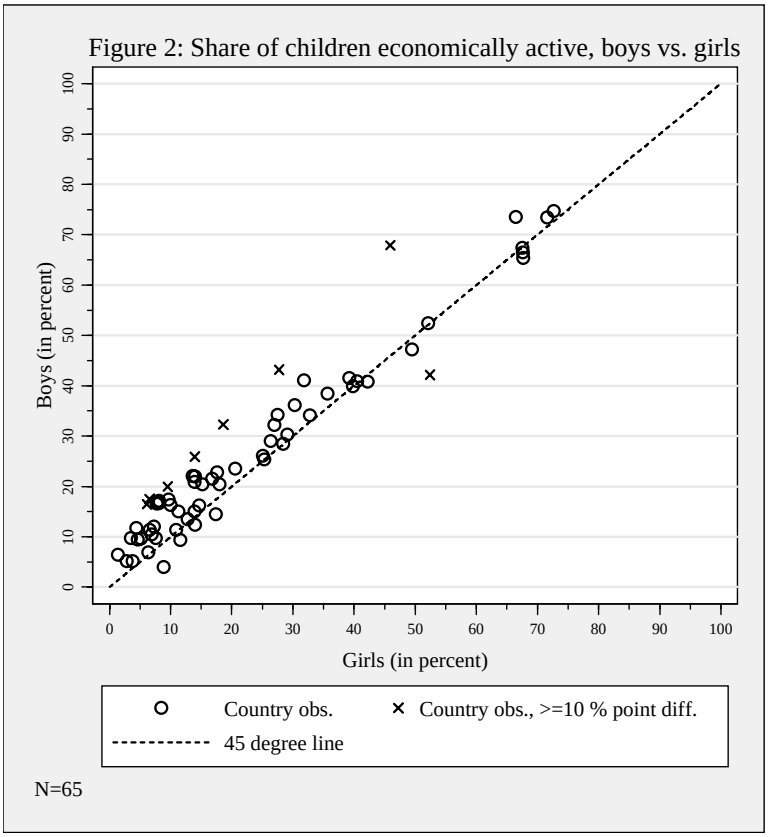


Table 4
Summary of country cases where girls' economic activity rate exceeds boys' economic activity rate, 7-14 year olds

Region	*N*	Cases	Share within region (in %)	Share of total cases (in %)
Sub-Saharan Africa	29	7	24.1	70.0
East Asia and the Pacific	3	0	0.0	0.0
Eastern Europe and Central Asia	8	0	0.0	0.0
Latin America and the Caribbean	19	0	0.0	0.0
Middle East and North Africa	4	2	50.0	20.0
South Asia	2	1	50.0	10.0
All regions	65	10	15.4	100.0

Table 5
Child economic activity rates by region and gender, 7-14 year olds

Region	*N*	Boys (mean %) (1)	Girls (mean %) (2)	Boys-Girls (% points) (1)-(2)	Boys-Girls (mean % points)
Sub-Saharan Africa	29	37.3	31.5	5.8	5.9
East Asia and the Pacific	3	22.1	16.8	5.3	5.3
East Europe and Central Asia	8	14.4	11.1	3.3	3.4
Latin America and the Caribbean	19	15.1	7.9	7.2	7.2
Middle East and North Africa	3	8.0	10.9	-2.9	-0.8
South Asia	2	24.4	19.9	4.4	4.3
All regions	64	23.9	18.9	5.0	5.2

Notes: In calculating the various statistics, each country's child economic activity rate was weighted by the country's child population (0-14 years).

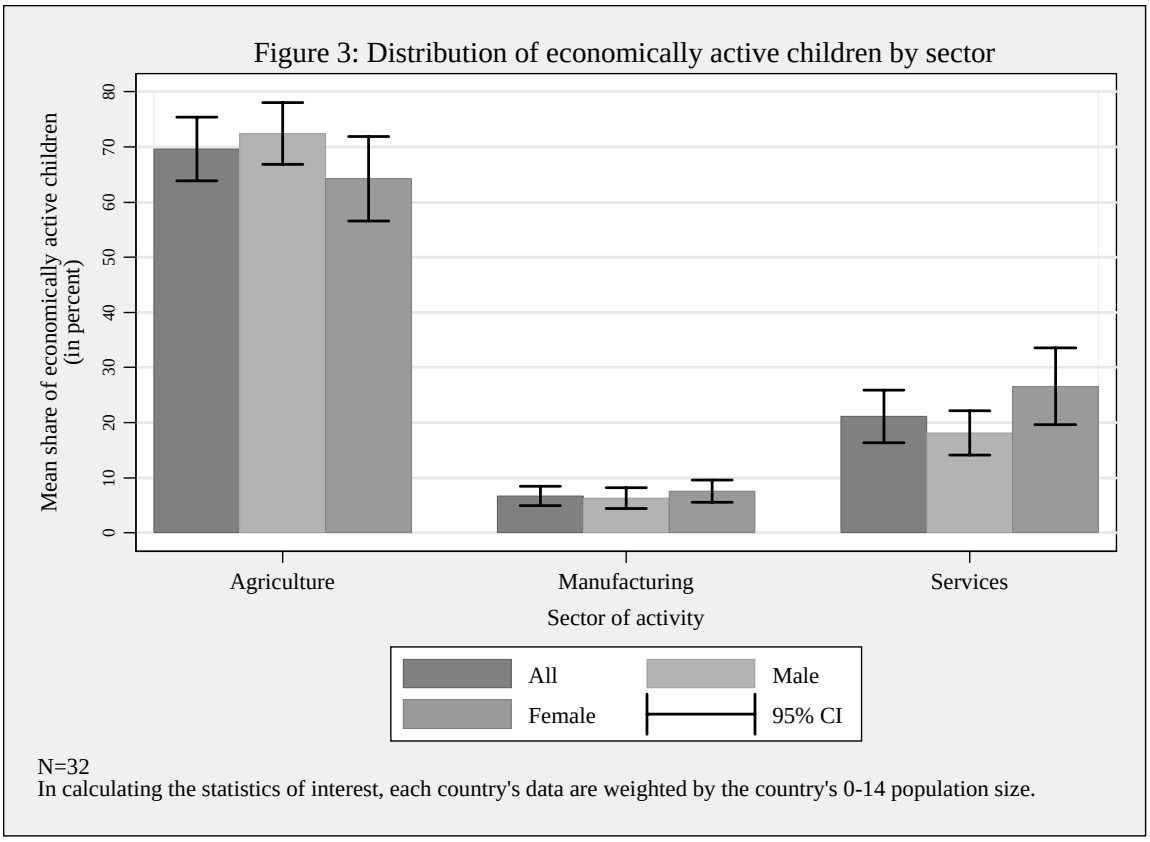


Table 6
Sectoral distribution of economically active children by region, 7-14 year olds

Region	*N*	Agriculture (mean %)	Manufacturing (mean %)	Services (mean %)
Sub-Saharan Africa	10	87.6	1.5	9.9
East Asia and the Pacific	2	67.3	4.4	27.2
East Europe and Central Asia	2	67.8	14.6	6.6
Latin America and the Caribbean	15	56.5	8.5	32.9
Middle East and North Africa	2	75.2	4.9	8.3
South Asia	2	66.1	10.9	21.4
All regions	33	69.6	6.7	21.2

Notes: In calculating the various statistics, each country's child economic activity rate was weighted by the country's child population (0-14 years).

Table 7
Regional summary of country cases where the share of economically active children not in school exceeds the share in school, 7-14 year olds

Region	*N*	Cases	Share within region (in %)	Share of total cases (in %)
Sub-Saharan Africa	29	12	41.4	66.7
East Asia and the Pacific	3	0	0.0	0.0
Eastern Europe and Central Asia	8	1	12.5	5.6
Latin America and the Caribbean	19	0	0.0	0.0
Middle East and North Africa	4	4	100.0	22.2
South Asia	2	1	50.0	5.6
All regions	65	18	27.7	100.0

Table 8
School attendance distribution of economically active children by region, 7-14 year olds

Region	*N*	School attendance	
		Yes (mean %)	No (mean %)
Sub-Saharan Africa	29	52.4	47.6
East Asia and the Pacific	3	84.6	15.4
East Europe and Central Asia	8	64.3	35.7
Latin America and the Caribbean	19	78.8	21.2
Middle East and North Africa	4	34.2	65.8
South Asia	2	41.1	58.9
All regions	65	60.1	39.9

Notes: In calculating the various statistics, each country's share of economically active children in-school or out-of-school was weighted by the country's child population (0-14 years).

Table 9
Bonferroni multiple comparison tests of the mean shares of economically active children attending school across regions, 7-14 year olds

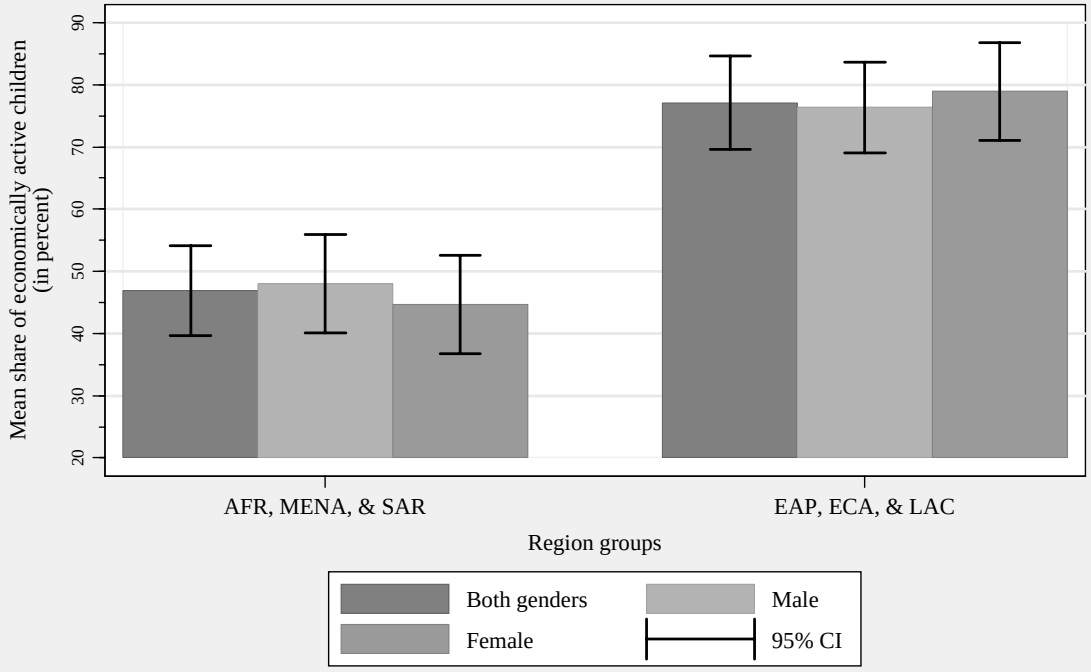
	Row mean – Column mean (*p*-value)				
	AFR	EAP	ECA	LAC	MENA
EAP	32.2 (0.155)				
ECA	11.9 (1.000)	-20.3 (1.000)			
LAC	26.4 *** (0.001)	-5.8 (1.000)	14.5 (1.000)		
MNA	-18.2 (1.000)	-50.4 ** (0.025)	-30.1 (0.256)	-44.6 *** (0.002)	
SAR	-11.3 (1.000)	-43.5 (0.310)	-23.2 (1.000)	-37.7 (0.211)	6.9 (1.000)

Notes: * statistically significant at the 10% level; ** at the 5% level; at the 1% level.

Table 10
Regional summary of country cases where the share of economically active girls in school exceeds the share of economically active boys in school, 7-14 year olds

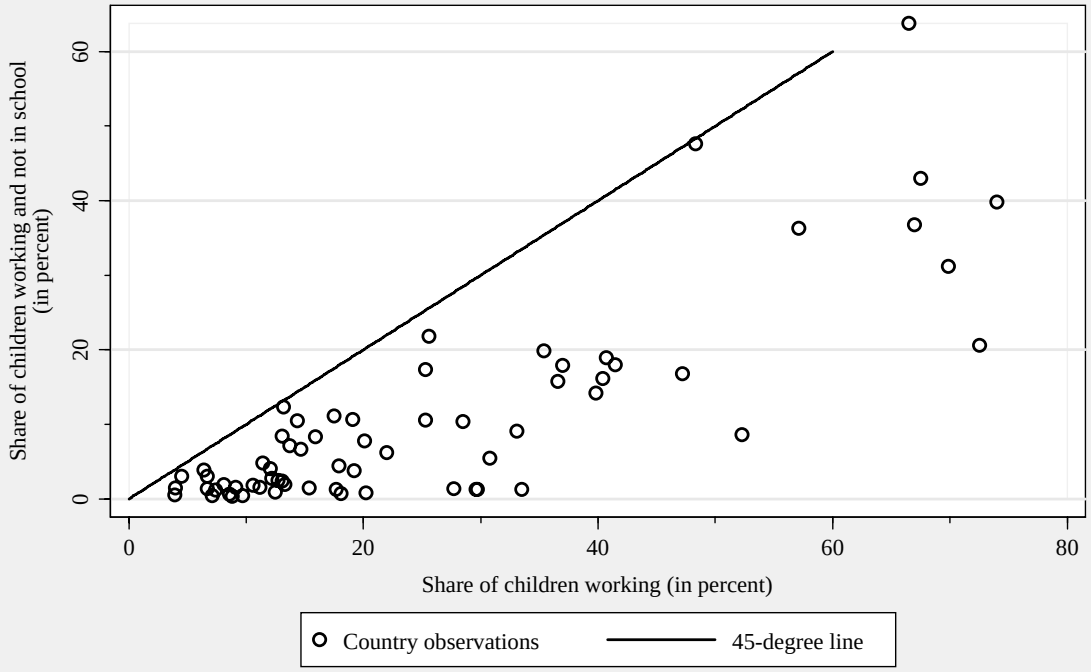
Region	*N*	Cases	Share within region (in %)	Share of total cases (in %)
Sub-Saharan Africa	29	7	24.1	26.9
East Asia and the Pacific	3	2	66.7	7.7
Eastern Europe and Central Asia	8	4	50.0	15.4
Latin America and the Caribbean	19	12	63.2	46.2
Middle East and North Africa	4	1	25.0	3.8
South Asia	2	0	0.0	0.0
All regions	65	26	40.0	100.0

Figure 4: Mean share of economically active children attending school by gender and region group



AFR, MENA, & SAR group: N=35; EAP, ECA, & LAC group: N=30.

Figure 5: Scatterplot of the share of children working vs. the share of children working and not in school

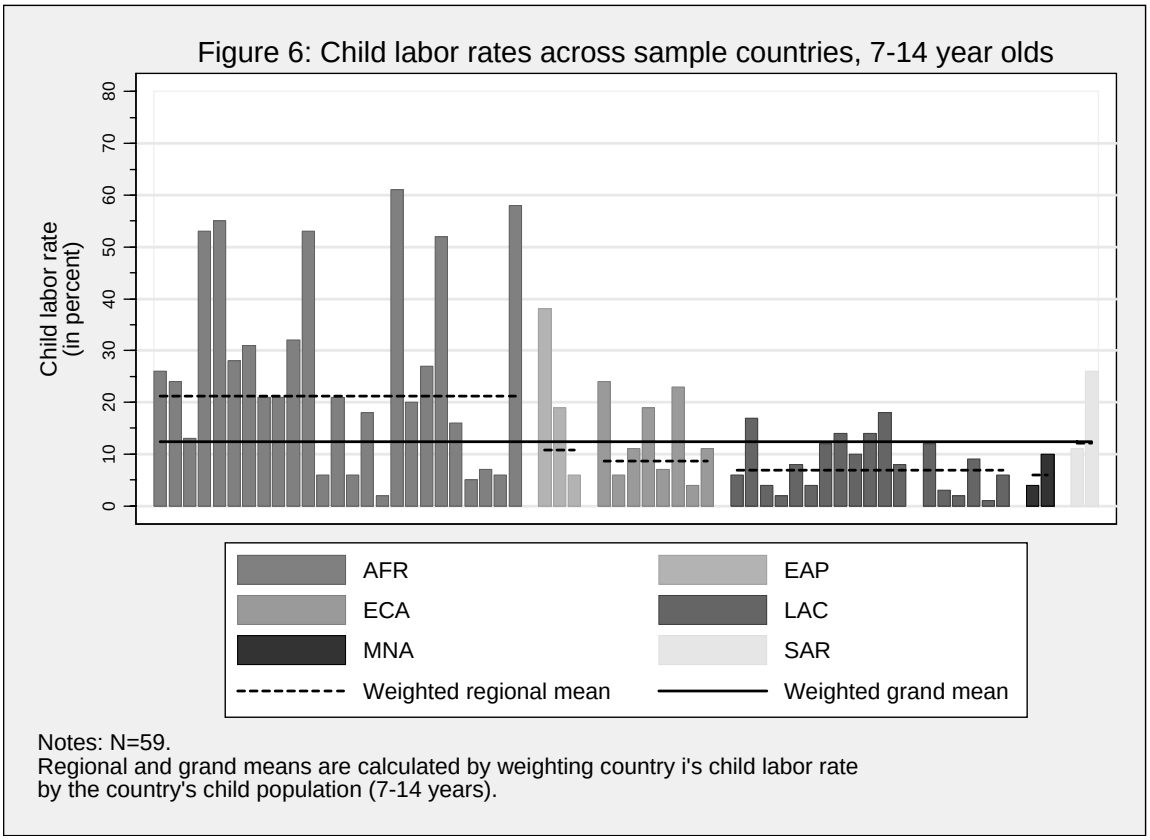


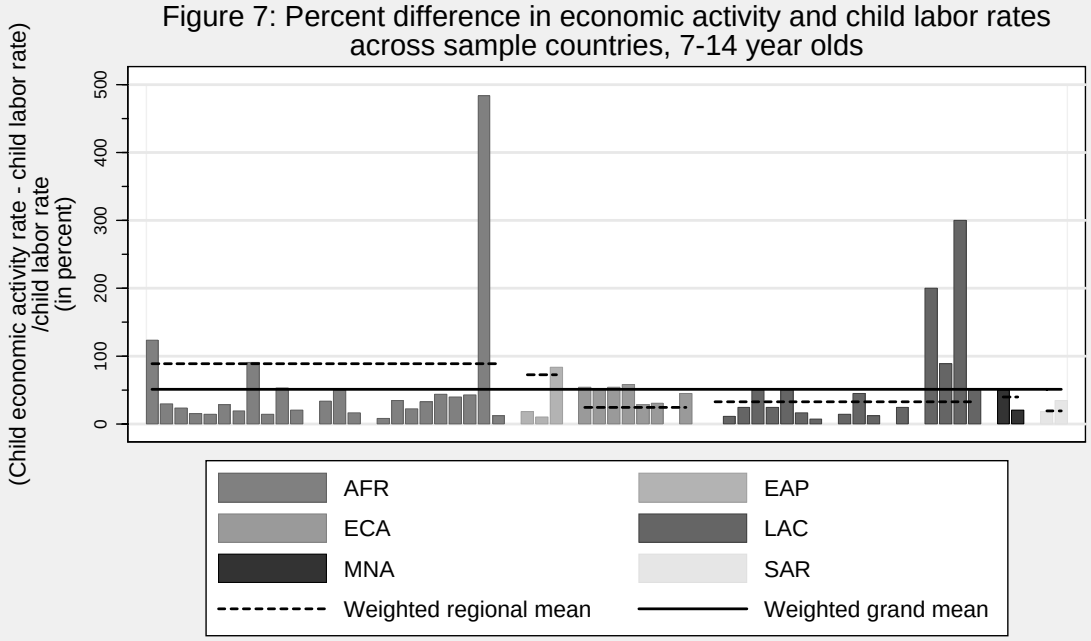
N=65.

Table 11
Summary statistics of child labor rates by region, 7-14 year olds

Region	*N*	Mean (in %)	Standard deviation (in % points)	CV (in %)
Sub-Saharan Africa	25	21.2	16.2	76.4
East Asia and the Pacific	3	10.8	13.8	127.8
Europe and Central Asia	8	8.7	6.4	73.6
Latin America and the Caribbean	19	6.9	4.1	59.4
Middle East and North Africa	2	6.0	4.0	66.7
South Asia	2	12.1	5.6	46.3
All regions	59	12.4	11.7	94.4

Notes: CV denotes coefficient of variation. Statistics are calculated by weighting each country's child labor rate by the country's child population (7-14 years).





Notes: N=59.
A missing bar within a regional cluster indicates no difference between the economic activity rate and child labor rate for that country.
Regional and grand means are calculated by weighting the percent difference for country i by country i's child population (7-14 years).

Table 12
Bonferroni multiple comparison tests of mean log child labor rates across regions, 7-14 year olds

	Row mean – Column mean (*p*-value)				
	AFR	EAP	ECA	LAC	MENA
EAP	-0.70 (1.000)				
ECA	-0.83 ** (0.040)	-0.13 (1.000)			
LAC	-1.00 *** (0.000)	-0.29 (1.000)	-0.16 (1.000)		
MNA	-1.08 (0.398)	-0.39 (1.000)	-0.25 (1.000)	-0.09 (1.000)	
SAR	-0.31 (1.000)	0.38 (1.000)	0.51 (1.000)	0.68 (1.000)	0.77 (1.000)

Notes: * statistically significant at the 10% level; ** at the 5% level; at the 1% level.

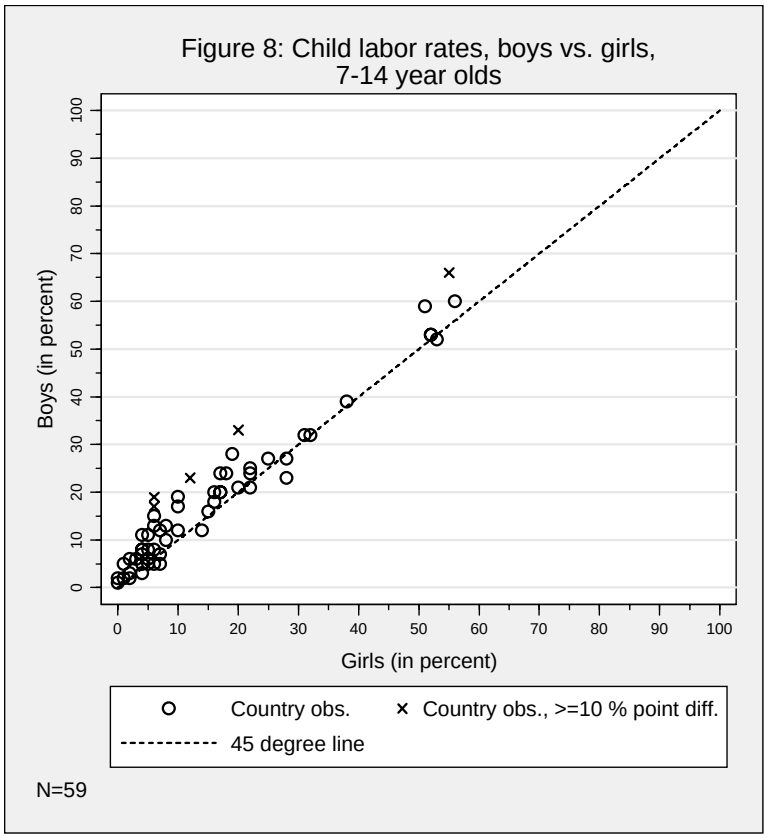


Figure 8: Child labor rates, boys vs. girls,
7-14 year olds
Boys (in percent)
Girls (in percent)
0
10
20
30
40
50
60
70
80
90
100
Country obs.
Country obs., >=10 % point diff.
45 degree line
N=59

Table 13
Summary of country cases where girls' child labor rate exceeds boys' child labor rate, 7-14 year olds

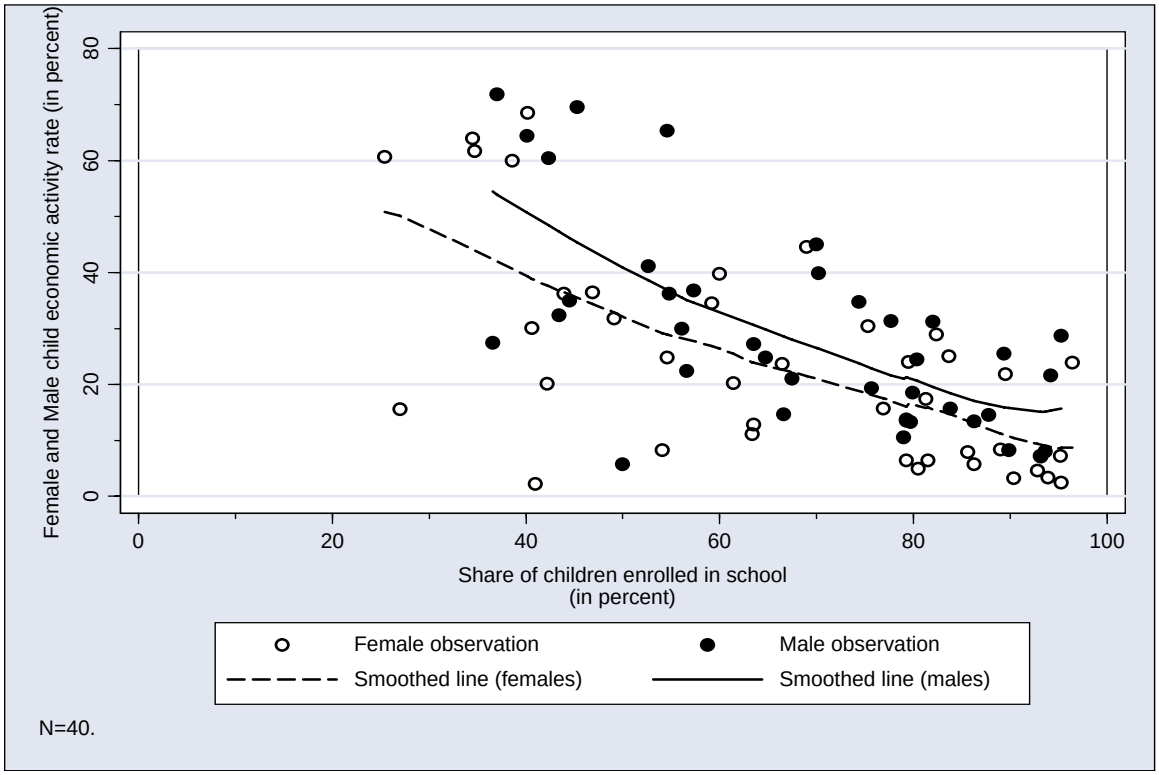
Region	*N*	Cases	Share within region (in %)	Share of total cases (in %)
Sub-Saharan Africa	25	6	24.0	10.2
East Asia and the Pacific	3	0	0.0	0.0
Eastern Europe and Central Asia	8	0	0.0	0.0
Latin America and the Caribbean	19	0	0.0	0.0
Middle East and North Africa	2	1	50.0	1.7
South Asia	2	1	50.0	1.7
All regions	59	8	13.6	13.6

Table 14
Child labor rates by region and gender, 7-14 year olds

Region	*N*	Boys (mean %) (1)	Girls (mean %) (2)	Boys-Girls (% points) (1)-(2)	Boys-Girls (mean % points)
Sub-Saharan Africa	25	22.0	20.1	2.0	2.0
East Asia and the Pacific	3	12.6	10.0	2.6	2.7
East Europe and Central Asia	8	10.0	7.4	2.6	2.6
Latin America and the Caribbean	19	9.5	4.8	4.7	4.7
Middle East and North Africa	2	6.0	5.0	1.0	1.0
South Asia	2	15.6	7.7	7.9	7.9
All regions	59	14.2	10.6	3.6	3.7

Notes: In calculating the various statistics, each country's child labor rate was weighted by the country's child population (7-14 years).

Figure 9: Scatter plot of the share of female/male children economically active vs. the share of children enrolled in school



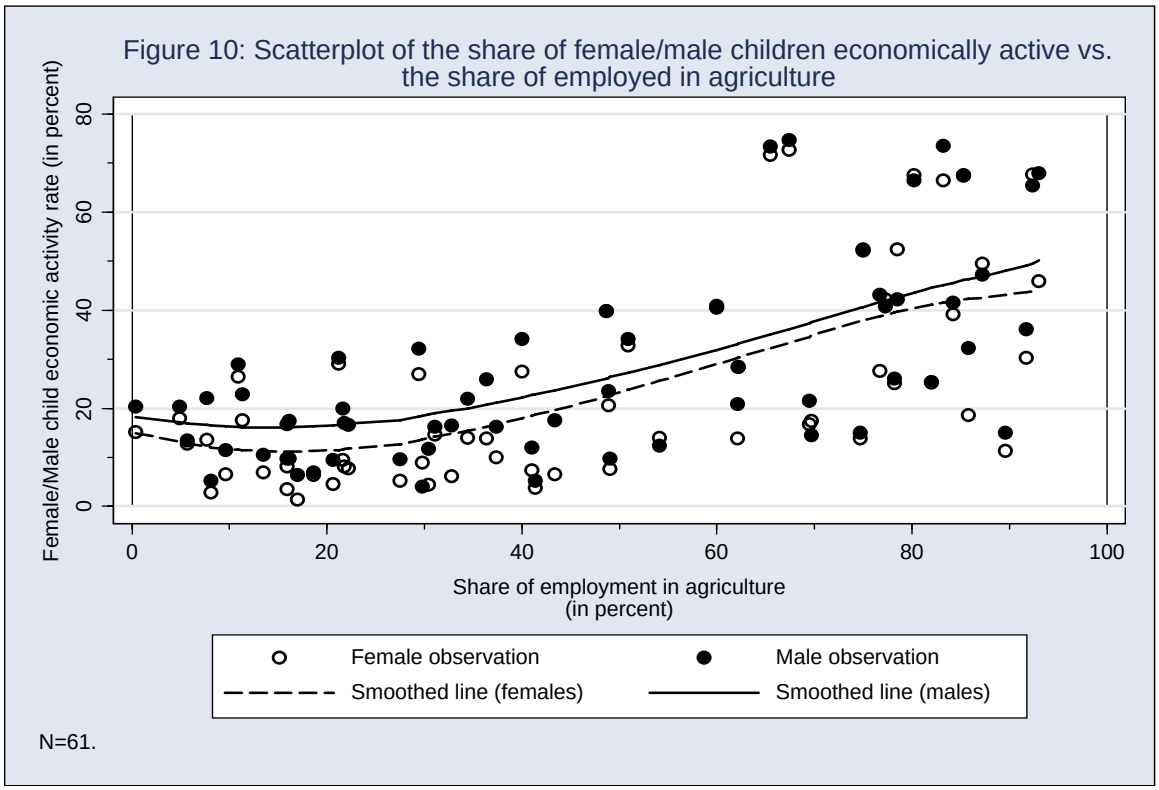


Figure 11: Scatter plot of share of children working vs. per capita national incomes

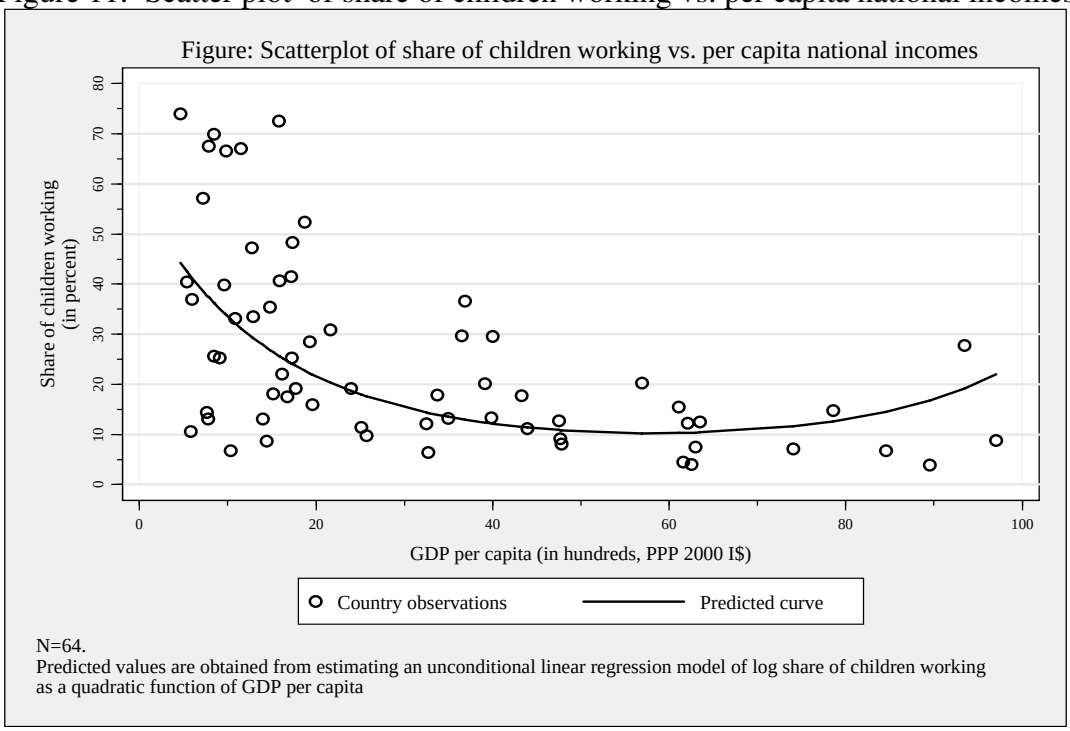


Figure 12: Scatter plot of the share of female/male children working and not in school vs. per capita national incomes