A Child Left Behind: An Empirical Analysis of the Correlates and Consequences of Child Labor in Brazil

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by

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Abstract

This paper uses Brazilian census data to evaluate the correlates, consequences, and possible causes of child labor. I find strong evidence that although most working children are also attending school, they are falling well behind their peers. I then attempt to explain state-by-state variation in child labor participation rates by using state level data, finding that economic concentration in specific industries is correlated with higher child participation in the labor market. Finally, using census data on income, I show that the current Brazilian program to alleviate child labor may also be effective in targeting higher income households then those now eligible for the program.

I. Introduction

Talk of child labor in the developing world typically evokes images of hapless children sweating their futures away in cramped factories, while greedy owners and managers become rich on their backs. This image has led many to call for legislation that bans child labor, or in developed nations, one hears the call to ban imports from countries that employ child labor in production.[1] Before racing to any action one must critically evaluate child labor, understanding why it occurs and what, if any, means should be taken to alleviate it.

Estimates of the worldwide incidence of child labor are dependent on how you define a child and how you define labor. The International Labor Organization's (ILO) convention No. 138 states that anyone 15 and older should, under normal circumstances,

[1] See "The Child Labor Deterrence Act" introduced by senator Tom Harkin

be allowed to work (ILO, 1996)[2]. Using this definition of a child and considering a laborer anyone who participates in full or part time work, the ILO estimates that world wide more than 260 million children are working. That figure is fully one sixth of the world's children. If you redefine laborer to include only those children who are involved in full time labor, that figure drops substantially to around 78.5 million (Grootaert, Kanbu 1995, p. 189). In Brazil, while the incidence of child labor is declining it remains large, especially in light of relatively high income per capita (Ferreira, Lanjouw, and Neri, 2002, p. 1).

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Table 1:
Child Labor Participation Rates for Children, 10-14 Years

	1950	1960	1970	1980	1990	1995
World	27.57	24.81	22.3	19.91	14.65	13.02
Africa	38.42	35.88	33.05	30.97	27.87	26.23
Latin America & Caribbean	19.36	16.53	14.6	12.64	11.23	9.77
Asia	36.06	32.26	28.35	23.42	15.19	12.77
Europe	6.49	3.52	1.62	0.42	0.1	0.06
Ethiopia	52.95	50.75	48.51	46.32	43.47	42.3
Brazil	23.52	22.19	20.33	19.02	17.78	16.09
China	47.85	43.17	39.03	30.48	15.24	11.55
India	35.43	30.07	25.46	21.44	16.68	14.37
Italy	29.11	10.91	4.12	1.55	0.43	0.38

Source: ILO (1996a).

High child labor participation rates should concern us for several reasons. First, children are exposed to hazardous conditions on the job. Regardless of industry employed, child laborers are more vulnerable than adults to direct physical harm and are more susceptible to cumulative hazards such as chemical or radiation exposure (ILO

[2] Taken From Basu 1999
[3] Table taken from Basu 1999, it is based on IADB figures

Website, 1999). Second, it is a stylized fact that child laborers achieve lower education levels and have lower future earnings potential than their nonworking counterparts (Emerson Souza, 2003, p. 376). It is because of these two pernicious effects that stemming the tide of child labor has found a legitimate place at the forefront of the global political consciousness.

Many of the world's governments, including Brazil's, have made the reduction of child labor participation rates a priority. Through legislation and regulation, governments are attempting to influence families to keep their children out of the labor force, but are they using the right means? This paper will describe child labor in Brazil, and present an overview and evaluation of the methods used by the Brazilian government to fight it. The findings will be presented as follows; a summary of the data used in the study will be presented in section II. Section III will develop the model used for exploring child labor. Section IV will outline summary statistics for Brazil. Section V will present an overview of Brazil's efforts to curtail child labor. Section VI will present regression results, and section VII will summarize the paper and present some possible policy implications of the empirical findings.

II. The Data

The data set used in this paper is the main Brazilian household survey for 2001, the Pesquisa Nacional por Amostragem a Domicilio (PNAD), which I obtained from the Brazilian Census Bureau (IBGE). The PNAD is an annual panel survey that does not track participants through time, similar to the Current Population Survey in the U.S. On a household level, the data contains information on family size, composition, income, and

region of residence. The survey also contains personal information on age, education, gender, race, and position of the individual in the household (mother, father, child etc.). Although the survey is nation wide, there is a paucity of data for northeast rural regions of the country due to government budget constraints. Although 2002 PNAD data was the most recent available, 2001 was chosen because it contained additional information about the work of children from ages 5-17.

The 2001 survey contains data on 378,837 individuals. As the focus of this paper is on child labor, I restricted the data set to those individuals between the ages of 4 and 16. As outlined above, the ILO defines a child laborer as being under the age of 15 who is in the workforce. My inclusion of 15 and 16 year old children is consistent with the stance of the Brazilian government which has legislation prohibiting a child from entering the work force before the age of 17 (world bank 2001, p. xi). I then eliminated observations that had no data on family income levels, or family composition, as these became essential elements in my analysis. These restrictions left me with a sample of 84,987 children, 42,231 females and 42,756 males from 26 states of Brazil and the Federal District.[4,5]

While defining what constitutes a child only required selecting an age bracket, defining what constituted a laborer was a more intricate task. In regards to work outside the home, the data showed some inconsistency. Some respondents answered yes to the question "have you worked in the past week?" while answering no to the question of

[4] The Federal District is a rectangular area in the middle of the state of Goiás where the Federal Government is established. According to the Constitution, the Federal District cannot be divided in municipalities, like all other states; instead, the F.D. is divided in so called Administrative Regions, the most important of which is Brasília. However, unlike the United States, the Federal District contains regions apart from the capital, including Taguatinga, and Guara. (http://www.v-brazil.com)

[5] The use of other variables, such as school attendance rates, in some analyses reduces the data set further.

"have you worked in the past year?" For consistency, I defined a worker as a child who reported working positive labor hours at any time in the past year.[6]

III. Model of Child Labor

In assessing the causes and correlates of child labor I have chosen to view child labor from a perspective common in present research. Child labor is not likely the result of cruel parents forcing their children to work so they may have leisure time. On the contrary, child labor is more often, as Basu and Van phrased it, "(a) problem of stark poverty where the parents are compelled to send the children to work for reasons of survival." (Basu and Van 1998, p. 413) In this view, poverty should be the most prominent correlate with child labor. Indeed, when the Brazilian government implemented programs to target child labor they did so partly by subsidizing the income of the household in hopes of alleviating the need for parents to send their children to work. There is also significant evidence to support the assertion that child labor is not a result of societal norms. In support of this assertion, Basu and Van note "the children of the nonpoor seldom work even in very poor countries" (Basu and Van 1998, p. 415)

As my allusions to their work indicate, I base my evaluation of child labor in Brazil on the model forwarded by Basu and Van in their seminal work, "The Economics of Child Labor." Their model is founded on two basic assumptions. The first, termed the *Luxury Axiom* supposes that "A family will send the children to the labor market only if the family's income level from non-child labor sources drops very low" (Basu and Van 1998, p. 421). Their second assumption, which deals with a firm's ability to substitute

[6] Much of the analyses outlined later in the paper were also run using "worked in week" as the dependent variable. This yielded similar quantitative results. The results of these regressions are available upon request.

between child and adult labor, is not relevant to my research. Although the *Luxury Axiom* is not infallible, (We will see evidence from Brazil that some of the children from wealthier families are still in the labor market), the basic concept that families would like to withdraw their children from the labor market if economically feasible appears to be supported by the data.

Applying this model to the PNAD data set is problematic. When Basu and Van speak of income in their Luxury Axiom they are not referring to absolute income per se, but rather to the level of consumption that income permits. In Brazil, a diverse country with large cost of living variances, a given income level does not permit identical consumption across the country. Thus, a homogenous price assumption is inadequate. Unfortunately the PNAD survey only collects data on income, and the Brazilian Census Bureau does not collect annual data on regional price indexes. To cope with the issue I used the guidelines set forth by Ferreira Lanjouw and Neri (Ferreira Lanjouw and Neri, p. 2003).[7] Using data from Brazil's other population survey, the PPV, the authors construct poverty lines, and price indices based on probable consumption patterns rather than merely income data.[8] The price lines they set out are used by the authors to construct a poverty profile for Brazil. In my research, The price lines are used to deflate income data across the regions of Brazil to account for cost of living variation.

[7] For Details on income deflators used, see Ferreira Lanjouw and Neri, in "A Robust Poverty Profile for Brazil Using Multiple Data Sources." (2003).

[8] The PPV investigates both income and consumption patterns of individuals, this allowed Ferreira Lanjouw and Neri to generate real income levels that were in line with consumption. Unfortunately the PPV was last undertaken in 1996 and the IBGE has not conducted a more recent consumption based survey. This makes the price lines used in this analysis somewhat out of date, but still superior to a homogenous price assumption.

IV. Summary Statistics

Using the definitions of child and laborer outlined above the following statistics were derived from the model. According to the data, 11.7% of the children in Brazil are currently engaged in the labor market. However, there is a wide degree of disparity between males and females and urban and rural residents. 8.39% of female children in Brazil are actively involved in the labor market, compared with 15.09% of male children. In urban areas of Brazil only 8.57% of the children are working compared with 27.59% in rural areas. Also, the sexual disparity increases as you move from urban to rural areas. In urban areas the male child participation rate is only 3.88 percentage points higher than that of females, while in rural areas the difference climbs to 22.26 (Table 2).

Table 2:

Child labor Rates: Males v Females Rural v Urban
All Children Aged 4-16

	Male Child		Female Child		Both Sexes	
	Urban	Rural	Urban	Rural	Urban	Rural
Child Labor						
Yes						
Count	3729	2642	2346	1243	6075	3885
%	10.51%	39.19%	6.62%	16.93%	8.57%	27.59%
No						
Count	31761	4099	33069	6098	64830	10197
%	89.49%	60.81%	93.38%	83.07%	91.43%	72.41%

The disparity between male and female work may largely be explained by higher involvement in domestic tasks on the part of females. Females in the data spent an average of 14.45 hours per week on domestic tasks while males spent only 8.87 hours. Across the population females spent more time on domestic tasks than males. In urban areas child laborers regardless of sex spent more time working domestically than their nonworking counterparts, while in rural areas this trend was reversed. In general the

pattern of domestic work across sexes and in rural vs. urban areas varied greatly, the results are summarized below in Table 3.

Table 3:

Child Labor Rates: Males Females and Domestic Work
All Children Aged 4-16

	Male Child		Female Child		Both Sexes	
	Hrs/Wk domestic		Hrs/Wk domestic		Hrs/Wk domestic	
	Urban	Rural	Urban	Rural	Urban	Rural
Child Labor						
Yes						
Count	3729	2642	2346	1243	6075	3885
Hrs/Wk dom	9.41	8.91	16.42	15.76	12.12	11.10
No						
Count	31761	4624	33069	5573	64830	10197
Hrs/Wk dom	8.68	9.58	14.10	14.96	11.44	12.52
Total						
Count	35490	7266	35415	6816	70905	14082
Hrs/Wk dom	8.79	9.26	14.32	15.15	11.55	12.11

Note: Hours per week are only domestic labor

Despite the higher labor participation rates of males than females one should pause before concluding that child labor is a more pressing concern in the male population. According to the ILO, girls are more likely than boys "to be working in industries which are hidden and unregulated," which leaves them "more vulnerable to exploitation and abuse." (ILO website, 1999) It is therefore likely that female child labor is underreported compared to that of males, and possibly more hazardous.

As mentioned above, child labor is a concern in more than the short term. Children who work are less likely to attend school, this lowers their future earnings potential and lowers the human capital accumulation of the nation as a whole (World Bank, 2001. p. V). This assertion appears contradicted by a fairly high rate of school attendance even among Brazilian child laborers. In Brazil 83.89% child laborers attend school, compared with 90.27% of children in general and 92.10% of children who don't work. Males are more likely than females to attend school regardless of their child labor

status. This may be caused by societal norms, or the increased domestic responsibilities of females as was shown in Table 3. Table 4 summarizes the school attendance status of both working and non-working children.

[9]

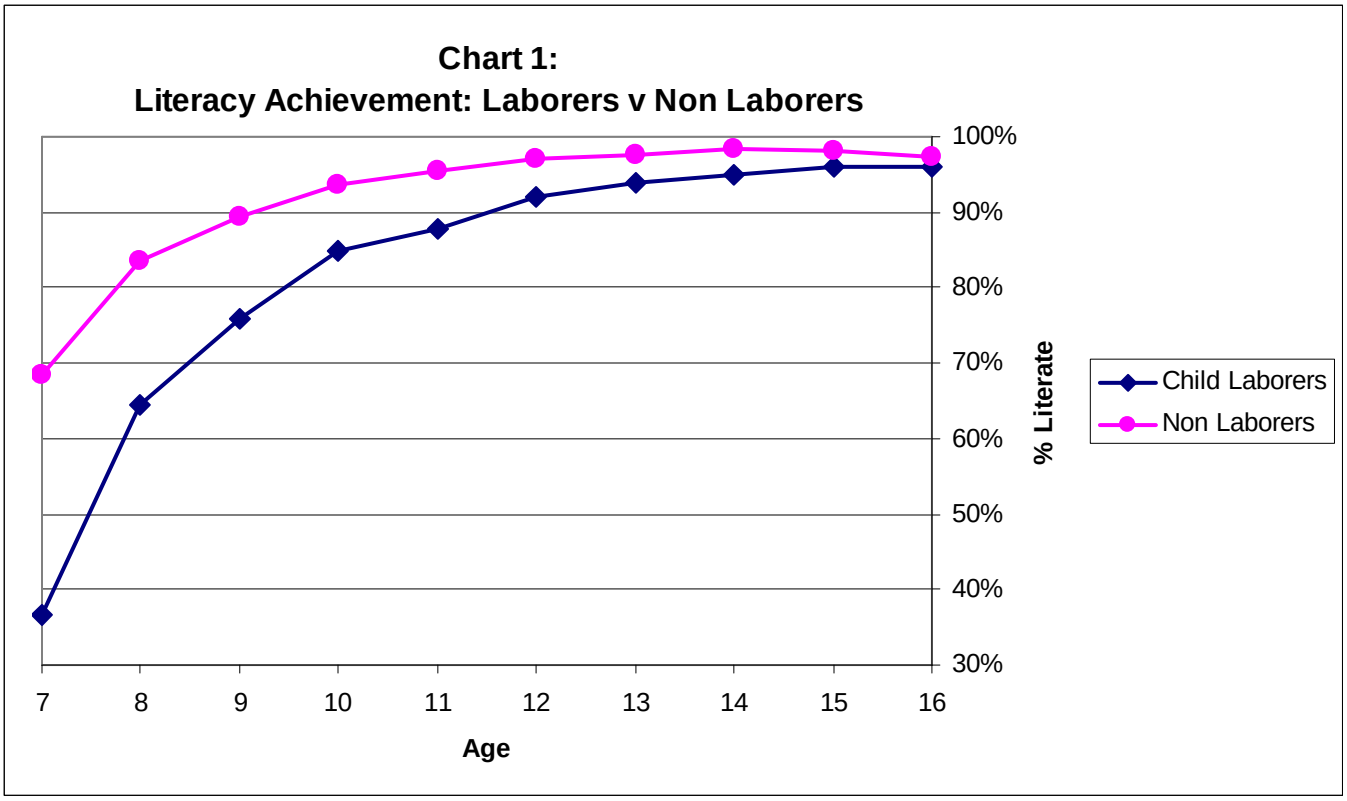
Table 4:

Child Labor Rates: School Attendance Male v Femals
All Children Aged 7-16

	Male Child		Female Child		Both Sexes	
	Attends School		Attends School		Attends School	
	No	Yes	No	Yes	No	Yes
Child Labor						
Yes						
Count	966	5351	617	2950	1583	8301
Row %	15.29%	84.71%	17.30%	82.70%	16.02%	83.98%
No						
Count	1145	28028	1542	30171	2687	31316
Row %	3.92%	96.08%	4.86%	95.14%	7.90%	92.10%
Total						
Count	2111	33379	2159	33121	4270	39617
Row %	5.95%	94.05%	6.12%	93.88%	9.73%	90.27%

The detrimental effects of child labor on school achievement are not limited to lower attendance rates. Children who work and attend school are falling behind their peers at an alarming rate. Literacy rates for working children are below the national average. Although both workers and non-workers have literacy rates in the high 90s by the time they reach the age of 16, child laborers achieve literacy much later in life, which stunts their total educational achievement (Chart 1).[10]

[9] A Similar table using 1998 PNAD data appears in Emerson and Souza 2002.
[10] The argument that child laborers gain knowledge of the World of Work which offsets any educational loss has not held up to empirical research. (Baland, Robinson 2000, 667)

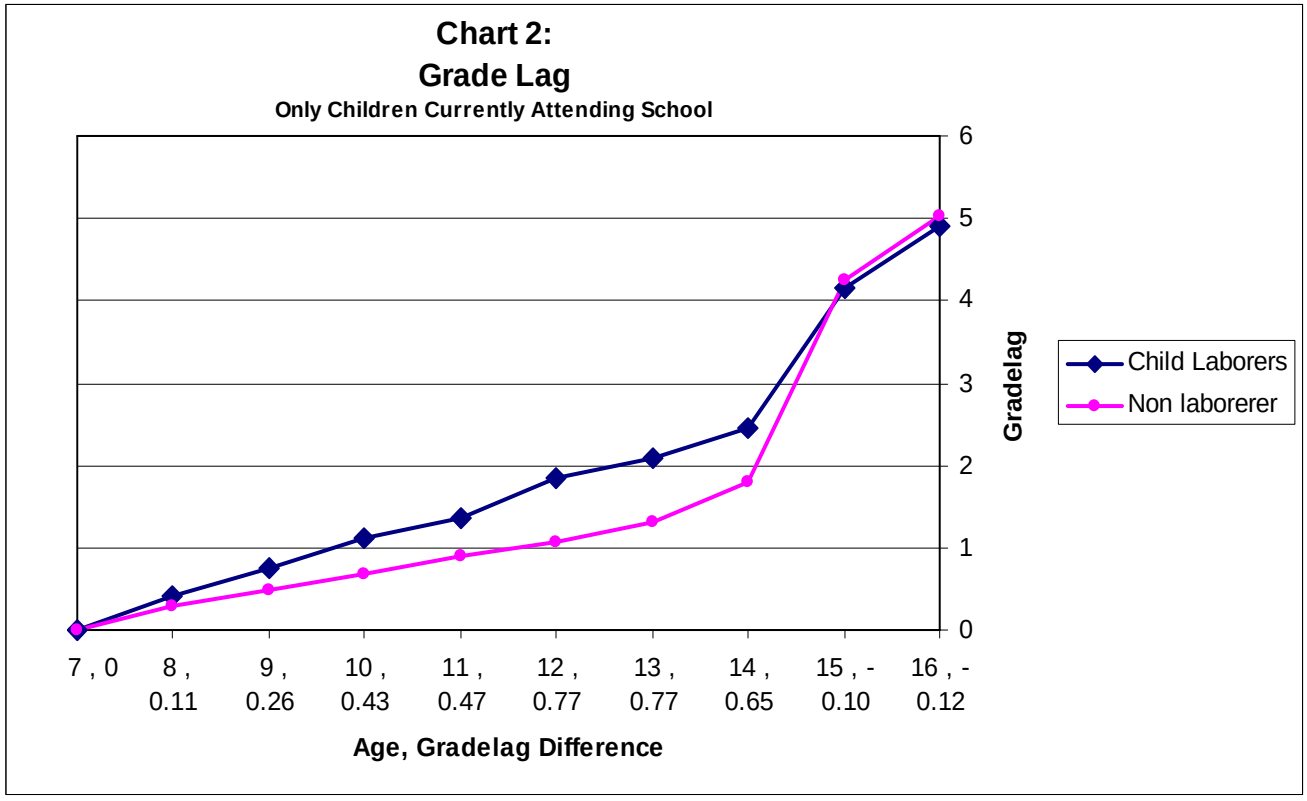


By the age of eight, 83% of non working children can read, compared to 65% of working children, this disparity decreases with age. In light of the similar school attendance rates, this result is somewhat surprising. The cause for the differing literacy rates is likely the result of later school enrollment by laborers and lower achievement while in school. Although the majority or child laborers are still attending school, any time spent working means less time available to concentrate on school. If this is the case then workers should not only be falling behind their peers in terms of literacy, but in other measures of scholastic achievement as well. To test this, a grade-lag variable was created that measure how far each child in the data was falling behind.[11]

The PNAD data contains information on what grade the child is currently attending. In Brazil, it is common practice that a child begins school at the age of seven. Therefore, a seven year old should, assuming he/she is not falling behind, report being in

[11] This measure of school lag is consistent with the work of the World Bank when they studied the impact of child labor on school attainment (World Bank, 2001).

grade 1, an eight year should be in grade 2 and so on. The grade-lag variable is equal to (Age – 6 – Grade). Because this is not an attempt to measure whether or not children are attending school, but rather how they are doing in their studies, only students who currently reported attending school are included in the data. It should also be noted that students born later in the year will have grade-lags biased upwards (World Bank, 2001 p. 15). However, because both groups in this comparison, workers and non-workers, experience this bias, the impact on the analysis should be negated.



As can be seen in Chart 2, the difference in grade-lag between working and non-working students increases steadily until it reaches its pinnacle around age 12 or 13 when students should be in the fifth or sixth grade. After this point the grade-lags converge, and non-working students actually have a higher grade-lag than child laborers for 15 and 16

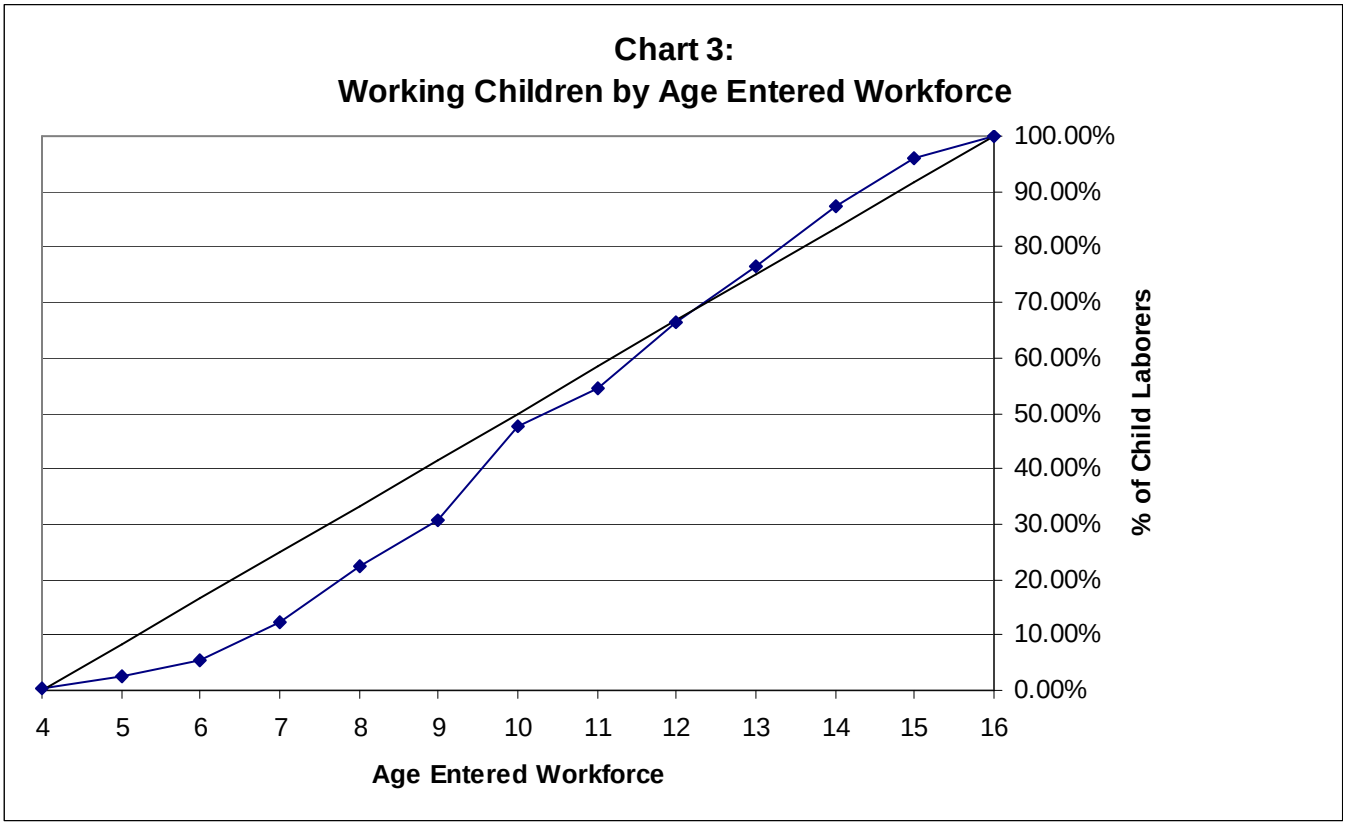
year olds. This is likely due to the fact that working students have a higher attrition rate and are more likely to drop out of school. 15 to 16 may be the age when they chose to leave. In general, the data reflect the expected trend in grade-lag with child laborers falling farther behind their non-working peers. It should also be noted that this trend reverses itself in rural communities, where child non-laborers have slightly larger grade-lags before age 11, but significantly smaller grade-lags in the following years (Appendix Chart A). [12] Also, grade-lags of workers vary greatly across the states of Brazil, ranging from an average difference across all years of 2.86 in the state of Amapá, to an average difference of .56 in the State of Acre (Appendix Table B).

The World Bank believed that a major cause of this grade-lag is late enrollment into school by young working children. Using 1999 data they observed that in rural areas, Brazilian working children enroll four months later than those who do not work, in urban areas the difference is only three months (World bank, 2001, p. 16). In my data, relatively few of the child laborers are as young as 7 years old, so it seems odd that late enrollment would be driving the grade-lag. However, more important than the current age of the child laborer is the age in which they entered the labor market. This is a likely a better measure of the cumulative impact of child labor.

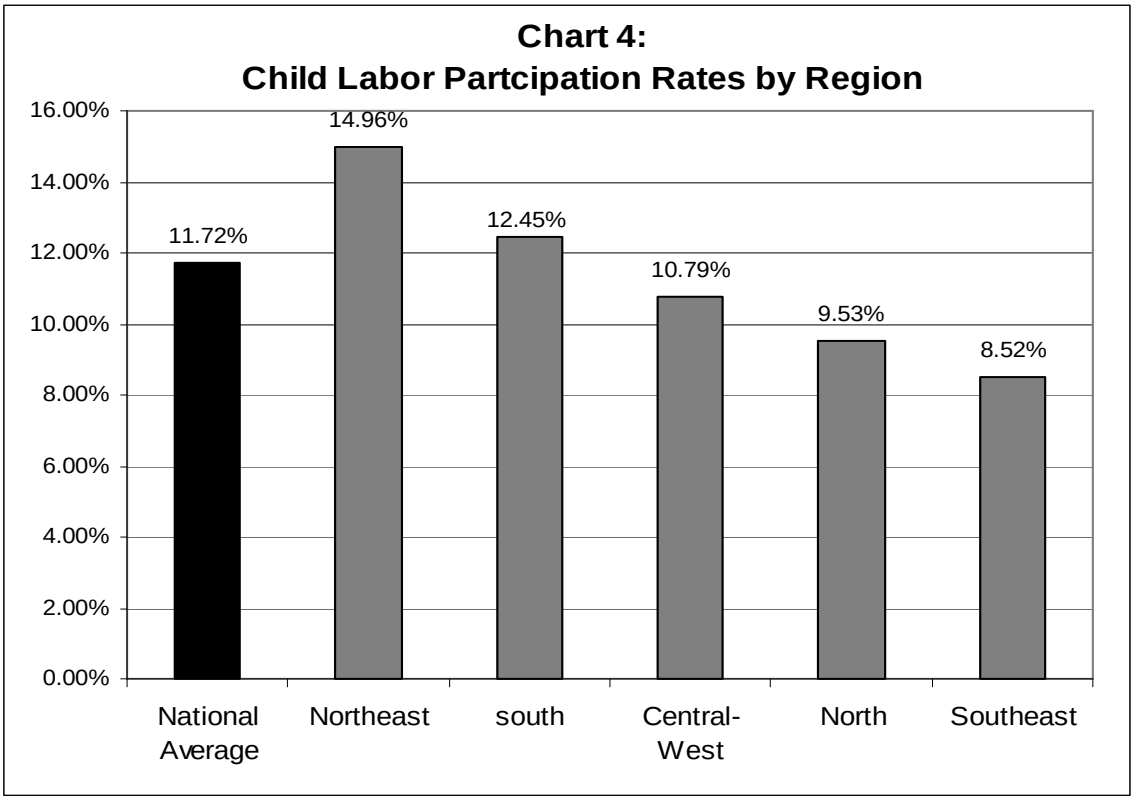
PNAD 2001 provides data on what age each child began working. This data was sorted by the age a child began working, and then a running sum of the percentage of child laborers entering the workforce was calculated. From this it can be seen that of working children, 12% entered the work force before the age of 8, while 22% entered

[12] World Bank, 2001, also observed this phenomena using 1999 PNAD data and attributed it to "supply-side differences: rural schools may be providing substandard services relative to urban schools." As well as "demand-side effects: rural households are more likely to be poorer and less likely to be able to afford keeping the child in school or to be able to afford sending them to better schools." However, this explanation seems inadequate and the phenomenon deserves further inquiry.

before the age of 9. More than half of all working children in the data entered the workforce before the age of 12. Chart 3 below summarizes the results.



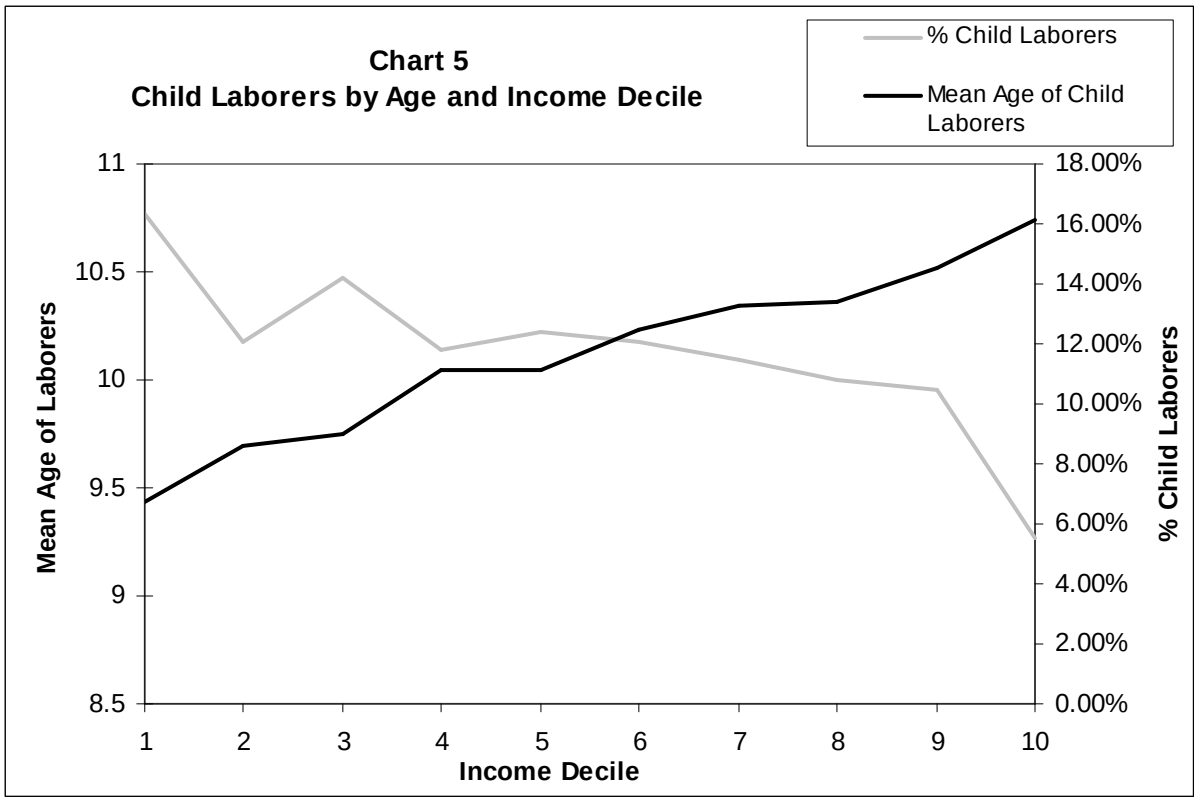
Labor Participation rates vary a great deal across Brazil. By sorting the data by state and by region it can be seen that there is a large degree of variation in child labor participation rates across states and regions. The rates range from a high of almost 15% in the Northeast region of the country to a low of a little over 8.5% in the Southeast. Chart 4 below illustrates the regional variation.



There is also a large degree of variation amongst states within these regions (Appendix Chart C). The largest incidence of child labor occurs in the northeast state of Piauí, with a child labor rate of 22.74%. Yet within that region, the state of Sergipe has a child labor rate of only 11.33%. A large degree of this variation can be accounted for by the rural/urban distribution of the sample within the state. States with larger rural populations are likely to have a higher child labor participation rates. However, even when controlling for this we still observe a large degree of variation in child labor rates across states (Appendix Chart D). As will be seen in the empirical section, much of the variation across these states may be correlated with the state level economic concentration in certain industries.

The impact of household income on decision to send a child into the labor market is of primary concern to this study. As was outlined in section III it is believed that poor families put their children into the work force out of desperation, not out of neglect or

abuse. We would therefore expect that families with lower real incomes would have higher rates of child labor, and indeed the data support this (Chart 5).



As can be seen in Chart 5, poor families are not only putting their children to work at a higher rate than the rich, but also at a younger age. Because the negative impact of child abuse is cumulative, the younger the age entering the labor market, the more pernicious is child labor. Therefore, although the labor participation rates of the wealthy are non-negligible, they are not as concerning as child labor in poor families.

As expected, the income generated by these child laborers is a significant percentage of family income in poor households. For the bottom two income deciles child laborers' income is 45% that of total household income, excluding children. This is consistent with the theory of Basu and Van and indicates that the families of the poor rely

heavily on the income generated by their children. Table 5 below summarizes child laborers' contribution to household income.

Table 5:

Percentage of Monthly Family Income Provided by Children By Income Decile

Decile	Total Family Income (R)	Child Laborers' Income(R)	Total Family Income (USD)	Child Laborers' Income (USD)	% Family Income
1	R83.26	R63.62	$35.37	$27.02	76%
2	R191.28	R59.25	$81.25	$25.17	31%
3	R271.60	R64.81	$115.37	$27.53	24%
4	R358.45	R83.02	$152.26	$35.27	23%
5	R448.49	R88.61	$190.50	$37.64	20%
6	R565.10	R104.82	$240.03	$44.52	19%
7	R722.52	R118.69	$306.90	$50.42	16%
8	R956.07	R144.87	$406.10	$61.54	15%
9	R1,426.06	R157.34	$605.74	$66.83	11%
10	R3,929.63	R210.87	$1,669.17	$89.57	5%

Notes: Conversion based on 2001 average USD/Real exchange rate
Family income is exclusive of child laborers' contribution

Although, the contribution to family income in percentage terms by the children of the rich is less than by the children of the poor, their absolute income levels are much higher. Even controlling for age, the children of rich households have significantly higher income levels than those of poor households. This may be the result of nepotism by rich families, or better education and thus higher earning potential of rich children (Appendix Chart E).

V. Brazil's Efforts to Curtail Child Labor

In 1996, Brazil instituted a child labor reduction program entitled *Programa de Erradicacao do Trabalho Infantil* (PETI). The program consisted of two separate fronts.

The first component consisted of an income subsidy provided to low-income households. The second was a required amount of school attendance. To qualify for this subsidy households had to fulfill the following requirements.

- Have per capita income below one-half the minimum wage (roughly equal to R150, $65/month).
- Households were required to sign a contract agreeing to the following
    - Their child would not work.
    - The child would attend school at least 80% of the time.
    - The child would attend after-school sessions called the *Jornada Ampliada* which roughly doubled the length of the school day. (Ferreira, Lanjouw, and Neri, 2002, p. 4)

The program originated in the northeast state of Pernambuco and was later expanded to include the states of Bahia and Sergipe, also in the northeast. The program was instituted in these regions because of the high rates of child participation in the harvest and refinement of sisal (agave), which is considered extremely hazardous. (Ferreira, Lanjouw, and Neri, 2002, p. 5). The level of the income subsidy was dependent on the state of residence and the amount of children a household enrolled in the PETI program. In all three states half of the transfer went to cover the cost of the after-school session and half was given directly to the household. In Bahia and Sergipe the transfer amount was R25/month per child, while in Pernambuco the transfer was $50/month for 1 or 2 participating children, $100/month for 3 or 4 children, and $150/month for 5 or more. The way the subsidy was structured in Pernambuco was obviously problematic, as parents had no incentive to enroll a second, fourth or sixth child in the program. In response to this problem, a common benefit criterion was set for all states from 2001 onwards. Families now receive a subsidy for each participating child (World Bank, 2001, p. viii).

The program has, by in large, been a great success.[13] It has both decreased child labor participation and increased school attendance by the target population. The only negative consequence has been increased labor participation, in terms of hours worked, by those children who do not participate in the program. This has been largely attributed to supply and demand effects. The decrease in the child labor supply increased wages, as a consequence, those children still in the labor are working more (Ferreira, Lanjouw, Neri 2002, p. 18).

VI(a). Basic Regression Results[14],[15]

In building a model to explain child labor and Brazil, I began with the basic correlations that could be predicted from the summary statistics. As expected the coefficients on male, age, and number of children in the family are all positive and significant at 99%. The positive and significant coefficient on the "number of children in the family" variable indicates that the more children in the family, the more likely an individual is to work. This is likely the effect of spreading a set family income level across more children. The coefficients on income is negative while income squared is positive, indicating that higher income levels decrease your chance of working, but at a decreasing rate CP. However the magnitude of the income-squared dummy is so small it can almost be ignored. The dummy coefficient for urban children is negative and significant while the coefficient on the dummy variable for white children is negative, but

[13] See both World bank, IADB
[14] All models were run with logistic regression, predicting the probability of a child working. Models were also run using probit regressions, yielding quantitatively similar results. Those outputs are available upon request.
[15] Positive coefficients indicate higher probability of a 1 value for the 1,0 variable Laborer

not significant.[16] Surprisingly the coefficient for two parent households is not significant. Indicating that having the father in the household does not decrease a child's chance of working. The relationship between the presence of a father in the household and family income may explain the insignificance of this variable. The coefficient for "does not attend school is positive" as expected, indicating that children attending school are less likely to work. However this variable was removed in later regressions because of strong endogenous variable concerns. There was also a variable for whether the child in question is not the offspring of the family head, but rather another relative, this was not significant at any level and was removed.

The model also ran fixed effects across the states. The zero level dummy was the state of Minas Gerais. This was chosen because its child labor participation rate (11.69%) was closest to the national average (11.7%). In comparison to this base state, children in the states of Amapá in the North and Rio de Janeiro in the Central-West region had the lowest probability of working, while children in the Northeast states of Piauí and Maranhão had the highest chance of working. Table 6 summarizes the regression results.

[16] In later models the urban dummy will be replaced by a area coding dummy that picks up more information about the population size and density households' location

Table 6:

Regression With State Fixed effects

	Coeff.	Pr>Chisq
Intercept	-7.3961	<.0001
Male	0.8004	<.0001
Real Income	-0.0002	<.0001
Real Income^2	1.87E-09	<.0001
Age	0.5201	<.0001
Age^2	-0.00338	3.66E-02
Urban	-1.5175	<.0001
Both Parents in Household	-0.012	0.7067
# Children in Household	0.1144	<.0001
White	-0.0441	0.1209
Obs = 83360		
Max-rescaled R^2 0.3544		

State Fixed Effects	Coeff.	Pr>Chisq
Sergipe	0.5883	<.0001
Bahia	0.5627	<.0001
Espírito Santo	0.4426	<.0001
Rio de Janeiro	0.4358	<.0001
São Paulo	0.3547	<.0001
Paraná	0.3451	<.0001
Santa Catarina	0.2702	<.0001
Rio Grande do Sul	0.2591	<.0001
Mato Grosso do Sul	-0.2311	<.0001
Mato Grosso	-0.4847	<.0001
Goiás	-0.8042	<.0001
Distrito Federal	-0.9174	<.0001
Rondônia	0.2867	0.0002
Acre	0.4444	0.0004
Amazonas	0.2633	0.002
Roraima	-0.938	0.0039
Pará	0.2166	0.0145
Amapá	-0.4729	0.0239
Tocantins	-0.1878	0.0409
Maranhão	-0.1242	0.1148
Piauí	-0.1394	0.1495
Ceará	-0.0639	0.1959
Rio Grande do Norte	-0.1464	0.2085
Paraíba	-0.0729	0.2292
Pernambuco	0.0711	0.3794
Alagoas	-0.0245	0.5564

Note: Bold denotes significance level of or above 95%

In order to account for the significant differences in child labor probabilities across states, state dummies were replaced with state level economic data from 2001. The data contains state level employment statistics across all sectors of the economy.[17] The hypothesis is that certain industries can better use small bodies and small hands and thus have higher demand for child laborers. This would increase the demand for child labor in certain states, increasing the wage and increasing the amount of children willing to work. Appendix Table F summarizes economic concentration by state. On average, the state economies of Brazil are concentrated in services and retail, heavy industrial activity, and public security and defense, with the highest concentration in public defense.

[17] The variables are entered into the model as percentage of total employment. That is, (Total Employment in Agriculture in State A)/(Total Employment in State A)

Table 7:

Child Laborers by Industry

Industry	Children	% of Child Laborers
Agriculture	3700	37.15%
service	1957	19.65%
Unknown	1654	16.61%
vendor	1389	13.95%
manufacturing	674	6.77%
infrastructure	251	2.52%
finance	115	1.15%
fishing	85	0.85%
professional	81	0.81%
transport	29	0.29%
telecomm	9	0.09%
electrical	7	0.07%
state	6	0.06%
sanitation	3	0.03%

Table 7 above Summarizes where the children in the data set are currently working. It's apparent that the majority of the working children in the data set are working in agriculture, 37.15%. This is consistent with other surveys of child labor in Brazil (World Bank, 2002) and with child labor globally. Children, though not as capable as adults, are able to contribute to agriculture. Therefore it is not surprising that the coefficient on agriculture is positive. Indicating that states with higher economic concentration in agriculture demand more child labor. Child labor is also highly concentrated in service and vendor activities. It is therefore not surprising that the regression coefficient "Retail and Service Activities" is also positive and significant. The coefficient on telecommunication is predictably negative. Indicating that regions with higher employment concentrations in this white-collar industry are less likely to send their children into the work force. This is not surprising considering what little worth a child would be to a telecommunications firm. The rest of the economic variables in the model are harder to explain. There are positive and significant coefficients on both education and social services. This may be due to some endogeneity in the model. The

government may be allocating more social spending to the states with higher rates of social ills such as child labor, which would explain this result (Table 8).

Table 8:

Regression with State Employment Concentration Percentages

	State Econ Percentages		With HIV Rates	
	Coeff.	**Pr>Chisq**	**Coeff.**	**Pr>Chisq**
Intercept	-12.6668	<.0001	-12.3041	<.0001
Male	0.7957	<.0001	0.7964	<.0001
Real Income	-0.00021	<.0001	-0.00021	<.0001
Real Income^2	1.98E-09	<.0001	1.954E-09	<.0001
Age	0.517	<.0001	0.5168	<.0001
Age^2	-0.00332	0.0395	-0.00332	0.0397
Urban	-1.5522	<.0001	-1.5516	<.0001
Both Parents in Household	-0.0106	0.739	-0.00996	0.7537
# Children in Household	0.1184	<.0001	0.1175	<.0001
White	-0.0723	0.0089	-0.0603	0.0317
HIV Rate	*******	*******	-0.00616	0.0139
Aggriculture	3.9797	0.0893	1.7795	0.4787
Manufacturing	5.8254	<.0001	5.8863	<.0001
Retail, and Service Activities	10.9045	<.0001	10.6206	<.0001
Telecommunications	-7.1696	0.0092	-8.2301	0.0031
Public Security and Defense	4.6714	<.0001	4.2398	<.0001
Education	7.1298	0.0031	5.5603	0.0264
Other Social Services	11.5746	<.0001	11.6387	<.0001
	Obs = 84850		Obs = 84850	
	Max-rescaled R^2 = 0.3494		Max-rescaled R^2 = 0.3495	

In hopes of explaining more about what causes the variation across states in Brazil, I added a variable that contained the HIV infection rates from 2001. HIV rates are possibly correlated with, publicheath and public education among others. The coefficient was negative and significant, but with a very small magnitude. Interestingly, when this variable was placed in to the equation the coefficient on state level agricultural

concentration lost its significance and the coefficient on education loss some magnitude and significance. Indicating the possible correlation between these variables, see table 8.

VI (b). Working With the Income Variable

As mentioned above, it is poverty beyond anything else that is the perceived cause of child labor. In my analysis, although the coefficient on income exhibits the proper sign and is highly significant, the exponential specification does not appear to be properly capturing the impact of poverty on child labor. I believed, as Basu and Van did, income changes effect child labor participation mainly for low-income households. Once a household reaches a certain threshold income level, then further changes should not impact child labor. I did not feel that the exponential specification was properly accounting for this phenomena.

In order correct for this, and to align the model with the theoretical framework put forth by Basu and Van, the specification of income was changed. According to Basu and Van's model, "A family prefers to send the child to work if an only if in the absence of income from the child each individual's consumption falls below a certain exogenously fixed subsistence level" (Basu and Van p. 416). In light of this, income should only impact the probability of child labor until it permits the subsistence level of consumption. After this minimum level is obtained, changes in income should no longer matter for the decision to put a child to work. Of course theirs' is a theoretical framework and will not fit perfectly the reality of the situation in Brazil. They assume identical households, and one fixed critical level of subsistence consumption across all households; this will not be the case in Brazil. Still I believed it was worth the effort to break down the income level

and try to find if there exists a critical level of income that has the highest impact on child labor.

Income was broken down into several component levels to try to see where the critical level of income falls. First income was broken down into 10 intervals of 100 Reales (approx $42.5), and a final interval for anyone with income level greater than 1000. Each interval was assigned a dummy variable with the final, highest income level being the baseline. Next, income was broken down based on deciles of the population in the data set. That is, those in the lowest 10% of the population in terms of income received a dummy, those in the next 10% received a dummy, and so on. This was done in two different ways. First the baseline level was assigned to the top income decile. This allowed comparison between every level and the top income decile. Next, the baseline set to the top five deciles, allowing comparison between the individual deciles of the bottom 50% of the population, and the top half. All the results are summarized in Appendix Table G.

As might have been predicted, the income breakdowns based on decile showed erratic and inconsistent results, this would seem to support Basu and Van's assertion that the critical subsistence level is fixed exogenously and is not dependent on where you fall compared to the population, but what level of absolute consumption your income permits. The income breakdowns that were based on absolute income levels were much more informative. In the breakdown by income levels of R100, only the first three dummies, from 0 – 100, 100 –200 and 200 – 300 Reales/month were positive and significantly differently from the baseline level of <1000.

This analysis indicates that the children of the very poor are working at significantly higher rates than the children of the rich. However, there is no significant difference between the children of the middle-income levels, above 300 Reales/Month, and the children of the wealthy. Unfortunately, this does little to indicate where the Basu and Van's critical level of consumption may lie. The analysis only indicates that a change from very low levels of income to very high levels, would significantly impact the probability that a child would enter the workforce.

In an attempt to locate the critical value of income that would permit a parent to withdraw a child from the labor market, comparisons were made between the probability of labor market participation of a child in a given income level, and a child in the income level above them. In contrast with the interpretation of a typical dummy variable, which only allows for comparisons with the zero valued dummy, this technique permits comparisons between any two levels of income. A significant estimate indicates that the predicted probability a child from a household in the first income level would enter the labor market, is significantly different from the predicted probability of labor force participation of a child from the other level in the comparison.

If we compare each income level with the one directly above it, that is compare households with income level less than R100 with income levels R100-R200, then compare R100-R200 to R200-R300, and so on, we see each movement up the income ladder is significant until you reach the third income tier, that of 200-300 R/Month. There is no significant differences, in terms of impact on child labor probability, between household in the third and forth tier. The same holds true for all subsequent income tiers. See Table 9 for results.

Table 9:

Comparison Tables:

Contrast Observations with Consecutive Family Income Levels

Impact on Predicted Probability of Child Labor

Compare Income Level	Against Income Level	Estimate	Pr>Chisq
<100R	100-200R	1.2732	**<.0001**
100-200R	200-300R	1.1076	**0.0222**
200-300R	300-400R	1.0582	0.2523
300-400R	400-500R	1.0147	0.7963
400-500R	500-600R	1.017	0.7891
500-600R	700-800R	0.903	0.1398
700-800R	800-900R	1.1235	0.1382
800-900R	900-1000R	0.8834	0.1564

Note: Bold Denotes Significant Comparison at 90%

Attempting to find this critical level of income has more value than simply testing the hypothesis of Basu and Van that there exists an exogenously fixed minimum consumption level. From a public policy perspective if one could find this critical level, then an income transfer program could be designed to target households with the precise and effective level of subsidy for maximum impact. However, at this point the results from the model appear inadequate to do this and do not point to any specific critical level of household income.

In a further attempt to find what level of household income is the critical level, the income variable was broken down into income per family member to better align with Basu and Van's theory that it is "each individual's consumption" level that matters, and not the overall wealth of the family. [18] This parceling out of income levels by family member does not perfectly account for an individual's consumption (consider the decreasing average cost of shelter for each additional family member) but it may be a better approximation of personal consumption than is total family income. After the income variable was broken down by number of family members, tiers were assigned at

[18] The earlier regressions were also run using this parceled out income technique. The results were similar with different magnitudes on the income coefficient. These are also available on request.

25R intervals, using dummy variables in the method outlined in the first income breakdown.[19] Comparisons were made between the adjacent tiers of income, comparing the first tier with the second, the second with the third and so on. The data was then divided into the five regions of Brazil. This division into regions was an attempt to account for any regional differences that the income deflators were not picking up. The results are somewhat surprising.

The data shows that in the northern region of Brazil the income per family member comparison is only significant between the fifth and sixth income tiers. Other individual level changes were not significant. In the northeast region comparison of the first and second tier, seventh and eighth tier, and eighth and ninth tier were significant, while other changes were not. In the southern region the only significant comparison was between the second and third tiers. The results are summarized in Table 10.[20]

[19] The smaller interval was an attempt to get a more precise estimate of where the critical value may lie. Also, because income was parceled by family member its magnitude has decreased.

[20] Note that because the income level dummies are different both in definition, and in level (R25 compared to R100), the results from these regressions will not correspond to the results in the earlier regressions.

Table 10:

Comparison Tables By Region:

Contrast Observations with Consecutive Income Per Family Member Levels

Impact on probability of Child Labor

Compare Income Level	Against Income Level	North		Northeast		South		Southeast		Central West	
		Estimate	Pr>Chisq	Estimate	Pr>Chisq	Estimate	Pr>Chisq	Estimate	Pr>Chisq	Estimate	Pr>Chisq
<25R	25-50R	0.859	0.394	1.286	**<.0001**	1.215	0.334	1.829	**0.000**	0.872	0.591
25-50R	50-75R	1.145	0.300	0.997	0.960	1.740	**0.000**	1.138	0.304	1.064	0.707
50-75R	75-100R	0.979	0.882	1.071	0.327	1.027	0.861	0.844	0.159	1.308	**0.094**
75-100R	100-125R	1.064	0.697	1.001	0.988	1.148	0.375	1.112	0.386	0.685	**0.019**
100-125R	125-150R	0.694	**0.037**	1.022	0.841	0.947	0.733	1.304	**0.043**	1.134	0.462
125-150R	150-175R	1.134	0.516	0.957	0.725	1.028	0.874	0.703	**0.009**	0.802	0.233
150-175R	175-200R	1.253	0.320	1.295	**0.098**	0.771	0.144	1.325	**0.060**	1.100	0.654
175-200R	200-225R	1.106	0.758	1.578	**0.050**	1.252	0.275	1.002	0.991	1.072	0.793
200-225R	225-250R	1.442	0.355	0.646	0.106	0.978	0.925	1.023	0.906	1.294	0.429
225-250R	250-275R	0.865	0.737	1.517	0.189	0.880	0.627	1.249	0.273	0.871	0.713
250-275R	275-300R	0.630	0.264	0.783	0.478	1.330	0.288	0.679	**0.076**	1.583	0.232

Note: Bold Denotes Significant Comparison at 90%

Interpreting these results deserves some care. The observation that there is no significant difference between the predicted probability of child labor in the north until the firth and sixth income tiers does not imply that a change from the first to the fifth tier would have no significant impact on the decision to send a child to work. Rather, the results indicate that the most significant impact on probability happens *between* these two levels. In the end, the clearest result from this analysis is that the impact of a change in income levels has its most significant impact on the probability of child labor at different income levels for the different regions of Brazil.

This same method was then applied to the three states targeted by Brazil's PETI program (Table 11). The most significant comparisons in Pernambuco were between the first and second, and second and third tiers. In Bahia, there was a significant difference between the first and second tiers, and all tiers above the ninth. In Sergipe the most significant comparisons were between the second and third and third and fourth tiers.

Table 11:

Comparison Tables By States of the PETI:

Contrast Observations with Consecutive Income Per Family Member Levels

Impact on probability of Child Labor

Compare Income Level	Against Income Level	Pernambuco		Bahia		Sergipe	
		Estimate	Pr>Chisq	Estimate	Pr>Chisq	Estimate	Pr>Chisq
<25R	25-50R	1.428	**0.021**	1.295	**0.034**	1.153	0.690
25-50R	50-75R	1.263	0.109	0.877	0.227	0.583	**0.073**
50-75R	75-100R	1.030	0.866	1.211	0.154	2.212	**0.034**
75-100R	100-125R	0.811	0.331	1.085	0.636	1.215	0.697
100-125R	125-150R	1.048	0.865	0.913	0.642	1.188	0.783
125-150R	150-175R	1.000	0.999	1.036	0.877	1.234	0.816
150-175R	175-200R	1.055	0.882	1.675	0.107	0.326	0.233
175-200R	200-225R	1.616	0.392	1.247	0.626	0.224	0.308
200-225R	225-250R	0.724	0.643	0.389	**0.038**	1.878	0.673
225-250R	250-275R	2.112	0.411	4.862	**0.020**	0.444	0.569
250-275R	275-300R	0.442	0.359	0.283	**0.085**	*****	*****

Note: Bold Denotes Significant Comparison at 90%

Because the PETI program bases eligibility on total family income, and not income per family member, the income variable was redefined again. Family income, as opposed to per family member income, was broken into tiers of R25 and same comparison technique was used. It should be noted that this model is also of merit because the magnitude of tier spacing, R25, is also the level of income subsidy in both Bahia and Sergipe. Therefore, participation in the PETI program would raise family income exactly one tier per child participating.[21]

The results differ from somewhat from those from the prior regressions (Table 12). In Pernambuco, as was the case using income per family member, comparisons were most significant at the lowest levels of income. However, unlike the other result, comparisons were significant between households of the sixth and seventh, and seventh

[21] Also, it should be noted that because of the low-income eligibility requirement, only household in the first six tiers of income are eligible for the subsidy.

and eighth tiers. The results in Bahia showed significant changes between the fifth and sixth, eighth and ninth, and surprisingly between the eleventh and twelfth tiers. In Sergipe, significant level changes were between the eighth level, and all tested levels above.

Table 12:

Comparison Tables By States of the PETI:

Contrast Observations with Consecutive Family Income Levels

Impact on probability of Child Labor

Compare Income Level	Against Income Level	Pernambuco		Bahia		Sergipe	
		Estimate	Pr>Chisq	Estimate	Pr>Chisq	Estimate	Pr>Chisq
<25R	25-50R	1.981	0.501	1.839	0.361	2.362	0.586
25-50R	50-75R	3.494	**0.077**	0.716	0.385	0.259	0.312
50-75R	75-100R	0.236	**0.034**	1.785	**0.063**	0.861	0.875
75-100R	100-125R	0.949	0.876	0.693	0.204	2.131	0.343
100-125R	125-150R	1.039	0.908	2.183	**0.007**	0.888	0.862
125-150R	150-175R	1.442	0.241	1.076	0.777	2.933	0.117
150-175R	175-200R	1.364	0.274	1.128	0.578	1.203	0.782
175-200R	200-225R	2.292	**0.019**	0.512	**0.012**	0.382	0.167
200-225R	225-250R	0.466	**0.023**	1.505	**0.097**	9.595	**0.007**
225-250R	250-275R	1.015	0.957	1.010	0.965	0.111	**0.006**
250-275R	275-300R	1.289	0.421	0.519	**0.005**	7.326	**0.099**

Note: Bold Denotes Significant Comparison

The significant impact of income level changes on child labor probability at income levels above those eligible for the PETI program is surprising. In Bahia for example, a child in the eighth tier has a significantly higher probability of being a child laborer than a child in the ninth tier. However, this child would not be eligible for the PETI program because the family's income is above the maximum level of eligibility. As such, it appears as though the PETI would be effective in accomplishing its goal of decreased child labor even at these higher income levels. Although subsidizing the rich is certainly not the goal of the PETI, it should be noted that the minimum wage in Brazil, 300R/Month, falls at the twelfth and final tier in this analysis. So, although the

households in the upper tiers are wealthy in comparison to Brazil's poorest families they are by no means rich, and should perhaps be considered for inclusion in the program.

VII. Conclusion and Policy Implications

Child labor rates in Brazil remain high at 11.7% nationwide with rural children working at much higher rates than urban children, and males working more than females. The negative impact of child labor can be seen on both later literacy attainment and lagging school progress. Despite the assumption that only the children of the poor are working, the children of wealthier families in Brazil report some degree of labor market participation. However, the children of wealthier households start work at a later age, and are better compensated than the children of the poor.

Child labor rates appear to be correlated with state level concentration in certain industries. There is a positive correlation with agriculture and service industries, and a negative correlation with white-collar industries such as telecommunications. As expected, the correlation between child labor and family income levels is strongest at its lowest levels across all of Brazil. However, the level at which income changes may have the greatest impact on child labor participation rates in Brazil varies widely across states and regions.

Prior research has shown the current Brazilian child labor reduction program (PETI) to be highly effective in accomplishing its goals. With that in mind one policy implication of my results is that extending the program to cover families with slightly higher income levels could also reduce child labor.

Appendix

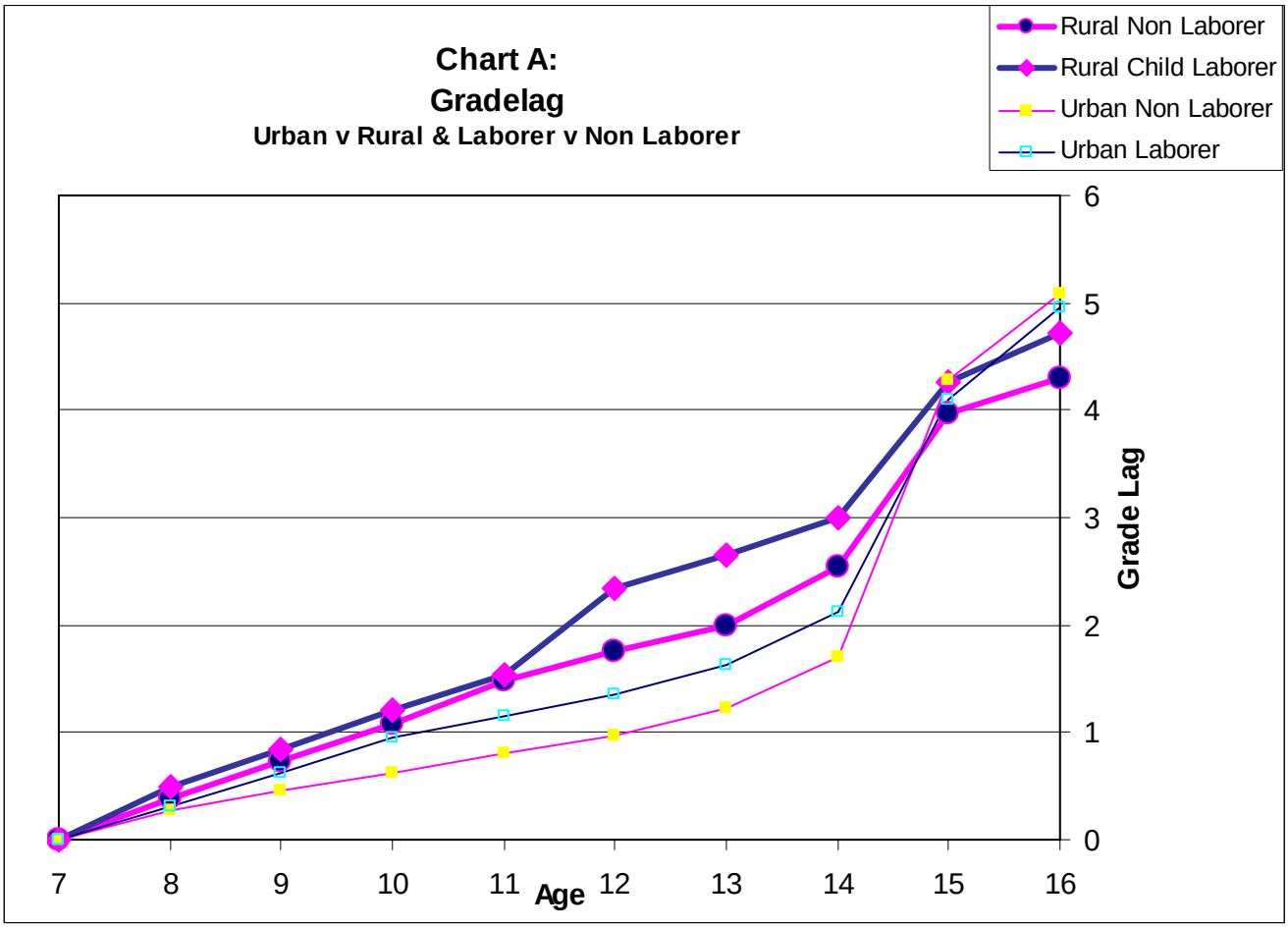


Chart A:
Gradelag
Urban v Rural & Laborer v Non Laborer
Rural Non Laborer
Rural Child Laborer
Urban Non Laborer
Urban Laborer
Grade Lag
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Age

Table: B

Average Gradel lags for States of Brazil

State	Count Worker	Count Non-Workers	Worker Gradelag	Non-Worker Gradelag	Gradelag Diff
Amapá	10	242.00	3.40	0.54	2.86
São Paulo	710	8676.00	3.00	0.79	2.21
Rondônia	96	1131.00	2.73	0.72	2.01
Paraná	580	3839.00	2.33	0.69	1.63
Sergipe	170	1264.00	2.58	1.01	1.57
Paraíba	269	1713.00	2.54	1.01	1.52
Espírito Santo	227	1454.00	2.26	0.77	1.49
Roraima	28	373.00	2.39	0.92	1.47
Maranhão	516	1761.00	2.48	1.02	1.46
Mato Grosso	270	1598.00	2.16	0.71	1.46
Tocantins	287	1229.00	2.25	0.85	1.39
Alagoas	276	1347.00	2.51	1.12	1.39
Santa Catarina	291	1856.00	2.14	0.75	1.39
Rio de Janeiro	227	5099.00	2.33	0.95	1.39
Goiás	502	3311.00	2.06	0.71	1.35
Mato Grosso do Sul	197	1427.00	2.01	0.68	1.33
Rio Grande do Norte	184	1256.00	2.25	0.93	1.32
Rio Grande do Sul	758	5503.00	2.09	0.81	1.29
Piauí	339	1137.00	2.46	1.18	1.28
Amazonas	133	1974.00	2.14	0.95	1.19
Minas Gerais	994	7277.00	1.82	0.67	1.14
Pará	426	4245.00	2.09	1.01	1.08
Bahia	1338	7734.00	2.06	0.99	1.07
Distrito Federal	97	2320.00	1.82	0.82	1.00
Ceará	1014	5197.00	1.69	0.75	0.94
Pernambuco	740	5423.00	1.84	0.97	0.87
Acre	91	692.00	1.40	0.84	0.56

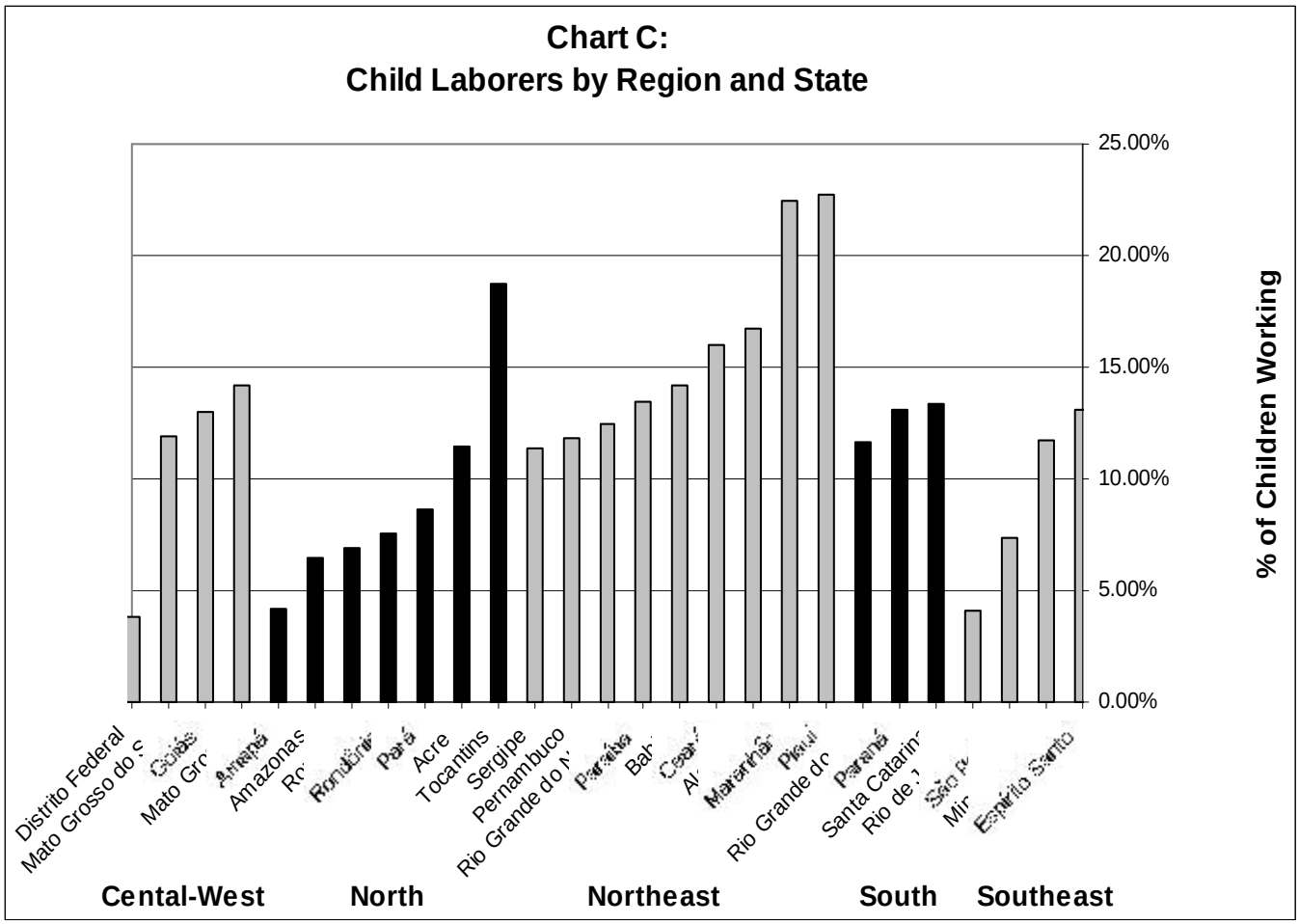


Chart C:
Child Laborers by Region and State
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
% of Children Working
Distrito Federal
Mato Grosso do S
Goiás
Mato Gro
Amapá
Amazonas
Ro
Rondôni
Pará
Acre
Tocantins
Sergipe
Pernambuco
Rio Grande do N
Paraíba
Bah
Ceará
Al
Maranhão
Piauí
Rio Grande do
Paraná
Santa Catarin
Rio de J
São P
Mi
Espírito Santo
Cental-West
North
Northeast
South
Southeast

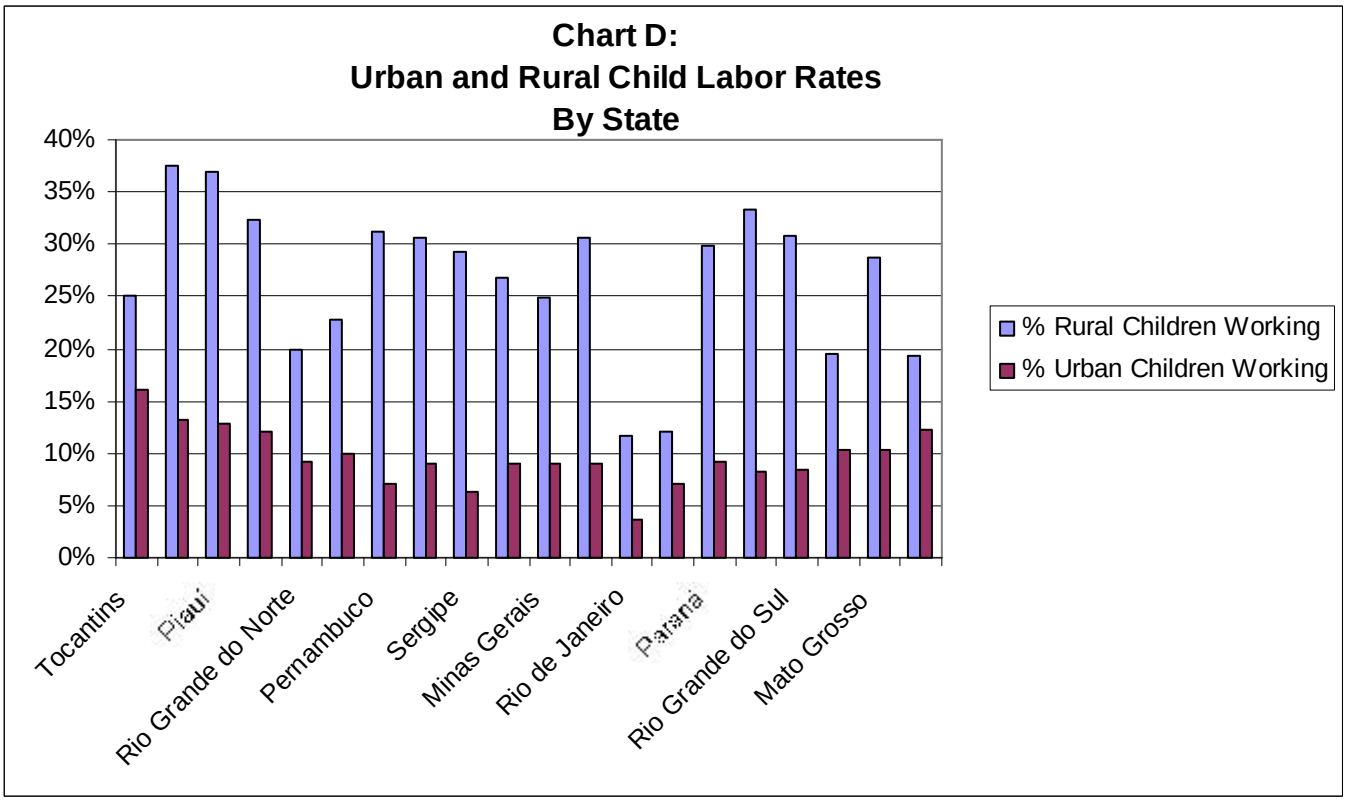


Chart D:
Urban and Rural Child Labor Rates
By State
40%
35%
30%
25%
20%
15%
10%
5%
0%
% Rural Children Working
% Urban Children Working
Tocantins
Piauí
Rio Grande do Norte
Pernambuco
Sergipe
Minas Gerais
Rio de Janeiro
Paraná
Rio Grande do Sul
Mato Grosso

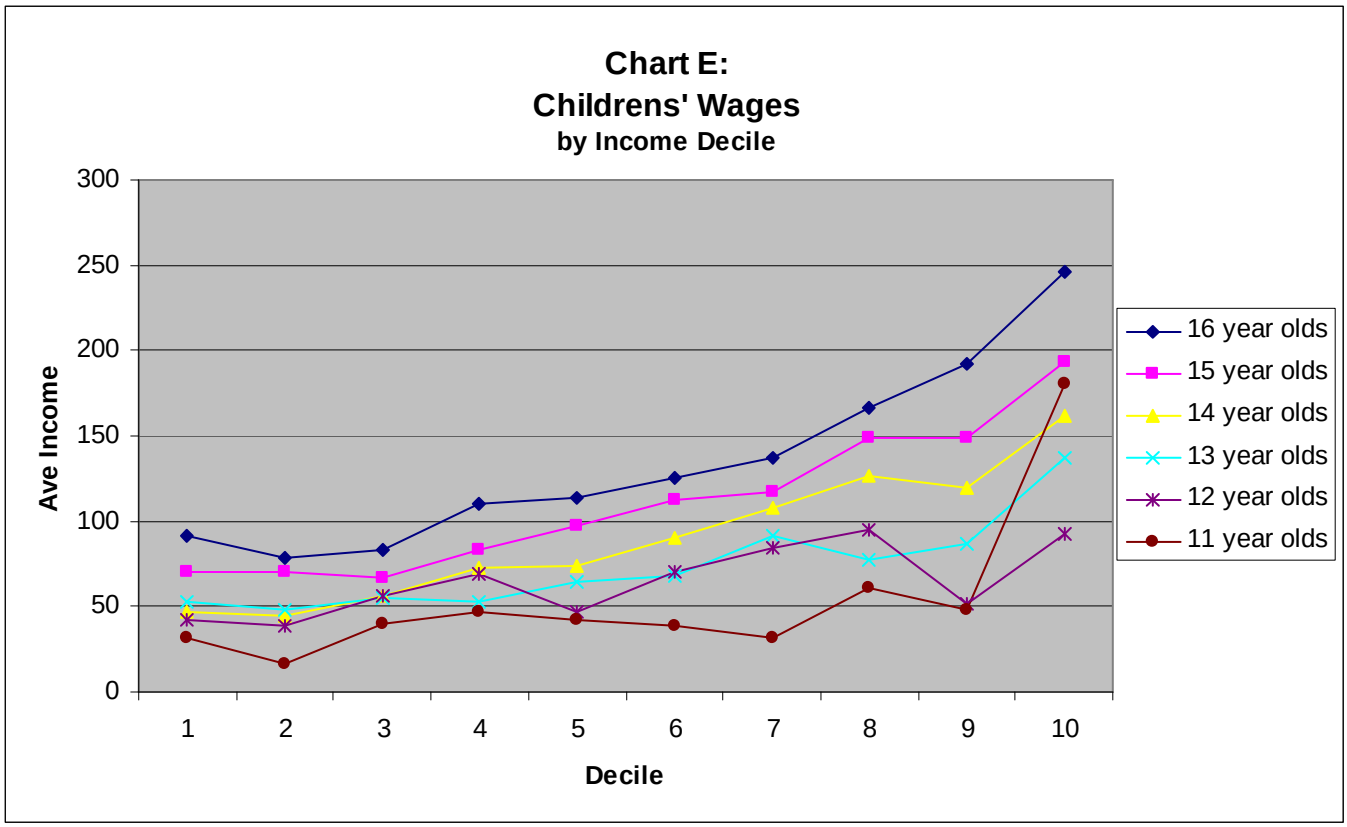


Chart E:
Childrens' Wages
by Income Decile
Ave Income
300
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
Decile
16 year olds
15 year olds
14 year olds
13 year olds
12 year olds
11 year olds

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Table
State Level Economic Concentration by

Region	Agg	Fishing	Export Manufacturin	Heavy Manufacturin	Utilitie	Constructio	Retail, and Service Activitie	Providing Food and Shelter	Telecom unication	Financial	Real Estate	Public Security and Defense	Education	Health and Human Services
Rio de Janeiro	0.19%	0.01%	0.45%	11.21%	0.66%	3.77%	21.49%	5.43%	7.05%	2.55%	7.05%	16.94%	5.40%	4.22%
Distrito Federal	0.34%	0.00%	0.04%	2.51%	0.58%	3.45%	14.74%	3.44%	3.61%	3.00%	3.61%	43.05%	2.85%	5.09%
Amazonas	0.35%	#N/A	0.31%	18.99%	0.64%	3.63%	17.34%	2.84%	6.21%	1.10%	6.21%	31.65%	3.15%	2.27%
Rondônia	0.42%	0.02%	0.31%	13.45%	0.87%	2.72%	25.89%	2.02%	3.45%	1.07%	3.45%	37.20%	2.06%	2.83%
Sergipe	0.62%	0.07%	0.55%	11.36%	0.86%	5.28%	17.12%	2.74%	3.55%	1.11%	3.55%	34.25%	4.48%	5.80%
Acre	0.90%	0.00%	0.05%	5.53%	0.00%	4.90%	19.05%	2.02%	3.66%	1.02%	3.66%	48.41%	2.77%	2.71%
Amapá	0.90%	0.01%	0.18%	3.72%	1.13%	4.51%	22.55%	2.36%	3.89%	4.56%	3.89%	37.53%	2.74%	1.52%
Rio Grande do Sul	0.91%	0.02%	0.27%	25.48%	0.64%	3.49%	25.41%	3.64%	5.13%	1.81%	5.13%	14.78%	2.98%	3.99%
Piauí	1.05%	0.16%	0.13%	8.39%	1.14%	4.19%	22.67%	1.96%	3.21%	1.31%	3.21%	39.24%	4.41%	3.12%
São Paulo	1.27%	0.01%	0.18%	21.85%	0.60%	3.64%	22.73%	4.18%	5.56%	2.74%	5.56%	12.96%	3.33%	3.73%
Brasil	1.31%	0.04%	0.39%	18.26%	0.69%	3.97%	22.94%	3.88%	5.22%	2.06%	5.22%	19.10%	3.65%	3.68%
Ceará	1.33%	0.19%	0.26%	18.41%	0.48%	4.47%	21.24%	2.93%	3.64%	1.43%	3.64%	25.50%	4.05%	3.22%
Roraima	1.34%	#N/A	0.08%	3.95%	#N/A	4.42%	22.70%	2.51%	2.82%	0.84%	2.82%	45.16%	2.83%	2.42%
Goiás	1.39%	0.01%	0.46%	15.10%	0.95%	4.01%	25.87%	3.03%	4.40%	1.50%	4.40%	23.82%	3.75%	3.12%
Espírito Santo	1.40%	0.04%	1.68%	14.33%	0.72%	5.40%	25.24%	3.68%	6.37%	1.64%	6.37%	19.51%	3.34%	3.43%
Maranhão	1.41%	0.07%	0.19%	6.24%	1.08%	5.14%	21.68%	1.87%	4.38%	1.72%	4.38%	37.94%	3.76%	3.47%
Santa Catarina	1.51%	0.08%	0.41%	32.60%	0.79%	3.59%	22.47%	4.05%	4.77%	1.52%	4.77%	11.25%	2.98%	2.17%
Pará	1.55%	0.17%	0.63%	12.66%	0.87%	5.57%	20.36%	2.44%	4.93%	1.58%	4.93%	31.03%	3.46%	3.30%
Paraná	1.55%	0.01%	0.27%	20.98%	0.59%	3.57%	26.22%	3.88%	5.36%	1.82%	5.36%	14.65%	4.14%	3.41%
Minas Gerais	1.56%	#N/A	0.96%	17.93%	0.89%	4.54%	25.07%	3.91%	5.28%	1.55%	5.28%	18.16%	3.34%	3.83%
Tocantins	1.62%	0.01%	0.35%	6.22%	1.32%	5.04%	23.51%	1.89%	2.76%	1.00%	2.76%	46.89%	2.37%	2.07%
Pernambuco	1.72%	0.08%	0.18%	14.75%	0.61%	4.91%	20.62%	3.57%	4.50%	1.39%	4.50%	24.41%	4.18%	3.87%
Paraíba	1.73%	0.13%	0.37%	11.85%	0.75%	4.36%	16.96%	1.86%	2.92%	1.05%	2.92%	40.34%	5.22%	3.05%
Bahia	2.05%	0.14%	0.49%	9.63%	0.65%	4.90%	23.73%	3.95%	4.97%	1.58%	4.97%	26.16%	3.54%	4.35%
Alagoas	2.76%	0.00%	0.17%	23.98%	0.76%	2.91%	17.44%	2.78%	3.05%	0.95%	3.05%	29.83%	4.35%	2.73%
Mato Grosso do Sul	3.10%	0.02%	0.26%	11.79%	0.68%	4.51%	26.14%	3.00%	4.08%	1.59%	4.08%	27.07%	3.05%	3.00%
Rio Grande do Norte	3.62%	0.43%	1.37%	12.83%	0.62%	3.90%	19.03%	3.30%	3.11%	1.11%	3.11%	33.35%	4.64%	3.32%
Mato Grosso	3.76%	0.02%	0.36%	17.64%	0.68%	3.67%	28.66%	3.02%	4.27%	1.57%	4.27%	17.88%	2.92%	3.15%
AVERAGE	1.5	0.1	0.4	14.0	0.7	4.2	22.1	3.1	4.4	1.7	4.4	28.9	3.6	3.3
VARIANCE	0.0	0.0	0.0	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.2	0.0	0.0

Table G:

Various Income Breakdowns: All Brazil

	Income by 100R		Income by Decile[1]		Income By Decile[2]	
	Coeff.	Pr>Chisq	Coeff.	Pr>Chisq	Coeff.	Pr>Chisq
Intercept	-12.4792	<.0001	-12.3397	<.0001	-12.445	<.0001
0-100R	0.5917	<.0001	******	******	******	******
100-200R	0.0489	0.1734	******	******	******	******
200-300R	0.1175	0.0006	******	******	******	******
300-400R	-0.0403	0.244	******	******	******	******
400-500R	-0.00767	0.8415	******	******	******	******
500-600R	-0.0685	0.0959	******	******	******	******
600-700R	-0.1064	0.0223	******	******	******	******
700-800R	-0.0406	0.4206	******	******	******	******
800-900R	-0.0521	0.3476	******	******	******	******
900-1000R	-0.1154	0.0682	******	******	******	******
1st Decile	******	******	0.5286	<.0001	******	******
2nd Decile	******	******	0.00409	0.913	******	******
3rd Decile	******	******	0.1924	<.0001	******	******
4th Decile	******	******	-0.0105	0.7749	******	******
5th Decile	******	******	0.046	0.2024	******	******
6th Decile	******	******	0.00346	0.9238	******	******
7th Decile	******	******	-0.00331	0.928	******	******
8th Decile	******	******	-0.0454	0.2278	******	******
9th Decile	******	******	-0.0292	0.4444	******	******
1st Decile	******	******	******	******	0.411	<.0001
2nd Decile	******	******	******	******	-0.108	0.0019
3rd Decile	******	******	******	******	0.0818	0.0132
4th Decile	******	******	******	******	-0.1168	0.0007
5th Decile	******	******	******	******	-0.0573	0.0929
Male	0.7736	<.0001	0.7781	<.0001	0.7722	<.0001
Age	0.5218	<.0001	0.52	<.0001	0.5257	<.0001
Age^2	-0.00341	0.0353	-0.00329	0.0425	-0.00359	0.0267
Urban	-1.5271	<.0001	-1.5035	<.0001	-1.5306	<.0001
Both Parents in Household	0.0051	0.8736	0.0132	0.6805	-0.00611	0.8486
# Children in Household	0.1154	<.0001	0.1126	<.0001	0.116	<.0001
White	-0.0833	0.0031	-0.0638	0.0238	-0.1052	0.0002
HIV Rate	-0.00628	0.0126	-0.00629	0.0125	-0.00729	0.0037
Aggriculture	1.869	0.4592	1.5207	0.5472	1.6042	0.5253
Manufacturing	5.9617	<.0001	5.6517	<.0001	5.9244	<.0001
Retail, and Service Activities	10.6344	<.0001	10.4311	<.0001	10.79	<.0001
Telecommunications	-6.1802	0.026	-6.9376	0.0126	-6.2229	0.025
Public Security and Defense	4.2895	<.0001	4.0683	<.0001	4.2615	<.0001
Education	4.7204	0.0599	4.0078	0.1115	4.9106	0.0501
Other Social Serv	10.8151	<.0001	10.6564	<.0001	10.6281	<.0001

Note1: Base level is the 10th Decile

Note2: Base level is the 6th-9th Decile