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Sector-Specific Variations in the Effect of Trade on Child Labor

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Abstract

This paper examines how child labor rates within three broadly defined sectors (agriculture, manufacturing and services) are individually impacted by each sector's export activity. I utilize newly available survey data which quantify sector-level child labor activities. I do not find evidence supporting the assertion that greater sector exports are correlated with higher incidences of child labor. To the contrary, evidence suggests that higher sector exports are correlated with fewer children working within that sector, particularly in manufacturing. Thus the argument that high-export sectors will have higher child labor is unfounded.

1. Introduction

Some 215 million children participate in labor activities worldwide with approximately 60 percent working within agriculture (IPEC 2012). Globalization is often blamed for the epidemic, particularly among the popular media, but empirical evidence doesn't support this claim. The existing empirical literature evaluating the effect of international trade on child labor overwhelmingly fails to find a positive relationship between measures of trade liberalization and child labor. Indeed many find a significantly negative relationship which is principally channeled through the income effect of trade on child labor. Nonetheless, critics often suggest that some groups of children, particularly those working in high export sectors, are in fact negatively affected by international trade. For example, growing manufacturing exports might increase the demand for cheap, low-skilled labor which might in turn increase the proportion of children working in manufacturing. While the academic literature fairly convincingly identifies extreme poverty as the principle reason children work, activists often argue that it's the demand for cheap, unregulated labor among multinational firms that fuels child labor. To this end, product or company boycotts are encouraged in hopes of eliminating child labor from supply chains. If effective, this could be potentially detrimental if the displaced child's household isn't compensated for lost income. Further, these displaced children often shift to more hazardous forms of labor.[1]

If, however, higher exports from a sector were correlated with higher child labor within that particular sector this would warrant further investigation into whether the demand for child labor among multinational firms might increase, even above any potential income effect from trade as noted above. If this relationship were to exist, it could be that the aggregate nature of the child labor data used in the existing literature may mask this relationship. Until recently, this question could not be addressed empirically due to insufficient data, however new survey data available through the International Labour Organization's Statistical Information and Monitoring Programme on Child Labour (SIMPOC) afford a better picture of how correlations between international trade and working children might vary depending on sector affiliation. Using a cross section of these new data as complied by the World Development Indicators (World Bank 2013), this paper presents preliminary results measuring how exports from three broadly defined sectors—agriculture (including forestry, hunting and fishing), manufacturing and services—are individually related to child labor.[2] I find that, like the aggregated studies, there is no indication that heavily exporting sectors are correlated with higher levels of child labor within that particular sector. Instead, I find some evidence suggesting high export sectors are associated with lower child labor, particularly in manufacturing, however the result is not robust. These results are limited to a cross section analysis as annual child labor data are scarcely available.

This paper proceeds as follows. In Section 2, I present my theoretical hypotheses of the relationship between sector exports and child labor. Section 3 presents the data and empirical approach. Section 4 explains the empirical findings. Section 5 concludes.

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[1] See Voy (*forthcoming*) for an overview of the literature surrounding the child labor debate.

[2] Child labor for the purposes here includes economic activity including market work but not domestic chores performed within the home or on the family's farm for household consumption.

2. Theoretical Hypotheses

There are a number of factors that could impact how sector-level child labor might respond to increases in sector exports. First, if the exported goods are unskilled labor-intensive, rising exports may increase the demand for unskilled labor, a result of the well-known Stolper-Samuelson theorem. The change in demand for unskilled labor drives up the wage for both low skilled adults and children. This increases the opportunity cost of non-work alternatives for children, including school and leisure, leading to higher levels of child labor. On the other hand, if trade liberalization, particularly increased export activity, leads to higher per capita income the supply of child labor will likely decline. In particular, the wages of adults working within the exporting sector will likely also increase as a result of higher exports. Since low skilled adults are those most likely to depend on the income provided by child labor, this is of particular importance. The boost to household income resulting from increases in parental wages may push the household above its subsistence threshold. This is modeled by Basu and Van (1998) as the income axiom of child labor. Once income exceeds this subsistence level, the child's contribution to household income will no longer be depended upon for survival and child labor declines. Thus, the overall impact of each sector's exports on child labor largely depends on the magnitude of the income effect (as discussed by Edmonds and Pavcnik 2006) in relation to increases in child labor demand. I test this relationship by comparing sector exports with labor force participation rates of children working within three exporting sectors.

3. Methodology and Data

I estimate three equations to determine if there exists any significant correlation between each sector's exports and child labor within that sector. Equation (1) is a simple regression with the proportion of children working in country i, sector j, as the dependent variable. Independent variables include measures of each sector's exports and value added. Exports, the variable of interest in this model, is measured as the proportion of country i's exports from sector j as a proportion of its GDP. Value added, also measured as a proportion of GDP, is included to control for sector size. Finally, $\boldsymbol{I}$ is a vector of sector dummy variables (agriculture is the omitted group).

$$child\ labor_{ij} = \beta_0 + \beta_1 \frac{exports_{ij}}{GDP_i} + \beta_2 \frac{value\ added_{ij}}{GDP_i} + \boldsymbol{\alpha I} + \varepsilon_{ij} \qquad (1)$$

A positive and significant estimate for β_1 would suggest that higher sector exports are associated with more child labor within that sector. A negative coefficient estimate would indicate an inverse relationship between child labor and exports (as observed at the aggregate level for trade liberalization).

In equation (2), the log of per capita income for country i is added to the model following Edmonds and Pavcnik (2006) and Davies and Voy (2009).

$$child\ labor_{ij} = \beta_0 + \beta_1 \frac{exports_{ij}}{GDP_i} + \beta_2 \frac{value\ added_{ij}}{GDP_i} + \beta_3 \ln(income_i) + \boldsymbol{\alpha I} + \varepsilon_{ij} \qquad (2)$$

Finally, in equation (3) I control for unaccounted for country-level variations in child labor by adding a vector, C, of country fixed effects to the model.[3]

$$child\ labor_{ij} = \beta_0 + \beta_1 \frac{exports_{ij}}{GDP_i} + \beta_2 \frac{value\ added_{ij}}{GDP_i} + \alpha I + \gamma C + \varepsilon_{ij} \qquad (3)$$

While the coefficient estimates for β_1 from the above equations shed insight into whether a significant relationship exists between sector exports and child labor, the current specification restricts this effect to be uniform across all three sectors. If, in fact, it is the case that the impact varies by sector, then the specification above is inappropriate. In order to isolate the sector-specific effects of exports on child labor independently I regress child labor on a series of interaction terms between exports (as a proportion of GDP) and a dummy variable for each sector. This yields independent coefficient estimates of the effect of exports on child labor for each sector. As before, this model is estimated with and without the inclusion of per capita income and country fixed effects.

3.1 Data

Child labor data are fleeting, and, until very recently, sector-level data were non-existent. Recently, however, under the direction of the ILO's SIMPOC, more specific and higher quality data are becoming increasingly available. The data used for this paper are from these new household surveys which are conducted domestically and compiled by the World Development Indicators (World Bank 2013). I use an unbalanced panel of 50 countries for which sufficient sector-level child labor data are available.[4] Sample years range between 1998 and 2010 (mean year is 2005), depending upon the year or years during which each country's labor surveys were conducted. In most cases a country will have conducted only one child labor survey within the last 15 years meaning the results herein represent a cross section analysis. The child labor variable represents the percent of children between the ages of seven and 14 in country i that are economically active in sector j.[5]

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[3] Income is excluded as an independent variable from equation (3) as the country fixed effects will pick up any variation attributed to it.

[4] Sample countries (observation year in parentheses): Azerbaijan (2005), Bangladesh (2003), Bolivia (2008), Brazil (2007, 2008, 2009), Burkina Faso (2006), Cambodia (2001, 2004), Cameroon (2001, 2007), Chile (2003), Colombia (2007), Costa Rica (2004), Dominican Republic (2005), Ecuador (2006, 2009), El Salvador (2003, 2007, 2009), Ethiopia (2005), Guatemala (2006), Honduras (2004, 2007), India (200, 2005), Indonesia (2009), Jordan (2007), Kenya (1999), Kyrgyz Republic (1998, 2007), Lesotho (2002), Madagascar (2001, 2007), Mali (2005, 2007), Mexico (2007, 2009, 2010), Mongolia (2007), Morocco (1999, 2004), Namibia (1999), Nepal (1999), Nicaragua (2001, 2005), Pakistan (2008), Panama (2008), Paraguay (2005), Peru (2007), Philippines (2001), Portugal (2001), Romania (2000), Rwanda (2008), Senegal (2005), Sierra Leone (2007), Sri Lanka (1998), Sudan (2008), Tanzania (2001, 2006), Togo (2006), Turkey (1999, 2006), Uganda (2006), Uruguay (2009), Venezuela (2003, 2006), Yemen (1999), Zambia (2005, 2008).

[5] A child is considered "economically active" if he or she completed at least one hour of productive work during the reference week of the labor survey, a threshold that is set by the World Bank and consistent with the definition adopted by the 13th International Conference of Labor Statisticians (ICLS). This definition does not include household chores or domestic production of goods and services for the household's own consumption. The one hour threshold set by the ICLS is arguably far too low to capture an intensity of work that would negatively impact a child's development. It isn't clear that working a few hours per week, especially for the children of very poor

Sector export and value added data are also derived from the World Development Indicators. Sector exports represent each sector's respective exports divided by that country's GDP (current, U.S. dollars). Value added data represent the sum of gross output less the value of intermediate inputs used in production as a percent of GDP. Finally, the income variable comes from Penn World Table 7.1. Real PPP-adjusted per capita GDP (deflated by the chain index, in constant 2005 prices) is used to calculate the income measure. Ideally, this measure would be sector-specific measuring the mean level of household income for children working in sector j, but these data are unavailable. Nonetheless, since national income per capita depends on sector income per capita, this hopefully captures any income effect through which child labor might be affected by sector exports. Penn World Table 7.1 uses base year 2005.

Table I presents descriptive statistics of the data used herein. Not surprisingly, the vast majority of economically active children in the developing world work in agriculture. The proportion of children working in agriculture however, varies substantially between country and by gender (Edmonds 2008, and Voy 2012).

4. Empirical Results

Table II presents the results of estimating equations (1) through (3) as discussed in section 3. Regardless of the inclusion of per capita income or country fixed effects, I find no evidence to support the assertion that exports and child labor are positively correlated at the sector level. To the contrary, after the inclusion of income, I find a negative and significant impact of sector exports on child labor. That is, as a sector's exports increase the proportion of children working within that sector declines. This result however is not robust to the inclusion of country level fixed effects and, by itself, shouldn't be interpreted as a negative causal impact of exports on child labor. The significance and signs of sector value added and dummy variables are as expected. For value added, it is expected that larger sectors will have a larger share of child labor working within them. [6] The significance of the dummy variable coefficients simply indicates that child labor in manufacturing and services is significantly lower than child labor in agriculture (the omitted sector).

Endogeneity of exports, value added and income is potentially a concern. Ideally I would create instrumental variables for exports using a modified gravity equation first developed by Frankel and Romer (1999) to estimate trade based on geographical determinants. Edmonds and Pavcnik (2006) use a similar process to address the endogeneity of trade with respect to child labor. Davies and Voy (2009) replicate the trade instrument developed by Edmonds and Pavcnik (2006) and develop a modified gravity equation to instrument for FDI. Unfortunately, since geography doesn't vary by sector, I am unable to address endogeneity in this manner. The

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households, is necessarily welfare-reducing. Nonetheless, the restrictions of the data hopefully won't bias the results herein as mean estimates of hours worked during the previous week in market range between 26 and 32 hours for children between the ages of 10 and 14 years (Edmonds 2009, p. 12). Thus, the data under the ICLS definition aren't simply picking up a cluster of children working a couple of hours a week which is the principle concern with the way the variable is defined.

[6] Using the share of employees working in each sector instead of the sector's value added to account for sector size yield qualitatively similar results; namely, exports remain insignificant while the employee share coefficient is positive and highly significant.

existing literature finds that endogeneity of trade and FDI with respect to child labor bias coefficient estimates upward. That is, instrumented estimates yield a larger negative impact of trade and FDI on child labor. As such, I expect that if sector-level endogeneity is a problem, my estimates would similarly be biased upwards, that is, toward finding a smaller negative or even positive correlation between exports and child labor. Thus, I remain confident in my ability to preliminarily reject the idea that sector-level exports increase sector-level child labor.

Finally, as discussed in section 3, the specification presented in Table II restricts the coefficient on exports to be the same for each sector. In reality this may not be the case. Table III presents the results for the interaction regressions which estimate each sector's export coefficient independently. Interestingly the coefficient on exports in manufacturing is negative and statistically significant at the five percent level even after adding per capita income. The significance drops off with the inclusion of country level fixed effects.[7]

5. Conclusion

Contrary to common fears, the preliminary results presented herein find no positive correlation between sector exports and child labor. That is, there is no evidence suggesting that exports increase child labor, even within heavily exporting sectors. To the contrary, child labor force participation rates for manufacturing are negatively correlated with exports, even after controlling for the potential income effect of trade. This negative association for manufacturing is an important area for future research.

At a point in time in which market access for developing country exports is a hot button issue, recognizing linkages between a specific sector's exports and its child labor seems of particular importance. It is my hope that my research will provide additional insight for use in this debate.

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[7] In unreported results, I use the five-year growth rates of sector exports to explain child labor within each sector. I don't find any robust correlation—positive or negative—between export growth and child labor.

Tables

Table I: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Year	198	2005	3.2240	1998	2010
Child Labor	198	5.4620	9.6450	0	52.9816
Agriculture	65	12.8350	13.9397	0.4005	52.9816
Manufacturing	65	0.708	0.6067	0	2.6359
Services	68	2.958	2.549	0.0322	13.1200
Exports/GDP	198	0.0596	0.0786	0.0001	0.5088
Agriculture	65	0.0127	0.2392	0.0001	0.1430
Manufacturing	65	0.0993	0.1087	0.0007	0.5088
Services	68	0.0658	0.0508	0.0084	0.2516
Value Added/GDP	198	28.6093	19.4266	2.8422	76.9943
Agriculture	65	17.2939	11.0564	2.8422	46.6909
Manufacturing	65	15.2580	5.7046	3.1065	26.3578
Services	68	52.1879	10.0197	25.8686	76.9943
ln(Per Capita Income)	198	8.0235	0.9207	6.1635	9.9087

Table II: Child Labor and Sector Exports

	(1)	(2)	(3)
Exports/GDP	-7.52	-9.24	-10.51
	(5.17)	(4.59)**	(8.52)
Value-Added	0.42	0.41	0.49
	(0.09)***	(0.08)***	(0.07)***
ln(Income)		-3.38	
		(0.53)***	
Manufacturing	-10.62	-10.48	-10.21
	(1.36)***	(1.23)***	(1.38)***
Services	-24.15	-23.84	-26.69
	(4.15)***	(3.54)***	(3.40)***
Observations	198	198	198
Country fixed effects	No	No	Yes
Number of countries			50
R-squared	0.45	0.55	0.63

Robust standard errors in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table III: Child Labor and Sector Interactions

	(1)	(2)	(3)
Exports/GDP x Agriculture	89.81	53.33	23.22
	(66.20)	(68.37)	(76.44)
Exports/GDP x Manufacturing	-9.66	-8.18	-9.36
	(3.80)**	(3.64)**	(9.26)
Exports/GDP x Services	-11.17	-21.81	-22.31
	(15.27)	(10.34)**	(15.43)
Value-Added	0.41	0.40	0.47
	(0.10)***	(0.09)***	(0.08)***
ln(Income)		-3.18	
		(0.58)***	
Manufacturing	-9.09	-9.71	-9.85
	(1.44)***	(1.43)***	(1.60)***
Services	-22.43	-21.94	-24.74
	(4.86)***	(4.11)***	(3.79)***
Observations	191	191	191
Country fixed effects	No	No	Yes
Number of countries			45
R-squared	0.47	0.56	0.62

Robust standard errors in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

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