

The Effect Of Trade Openness On Child Labor: Empirical Evidence From Developing Economies

ROSSAZANA AB-RAHIM* AND BILAL TARIQ

*Faculty of Economics and Business, Universiti Malaysia Sarawak,
94300 Kota Samarahan, Sarawak.*

ABSTRACT

The aim of this study is to investigate the impact of international trade on the child labor by using new trade theory among the developing countries based on trade induced child labor effects. The relationship between the child labor and the selection and scale effect for the developing countries which are engaged in the trade of both differentiated and homogeneous goods is further examined. The ratio of gross domestic product (GDP) and industrial value added represents the scale effect while the selection effect refers to the exit of least efficient firms due to trade liberalization. The results of generalized least squares (GLS) technique show child labor decreases with an increase in the value added. In addition, the findings also indicate the overall effect of trade along with trade child labor induced effects is favorable in the reduction of child labor. The results imply trade liberalization is a gain to the developing economies in the form of child labor reduction.

JEL Classification: F1, F14, J82

Keywords: Child Labor, Scale Effect, Selection Effect, Trade Openness

INTRODUCTION

Recent events have regenerated global interest in child labor concerns. In October 2014, the Norwegian Nobel Committee awarded its Peace Prize to Kailash Satyarthi for the reorganization of his efforts against child labor activities. Eager to discover the global child labor activities, a growing number of studies have tended to focus on issues of child labor. The interaction of international trade and child labor offers a platform upon which to build studies on child labor.

*Corresponding author: Tel: +60 82 584433. E-mail: rossazana@gmail.com

Child labor is a global phenomenon which can be perceived through the lenses of geography, economic activity and trade openness (Edmonds and Pavcnik, 2006). The International Labor Organization's (ILO) International Program on the Elimination of Child Labor (IPEC) and the World Trade Organization (WTO) governing bodies reconfirmed its commitment to combat child labor through globalization and international trade (Fontana *et al.*, 2015). Mansoor (2005) claims that the role of international organizations and international trade reduces child labor activities; income improvements through trade liberalization ameliorate the problem of child labor. On this note, trade brings gains to consumers of trading countries; nevertheless, there are losers (countries with unskilled labor) and winners (countries with skilled labor) in free trade. Hence, in order to reap the optimal benefits from the trade, the trading countries must shift their focus to the creation, innovation and integration of knowledge.

On this note, Kaliappan *et al.* (2015) suggest that developing countries should focus on the stock of human capital to gain the comparative advantage of international trade, while Mohd Noor *et al.* (2011) state that skilled workers have a higher elasticity of substitution as compared to the unskilled workers in large firms. Furthermore, Eastman and Stykolt (1967) warn that trade, due to increasing returns to scale and production of differentiated products, might be a source of gain for one country (competent labor) but an object of worry for another country (incompetent labor) from trade.

Child labor is a stubborn misfortune for developing countries; fortunately, the trade openness has triggered the issues of child labor among the developed countries as results of the influx of foreign capital and investment in the developing markets. In the context of child labor, the trade appears in the form of trade-induced child labor effects than a blanket prohibition on child labor. Edmonds and Pavcnik (2006A) find that, economically, the notations of growth and development have knitted the developing or underdeveloped countries via the pathways of trade liberalization into an interdependent unit, where some children are engaged in manufacturing and service provision.

Previous trade studies have tended to confine their analysis to the trade of homogenous goods; trade economists usually investigate the relationship between trade and child labor in the context of perfect competition market based on the Stolper-Samson and Heckscher-Ohlin frameworks (Edmonds and Pavcnik, 2006b and Edmonds, 2010). Estevez (2010) argues that, when trade is opened within an unskilled-labor-abundant country, the demand for unskilled-labor-intensive goods changes according to the country-specific characteristics. Doytch *et al.* (2014) find that the effects of trade openness on child labor are heterogeneous depending on a country's characteristic. Hence, one would expect to observe a significant change in the incidence of child labor associated with trade openness in the countries where skilled workers are relatively less abundant. The unintended consequences of trade in the form of exacerbated child labor occur due to the unskilled-labor-abundant country in a simple Heckscher-Ohlin framework and trade-induced changes relative to factor prices according to the Stolper-Samuelson theorem (Edmonds and Pavcnik, 2006b). Thus, it is difficult to see how trade actually affects child labor because of the change in demand for unskilled workers. In another study, Edmonds and Pavcnick (2005a) find that trade affects multinational firms, and these firms are positively associated with the incidence of child labor in developing nations.

Since past studies have limited their focus to the trade of homogenous goods, the novelty of the present study is evident in terms of the setting of the wisdom of trade openness and its impact on child labor under the new trade theory framework. This study departs from this practice by confining the trade and child labor frameworks in the setting of trade of differentiated goods. The concept of product differentiation is generated from Krugman's work (1979) that states the increasing return might be a reason for trade between countries and it might be a tool for comparative advantage (Feenstra, 2003). The new trade theory, which is asserted by Krugman (1979), proposes the idea of increasing returns to scale and product differentiations. The great Krugman develops a tractable approach to model trade with the new assumptions, namely imperfect competition, increasing returns to scale and differentiated goods. The framework of new trade theory states that international trade diminishes the distortions related to imperfect competition (Tariq and Ab-Rahim, 2016). Along these lines, it would be interesting to examine how new trade affects the child labor in developing countries. In other words, what are the trade-induced impacts of the number of firms and scale of production on child labor?

Differentiated products represent a significant source of trade between developing countries, and therefore, it is enlightening to examine the new trade theory with regard to child labor. For instance, Estevez and Levy (2014) find that children are nearly as productive as their adult counterparts in the case of free trade. Feenstra (2003) determines the trade-induced effects for firms that are engaged in the production of differentiated products; the effects are decomposed to selection and scale effect. The former refers to the exit of the least efficient firms due to liberalization; as a result, average industry productivity increases. The latter effect refers to the change in the scale of the economy, holding all other things constant.

The first contribution of the present study is that it addresses the trade-induced effects based on Krugman's framework (1979) and examines the relationship between child labor and the variation in trade from the demand side. The second contribution of this study is that it disentangles the various new channels through which trade can affect child labor. Past studies assert that a core channel through which trade openness affects labor, via the trade-induced scale effect, is well established in a cross-country setting (Feenstra, 2003), and there are both theoretical reasons and empirical evidence that trade enhances the scale of production for developing countries. The remainder of this study proceeds as follows. The next section offers theoretical motivation as well as empirical evidence regarding the issue of child labor and trade liberalization; the Research Methodology section follows, providing an empirical background and describing the data used in the empirical section. The subsequent section presents and discusses the empirical results, while the conclusion section closes the paper and presents future research directions.

REVIEW OF LITERATURE

Theoretical Studies

In the theoretical literature on child labor, the notable contributors are Basu and Van (1998), Basu *et al.* (2010), Ranjan (2001), Baland and Robinson (2000), Jafarey and Lahiri (2002), and Dessy and Pallage (2005). Trade liberalization in a developing economy has abundant inefficient and disorganized labor; this is likely to increase the relative rate of return for unskilled labor and diminishes the satisfaction to spend on skills and education. Therefore, the rewards for child labor rise with the substitution effect along with an increased supply of child labor (Doepke and Zilibotti, 2010). Trade openness does not increase the demand for child workers if children generally work in sectors that compete with imports or in the non-tradeable segment. On the other hand, some economists suggest that the effects of trade openness would be negligible (Doepke and Zilibotti, 2009).

However, as Doepke and Zilibotti (2010) state, high-priced adult workers in the export sector increase the demand for child labor. Increased trade can lead to a greater child labor incidence in the formal or informal sector; it supplies inputs to the export sector. Generally, trade liberalization skeptics argue that free trade induces countries to a ‘race to the bottom’ (Singh and Zammit, 2004). Greater intensity of child labor could abate costs to earn the country a competitive advantage over others. Therefore, all economies face this incentive; increased trade intensity could bring a magnified incidence of child labor all over the world. Developing economies with tolerant labor standards, nominal wages, and a plenteous supply of unskilled workers, including child laborers, are regarded as a haven for foreign investors, a perspective that Doepke and Zilibotti (2010) refer to as conventional wisdom.

Krugman (1995) states that, if all the industries in the economy are perfectly competitive, then no substantial adjustment in labor and selection of variety can be possible. In this case, industries consistently substitute skilled workers with unskilled laborers (Krugman, 2008); thus, there is less chance of child labor due to more demand for skilled workers. The consequences of marginal and unobserved changes may be difficult to detect the change in child labor. In the same way, Tariq and Ab-Rahim (2016) advocate that comparative advantage can be altered by increasing returns to scale and product differentiation. The concept of competitiveness in Krugman’s framework (1995) is open to a variety of interpretations. However, the silent feature of these frameworks is that more competitive firms or industries improve their market shares at the cost of less competitive firms (Martin and Maskus, 2001). Nevertheless, Krugman (1995) casts doubt on the widely held conclusion that firms and industries can increase their competitiveness by lowering core labor standards.

It remains true that, at low productivity, poor or developing countries cannot be competitive with advanced countries unless they pay their workers much less and offer poor working conditions. On the other hand, Krugman (1979) finds that trade between the countries changes the (product varieties) number of firms; thus, the opening trade between countries indeed implies that some firms must exit, while the remaining firms expand their output and take advantage of scale economies (Feenstra, 2003); the result is an increase in the income level of a country.

Empirical Studies

A closer look at the existing empirical studies reveals that child labor falls in countries that trade more. Edmonds and Pavcnik (2006b) assert that improvement in economic activity via trade liberalization or globalization brings prosperity in countries; the results are staggering in term of change in child labor. In addition, Fontana *et al.* (2015) and Davies and Voy (2009) also suggest a relationship between trade liberalization and child labor. The latter study illuminates an absence of data for the firms which are engaged in the production of differentiated goods using child labor; hence, this issue necessitates a theoretical approach.

Edmonds (2005) examines the marginal utility of income and its effect on child labor under homothetic preferences; the results reveal that trade liberalization has a quasi-linear association with child labor. Nevertheless, the effect of trade openness on child labor is ambiguous due to the pattern of substitutability and complementarity. In a Heckscher-Ohlin trade setting, Ranjan (2001) shows that trade openness in the unskilled labor intensive country negatively affects child labor. Under the Stolper-Samuelson trade framework, Edmonds and Pavcnik (2006a) find that trade openness improves adult wages and reduces the child labor supply.

Iram and Fatima (2008) review the existing trade and child labor literature to bring out the broad understanding with respect to globalization. The authors offer support to the studies by Edmonds and Pavcnik (2005) and Basu and Ray (2002) in their claim that there is inconclusive evidence of the role of trade in the incidence of child labor. The former study states that child labor decreases due to the income effect of trade in developing economies; on the contrary, the latter claims that child labor increases in developing economies due to the substitution effect of trade.

The notable study by Neumayer and De Soysa (2005) shows that, if a country has abundant unskilled labor, it will export unskilled labor-intensive goods. Hence, trade increases the wages of unskilled labor and increases the chances of substitution of child labor with unskilled adult labor. This is the demand effect of trade liberalization; hence, due to this effect, the opponents of globalization discourage trade with poor countries, as it may enhance child labor in poor countries.

The review of theoretical and empirical studies suggests that trade affects child labor depending on the types of trade-induced effects. Trade-induced child labor selection and scale effects deserve substantial theoretical and empirical attention due to distinguishing characteristic of the new trade theory. The current cross-country analysis of child labor and trade openness sheds the light on three points of views. Firstly, the trade and child labor are correlated; secondly, the change in a number of firms affects child labor; and finally, the expansion of an economy affects child labor.

Based on the above-discussed studies, the traditional trade framework shows that international trade affects the scale of economy and scale of production, and it has an impact on child labor. New trade theory talks about the product differentiation and increasing returns to scale; the beauty of Krugman's framework (1979) is that it explains the effect of trade on a number of firms that are engaged in the production of differentiated products in the home and

foreign countries. Under the umbrella of Krugman framework, this paper attempts to investigate the trade-induced child labor effects.

RESEARCH METHODOLOGY

This study examines child labor in 89 countries and tests the robustness of the years 1990, 2000, and 2010.¹ The intertemporal variations in child labor data are driven by imputation and adjustments based on country-wise household surveys at the national level.² Table 1 shows a baseline descriptive statistics for study variables. This study targets children engaged in economic activity as a percentage of the country's population ages 5-14 from various data sources. Data adjustment is made to make the data comparable, because the data of all countries are not available for the same year.

Table 1 Description of Variables

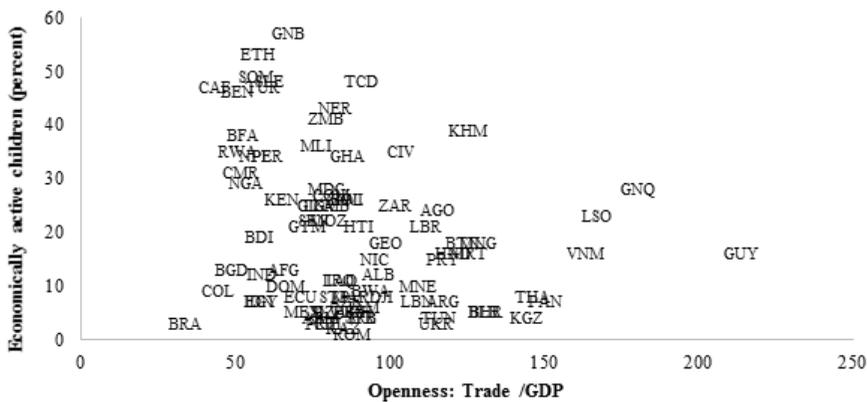
Variable Name	Variable Code	Explanation
Child labor	<i>Cl</i>	Economically active population between 5 to 14 years.
Trade openness	<i>Trade</i>	Sum of export and import measured as a share of GDP.
Selection effect	<i>SEL</i>	Number of listed companies in stock market
Trade induced child labor selection effect	<i>SELTR</i>	<i>SEL*Trade</i>
Scale effect	<i>SCL</i>	Manufacturing value added (annual percentage growth).
Trade induced child labor scale effect	<i>SCLTR</i>	<i>SCL*Trade</i>
Geography	<i>GH</i>	Latitude - a country's distance from equator
Skill Labor	<i>SKL</i>	Labor force with secondary education (% of total)
Constitutional area	<i>CSA</i>	Surface area (sq. km)

¹ The main constraint of undertaking studies on child labor is due to the limitation of data. The international organizations such as the World Bank (WB), International Labor Organization (ILO), and Understanding Children's Work (UCW) do provide reliable data of child labor of the developing countries; however, the big challenge for this study is to gather data for child labor and the number of listed companies' variables. A data limitation problem is also encountered by prominent scholars working on similar grounds, such as Edmonds and Pavcnik (2006a), Neumayer and De Soysa (2005), and Acaroglu and Dagdemir (2010). Hence, this study confines its analysis, covering 89 developing countries. It is noteworthy that data on child labor in big economies such as China is difficult to obtain due to the government regulations categorizing child labor data as 'highly confidential' (Hindman, 2014).

² Most of countries have some independent observations for given years. Some observations are taken by imputation rather than actual variation in child labor due to infrequent surveys, generally, in low income countries. For controlling the time invariant country characteristics, this study employs panel data analysis; follows closely works of Neumayer and De Soysa (2005), Acaroglu and Dagdemir (2010), and Estevez (2011).

Trade is measured in term of flows (exports + imports as a percentage of GDP) derived from the World Development Indicators (WDI). The selection effect of trade is adopted from Feenstra (2003); it is expressed in terms of a number of firms which are changed due to trade liberalization. To represent the selection effect, this study takes the number of listed companies. The data of a number of listed companies are taken from WDI, based on the given data and a better understanding of how the number of firms can affect the child labor due to the openness of trade. The present study provides the exploratory analysis of trade-induced child labor selection effect. Thus, the selection effect is represented by two measures: by the change in the number of product varieties produced domestically and by the change in the number of domestic firms (Feenstra, 2003). Domestically incorporated companies in the country’s stock market are used as a proxy for a number of firms as used by Aralas (2010). As a proxy for scale effect, the annual growth of industrial value added, which is a percentage of GDP, is used to express the scale effect. Taylor *et al.* (2001) employ the scale effect to measure the trade-induced scale effect, which is replicated in the current analysis.

Geographical distance as a time-invariant variable is associated with other explanatory variables and contrasts with an error term in the explanatory equation. Trade is greater among the neighboring countries, and the distance between the countries is reflected by the transportation cost; Krugman (1979 and 1980) suggests that higher transportation cost may reduce the trade between two countries and that overall trade will be discouraged due to transport cost differences. The cross-country geographical variation is time invariant, so it seems appropriate to check the impact of the distance between countries in terms of trade on child labor.



Source: UNICEF (2012) & World Development Indicators (2012).

Figure 1 Child Labor and Trade

This study initiates the analysis by examining the relationship between trade and child labor; various robustness checks are performed with different countries and excludes some of them. Four attributes are prominent in the data, as shown in Figure 1. First, there are notable cross-country differences in trade volumes, the number of firms, the scale of production, and

incidences of child labor that exploit the pragmatic approach to evaluating their impacts. Second, the available data presents the evidence that those countries that are more open to trade have less child labor. Third, at any given level of a number of firms, there is a relationship between trade and child labor. Fourth, there is considerable heterogeneity in a number of firms and child labor across countries. Graphical observation of the raw data supports the understanding that the openness of trade in developing is negatively associated with child labor. The link between the number of firms and child labor is observed in the raw data.

Table 2 Descriptive Statistics of the Variables

Variable	Mean	Standard Deviation	Maximum	Minimum
Child labor	21.72	17.15	54.4	1
Trade openness	178.43	654.53	5937	2
Selection effect	28.28	11.10	72.12	8.23
Trade induced child labor selection effect	69.25	33.79	199.67	11.08
Scale effect	9814.6	33565.58	394218	53.21
Trade induced child labor scale effect	2035.36	1458.88	10995.55	139.86
Geography	26.1377	18.724	69	4
Skill Labor	12.21	21.88	59.22	-34.6
Constitutional area	12.16	1.95	16.10	6.08

Table 2 describes the summary statistics for the variables used in the analysis. The dependent variable, child labor participation rates, among the countries varies between 1 and 54.4 percent. The explanatory variable selection effect changes between 5937 and 2 firms, scale effect varies from 72.12 to 8.23 percent, trade variable varies from 199.67 percent to 11.08 percent, and skilled labor changes from 69 to 4 percent. This study also adds some country-specific attributes; i.e. geography and constitutional area of the country. Geography is the latitude of a country, which indicates the distance from the equator, replicated from the concept presented by Edmonds and Pavcnik (2006a).

Empirical Framework

Empirical analysis as seen in studies such as Neumayer and De Soysa (2005) and Acaroglu and Dagdemir (2010), amongst others, suggests a linear regression equation for deriving a meaningful relationship between trade and child labor. This model is tested for statistical significance of whether an increase in trade is associated with a decrease in child labor, as hypothesized. Equation 1 explains the relationship between child labor and trade.

$$cl_i = \beta_0 + \beta_1 Trade_i + \varepsilon_i \dots (1)$$

If β_1 is not statically significant, then the test would fail to find clear evidence that change in trade and child labor are related to each other. The following question arises: are β_1 changes

in child labor associated with a change in the trade openness? According to Edmonds and Pavcnik (2005a), the notation $\beta_1 < 0$ is expected. The main challenge of this study is to address the selection and scale effect along with trade openness. While Edmonds and Pavcnik (2005a; 2005b) claim that trade could influence child labor, this study raises concern regarding another effect of child labor: that it creates a comparative advantage for trade under the Heckscher-Ohlin framework. Even though Krugman (1979) focuses on the product differentiation and scale of production, this study confines its analysis on the scale and selection effects of trade. The idea of scale effect is parallel to the income effect as taken by Edmonds and Pavcnik (2006a). The authors employ GDP per capita to show the effect of income on child labor, which is related to trade. However, this study takes the scale effect by using annual growth of industrial value added.

$$cl_i = \beta_0 + \beta_1 Trade_i + \gamma_1 SCL_i + \gamma_2 SEL_i + \varepsilon_i \dots (2)$$

In light of the previous research and theorists' arguments, the number of listed companies in countries can be used as a proxy of differentiated products. Equation (2) shows that the number of listed companies engaged in the production of differentiated products is a determinant of trade on the basis of selection of variety. Edmonds and Pavcnik (2006a) allow some country-specific characteristics in the empirical framework across the countries. A similar approach is followed by using country-specific attributes in this study. Equation (2) is modified to check the country-specific characteristic as follows:

$$cl_i = \beta_0 + \beta_1 Trade_i + \beta_2 A_i + \beta_3 Trade * A_i + \gamma_1 SCL_i + \gamma_2 SEL_i + \varepsilon_i \dots (3)$$

The following specification allows β_1 for interpretation; now β_1 is the change in child labor when trade relative to income change by 1 percent and a given attribute is 0, then $\beta_1 + \beta_3(A_i)$ represents change in child labor with a 1 percent change in trade for country-specific characteristics A_i .

This study considers country attributes such as average year of schooling³, constitutional area and geography (latitude). The estimation strategy is that geography-based trade is assumed and it has a non-trivial effect on child labor. A single market share might be potentially violated if firms in that country act in coordination. Here it is important to consider the key assumptions of Edmonds and Pavcnik (2005a) and how these assumptions affect the potential for multinationals to create linkages. Clearly, geography and other impediments lead to violations of the presumptions; it might be potentially violated if a country independently impacts child labor. In this empirical work, this study presents a placebo and robustness analysis to disentangle the scale and selection effects.

³ The measure of average school years is translated from Barro and Lee (2010); it accounts for a country's skilled labor.

RESULTS AND DISCUSSION

This study uses panel data technique (see, Baltagi, 2003 and Green, 2008) to obtain generalized least squares (GLS) estimates for the equational dimensions, which refer to the cross-sectional units (countries in this study), and temporal dimensions refer to the period of observations characterizing the cross-sectional units over time. The panel data method is employed to justify the spatial and temporal dimensions of the study. There are two dimensions that need to be considered in this analysis: the cross section (e.g. countries) and time periods. In the panel data method, robust statistical inferences can be corrected for both correlations of model errors over time and heteroskedasticity across countries. In this study, the Hausman test confirms random effects. Therefore, the regression coefficients are estimated by using random effects.⁴ Arellano and Bover (1995) observe that pooled ordinary least squares are less efficient in the case of the random effects estimator.

Table 3 Child Labor and Openness

Equation	Model 1	Model 2	Model 3
Trade openness	-0.033 (0.251)	-0.026 (0.374)	-0.022 (0.44)
Selection effect	-	-0.002*** (0.078)	-.003*** (0.098)
Scale effect	-	0.258* (0.005)	0.257* (0.005)
F-statistic	1.32	13.23	14.36
R2	0.0274	0.1960	0.1949

$$cl_i = \beta_0 + \beta_1 Trade_i + \varepsilon_i \dots (1)$$

$$cl_i = \beta_0 + \beta_1 Trade_i + \gamma_1 SCL_i + \gamma_2 SEL_i + \varepsilon_i \dots (2)$$

$$cl_i = \beta_0 + \beta_1 Trade_i + \beta_2 A_i + \beta_3 Trade * A_i + \gamma_1 SCL_i + \gamma_2 SEL_i + \varepsilon_i \dots (3)$$

Note: Values of standardized regression coefficient are reported and figures in the parenthesis are p-value; *, ** and *** denotes the statistical significant at the 1%, 5%, and 10% respectively.

Based on Table 3, the results of Model 1 are statistically insignificant and irrelevant due to the absence of the selection and scale effect, while Model 2 shows a negative association with the selection and positive association with a scale effect. The t-statistics are significant at conventional levels. The coefficient of the trade variable shows an insignificant association with child labor, while the scale effect is positively related to child labor. The scale effect is significant at the 1 percent level of significance, and the R-squared value of the model is 0.19. Model 3 is tested with country-specific characters; the previous signs are all preserved with a 10 percent level of significance except trade variable. F-statistics are improved from 13.23 to 14.36. Geographical importance as expressed in the earlier section can be a source of trade preferences; to test the robustness of results, this study adopts this variable. The results imply that an increase in the trade openness along with country-specific effects reduces the

⁴ This test checks whether the unique errors (u) are correlated with the regressors or not. The null hypothesis postulate that is they are not correlated; the variation across entities is assumed to be random and uncorrelated with the predictor (Green, 2008).

probability of child labor. Child labor is lower in countries that trade more, because income is higher in those countries.

The coefficient for trade-induced child labor selection effect suggests that the higher number of firms is associated with less child labor; the negative sign is due to the existence of more competent firms as compared to less competent firms in the economy. After controlling for number of firms, any remaining connotation between child labor and trade openness may reflect changes in the relative return to work as discussed in the Literature Review section. However, conditional on the number of firms, a statically significant link between trade and child labor is found, and the magnitude of the coefficient is meaningful.

This study utilizes the ratio of GDP and industrial value added (annual percentage growth) for the scale effect; previously, Edmonds and Pavcnik (2006a) use GDP per capita; as a proxy of income effect which is parallel to scale effect in this study. The problem of using GDP per capita for trade-induced scale effect might be a source of correlation with other unobserved country-specific attributes; this measure can face the identification problem and potentially biased estimators. Davies and Voy (2009) state that country-specific attributes affect child labor independently.

Table 4 Child Labor and Openness

Equation	Model 4	Model 5	Model 6
Scale effect	-0.269* (0.003)	-	-0.640* (0.000)
Selection effect	-0.003*** (0.083)	-	-0.004 (0.276)
SCLTR	-	-3.00e-05 (0.190)	.002** (0.050)
SELTR	-	-.00122*** (0.063)	1.71e-06 (0.981)
SKLTR	-	-	-0.002* (0.000)
F-statistic	12.15	5.68	15.40
R ²	0.182	0.12	0.234

$$cl_i = \beta_0 + \gamma_1 SCL_i + \gamma_2 SEL_i + \varepsilon_i \dots (4)$$

$$cl_i = \beta_0 + \gamma_1 SCLTR_i + \gamma_2 SELTR_i + \varepsilon_i \dots (5)$$

$$cl_i = \beta_0 + \gamma_1 SCL_i + \gamma_2 SEL_i + \gamma_3 SCLTR_i + \gamma_4 SELTR_i + \gamma_5 SKLTR + \varepsilon_i \dots (6)$$

Note: Values of standardized regression coefficient are reported and figures in the parenthesis are p-value; *, ** and *** denotes the statistical significant at the 1%, 5%, and 10% respectively.

SCLTR = Trade openness * Scale effect

SELTR = Trade openness * Selection effect

SKLTR = Trade openness * Skill labor

Based on Table 4, Model 4 excludes the trade variable, and the significance of scale effect is preserved at conventional levels. While the selection effect is transmuted with a 10 percent level of significance, the R-squared statistic is appropriate and shows the practical significance

of the selection and scale effects on child labor. Model 5 describes a situation in which the simultaneous influence of selection and scale effects with the interaction of trade variable on child labor is observed. These variables show the trade induced child labor effects.

As seen in Table 4, the trade-induced child labor selection effect has a minor effect on child labor. On the other hand, trade-induced child labor scale effect is statistically irrelevant at the 10 percent level of significance. According to the findings, the trade-induced child labor selection indicates that a number of firms are negatively associated with child labor due to competent firms in the market. Trade enhances the competence from local borders to international borders and escalates the demand of skilled labor. As stated in the theoretical framework, child labor declines in those countries which trade more, and trade is a source of trade-induced child labor effects, namely the selection and scale effects. The findings of Model 5 and 6 indicate that these trade-induced effects have a significant effect on the reduction of child labor.

Based on Table 4, Model 6 uses skill labor with the interaction of trade; this technique was previously used by Edmonds and Pavanic (2006b); some extra variables utilized in Model 6 describe the demand of child labor. The findings show that more supply of skilled labor reduces the demand of child labor among the developing countries. The scale effect by using gross domestic product (GDP), which is mentioned in a few studies is seen to be negatively associated with child labor. However, this study looks at this relation from the side of industrial production, as the new trade theory explained by Krugman (1979) focuses on industries, not countries' GDP. The motivation of this approach can increase the scale of production with trade penetration. The trade openness variable in the theoretical framework is negatively associated with child labor. However, increasing industrial production, as represented by trade-induced scale effect, indicates the influence conjointly in the connection between trade and child labor.

This study also concluded that skilled labor as a control variable is a significant determinant of child labor. A significant relationship between skilled labor and child labor is found as seen Table 4. This is an expected result in the presence of more skilled labor in a Krugman-type framework, in which production of differentiated goods discourages child labor, and skilled labor is preferred for differentiated products due to increasing returns to scale. In addition, the skilled labor variable increases the R-squared from 0.12 to 0.23.

CONCLUSION

The decline in child labor by virtue of trade openness is closely linked with the association of trade-induced selection and scale effects. Trade increases not only the earning opportunities for the developing countries but also the scale of production and is a source of child labor reduction. The beauty of this study is that it highlights the mechanisms by including scale and selection effects through which trade openness changes child labor in developing countries. Another important implication of this study is the clear evidence that postulates that trade-induced child labor effects stimulate child labor reduction in developing countries. This typical evidence seems important for future research.

This study contributes to the deeper understanding of Krugman's framework (1979) and describes an initial investigation of the presence of selection and scale effects. Further empirical investigations based on the Krugman framework presented in this study may be tested for a regional sample, such as SAARC, ASEAN, and other emerging regions with different developmental stages and geographical regions, which can also be considered under a similar mandate or de novo mutation findings. Finally, this present study extends Krugman's framework (1979) on selection and scale effects. The technique effect provides another dimension of trade openness and its effects on child labor. Exploring the link between technique effects on child labor remains a topic for future research.

The links between trade and the child labor are multiple, complex, and important. Policy makers should be aware of the relationship between economic growth and child labor reduction. The policy of trade liberalization is often suggested as a means of stimulating economic growth in developing countries. Given the potential benefits of trade liberalization policies, it is also important to examine whether such policies help the children of developing countries or make these children more vulnerable. Child labor regulations can be based on a win-win situation for economists and human rights activists by involving all stakeholders of trade in these developing countries.

Under the umbrella of Krugman (1979), children can be protected due to the production of differentiated goods and increasing returns to scale. Selection effect can be controlled by creating a competitive environment in the developing countries that can be obtained by focusing more on the trade of differentiated goods. The scale of production is a major source of change in the labor demand, and it also changes the demand for child labor. So, it is recommended that the scale of production be achieved through the application of the production of differentiated goods.

ACKNOWLEDGEMENT

Financial support from Universiti Malaysia Sarawak and Research Acculturation Collaborative Effort RACE/E(3)/1250/2015(06), Ministry of Education Malaysia is gratefully acknowledged. All remaining flaws are the responsibilities of the authors.

REFERENCES

- Acaroglu, H. & Dagdemir, O. (2010), "The Effects of Globalization on Child Labor in Developing Countries", *Business and Economic Horizons*, Vol. 2, pp. 37-47.
- Aralas, S. B. (2010), *Essays on Trade and Environment: The Environmental Effects of Intra-Industry Trade*, (Unpublished doctoral thesis) Michigan State University, East Lansing, Michigan, United States.
- Arellano, M. & Bover, O. (1995), "Another Look at the Instrumental-Variable Estimation of Error-Components Models", *Journal of Econometrics*, Vol. 68 No. 1, 29-51.
- Baland, J. M. & Robinson, J. A. (2000), "Is Child Labor Inefficient?", *Journal of Political Economy*, Vol. 108 No. 4, pp. 663-679.

- Baltagi, B. H., Song, S. H., & Koh, W. (2003), "Testing Panel Data Regression Models with Spatial Error Correlation", *Journal of Econometrics*, Vol. 117 No. 1, pp. 123-150.
- Barro, R & Lee, R. (2010), "A New Data Set of Education Attainment in the World", Cambridge NBER Working Paper no. 15902.
- Basu, K. & Ray, R. (2002), "The Collective Model of the Household and an Unexpected Implication for Child Labor: Hypothesis and an Empirical Test", Working Paper Series 2813, The World Bank Policy Research.
- Basu, K. & Van, P. H. (1998), "The Economics of Child Labor", *American Economic Review*, Vol. 88 No. 3, pp. 412-427.
- Basu, K., Das, S., & Dutta, B. (2010), "Child Labor and Household Wealth: Theory and Empirical Evidence of an Inverted-U", *Journal of Development Economics*, Vol. 91 No. 1, pp. 8-14.
- Davies, R. B. & Voy, A. (2009), "The Effect of FDI on Child Labor", *Journal of Development Economics*, Vol. 88 No. 1, pp. 59-66.
- Dessy, S. E. & Pallage, S. (2005), "A Theory of the Worst Forms of Child Labor", *The Economic Journal*, Vol. 115 No. 500, pp. 68-87.
- Doepke, M. & Zilibotti, F. (2009), "International Labor Standards and the Political Economy of Child-Labor Regulation", *Journal of the European Economic Association*, Vol. 7 No. 2-3, pp. 508-518.
- Doepke, M. & Zilibotti, F. (2010), "Do International Labor Standards Contribute to the Persistence of the Child-Labor Problem?", *Journal of Economic Growth*, Vol. 15 No. 1, pp. 1-31.
- Doytch, N., Thelen, N. & Mendoza, R. U. (2014), "The Impact of FDI on Child Labor: Insights from an Empirical Analysis of Sectoral FDI Data and Case Studies", *Children and Youth Services Review*, Vol. 47, pp. 157-167.
- Eastman, H. C. & Stykolt, S. (1967), *The Tariff and Competition in Canada*, Toronto: Macmillan of Canada.
- Edmonds, E. V. (2005), "Does Child Labor Decline with Improving Economic Status?", *Journal of Human Resources*, Vol. 40 No. 1, pp. 77-99.
- Edmonds, E. V. & Pavcnik, N. (2005a), "Child Labor in the Global Economy", *Journal of Economic Perspectives*, Vol. 19 No. 1, pp. 199-220.
- Edmonds, E. V. & Pavcnik, N. (2005b), "The Effect of Trade Liberalization on Child Labor", *Journal of International Economics*, Vol. 65 No. 2, pp. 401-419.
- Edmonds, E. V. & Pavcnik, N. (2006a), "International Trade and Child Labor: Cross-country Evidence", *Journal of International Economics*, Vol. 68 No. 1, pp. 115-140.
- Edmonds, E. V. & Pavcnik, N. (2006b), "Trade Liberalization and the Allocation of Labor between Households and Markets in a Poor Country", *Journal of International Economics*, Vol. 69 No. 2, pp. 272-295.
- Edmonds, E. (2010), "Trade, Child Labor, and Schooling in Poor Countries", in G. Porto & B. Hoekman (eds), *Trade Adjustment Costs in Developing Countries: Impacts, Determinants, and Policy Responses*, the World Bank Press, pp. 179-196.
- Estevez, K. (2010), "Essays on Child Labor, Productivity, and Trade (Doctoral dissertation)", University of Florida, Florida.

- Estevez, K. (2011), “Nutritional Efficiency Wages and Child Labor”, *Economic Modelling*, Vol. 28 No. 4, pp. 1793-1801.
- Estevez, K. & Levy, T. (2014), “Intra-industry Trade and the Demand for Child Labor”, *International Journal of Economic Theory*, Vol. 10 No. 3, pp. 275-294.
- Feenstra, R. C. (2003), *Advanced International Trade: Theory and Evidence*, Princeton: Princeton University Press.
- Fontana, L. B. & Grugel, J. (2015), “To Eradicate or to Legalize? Child Labor Debates and ILO Convention 182 in Bolivia”, *Global Governance: A Review of Multilateralism and International Organizations*, Vol. 21 No. 1, pp. 61-78.
- Green, W. H. (2008), “Discrete Choice Modelling”, *Handbook of Econometrics*, Vol. 2.
- Hindman, H. D. (2014), *The World of Child Labor: An Historical and Regional Survey*, ME Sharpe.
- Iram, U. & Fatima, A. (2008), “International Trade, Foreign Direct Investment and the Phenomenon of Child Labor: The Case of Pakistan”, *International Journal of Social Economics*, Vol. 35 No. 11, pp. 809-822.
- Jafarey, S. & Lahiri, S. (2002), “Will Trade Sanctions Reduce Child Labor? The Role of Credit Markets”, *Journal of Development Economics*, Vol. 68 No. 1, pp. 137-156.
- Kaliappan, S. R., Khamis, K. M. & Ismail, N. W. (2015), “Determinants of Services FDI Inflows in ASEAN Countries”, *International Journal of Economics & Management*, Vol. 9 No. 1, pp. 45-69.
- Krugman, P. R. (1979), “Increasing Returns, Monopolistic Competition, and International Trade”, *Journal of International Economics*, Vol. 9 No. 4, pp. 469-479.
- Krugman, P. (1980), “Scale Economies, Product Differentiation, and the Pattern of Trade”, *The American Economic Review*, Vol. 70 No. 5, pp. 950-959.
- Krugman, P. (1995), Increasing Returns, Imperfect Competition and the Positive Theory of International Trade, *Handbook of international economics*, Vol. 3, pp. 1243-1277.
- Krugman, P. (2008), “The Conscience of a Liberal”, Retrieved from http://krugman.blogs.nytimes.com/2013/07/08/safer-sweatshops/?_r=0
- Mansoor, F. (2005), “Laughter and Tears of Developing Countries: The WTO and the Protection of International Labor Standards”, *Currents: International Trade LJ*, Vol. 14, pp. 60-83.
- Martin, W. & Maskus, K. E. (2001), “Core Labor Standards and Competitiveness: Implications for Global Trade Policy”, *Review of International Economics*, Vol. 9 No. 2, pp. 317-328.
- Mohd Noor, Z., Isa, N., Said, R. & Abd Jalil, S. (2011), “The Impact of Foreign Workers on Labor Productivity in Malaysian Manufacturing Sector”, *International Journal of Economics and Management*, Vol. 5 No. 1, pp. 169-178.
- Neumayer, E. & De Soysa, I. (2005), “Trade Openness, Foreign Direct Investment and Child Labor”, *World Development*, Vol. 33 No. 1, pp. 43-63
- Ranjan, P. (2001), “Credit Constraints and the Phenomenon of Child Labor”, *Journal of Development Economics*, Vol. 64 No. 1, pp. 81-102.
- Singh, A. & Zammit, A. (2004), “Labor Standards and the ‘Race to the Bottom’: Rethinking Globalization and Workers’ Rights from Developmental and Solidarity Perspectives”, *Oxford Review of Economic Policy*, Vol. 20 No. 1, pp. 85-104.

- Tariq & Ab-Rahim, R. (2016), “The Environmental Effects of Intra-Industry Trade in the SAARC Region”, *International Journal of Business and Society*, Vol. 17 No. 1, pp. 113-130.
- Taylor, M. S., W. Antweiler & B. R. Copeland. (2001), “Is Free Trade Good? For the Environment”, *American Economic Review*, Vol. 94 No. 1, pp. 877-908
- UNICEF (2012), “Monitoring the Situation of Children and Women”, Nepal Multiple Indicator Cluster Survey 2010, Mid-and Far Western Regions, Final Report 2012. Kathmandu: UNICEF.
- World Bank Group (2012), *World Development Indicators 2012*, World Bank Publications.

APPENDIX A**Countries in the Sample**

AFRICA		
Algeria	Egypt, Arab Rep.	Mauritania
Angola	Equatorial Guinea	Morocco
Benin	Ethiopia	Mozambique
Botswana	Gambia	Niger
Burkina Faso	Ghana	Nigeria
Burundi	Guinea	Rwanda
Cameroon	Guinea-Bissau	Sao Tome and Principe
The Central African Republic	Kenya	Senegal
Chad	Lesotho	Sierra Leone
Comoros	Liberia	Somalia
Congo, Dem. Rep.	Madagascar	Tanzania
Cote D'Ivoire	Malawi	Tunisia
Djibouti	Mali	Zambia
ASIA		
Afghanistan	Kyrgyz Republic	Vietnam
Bahrain	Lao PDR	Nepal
Bangladesh	Lebanon	Pakistan
Bhutan	Mongolia	The Syrian Arab Republic
Cambodia	Indonesia	Sri Lanka
India	Iraq	Thailand
EUROPE		
Albania	Croatia	Romania
Armenia	Georgia	Serbia
Azerbaijan	Kazakhstan	Turkey
Belarus	Montenegro	Ukraine
Bosnia and Herzegovina	Portugal	
AMERICA		
Argentina	Ecuador	Jamaica
Bolivia	El Salvador	Mexico
Brazil	Guatemala	Nicaragua
Chile	Guyana	Panama
Colombia	Haiti	Paraguay
Dominican Republic	Honduras	Peru