

Master Thesis



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Globalization and Child Labor

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Abstract

This thesis studies the relationship between globalization and child labor rates. Findings of this study reveal that there is a U-shape relationship between trade openness and the total child labor rate. In addition, there is also a U-shape relationship between GDP per capita and the total child labor rate. The inflection point of this U shape is around \$10,110. More specifically, if a country's GDP per capita is below \$10,110, the total child labor rate decreases with an increase in GDP per capita. Whereas, if a country's GDP per capita is above \$10,110, the total child labor rate increases with economic growth. Moreover, when GDP per capita is added as an independent variable, FDI has no influence on the total child labor rate. This thesis also analyses the effect of globalization on the child labor rates by different genders, findings of which exhibit a U- shaped result between trade openness and male/female child labor rates, and also demonstrate a U shaped relationship between GDP per capita and male/female child labor rates. However, the effect of the process of globalization on child labor rate does not differ between boys and girls.

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1. Introduction

As a human right issue, the problem of child labor has existed throughout economic history. For instance, Adam Smith discusses the value of children in labor sectors, and suggests that in a “labor-shortage” society, the demand for child labor increases fertility rates and Marx believes that child labor was created by the industrial revolution (Edmonds, 2007). Until nowadays, with deeper integration and globalization processes, child labor is still a serious problem, which attracts great attention among developing countries.

1.1 Definition

According to the United Nations International Children’s Emergency Fund (UNICEF), child labor is defined as “all children below 12 years of age working in any economic activities, those aged between 12 and 14 engaged in more than light work, and all children engaged in the worse forms of child labor” (UNICEF, 2014).

Many of children work in industries that involve intolerable abuse, such as child slavery, trafficking, debt bondage forced labor, or illicit activities, which are considered as unacceptable for children (International Labour Organization., 2017). According to UNICEF, in 2005, there were around 5.7 million children in forced and bonded labor, 1.2 million were trafficked, 1.8 million were in prostitution and/or pornography, or were recruited as child soldiers (UNICEF, 2014). Based on International Labor Organization (ILO) investigations, child labor at least has one of the following characteristics (International Labour Organization., 2017):

- Violates a nation’s minimum age laws;
- Damages children’s physical or mental health;
- Prevents children from attending school;
- Uses children and undermine labor standards.

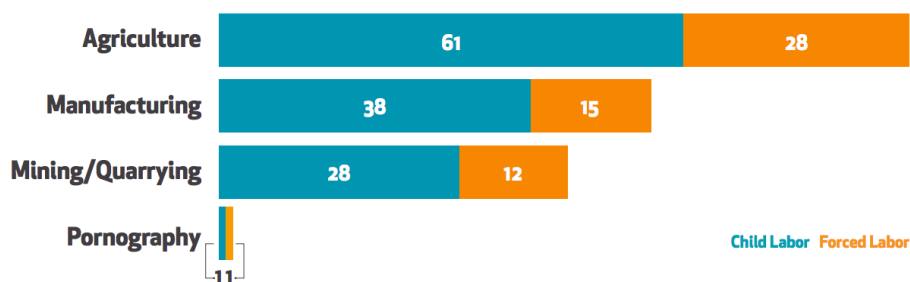
1.2 Current Situations

Besides child labor that is more visible, there are also forms of child labor that are more hidden within industries, such as in domestic service, retailing, manufacturing, or agriculture industries and many more. It is hard to get an accurate statistical result of how many children are involved in the child labor problem.

Although the ILO includes unpaid family child labor workers in their statistics, children who work in households are still excluded. These hidden child labor also have significant influence on societies, which harms a child’s growth greatly (Webbink, 2014).

Graph 1 shows the percentage of total productions produced by children for each industry. According to the graph, child labor is most prevalent in agriculture (61%) sector. This is in line with UNICEF report which finds that over 70% of child labors work in the agriculture industry (UNICEF, 2014).

Graph1: Percentage of Total Productions Produced by Child Labor and Forced Labor.



Source: Bureau of International Labor Affairs (2005), p35.

Child labor has a greater market demand for being cheaper and potentially more productive than adult labor in certain industries. According to ILO estimations, there are around 215 million children aged 5-14 years old engaged in different economic sectors globally. Among all regions, Africa has the largest amount of child labor (International Labour Organization., 2017). In fact, in the report from CNN (2013), more than half of the countries that are the worst for child labor are located in Africa (Hunt, 2013).

Unlike child labor in Asia and the Pacific, in which child labor is concentrated mostly in manufacturing and agriculture industries, child labor in Africa, especially in Sub-Saharan Africa, is more prevalent and involved in the worst forms that include child trafficking, hazardous jobs, among others (Amon et al., 2012).

Moreover, child labor phenomenon is more prevalent in rural areas than in urban ones (International Labour Organization., 2015). Poverty is the main cause of the child labor problem (Gill, 1994). As a result, child labor problems happen more in rural areas than in urban ones. For instance, Woldehanna, Tefera, Jones, & Bayrau (2006) find the following results in Ethiopia:

Table1: Children’s Main Activity by Sex and Location

| | Between 7 and 11 | | | Between 12 and 17 | | | All children | | | Between 7 and 11 | | Between 12 and 17 | |
|---------------|------------------|-------|-------|-------------------|-------|-------|--------------|-------|-------|------------------|-------|-------------------|-------|
| | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total | Rural | Urban | Rural | Urban |
| School only | 49.70 | 54.72 | 52.31 | 52.75 | 54.65 | 53.74 | 51.5 | 54.69 | 52.94 | 35.82 | 84.21 | 39.29 | 73.28 |
| Work & school | 10.04 | 7.66 | 8.80 | 22.02 | 12.82 | 17.23 | 15.33 | 9.93 | 12.52 | 12.47 | 1.70 | 24.74 | 17.23 |
| Work only | 10.28 | 5.33 | 7.70 | 11.01 | 12.54 | 11.80 | 10.60 | 8.50 | 9.51 | 11.68 | 0.00 | 18.62 | 11.80 |
| Minimal work | 29.99 | 32.30 | 31.19 | 14.22 | 20.00 | 17.23 | 23.02 | 26.88 | 25.03 | 40.04 | 14.09 | 17.35 | 17.23 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Source: Woldehanna et al., (2006), p24, Table 6.3: Children’s main activity by sex and location

Studies of the age group between 7 and 11 in rural and urban areas indicate that around 36% of rural and 84% of urban children have “school only” as their main activity. However, around 13% of children in rural areas is categorized as “work and school” and 12% is “work only”, which are much higher rates compared with their peers in urban areas. Similar results have been observed in older age groups as well (Woldehanna et al., 2006).

Furthermore, except for locations, gender effects also have an influence on the child labor problem. In fact, gender discrimination exists amongst the child labor problem (Osment, 2014). Girls and boys are often engaged in different jobs because of the differences in culture and social norms. For instance, boys are often engaged in manufacturing, restaurant and transport, whereas girls are more involved with domestic work.

Some scholars argue that boys engage in child labor activities more than girls. This might be because boys are economically more active than girls (Osment, 2014). However, this does not necessarily have to be the case.

Compared with boys, girls have to suffer the triple burden of school, housework, and working outside the home, whether it is paid or unpaid (UNICEF, 2007). Mamadou (2009) claims that girls are more involved in private households, such as caring for siblings. According to a statistical result, more than 90% of those engaged in domestic service are girls, which is less visible form of child labor and therefore harder to trace (UNICEF, 2007).

Moreover, traditional gender roles should be considered in here as well. In many areas, girls are denied their right to receive education. For instance, in Egypt, parents are reluctant to send girls to school because it is seen as a bad investment since girls may marry earlier and leave home sooner (UNICEF, 2007). In East and Southeast Asia, sending girls to work in

domestic service is seen as a good preparation for marriage. In India, many girls who have to work at home are accompanied by their mothers at an earlier age. Later on, they are usually hired to work in the domestic sector themselves.

The characteristics of the domestic service industry make child labor more invisible, and the domestic service sector is the least regulated of all occupations. Thus, those children who work in this sector are more exposed to violence, exploitation, and abuse (UNICEF, 2007).

As a consequence of large amounts of child labor and the moral and ethical problems that have been caused by it, this issue has garnered great public attention. Therefore, Non-Governmental Organizations (NGOs) and governments develop various policies that aim to eliminate the child labor problem.

For instance, UNICEF has implemented a Parenting Education program for less-developed countries which aims to increase parents' awareness of the negative effects of child labor (UNICEF, 2007). In addition, UNICEF has developed a community-based child center in countries such as Malawi and Nepal, to give children between age 3 till 5 safe environments to grow in. By the end of the 1990s, 50,000 parents had participated in this program, and child labor have been decreased (UNICEF, 2007).

1.3 Reasons

Although different programs and policies have been implemented to reduce child labor, the issue still cannot be eliminated once for all. Thus, it is important to discuss the reasons behind this problem, and to analyze in what ways child labor has been affected.

Economists usually believe that poverty is the main cause of child labor. Child labor is mainly concentrated intensively in poor countries (Basu, 1999). For poor households, the decision to send children to school is associated with various factors. Changes in household economic conditions (e.g., becoming poor), could affect parents' decision in sending their children to school or to work. In fact, child labor acts as a mechanism for consumption smoothing (Neumayer & Soysa, 2005). Consequently, when a household suffers from, for instance, a temporary economic crisis, child labor is essentially important. The child labor phenomenon does not indicate that parents want to enjoy more leisure time while their children work, but rather reflects the problem of poverty. Parents have to send their children to work when a household suffers from poverty (Basu & Van, 1998). Ersado (2005) reveals

that in developing countries, more than one member of a household has to generate income to maintain a certain income level, which often coincides with using child labor.

Except for poverty, schooling costs and the availability and quality of education also have effects on child labor. For instance, if the opportunity cost of sending a child to school is high (i.e. school cost is high) or/and the opportunity cost of not working is high (i.e. wages increasing), there is a higher likelihood for parents to send their children to work. Consequently, it is important to increase public expenditure for education and school quality to lower the incidence on child labor.

Though there are many common acknowledgments for child labor, economists still debate whether increases of trade openness and FDI can have positive or negative effects on child labor.

1.4 The Central Question

Thus, to study the true effect of the process of globalization on child labor, this thesis will focus on the following research question:

To what extent and in what ways does globalization affect child labor?

In addition, a sub-question will be studied to answer the main research question better, namely,

How does the effect of the process of globalization on child labor differ between boys and girls?

In order to answer the above questions, this thesis is organized as follows:

Section 2 presents an overview of the theoretical framework that considers different perspectives of the effects of globalization on child labor problem. Section 3 provides data and empirical information for this thesis. The fourth uses the empirical analysis methodology to test previous hypotheses. Section 5 tests the robustness of the thesis. The last section summarizes the conclusion and gives policy recommendations accordingly.

2. Theoretical background

Although child labor problem has been studied for a long time, there is still an ongoing debate regarding how globalization influences child labor problems among economists. Traditionally, there are polarized opinions regarding this problem, namely, globalization promotes or reduces child labor rates. Recently, some scholars have extended the theoretical framework based on traditional ones.

2.1 Globalization Promotes Child Labor

From an economic point of view, globalization affects the demand for child labor directly. For instance, in Maskus's (1997) paper, he finds that because of trade liberalization, the export sector has been raised, which increases the demand of child labor and their wages. Consequently, the globalization process has had a negative impact on reducing the child labor problem.

In 2004, Basu and Chau studied the effects of trade openness on child labor and debt bondage in a dynamic model. They found that when trade openness increases, the supply of child labor also increases in a short run. However, trade openness does not affect the child labor supply in a long term.

In classic theory, scholars believe that globalization promotes child labor, and argue that trade between nations is based on comparative advantage. The Heckscher-Ohlin model sees developing countries as being abundant in unskilled-labor sectors (Dagdemiir & Acaroglu, 2010). Thus, the process of globalization can create comparative advantages in unskilled-labor sectors in developing countries. In other words, a country can gain a competitive advantage over others via higher rates of child labor, which indirectly reduces cost (Krueger, 1996). In addition, with this “race-to-the-bottom” competition, developing countries have a stronger incentive to cut costs in order to gain a competitive advantage (Neumayer & Soysa, 2005).

As a result, trade liberalization and FDI penetration increase the demand for child labor and their wages accordingly (Edmonds & Pavcnik, 2006), which indirectly increases the opportunity costs of children who attend school (Davies & Voy, 2009).

In addition, a substitution effect may happen, that is, because of a higher rate of return in the unskilled labor sector, the incentive to invest in skilled labor or education decreases. As a result, the supply of child labor also increases significantly (Grootaert & Kanbur, 1995).

2.2 Globalization Reduces Child Labor

However, there are also economists who argue that globalization reduces child labor due to there being not only a substitution effect, but also an income effect which affects child labor (Kis-Katos, 2007). The “income effect” in this case means when the income level has been improved in a poor household, parents are more likely to reduce their children’s workload (Edmonds & Pavcnik, 2002). This is in line with Neumayer & Soysa (2005) who conclude that, with higher incomes, impoverished households are in better situations and consequently, they don’t send their children to work anymore.

Scholars who support this idea state that as a result of globalization, the increase of FDI penetration lowers the incidence of child labor participation (Iram&Fatima, 2008). To be more specific, FDI penetration reduces the relative wage for unskilled-labor which in turn decreases the rate of return of child labor. Thus, children participation in labor force declines, and schooling increases (Rahman & Khanam, 2012).

Ranjan (2001) studies the effects of trade liberalization on the returns to education in the presence of credit constraints. He states that trade liberalization affects countries with a level of unskilled labor. With more open economic situations, developing countries shift from low-skilled labor intensive systems more towards capital intensive ones (Becker, 1997). With more net inflow of foreign capital, the rate of return of human capital might increase, which lowers earning opportunities for children. (Dwibedi & Chaudhuri, 2010). Consequently, it induces the rate of poor household parents sending their children to schools rather than to work. Moreover, when a family’s income reaches a certain level, parents are more likely to withdraw their children from the labor force.

Countries with opening economies find it easier to get access to international capital markets through globalization, which makes the interest rate decrease and the rate of return on education increase (Jafarey & Lahiri, 2002; Rajan, 2001). Consequently, parents have more incentive to send their children to school.

All of these factors reduce the incentive of supply for child labor. Additionally, with higher regulatory scrutiny and more exposed supervision, child labor tend to decrease during the globalization process.

2.3 Extensions of the Theoretical Framework

From those two perspectives above (globalization affects child labor negatively or positively), it should be considered that in developing countries, child labor may come under dual pressure from both income and substitution effects during the globalization process (Castillo & Salem, 2016).

Moreover, economic growth influences a household economic situation. For instance, if GDP per capita increases in a household, this household economic situation might be improved enough to move out of poverty (Edmonds, 2005). Consequently, parents have less incentive to send children to work, which decreases child labor rate. Thus, it is important to consider a certain country's economic position during the process of globalization, which means the theoretical framework needs to be extended.

Tesfay (2003) takes the child labor rate from the ILO (1989-1999), which he expresses as the number of children aged 10-14 who are active in the labor force divided by the number of children aged 10-14 in total, as a dependent variable. Additionally, by using a panel data methodology, he reveals that there is no prior relationship between globalization and child labor. In fact, he finds that child labor participation rates have an inverted "U" shaped, Kuznets-like shaped curve with GDP per capita in Africa, Asia, Middle East, and Latin America regions.

Tesfay (2003) indicates that child labor participation rates increase with economic growth in the beginning but decrease at a later stage in developing countries. The evidence shows that the result is most significant in countries whose PCGDP (per capita gross domestic product) is above \$1,000. He believes that those countries are in the upward part of the curve, namely, child labor increases with globalization, and can persist for many years (Tesfay, 2003).

He also argues that with the process of globalization, economic growth implies more market opportunities for all participants, including child labor. The market opportunities are referred to here as the productive activities within households and in the market. As globalization develops, human capital increases and children's productivities decline. Meanwhile, family income growth shows a stable trend, and the necessities for sending children to work reduce.

This theory is consistent with Castillo & Salem's (2016) argument. Castillo & Salem (2016) also find the empirical result that there is an inverse "U" shape between child labor

and globalization in medium and low income countries by using the panel data methodology method.

They believe that the substitution effect has more influence on child labor than the income effect in the earlier stage of the process of globalization, and this income effect outweighs the substitution effect in the latter stage. They not only considered economic factors, but also political and social perspectives and found an inverse “U” shape between child labor rates and globalization (Castillo & Salem).

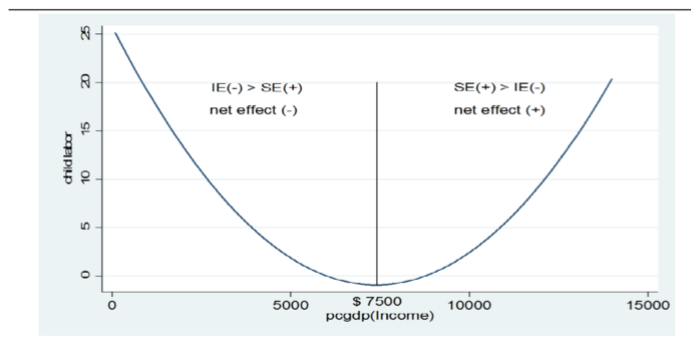
Unlike Tesfay (2003) and Castillo & Salem(2016), Dagdemir & Acaroglu (2010) find that there is a “U” shape relationship between globalization and child labor in developing countries. They argue that due to the differences in stages of globalization process for developing countries, the impacts on child labor differ as well.

They use labor force participation of children aged 5-14 from UNICEF (2009) as dependent variable. More importantly, in addition to the use of trade openness and FDI, they use PCGDP as an independent variable.

Dagdemir & Acaroglu (2010) argue the question of “how globalization affects child labor in developing countries” depends on the level of economic growth, which is affected by trade openness and FDI penetration. They assume that there is a quadratic relationship between economic growth and child labor. A positive substitution effect, which is due to the increase of child labor demand and wages; and a negative income effect, which is based on the PCGDP level, should be summed up.

Based on a cross-national model, the results show that child labor decreases in developing countries with PCGDPs with less than \$7,500, but increase when PCGDP is above \$7,500 under the process of globalization. It can be seen more clearly in the following graph:

Gaph2: The Relationship Between GDP Per Capita and Child Labor.



Source: Dagdemir & Acaroglu(2010), p44, Figure 4 The Relationship Between GDP per Capita and Child Labor by Substitution and Income Effects for Developing Countries.

Dagdemir & Acaroglu (2010) argue that for the first stage, the income effect dominates. The negative net effect lowers child labor. In this situation, parents have higher level of income tend to send their children to school, which decreases the supply of child labor. The second stage shows that a positive substitution effect and negative income effect still exist, but that the substitution effect dominates in this phase. With deeper globalization integration, economic sectors have been transferred from low-skilled labor intensive to high-skilled labor-intensive areas, which deteriorates impoverished households. To sustain their income levels, parents are more inclined to send their children to work than to school. Therefore, child labor increases along with the globalization process.

2.4 Theoretical Framework for Globalization and Child Labor by Gender

This thesis will also further discuss about what is/are the effect(s) of globalization on child labor by gender. A report regarding Global child labor trends (Hagemann & Mehran, 2006) shows that far more boys have been engaged in child labor than girls, the difference being about 31.6 million. In addition, the gap widens as age increases. However, there is not much literature on how the impact of the process of globalization on child labor differs between boys and girls. Therefore, this thesis will contribute to the existing body of literature by specifying the gender and studying the effect of globalization on child labor by gender.

With regard to child labor problems, parents' decisions in a household plays a central role. After a household assessing the costs and benefits of the child, each child in a household's position is different. The final outcome (whether a child has to work or go to school) is the result of a bargaining process within a household (Gallego & Sepulveda, 2007).

Basu & Van (1998) argue that the choice for households sending their children to work comes out of necessity not greed. Once a household's income surpasses a threshold, the family will stop sending their children to work, regardless of sex. This theory has been supported by Edmonds & Pavcnik's (2006) empirical finding. If a family has multiple children, the household income might increase, but the amount raised is not enough to stop sending all the children to work.

The subsistence theory believes that there is no significant gender difference in the globalization process if households send their only child to work, but if there are multiple children in a household, gender biases will influence household preference regarding the withdrawing of one sex from the labor market before the other (Basu & Van, 1998). For instance, if boys are more productive than girls, a household will consider withdrawing girls first out of the labor market (Voy, 2012).

Indeed, systematic differences exist among boys and girls, which affect the rate of child labor (Gallego & Sepulveda, 2007). Baland & Robinson (2000) explain that this gender effect is associated with time allocation and budget constraints.

In a perfect capital markets world without budget constraints, child labor is determined by the gender differences on returns to education and differences in wages for the child. If bequests are zero in this perfect market, parents cannot use a bequest to offset children's ability differences. Thus, they have to compensate this difference by only investing in educating the most capable child (children) relative to his or her siblings. As a result, poor households have more homogenous outcomes for heterogeneous children within this household. This implies that the wages of child labor, the difference of wages between boys and girls, and the subjective ability of a child towards schooling, can explain the gender gap in the child labor phenomena (Gallego & Sepulveda, 2007).

In addition, cultural and religious beliefs and biases with regard to gender roles, might affect households' decisions (Lopez-Calva, 2001). Reggio (2011) finds that in Mexico, if a mother's bargaining power within a household increases, working hours of female child labor decreases but it does not affect male children. Consequently, females' positions within households affect female child labor rates.

2.5 Hypotheses

The effects of globalization will be decomposed to its components: foreign direct investment (FDI) and trade openness (Dagdemir & Acaroglu, 2010). In addition, a household

economic situation is associated with the income effect, which has affected the child labor rate. Thus, this thesis will also use the GDP per capita as indicator to test its relationship with the child labor rate.

Moreover, there are two major theories that have been discussed above. The first one is based on Tesfay (2003) and Castillp & Salem (2016) who state that there is an inverted U shape between the child labor rate and globalization; and an inverted U shape between the child labor rate and GDP per capita. The other theory is based on Dagdemir & Acaroglu (2010) and states that there is a U shape relationship between the child labor rate and globalization; and a U shape relationship between the child labor rate and GDP per capita.

To testify which theory most accurately describes the reality, I will use data taken from UNICEF (2016) and the World Bank to make new empirical research. The hypotheses for this thesis are as following:

There is a U shape between GDP per capita and the child labor rate.

There is a U shape between trade openness and the child labor rate.

There is a U shape between FDI penetration and the child labor rate.

Globalization has more impact on male child labor than that of females.

3. Methodology

3.1 Data

This thesis uses cross-national data to study the effect of globalization on child labor. For the total child labor rate, this thesis studies 110 developing countries in total. For the child labor rate by gender, 99 countries are available, which are used as the dependent variable (see Appendix I). This thesis uses data taken from UNICEF and the World Bank. The dependent variable, “children in employment”, is taken from UNICEF’s Multiple Indicator Cluster Survey (MICS) from 2016, which measures the percentage of children aged 5-14 that are engaged in child labor (by sex, place of residence and household wealth quintile) (UNICEF, 2016). In addition, I study the effect of globalization on child labor by gender. The dependent variable child labor by gender is also taken from MICS (UNICEF, 2016). Foreign direct investment, net inflows (The World Bank, 2016); trade openness, the summing of exports and imports (The World Bank, 2016); and the GDP per capita (The World Bank, 2016) are used as independent variables. (Note: this thesis use GDP per capita (US\$)/1,000 in analyses).

For control variables, this thesis follows Neumayer & Soysa (2005)’s study and uses government expenditures on education as one of the control variables (The World Bank, 2016). When government expenditure on education increases, the cost of sending children to school decreases for instance, and household can get subsidy from government, which might motivate parents to send their children to school rather than to work. Thus, government expenditure on education might influence child labor rate. For this indicator, nine countries are missing. Thus, this thesis creates dummy variables and uses the mean of government expenditure on education as a replacement to solve the missing variable problem. Another control variable is urbanization rate (The World Bank, 2016). Woldehanna, Tefera, Jones, & Bayrau (2006) find that there is more child labor in rural areas than urban. Thus, with higher urbanization rate, child labor rate might be affected negatively.

3.2 Empirical Frameworks

For this thesis, the effect of globalization on child labor rates, is calculated with the following empirical specification:

$$childlabor_{it} = \alpha_0 + \beta_g gdp_{it} + \beta_t trade_{it} + \beta_F FDI_{it} + \beta_c controls_{it} + \tau_t + \varepsilon_{it} \quad (1)$$

Equation (1) assumed that there is a linear relationship between the GDP per capita and the child labor rate and globalization and the child labor rate. In equation (1), $chldlabor_{it}$ is the child labor rate, gdp_{it} is the GDP per capita, $trade_{it}$ is trade openness, FDI_{it} is FDI penetration, and $controls_{it}$ include the government expenditure on education and the urbanization rate. The intercept in this equation is α_0 , β_g , β_t , β_F and β_c and are coefficients for gdp_{it} , $trade_{it}$, FDI_{it} and $controls_{it}$ accordingly. In this equation, τ_t is the year dummy and ε_{it} is the error term.

If there is a negative relationship between the GDP per capita and the child labor rate, globalization and the child labor rate, then $\beta_g < 0$, $\beta_t < 0$, $\beta_F < 0$.

$$chldlabor_{it} = \alpha_0 + \beta_g gdp_{it} + \beta_{g2} gdp2_{it} + \beta_t trade_{it} + \beta_{t2} trade2_{it} + \beta_F FDI_{it} + \beta_{F2} FDI2_{it} + \beta_c controls_{it} + \tau_t + \varepsilon_{it} \quad (2)$$

Moreover, this thesis further uses equation (2) to test a non-linear relationship between the GDP per capita and the child labor rate and globalization and the child labor rate. In equation (2), $chldlabor_{it}$ is the child labor rate, gdp_{it} is the GDP per capita, $trade_{it}$ is trade openness, and FDI_{it} is FDI penetration. In addition, $gdp2_{it}$, $trade2_{it}$, $FDI2_{it}$ are quadratic terms for the GDP per capita, trade openness and FDI accordingly. $Controls_{it}$ are control variables, which include the government expenditure on education and the urbanization rate. The intercept in this equation is α_0 , β_g , β_t , β_F and β_c are coefficients for gdp_{it} , $trade_{it}$, FDI_{it} and $controls_{it}$. and β_{g2} , β_{t2} , β_{F2} are coefficients for $gdp2_{it}$, $trade2_{it}$ and $FDI2_{it}$. In equation (2), τ_t is the year dummy and ε_{it} is an error term.

If $\beta_g < 0$, $\beta_t < 0$, $\beta_F < 0$, and $\beta_{g2} > 0$, $\beta_{t2} > 0$, $\beta_{F2} > 0$, then there is a U shape relationship between the GDP and the child labor rate, a U shape relationship between globalization and the child labor rate.

For the gender effect, equation (3) shows a linear relationship between the child labor rate by gender and the GDP per capita, and the child labor rate by gender and globalization.

$$chldlabor_{it} = \alpha_0 + \beta_g gdp_{it} + \beta_t trade_{it} + \beta_F FDI_{it} + \beta_c controls_{it} + \beta_s Sex_{it} + \beta_{gs} gdp_{it} \times Sex_{it} + \beta_{ts} trade_{it} \times Sex_{it} + \beta_{Fs} FDI_{it} \times Sex_{it} + \beta_{cs} controls_{it} \times Sex_{it} + \tau_t + \varepsilon_{it} \quad (3)$$

Sex_{it} is the dummy variable. In here, girls=0, boys =1. If Sex_{it} is positively significant, it implies that male child labor rate is higher than female child labor rate. The term $gdp_{it} \times$

Sex_{it} is the interaction term between gdp_{it} and Sex_{it} , β_{gs} is the coefficient for this interaction term. This coefficient measures the differences of the effectiveness of GDP per capita on female and male child labor. Namely, β_g is GDP per capita's influence on female child labor rate, whereas, $\beta_g + \beta_{gs}$ is GDP per capita's influence on male child labor rate. The rest $\beta_{ts}trade_{it} \times Sex_{it}$ and $\beta_{FS}FDI_{it} \times Sex_{it}$ can be interpreted as the same.

Equation (4) assumes a non-linear relationship between GDP per capita and the child labor rate by gender, and a non-linear relationship between globalization and the child labor rate by gender.

$$\begin{aligned}
 childlabor_{it} = & \alpha_0 + \beta_g gdp_{it} + \beta_{g2} gdp2_{it} + \beta_t trade_{it} + \beta_{t2} trade2_{it} + \beta_F FDI_{it} + \\
 & \beta_{F2} FDI2_{it} + \beta_c controls_{it} + \beta_s Sex_{it} + \beta_{gs} gdp_{it} \times Sex_{it} + \beta_{ts} trade_{it} \times Sex_{it} + \\
 & \beta_{FS} FDI_{it} \times Sex_{it} + \beta_{gs} gdp2_{it} \times Sex_{it} + \beta_{ts} trade2_{it} \times Sex_{it} + \beta_{FS} FDI2_{it} \times Sex_{it} + \\
 & \beta_{cs} controls_{it} \times Sex_{it} + \tau_t + \varepsilon_{it}
 \end{aligned} \tag{4}$$

This equation adds quadratic terms for GDP per capita, trade openness, and FDI accordingly. In addition, it also interacts dummy variable with each independent variables and their quadratic terms.

3.3 Endogeneity Problem

There might be a reversed causality between child labor and globalization. Clearly, globalization affects child labor rates through different channels, which have been discussed here previously. However, there are limited literature studies available on how child labor affects globalization.

In Musteen & Zheng's (2013) paper, the authors argue that one of the MNCs (Multi-National Companies) valuable intangible assets is reputation. If MNCs invest too much in child labor countries/sectors, this may cause bad spillover effects, which could damage their reputations and affect their profitability as a consequence. From this point of view, firms may not have too much incentive to invest in child labor sectors/countries. In addition, with better regulatory environments and anti-child labor laws, the risk for MNCs to invest in child labor countries increases, which may further lower their incentives to invest. As a result, the process of globalization in those countries could be affected adversely.

From this perspective, there may be a reversed causality between child labor and globalization that should be taken into account in the models.

This thesis uses a one-year lag of independent variables for GDP per capita, trade openness and FDI as instrument variables to test the robustness in section 5.

3.4 Multicollinearity

Table 2 shows correlation matrix between each variable. Only GDP per capita (-0.57) is slightly higher correlated with child labor rate; and urbanization (0.55) is slightly higher correlated with GDP per capita. These findings imply that there is a little potential risk of multicollinearity between GDP per capita and child labor rate, urbanization rate and GDP per capita. All other variables have little risk with multicollinearity.

Table 2 Correlation Matrix

| | child labor rate | gdp per capita | Tradeopeness | FDI | Government education expenditures | Urbanization |
|-----------------------------------|------------------|----------------|--------------|---------|-----------------------------------|--------------|
| child labor rate | 1 | | | | | |
| gdp per capita | -0.5721 | 1 | | | | |
| Tradeopeness | -0.1459 | 0.0055 | 1 | | | |
| FDI | -0.0194 | 0.0304 | 0.4943 | 1 | | |
| Government education expenditures | -0.1918 | 0.0486 | 0.0041 | -0.1312 | 1 | |
| Urbanization | -0.3956 | 0.5473 | -0.0049 | 0.1272 | 0.0372 | 1 |

Table 3 uses VIF test to examine multicollinearity further. The VIF for each variable is below 1.5, and their tolerance factors (1/VIF) are higher than 0.6, which indicate that there is little multicollinearity risk between variables.

Table 3 Variance Inflation Factor

| Variable | VIF | 1/VIF |
|--------------|-------------|-----------------|
| fdi1 | 1.43 | 0.698026 |
| urbanization | 1.39 | 0.717388 |
| gdppercapita | 1.37 | 0.731905 |
| tradeopenn~s | 1.37 | 0.731949 |
| eduexp | 1.04 | 0.960603 |
| Mean VIF | 1.32 | |

4. Results

Table 4 describes the statistics for the variables of the model. For the dependent variable: the total child labor rate is between 1% and 49%, and the mean is 15.38%. Regarding the independent variables GDP per capita is between 210 USD and 15,432 USD, the mean is 3,460 USD. FDI is between 6.57% and 24.01%, and the mean is 4.85%. Trade openness is between 25% and 204%, and the mean is 85.6%. Control variable government expenditure on education is between 1.2% and 10.09%, and the mean is at 4.34%. And urbanization rate is between 9% and 93% among the developing countries, and the mean is 47%.

Table4 Summary Statistics.

| Variable | Mean | Std.Dev. | Min | Max |
|--|-------|----------|-------|-------|
| child labor rate (%), percentage of children 5–14 years old involved in child labour at the moment of the survey | 15.38 | 11.49 | 1 | 49 |
| child labor rate of boys(%) | 16.56 | 11.74 | 1 | 45 |
| child labor rate of girls(%) | 14.83 | 12.03 | 1 | 54 |
| gdp per capita(current US\$) | 3460 | 3660 | 210 | 15432 |
| Trade openness (%), sum of exports and imports of goods and services measured as a share of gross domestic product | 85.57 | 48.60 | 19.46 | 334.1 |
| FDI (%), Foreign direct investment, net inflows, measured as a share of gross domestic product | 4.85 | 4.46 | 5.67 | 24.01 |
| Government education expenditures rate(%), Total government education expenditures of expressed as a percentage of GDP | 4.34 | 1.87 | 1.2 | 10.09 |
| Urbanization (%), the percentage of Urban population | 47.21 | 20.82 | 9.735 | 93.55 |

4.1 Total Effect

Table 5 shows the results of the regressions for the total child labor based on equation (1). This regression assumes that there is a linear relationship between globalization and child labor rates. In addition, there is a linear relationship between the GDP growth and the child labor rate as well. In Table 5, column (1) shows the results of the regressions for the trade openness on the child labor rate; column (2) shows the results of the regressions for the trade openness and FDI on the child labor rate; column (3) shows the results of the regressions for the GDP per capita, trade openness and FDI on the child labor rate; column (4) adds the government expenditure on education based on column (3), and the last column adds the urbanization rate based on the previous column to regress the linear relationship.

Table 5 shows that the coefficient of the GDP per capita is negatively significant with the child labor rate. However, both trade openness and FDI's coefficients are not significant in this case. Hence, these imply that there is no linear relationship between trade openness, FDI, and the child labor rate. In other words, linearity cannot capture the relationship between globalization and the total child labor rate or the GDP per capita and the child labor rate.

Table5 Total Effect Linear Shape OLS

| | (1) childlabor | (2) childlabor | (3) childlabor | (4) childlabor | (5) childlabor |
|---------------|--------------------|--------------------|----------------------|----------------------|----------------------|
| tradeopenness | -0.0295 (-0.89) | -0.0236 (-0.80) | -0.0231 (-1.03) | -0.0257 (-1.19) | -0.0300 (-1.40) |
| fdi | | 0.220 (0.77) | 0.211 (1.08) | 0.168 (0.85) | 0.195 (1.03) |
| gdppercapita | | | -1.684*** (-8.49) | -1.687*** (-8.42) | -1.435*** (-6.53) |
| eduexp | | | | -0.753 (-1.53) | -0.819 (-1.61) |
| urbanization | | | | | -0.0808* (-1.91) |
| _cons | 18.32*** (3.50) | 16.58*** (3.30) | 22.94*** (4.88) | 27.18*** (4.60) | 31.02*** (5.20) |
| Observations | 110 | 110 | 110 | 110 | 110 |
| R-squared | 0.0325 | 0.0646 | 0.384 | 0.390 | 0.401 |

Notes: Robust T-test statistics appear in parentheses below the coefficient. *** indicates $p < .01$; ** indicates $p < .05$; * indicates $p < .10$, Each column controls the year fixed effect, but the output is omitted for brevity.

Table 6 represents the regression results derived from equation (2). In this equation, it is assumed that there is a non-linear relationship between the GDP per capita and the child labor rate. Moreover, there is a non-linear relationship between globalization and the child labor rate. In Table 6, column (1) regresses the trade openness and the quadratic term of the trade openness on the child labor rate. Column (2) adds FDI and its quadratic term based on column (1) to regress their relationship with the child labor rate. The rest can be done in the same manner as before. The last column (5) adds the urbanization rate and its quadratic term on column (4) to regress their effect on the child labor rate.

Table 6 testifies to a non-linear relationship between globalization, GDP per capita, and the total child labor rate. The regression result in Table 6 shows that the GDP per capita coefficient is around -4.51, which is significant at 1%. In addition, the quadratic term of the GDP per capita coefficient is around 0.223, which is positively significant at 1%. Therefore, there is a U shape relationship between GDP per capita and the total child labor rate.

Table 6 also shows the relationship between globalization, which is measured by trade openness and FDI, and the total child labor rate. The coefficient of trade openness is around -0.0807, which is negatively significant at 5%, the quadratic term of trade openness is positively significant (around 0.00023) at 10% as well. Thus, there is a U shape relationship between trade openness and the child labor rate. The inflection point is around 166%. To be more specific, when trade openness is below 166%, the child labor rate decreases. When trade openness is above 166%, the total child labor rate increases with an increase in trade openness.

However, in Table 6, both FDI and its quadratic term are not significant. This finding is in line with Davies, Ronald & Voy's (2007) study. In their paper, they found that FDI is negatively correlated with the child labor rate. However, FDI becomes insignificant after adding per capita income as an independent variable and the result is robust after corrections for the endogeneity problem (Davies, Ronald & Voy, 2007). This finding contrasts with the previous literature.

Moreover, there are two control variables, namely government expenditure on education and the urbanization rate, in this thesis. Theoretically, with government spending more on education, the opportunity cost for sending children to school decreases, and the amount of child labor decreases consequently. In addition, when the urbanization rate increases, the child labor rate decreases. However, this thesis does not find that government spending on education and urbanization rate has a significant influence on the child labor rate.

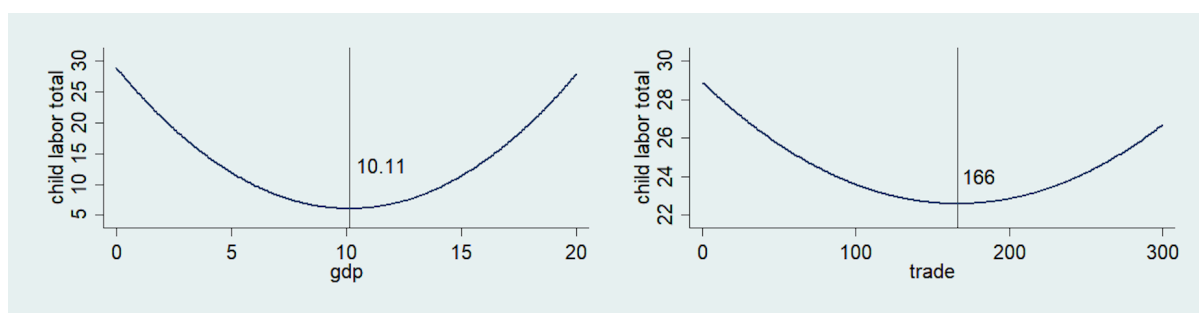
Table6 Total Effect U-shape OLS

| | (1) childlabor | (2) childlabor | (3) childlabor | (4) childlabor | (5) childlabor |
|----------------------------|-----------------------|-----------------------|----------------------|----------------------|----------------------|
| tradeopenness | -0.209*** (-3.11) | -0.161*** (-3.02) | -0.0847** (-2.15) | -0.0820** (-2.19) | -0.0807** (-2.07) |
| tradeopenness ² | 0.000654*** (3.45) | 0.000471*** (3.13) | 0.000251* (1.83) | 0.000230* (1.77) | 0.000228* (1.72) |
| fdi | | -0.349 (-0.49) | -0.0777 (-0.23) | -0.207 (-0.58) | -0.208 (-0.57) |
| fdi ² | | 0.0377 (1.09) | 0.0111 (0.65) | 0.0162 (0.94) | 0.0158 (0.90) |
| gdppercapita | | | -4.358*** (-7.11) | -4.436*** (-7.14) | -4.510*** (-6.07) |
| gdppercapita ² | | | 0.215*** (4.96) | 0.221*** (5.14) | 0.223*** (4.75) |
| eduexp | | | | -0.868 (-1.60) | -0.862 (-1.58) |
| urbanization | | | | | 0.00999 (0.26) |
| _cons | 22.22*** (4.94) | 21.40*** (4.78) | 27.00*** (7.08) | 32.02*** (5.76) | 31.58*** (5.39) |
| Observations | 110 | 110 | 110 | 110 | 110 |
| R-squared | 0.122 | 0.115 | 0.493 | 0.506 | 0.500 |

Notes: Robust T-test statistics appear in parentheses below the coefficient. *** indicates $p < .01$; ** indicates $p < .05$; * indicates $p < .10$. Each column controls the year fixed effect, but the output is omitted for brevity.

Based on the regression results from Table 6, Graph 3 graphically captures the effects of globalization on the total child labor rate and the effects of GDP per capita on the total child labor rate.

Graph 3 Graphical result



For the graph in the left, the inflection point of the U shape here is around \$10,110. Namely, when the GDP per capita is smaller than \$10,110, with increasing GDP per capita, the child labor rate declines; when the GDP per capita is above \$10,110, with the raising of the GDP per capita, the total child labor rate increases as well.

The inflection point can be calculated from the coefficients, which equals $(-\frac{b}{2a})$. In this equation, “b” is the one-degree term and “a” is the quadratic term. For instance, to calculate the inflection point of GDP per capita on the total child labor rate, the equation can be written as:

$$\frac{-4.15}{-2 * 0.223} = 10.11$$

To summarize, there is a U shape relationship between GDP per capita and the total child labor rate, the inflection point being around \$10,110. In addition, there is a U shape relationship between trade openness and the total child labor rate. The inflection point is at around 166%.

4.2 Gender Effect

This section tests how globalization affects child labor differently with regard to gender. Based on equation (3), Table 7 shows the regression results for the linear relationship

between the GDP per capita, globalization and the child labor rate by gender. I create the dummy variable: sex, and assumes girls=0, boys=1.

From this table, we can see that the GDP per capita is negatively correlated with the child labor for both boys (-1.429+0.0121) and girls (-1.439). However, the effect of trade openness and FDI on child labor by gender and all interaction terms are not significant, which means that the linear relationship cannot capture the effectual relationship between GDP per capita, globalization, and child labor rates by gender.

Table 7 Gender Effect Linear Shape OLS

| | (1) | (2) | (3) | (4) | (5) |
|-------------------|---------------------|---------------------|----------------------|----------------------|----------------------|
| | childlabor | childlabor | childlabor | childlabor | childlabor |
| tradeopenness | -0.00996 (-0.33) | -0.0234 (-0.69) | -0.0175 (-0.71) | -0.0183 (-0.78) | -0.0207 (-0.90) |
| Sex*tradeopenness | -0.00387 (-0.09) | -0.00219 (-0.05) | -0.00246 (-0.07) | -0.00204 (-0.06) | -0.00151 (-0.05) |
| Sex | 3.823 (0.59) | 3.823 (0.58) | 3.603 (0.74) | 1.504 (0.23) | 0.816 (0.12) |
| Fdi | | 0.300 (0.88) | 0.202 (0.85) | 0.139 (0.58) | 0.153 (0.68) |
| Sex*fdi | | -0.0376 (-0.08) | -0.0330 (-0.10) | -0.00294 (-0.01) | -0.00612 (-0.02) |
| gdppercapita | | | -1.795*** (-8.42) | -1.784*** (-8.68) | -1.493*** (-7.20) |
| Sex*gdppercapita | | | 0.0824 (0.28) | 0.0772 (0.27) | 0.0121 (0.04) |
| eduexp | | | | -0.953* (-1.68) | -0.917 (-1.63) |
| Sex*eduexp | | | | 0.460 (0.57) | 0.452 (0.56) |
| urbanization | | | | | -0.0964** (-2.29) |
| Sex*urbanization | | | | | 0.0216 (0.36) |
| _cons | 15.07*** (2.96) | 15.00*** (2.95) | 21.64*** (4.66) | 26.39*** (4.04) | 30.25*** (4.77) |
| Observations | 198 | 198 | 198 | 198 | 198 |
| R-squared | 0.0410 | 0.0376 | 0.354 | 0.361 | 0.372 |

Notes: Robust T-test statistics appear in parentheses below the coefficient. *** indicates $p < .01$; ** indicates $p < .05$; * indicates $p < .10$. Each column controls the year fixed effect, but the output is omitted for brevity.

Table 8 shows the regression result for a non-linear relationship between GDP per capita, globalization, and the child labor rate by gender. After adding all variables, column (5) shows all coefficients accordingly.

The regression results indicate that for female child labor, the GDP per capita coefficient is around -0.0478, which is significant at 1%. In addition, the quadratic term of the GDP per capita coefficient is around 0.244. Therefore, there is a U shape relationship between GDP per capita and the child labor rate for girls.

For boys, the GDP per capita coefficient equals the GDP per capita coefficient for girls plus the interaction terms between Sex and GDP per capita ($\beta_g + \beta_{gs}$), which is around -0.043 (-0.0478+0.00402). The coefficient for its quadratic term is around 0.216 (0.244-0.0278). This implies a U shape relationship between GDP per capita and the child labor rate for boys.

Similarly, the coefficient of trade openness is negatively significant (-0.0865), and the quadratic term of trade openness is positively significant (around 0.000265) at 10%. Thus, there is a U shape relationship between trade openness and the female child labor rate.

For boys, the trade openness coefficient is negatively significant (-0.0865-0.00597), whereas, its quadratic term is positively significant (0.000265+0.0000145). Consequently, there is a U shape relationship between trade openness and the male child labor rate.

To summarize, there is U shape relationship between GDP per capita and the female/male child labor rate. In addition, there is U shape relationship between trade openness and the female/male child labor rate.

However, all interaction terms are not significant, which implies GDP per capita or trade openness does not have a different impact on female and male child labor rates.

Table8 Gender Effect U shape OLS

| | (1) childlabor | (2) childlabor | (3) childlabor | (4) childlabor | (5) childlabor |
|--------------------------------|-----------------------|-----------------------|----------------------|----------------------|---------------------|
| tradeopenness | -0.175*** (-2.66) | -0.191*** (-2.71) | -0.0931* (-1.95) | -0.0931* (-1.95) | -0.0865* (-1.79) |
| tradeopenness ² | 0.000567*** (3.12) | 0.000545*** (2.85) | 0.000282* (1.78) | 0.000282* (1.78) | 0.000265* (1.67) |
| Sex*tradeopenness | 0.00421 (0.05) | 0.00514 (0.05) | -0.00184 (-0.03) | -0.00184 (-0.03) | -0.00597 (-0.08) |
| Sex*tradeopenness ² | -0.0000277 (-0.11) | -0.0000155 (-0.06) | 0.00000296 (0.01) | 0.00000296 (0.01) | 0.0000145 (0.06) |
| sex | 3.385 (0.37) | 2.837 (0.30) | 2.623 (0.47) | 2.623 (0.47) | 2.965 (0.52) |
| fdi | | -0.265 (-0.35) | -0.0661 (-0.16) | -0.0661 (-0.16) | -0.110 (-0.18) |
| fdi ² | | 0.0408 (1.14) | 0.0117 (0.55) | 0.0117 (0.55) | 0.0103 (0.33) |
| Sex*fdi | | 0.216 (0.21) | 0.214 (0.40) | 0.214 (0.40) | 0.183 (0.22) |
| Sex*fdi ² | | -0.0173 (-0.36) | -0.0160 (-0.59) | -0.0160 (-0.59) | -0.0149 (-0.36) |

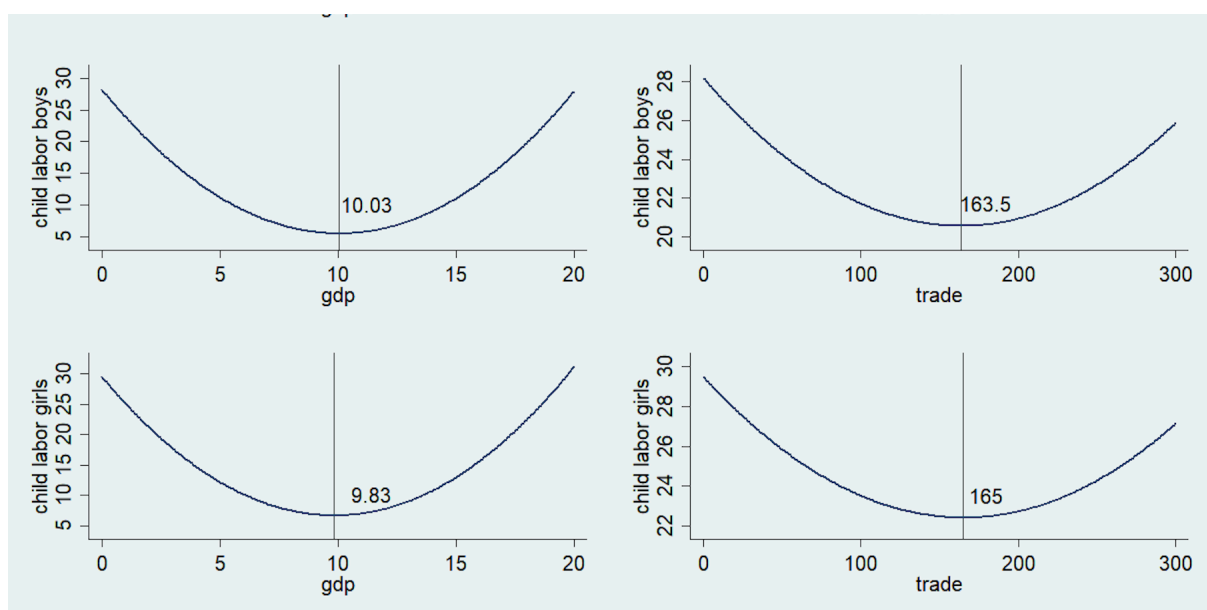
| | | | | | |
|-------------------------------|----------|----------|------------|------------|------------|
| gdppercapita | | | -0.0466*** | -0.0466*** | -0.0478*** |
| | | | (-6.66) | (-6.66) | (-6.30) |
| gdppercapita ² | | | 0.239*** | 0.239*** | 0.244*** |
| | | | (4.51) | (4.51) | (4.61) |
| Sex*gdppercapita | | | 0.00404 | 0.00404 | 0.00402 |
| | | | (0.40) | (0.40) | (0.39) |
| Sex*gdppercapita ² | | | -0.0277 | -0.0277 | -0.0278 |
| | | | (-0.36) | (-0.36) | (-0.37) |
| eduexp | | | | | -0.501 |
| | | | | | (-1.27) |
| urbanization | | | | | 0.0133 |
| | | | | | (0.43) |
| _cons | 19.52*** | 21.11*** | 26.21*** | 26.21*** | 28.07*** |
| | (4.25) | (4.40) | (6.98) | (6.98) | (5.61) |
| Observations | 198 | 198 | 198 | 198 | 198 |
| R-squared | 0.0945 | 0.0918 | 0.455 | 0.455 | 0.431 |

Notes: Robust T-test statistics appear in parentheses below the coefficient. *** indicates $p < .01$; ** indicates $p < .05$; * indicates $p < .10$. Each column controls the year fixed effect, but the output is omitted for brevity.

The coefficients of FDI are not significant in any case. Furthermore, the process of globalization does not affect female or male child labor rate differently.

Based on Table 8, Graph 4 shows the U shape relationship between male/female child labor and trade openness, and the U shape relationship between male/female child labor and GDP per capita. The calculation way for each inflection point mentioned before below Graph3.

Graph 4 Graphical results



Thus, the first two hypotheses (there is a U shape relationship between the GDP per capita and child labor and between trade openness and child labor) are accepted here, whereas the last two hypotheses (there is a U shape relationship between FDI penetration and child labor; globalization has more impact on male child labor rates than the female one) are rejected here.

5. Robustness

To check the robustness of previous results, this section uses one-year lag variables for each independent variable (the GDP per capita, trade openness, and FDI) as instrument variables to re-regress equations (1), (2), (3) and (4). If the result of 2SLS are as consistent as OLS regressions, then the results are robust.

5.1 Total Effect

Table 9 shows 2SLS regression results derived from equation (1), which assumes a linear relationship between the dependent and independent variables. The coefficient for GDP per capita is significant at 1%. In Table 9, we see that trade openness is significant, which is inconsistent with previous OLS regression. Thus, we cannot say that the coefficient for trade openness is robust. As a result, there is no indication that the linearity exists between globalization and the total child labor rate, and the GDP per capita and the total child labor rate.

Table9 Total Effect Linear Shape 2SLS

| | (1) childlabor | (2) childlabor | (3) childlabor | (4) childlabor | (5) childlabor |
|----------------|--------------------|--------------------|----------------------|----------------------|----------------------|
| tradeopenness | -0.0288 (-0.88) | -0.0348 (-1.12) | -0.0323 (-1.44) | -0.0361* (-1.69) | -0.0376* (-1.81) |
| fdi | | 0.470 (1.14) | 0.443 (1.46) | 0.436 (1.44) | 0.404 (1.39) |
| gdppercapita | | | -1.694*** (-9.46) | -1.688*** (-9.54) | -1.430*** (-7.26) |
| eduexp | | | | -0.676 (-1.51) | -0.759* (-1.65) |
| urbanization | | | | | -0.0830** (-2.17) |
| _cons | 18.25*** (3.77) | 16.53*** (3.53) | 22.80*** (5.12) | 26.57*** (4.78) | 30.58*** (5.55) |
| Observations | 110 | 110 | 110 | 110 | 110 |
| R-squared | 0.0325 | 0.0570 | 0.377 | 0.382 | 0.396 |
| Cragg-Donald F | 274.2 | 42.34 | 27.96 | 32.41 | 29.72 |

Notes: Robust T-test statistics appear in parentheses below the coefficient. *** indicates $p < .01$; ** indicates $p < .05$; * indicates $p < .10$. Each column controls the year fixed effect, but the output is omitted for brevity. Cragg-Donald F is Cragg-Donald (1993) F statistic, which is used for weak identification.

Table 10 displays results derived from equation (2) which tests a non-linear relationship between globalization, the GDP per capita, and the total child labor rate using 2SLS regression. GDP per capita is negatively correlated with the child labor rate (-3.89), but its quadratic term (0.18) is positively correlated with the total child labor rate, which implies a U shape relationship. Thus, this result is consistent with the previous OLS regression.

In addition, the same relationship can also be seen between trade openness and the total child labor rate (trade openness is negatively associated with the child labor rate, whereas its quadratic term is positively correlated with the dependent variable).

Table10 Total Effect U-Shape 2SLS

| | (1) | (2) | (3) | (4) | (5) |
|----------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | chlldlabor | chlldlabor | chlldlabor | chlldlabor | chlldlabor |
| tradeopenness | -0.239*** (-3.92) | -0.214*** (-4.05) | -0.134*** (-3.18) | -0.131*** (-3.27) | -0.132*** (-3.25) |
| tradeopenness ² | 0.000754*** (4.48) | 0.000601*** (4.05) | 0.000373*** (2.84) | 0.000344*** (2.73) | 0.000345*** (2.74) |
| fdi | | -0.0928 (-0.10) | -0.0959 (-0.18) | -0.182 (-0.33) | -0.202 (-0.37) |
| fdi ² | | 0.0409 (0.74) | 0.0327 (1.00) | 0.0381 (1.16) | 0.0395 (1.17) |
| gdppercapita | | | -3.927*** (-6.51) | -4.003*** (-6.48) | -3.891*** (-5.27) |
| gdppercapita ² | | | 0.183*** (4.17) | 0.190*** (4.27) | 0.184*** (3.75) |
| eduexp | | | | -0.775 (-1.55) | -0.786 (-1.57) |
| urbanization | | | | | -0.0115 (-0.30) |
| _cons | 23.12*** (5.58) | 22.58*** (4.84) | 28.12*** (7.65) | 32.52*** (6.24) | 33.08*** (6.09) |
| Observations | 110 | 110 | 110 | 110 | 110 |
| R-squared | 0.120 | 0.0993 | 0.474 | 0.483 | 0.476 |
| Cragg-Donald F | 36.56 | 8.180 | 5.644 | 5.617 | 4.845 |

Notes: Robust T-test statistics appear in parentheses below the coefficient. *** indicates $p < .01$; ** indicates $p < .05$; * indicates $p < .10$. Each column controls the year fixed effect, but the output is omitted for brevity. Cragg-Donald F is Cragg-Donald (1993) F statistic, which is used for weak identification.

These findings reinforce Dagdemir & Acaroglus' (2010) theories in that, at the first stage, the income effect dominates. Parents tend to send their children to school if they have a higher level of household income. For the second stage, this model shows that in the substitution effect domain, parents are more inclined to send their children to work rather than to school to maintain their previous income levels. However, these results also reject one of the findings from Dagdemir & Acaroglu (2010) who believe that there is a U shape relationship between FDI penetration and the total child labor rate. Consequently, FDI has no influence on child labor activities here.

5.2 Gender Effect

This section shows the gender effect using 2SLS regressions.

Based on equation (3), Table 11 shows the regression results for a linear relationship between globalization and the female child labor rate, and a linear relationship between the

GDP per capita and the female child labor rate. To realize possible endogeneity problems, a one-year lag of independent variables are used as instrument variables.

Column 5 shows that only the coefficient of the GDP per capita is significant. However, all other coefficients for trade openness and FDI are not significant in Table 11. These findings reject the linear shape between the dependent and independent variables. Hence, my thesis suggests that the assumption of a linear relationship should be rejected.

Table11 Gender Effect Linear Shape 2SLS

| | (1) childlabor | (2) childlabor | (3) childlabor | (4) childlabor | (5) childlabor |
|-------------------|---------------------|--------------------|-----------------------|-----------------------|-----------------------|
| tradeopenness | -0.0115 (-0.38) | -0.0267 (-0.72) | -0.0214 (-0.83) | -0.0212 (-0.81) | -0.0191 (-0.76) |
| Sex*tradeopenness | -0.00411 (-0.10) | -0.0125 (-0.24) | -0.0128 (-0.36) | -0.0131 (-0.36) | -0.0131 (-0.37) |
| sex | 2.440 (0.36) | 2.382 (0.35) | 2.034 (0.32) | 2.186 (0.32) | 2.186 (0.35) |
| fdi | | 0.344 (0.59) | 0.284 (0.64) | 0.256 (0.52) | 0.181 (0.37) |
| Sex*fdi | | 0.191 (0.24) | 0.194 (0.33) | 0.176 (0.26) | 0.176 (0.27) |
| gdppercapita | | | -0.0180*** (-9.19) | -0.0175*** (-9.04) | -0.0150*** (-8.16) |
| Sex*gdppercapita | | | 0.000959 (0.35) | 0.000889 (0.33) | 0.000889 (0.37) |
| eduexp | | | | -0.678* (-1.74) | -0.666* (-1.74) |
| urbanization | | | | | -0.0862*** (-3.15) |
| _cons | 15.23*** (3.21) | 15.13*** (3.19) | 21.66*** (4.94) | 24.71*** (4.55) | 28.27*** (5.55) |
| Observations | 198 | 198 | 198 | 198 | 198 |
| R-squared | 0.0410 | 0.0338 | 0.349 | 0.330 | 0.349 |
| Cragg-Donald F | 250.7 | 31.30 | 19.14 | 20.89 | 20.75 |

Notes: Robust T-test statistics appear in parentheses below the coefficient. *** indicates $p < .01$; ** indicates $p < .05$; * indicates $p < .10$. Each column controls the year fixed effect, but the output is omitted for brevity. Cragg-Donald F is Cragg-Donald (1993) F statistic, which is used for weak identification.

Based on equation (4), Table 12 shows the regression results for a non-linear relationship by using 2SLS regressions. Here, one-year lags of independent variables are used as instrumental variables.

This model shows that GDP per capita is negatively significant (-0.0437), and the GDP squared is positively correlated with the female child labor rates. Thus, a U shape can be drawn here. Moreover, the U shape relationship between GDP per capita and the male child labor rate can be observed. The same relationship can be seen between trade openness and the female/male child labor rate as well. Furthermore, the effect of trade openness and GDP

per capita on child labor rate does not differ between boys and girls. These results are consistent with the previous findings.

Table12 Gender Effect U shape 2SLS

| | (1) | (2) | (3) | (4) | (5) |
|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | childlabor | childlabor | childlabor | childlabor | childlabor |
| tradeopenness | -0.220*** (-3.43) | -0.252*** (-3.74) | -0.139*** (-2.71) | -0.130** (-2.52) | -0.130** (-2.52) |
| tradeopenness ² | 0.000704*** (4.10) | 0.000676*** (3.49) | 0.000423*** (2.90) | 0.000401*** (2.70) | 0.000401*** (2.70) |
| Sex*tradeopenness | 0.00346 (0.04) | -0.00627 (-0.06) | -0.0179 (-0.23) | -0.0223 (-0.29) | -0.0223 (-0.29) |
| Sex*tradeopenness ² | -0.0000256 (-0.10) | -0.0000224 (-0.08) | 0.00000476 (0.02) | 0.0000134 (0.06) | 0.0000134 (0.06) |
| sex | 2.229 (0.36) | 2.253 (0.27) | 1.892 (0.31) | 2.294 (0.31) | 2.294 (0.31) |
| fdi | | -0.692 (-0.48) | -0.0747 (-0.07) | -0.0381 (-0.02) | -0.0376 (-0.02) |
| fdi ² | | 0.0889 (0.69) | 0.0188 (0.18) | 0.0115 (0.07) | 0.0115 (0.07) |
| Sex*fdi | | 0.176 (0.09) | 0.179 (0.13) | 0.0522 (0.02) | 0.0522 (0.02) |
| Sex*fdi ² | | 0.00127 (0.01) | 0.00374 (0.03) | 0.0119 (0.05) | 0.0119 (0.05) |
| gdppercapita | | | -0.0430*** (-5.76) | -0.0436*** (-3.95) | -0.0437*** (-3.39) |
| gdppercapita ² | | | 0.210*** (3.81) | 0.214*** (3.21) | 0.215*** (2.82) |
| Sex*gdppercapita | | | 0.00620 (0.57) | 0.00701 (0.45) | 0.00701 (0.45) |
| Sex*gdppercapita ² | | | -0.0420 (-0.51) | -0.0466 (-0.48) | -0.0466 (-0.48) |
| eduexp | | | | -0.432 (-1.10) | -0.431 (-1.11) |
| urbanization | | | | | 0.000511 (0.01) |
| _cons | 21.03*** (4.91) | 24.55*** (4.05) | 27.23*** (6.28) | 28.98*** (5.15) | 28.96*** (4.77) |
| Observations | 198 | 198 | 198 | 198 | 198 |
| R-squared | 0.0902 | 0.0404 | 0.440 | 0.420 | 0.416 |
| Cragg-Donald F | 41.84 | 5.215 | 1.568 | 1.515 | 1.505 |

Notes: Robust T-test statistics appear in parentheses below the coefficient. *** indicates $p < .01$; ** indicates $p < .05$; * indicates $p < .10$. Each column controls the year fixed effect, but the output is omitted for brevity. Cragg-Donald F is Cragg-Donald (1993) F statistic, which is used for weak identification.

Thus, the findings in this section reinforce that the influence of the process of globalization and GDP per capita on child labor rate do not differ between boys and girls.

6. Conclusion

This thesis discusses the relationship between globalization and the child labor rate and analyses the gender difference in the child labor problem under the process of globalization.

Based on empirical studies, this thesis rejects previous theoretical frameworks that believe that globalization has either a positive or negative influence on the child labor problem. In addition, findings of this contrast with Tesfay's (2003) and Castillo & Salem's (2016) papers. This might be because both Tesfay and Castillo & Salem use panel data methodology, whereas this thesis, due to data limitation, uses cross-national data, which could affect the empirical results.

Additionally, this thesis shows that there is a U shape relationship between GDP per capita and child labor activities. This might be due to the fact that both income and substitution effects play important roles during the process of globalization, which affect child labor rates differently in various developing countries.

To be more specific, at the first stage, the result of the income effect is higher than the substitution effect ($IE > SE$). Closer to the inflection point, the effectiveness of the income effect increases and the effectiveness of the substitution effect decreases and the child labor rate declines and the income effect domains to the inflection point. At the second stage, the substitution effect starts to outweigh the income effect ($SE > IE$). When moving away from the inflection point, the effectiveness of the substitution effect increases, the effectiveness of the income effect decreases and the child labor rate rises eventually. All in all, the U curve can capture the total net result of the income and substitution effects.

Moreover, it is important to consider GDP per capita as a crucial independent variable, which influences the child labor rate. This finding is consistent with Dagdemir & Acaroglu (2010) conclusion that there is U shape relationship between economic growth and the child labor rate. The inflection point of the U shape curve is around \$10,110 and if a country's GDP per capita is below \$10,110, their child labor rate decreases with economic growth. If a developing country's GDP per capita is above \$10,110, the child labor rate increases with the economic growth.

However, unlike Dagdemir & Acargolu (2010), this thesis finds that FDI penetration does not influence the child labor rate. Davies & Voy (2009) state that there might be multicollinearity between the GDP per capita and FDI, which could explain why FDI has no influence on the child labor rate. However, I did not find multicollinearity problem between those two variables. Thus, Davies & Voy's explanation cannot apply in this case.

Alternatively, it might be that FDI simply has no influence on child labor. However, this explanation needs further exploration. Furthermore, this thesis finds that the influence of the process of globalization and GDP per capita on child labor do not differ between boys and girls.

This study has a few limitations. Firstly, the numbers of observation are small, which could influence the results. Moreover, because of data limitations, this thesis uses cross-national data instead of panel data, which may influence empirical results and the findings could be hard to generalize. In addition, because of the lack of sufficient data, this thesis does not capture some other important factors (e.g. adult education level), which could affect the child labor problem.

Nevertheless, the child labor problem is still a serious one, which needs to be eliminated and prevented. Despite the traditional ways of reducing the child labor problem that include making laws and regulations, reducing the demand and supply of child labor, and monitoring child labor activities (International Organization Labour, 2016), there are still some other important ways that should be considered. For developing countries, to eliminate and prevent child labor activities, they cannot apply a “one size fits all” approach. When assessing globalization activities, it is important to consider their economic situations during the process of globalization.

For instance, if a poorly developed country engages in globalization economic activities, its child labor problem can be reduced automatically by opening more trade with other countries. This is because with more trade openness, developing countries shift from unskilled-labor to skilled-labor intensive. Consequently, when the rate of return on child labor decreases, parents have less incentive to send their children to work. Moreover, the government of such a country needs to focus mostly on improving its economic growth, which consequently tends to suppress child labor problems.

On the contrary, if a developing country is already in the latter stage of globalization, increasing trade openness and the GDP growth exacerbates the child labor problem. For those countries, their governments not only need to improve their economic growth but also need to put extra effort to find other ways to solve child labor problem. For instance, the government can increase its spending on education to reduce the child labor problem.

In fact, based on the ILO (International Organization Labour, 2016), one of the most effective ways to reduce child labor is to facilitate free-compulsory education up to a certain age. By means of increasing the rate of return in education and reducing the opportunity costs

of schooling, parents have less incentive to force children to participate in labor activities and human capital for that country can be raised accordingly. Nowadays, programs such as the “Education for All” (EFA) are implemented in many developing countries, especially in Southeast Asia, as an effective way to reduce exploitive child labor activities (International Organization Labour, 2016). However, there is still a great need to improve and scale up such implementation in many African countries as well (International Organization Labour, 2017).

All in all, it is crucial to realize that there is still a long way to go to eliminate and prevent further child labor problems. And still, this issue needs great attention and efforts from governments, society, organizations, and people.

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Appendixes

Appendix I List of Countries

| | Countries |
|--|---|
| Countries for the total child labor rate | Afghanistan Albania Algeria Angola Argentina Armenia Azerbaijan Bahrain Bangladesh Barbados Belarus Belize Benin Bhutan Bolivia Bosnia and Herzegovina Botswana Brazil Burkina Faso Burundi Cabo Verde Cambodia Cameroon Central African Republic Chad Chile Colombia Comoros Congo, Rep. Costa Rica Cote d'Ivoire Congo, Dem. Rep. Djibouti Dominican Republic Ecuador Egypt, Arab Rep. El Salvador Equatorial Guinea Ethiopia Gabon Gambia, The Georgia Ghana Guatemala Guinea Guinea-Bissau Guyana Haiti Honduras India Indonesia Iran, Islamic Rep. Iraq Jamaica Jordan Kazakhstan Kenya Kyrgyz Republic Lao PDR Lebanon Lesotho Liberia Madagascar Malawi Mali Mauritania Mexico Mongolia Montenegro Morocco Mozambique Nepal Nicaragua Niger Nigeria Panama Paraguay Peru Philippines Portugal Moldova Romania Rwanda St. Lucia Sao Tome and Principe Senegal Serbia Sierra Leone Somalia Sri Lanka State of Palestine Sudan Suriname Swaziland Syrian Arab Republic Tajikistan Thailand Macedonia, FYR Timor-Leste Togo Trinidad and Tobago Tunisia Turkey Uganda Ukraine Tanzania Uruguay Vanuatu Venezuela, RB Vietnam Yemen, Rep. |
| Missing countries | Algeria Bosnia and Herzegovina Haiti Iraq Moldova Nicaragua Somalia St. Lucia Suriname |
| Countries for the child labor rate by gender | Afghanistan Albania Algeria Angola Argentina Armenia Azerbaijan Bahrain Bangladesh Barbados Belarus Belize Benin Bhutan Bolivia Bosnia and Herzegovina Botswana Brazil Burkina Faso Burundi Cambodia Central African Republic Chad Colombia Comoros Congo, Dem. Rep. Costa Rica Cote d'Ivoire Djibouti Ecuador Egypt, Arab Rep. Equatorial Guinea Ethiopia Gabon Gambia, The Georgia Ghana Guatemala Guinea Guinea-Bissau Haiti Honduras India Indonesia Iran, Islamic Rep. Iraq Jamaica Jordan Kazakhstan Kenya Kyrgyz Republic Lao PDR Lebanon Lesotho Liberia Macedonia, FYR Madagascar Malawi Mali Mauritania Moldova |

| | |
|-------------------|---|
| | Montenegro Morocco Mozambique Nepal Nicaragua Niger Nigeria Panama Paraguay Peru Philippines Portugal Romania Rwanda Senegal Serbia Sierra Leone Somalia Sri Lanka St. Lucia Suriname Swaziland Syrian Arab Republic Tajikistan Tanzania Thailand Timor-Leste Togo Trinidad and Tobago Tunisia Turkey Uganda Ukraine Uruguay Vanuatu Venezuela, RB Vietnam Yemen, Rep. |
| Missing countries | Algeria Bosnia and Herzegovina Haiti Iraq Montenegro Nigeria State of Palestine |

Appendix II Definitions of variables

| Variables | Definitions/sources |
|---------------------------------------|---|
| <p>Total child labor rate (%)</p> | <p>Percentage of children 5–14 years old involved in child labour at the moment of the survey. A child is considered to be involved in child labour under the following conditions: (a) children 5–11 years old who, during the reference week, did at least one hour of economic activity or at least 28 hours of household chores, or (b) children 12–14 years old who, during the reference week, did at least 14 hours of economic activity or at least 28 hours of household chores.</p> <p>Source: UNICEF global databases (2016) based on DHS, MICS and other nationally representative surveys.</p> <p>Retrieved from: https://data.unicef.org/topic/child-protection/child-labour/</p> |
| <p>Child labor rate by gender (%)</p> | <p>Percentage of children 5–14 years old involved in child labour at the moment of the survey. A child is considered to be involved in child labour under the following conditions: (a) children 5–11 years old who, during the reference week, did at least one hour of economic activity or at least 28 hours of household chores, or (b) children 12–14 years old who, during the reference week, did at least 14 hours of economic activity or at least 28 hours of household chores.</p> <p>Source: UNICEF global databases (2016) based on DHS, MICS and other nationally representative surveys.</p> <p>Retrieved from: https://data.unicef.org/topic/child-protection/child-labour/</p> |

| | |
|---|--|
| <p>GDP per capita (current US\$)</p> | <p>GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all.</p> <p>Source: World Development Indicators (2017)</p> <p>Retrieved from: http://data.worldbank.org/indicator/NY.GDP.PCAP.CD</p> |
| <p>Trade (% of GDP)</p> | <p>Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.</p> <p>Source: World Bank national accounts data, and OECD National Accounts data files.</p> <p>Retrieved from: http://data.worldbank.org/indicator/NE.TRD.GNFS.ZS</p> |
| <p>Foreign direct investment, net inflows (BoP, current US\$)</p> | <p>capital, reinvestment of earnings, and other capital. Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy. Ownership of 10 percent or more of the ordinary shares of voting stock is the criterion for determining the existence of a direct investment relationship. Data are in current U.S. dollars.</p> <p>Source: International Monetary Fund, Balance of Payments database, supplemented by data from the United Nations Conference</p> <p>Retrieved from: http://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD</p> |
| <p>Urban population (% of total)</p> | <p>Urban population refers to people living in urban areas as defined by national statistical offices. The data are collected and smoothed by United Nations Population Division.</p> <p>Retrieved from:</p> |

| | |
|---|--|
| | http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS |
| Government expenditure on education, total (% of GDP) | General government expenditure on education (current, capital, and transfers) is expressed as a percentage of GDP. It includes expenditure funded by transfers from international sources to government. General government usually refers to local, regional and central governments. |