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Child Labor and its Possible Solutions

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I . Introduction

If you travel to South-east Asia, you may realize children are not only children but also workers. They ask you to purchase the products with the practiced hands and sometimes in very persistent ways. They are proper laborers and spend most of their time in working places. Perhaps to you, they may seem to be burdened with a significant responsibility in the economy and that is actually true. ILO's most recent statistics estimates that 215 million children across the world are trapped in child labor. That is one eighth in Asia, one tenth in South America and one fourth in Africa, of the children in the region respectively. Meanwhile, the public concern for child labor has been stably growing and, moreover, government, people and firms behave as they attempt to solve the issue. However, there is still a controversial discussion whether those activities certainly contribute children to get out of their work.

This paper is dedicated to determine and analyze the most effective policies to eradicate child labor. Although there are a number of people and institutions that have managed to mend this problem in varieties of ways, it is still on the way to detect the prescription that possibly makes the condition better off. In this context, the paper firstly introduces the model provided by Basu and Van and its implications for government policies and fertility. Subsequently, we build our original model for the purpose of discovering the impact of education on child labor. By analyzing the model, we detect how education policies effect on the economy with child labor. The model suggests policies with only partial effects cause the situation worse off in a unique mechanism of which the people's decision is determined by the majority's behavior.

Present condition of child labor is shown in section 2. Then section 3 introduces an economic model of child labor containing 2 short parts discussing the general issues, the relation between fertility rate and child labor, and the effect of ban on child labor. We discuss the model of economics with unskilled labor in section 4 and analyze the possible solutions on child labor at second part of the section. Finally a conclusion will sum up lessons about child labor in section 5.

II Present condition of child labor

1. Definition of child labor

Briefly, let me introduce the definition and the present condition of child labor. According to ILO, child labor is the labor work which violates children's physical and

mental growth with an invasion of their dignity and potentiality. This labor especially invades children's opportunity for education and children are deprived by abuse immorally. Either way, where children leave their schools to work full time or where children work part-time, we call child labor in any way where children are forced to provide long-hour works in early ages. Moreover, child labor has slavish elements where children are separated from their families being surrounded by severe environments and deceases. In some cases, they live on street in urban areas by themselves. Whether a particular labor can be called child labor depends on ages, qualities, working hours, environments, and objective observations that differ between countries. Moreover, definition of child labor varies between sectors.

Although there is an international standard of restricting child labor defined in ILO's national committee (Conference 138), for instance, which has regulated the earliest labor age, the laws are not binding. Because each nation has defined child labor independently, the earliest age for labor, labor types and wages are all different to restrict. Bachman (2000) states that those biased labor laws obscure matters.

2. The statistics of child labor

The ILO has estimated that 15.5 million children are engaged in paid or unpaid domestic work in the home of a third party or employer. These children can be particularly vulnerable to exploitation. Their work is often hidden from the public eye, they may be isolated, and working far away from their family home. Stories of the abuse of children in domestic work are all too common. In its 2010 Global Report on child labor, the ILO has said that the global number of child laborers had declined from 222 million to 215 million, or 3 per cent, over the period 2004 to 2008, representing a "slowing down of the global pace of reduction." The report also expressed concern that the global economic crisis could "further brake" progress toward the goal of eliminating the worst forms of child labor by 2016. Progress was greatest among children aged 5-14, where the number of child laborers fell by 10 per cent. Child labor among girls has decreased by 15 per cent. However, it has increased among boys (by 8 million or 7 per cent). Furthermore, child labor among young people aged 15 to 17 increased by 20 per cent, from 52 million to 62 million.

3. Main causes of child labor

In brief, to start out, there are several reasons thought to be causing child labor

enumerated as follows. They are lack of opportunity to education, inappropriate labor laws, poverty, disaster, armed insurgents, HIV, rural-urban shift of population, labor practices, tradition and discrimination suggested by ILO. Although child labor is a complicated and deformed shape of society having relations to number of inevitable problems, the main root and outcome of child labor is poverty. Because child labor is the only resource in a poor family, they are forced to send children to labor instead of to education. However, in addition, education does not match up with employment opportunities in those regions and that leads families to have no incentive in investing in child education. More or less, those economies are relatively seen underdeveloped. Also Ferguson (2006) has proved that there is a vicious cycle that children work because of poverty and the labor work makes them even poorer.

III The economic model of child labor

1. A basic economics model of child labor

To begin with, this section briefly introduces the basic model of the economics with child labor (Basu and Van 1988). The model has been constructed under the assumptions that adults and children are substitute and a family sends children to work if their income without child labor falls below the particular level. Also adults always work in this economy. Demand for child and adult is determined in labor market keeping demand curve downward to the right. However, supply curve in this model is very characteristic. Because children are sent to work if and only if a family's income drops below the particular point, there are two vertical lines showing both supply curves for adult and child labor. Therefore this model represents that two equilibria possibly exist in this economy. In other words, if the demand curve intersects two supply curves, there are two equilibria, in one of which only adults work and in the other both adults and children work. Then if the productivity rises up causing demand curve to shift upward, there will be an equilibrium where only adults work. On the other hand, if productivity remains in low level having a second equilibrium, this economy will force children to work.

Secondly, this model indicates an interesting relation between the fertility rate and child labor. If a family has more children, they take more benefit by making children work. If fertility rate rises, in this model, supply curve, as mentioned above, shifts rightward. Hence two equilibria will exist more likely than with the economy with lower

fertility rate. In actual, it seems that there is a strong incentive to have more children to send to work when other families have more children in developing countries. The decision does not depend on one's efficiency but does on how the majority of people behave. Moreover, although having more children is not very effective for a labor family, equilibria determined here is Parato efficient as a whole economy. As easily guessed, this controversial issue has strong relations not only with child labor but also one's poverty, health and other social problems.

2. Can ban on child labor make a change?

According to the policy analysis conducted by Basu and Van model, banning child labor is not always efficient. Since it is hardly possible to achieve complete ban on child labor due to the unbalanced information and the limited monitoring, this policy could diversely cause the issue to be worse off. The reason why this happens is that if the policy can ban on only some parts of firms, in this economy, there will still be two equilibria remained with one in which only adults work at banned firms and the other in which both adults and children work at non-banned firms. Moreover, this makes child's wage even lower than the wage at post-ban. Although the policy seems justifiable as most of countries agree to impose, partial ban on child labor must be reconsidered. Meanwhile, if government accomplishes the exhaustive ban, there will be one equilibrium where only adults work. Because it might be inevitable to have two equilibria in the process, the policy's assignment is how to shift to the thorough ban. In any way, governments must deliberate the process before they conduct the policy.

IV Education and child labor

For the aim of understanding how skilled and unskilled labor exist in developing countries, in the following, we modify the model provided by Basu and Van. It is quite detailed following the process very much.

1. The economic model of skilled and unskilled labor

Our model is based on very weak assumptions as well as Basu and Van model. We replace the adult labor and the child labor in Basu and Van model with the skilled labor and the unskilled labor respectively. There are two significant assumptions in the

model:

The Luxury Axiom: A person chooses to start working in young ages, only if the income falls a certain level when they do not work.

The Substitution Axiom: Skilled labor and unskilled labor employed by firms are substitutes. Unskilled labor can be alternated by skilled labor.

To begin with, the Luxury axiom has to be implemented. This model employs the assumption that a person lives two periods in his life. And there are two types of labor: unskilled labor and skilled labor. Unskilled labor is uneducated as they start working in young ages. Since they are illiterate, their skills do not improve. This may seem to be an extreme assumption, though, in some point it is true that uneducated laborers continue to remain in unproductive manual labor work. As another type, skilled labor lives period 1 as a child who is in education. When they complete the period of education, they begin working as skilled labor. Assume that period 1 is often childhood, young or adolescent. On the other hand, adults are seen in period 2.

	period1	period2
Unskilled	Labor	Labor
Skilled	Education	Labor

Unskilled labor and skilled labor are denote respectively by U and S. Population is N. The ratio of unskilled labor in each generation is identified as q and that of skilled labor is (1-q). In production, each unit of skilled labor is equivalent to δ units of unskilled labor. Because the productivity of skilled labor is higher than that of unskilled labor, δ must meet $1 < \delta$. The supply of each labor, $S^{SL}(q)$ and $S^{UL}(q)$, is given respectively by;

$$(28) S^{SL}(q) = Nq + Nq$$

$$(29) S^{UL}(q) = \delta(1 - q)N.$$

As a total supply,

$$(30) S^L(q) = S^{SL}(q) + S^{UL}(q)$$

$$= Nq + Nq + \delta(1 - q)N$$

$$= 2Nq + \delta(1 - q)N.$$

Since unskilled labors work both period 1 and period 2, skilled labors work only in period 2 with high productivity and the total supply for labor is shown above.

We shall now impose an assumption which is in keeping with the Luxury axiom.

$2W^u > W^s \rightarrow$ course U (unskilled labor)

$2W^u < W^s \rightarrow$ course S (skilled labor)

$2W^u = W^s \rightarrow$ indifferent between U and S

$$(31) S^L(1) = 2N \quad (2W^u > W^s)$$

If $q = 1$ is satisfied, total supply of labor is $2N$. Having no skilled labor means that no one prefers to be skilled labor in this economy. All the population becomes unskilled labor.

$$(32) S^L(0) = \delta N \quad (2W^u < W^s)$$

Here is an important point. Because unskilled labor has been working over two periods, the supply of unskilled labor should be larger than the supply of skilled labor in one period. Thus, we assume $S^L(1) > S^L(0)$. And $2 > \delta$ is given.

To the next step, we define level r is an exogenous figure that people measure it with their consumptions to determine which courses to take. Also, we assume people equally consume c in each period. The fact indicates Period1 and period2 meet same amount of consumptions. If one is a future skilled labor with no income in period1, he mortgages initial part of his income in the period 2 so that he could debt the money to consume in period1.

There is another variable to be implemented. We call e the child's work effort which can only take on values of 0 or 1. And adults in period 2 always work, no matter what wages are. However, if person works in period1, he will become an unskilled labor over two periods. Thus, when $e = 0$ course S has been chosen, on the other hand, when $e = 1$, person is supposed to be in course U.

As it has been already mentioned above, if each consumptions falls below the certain level, r , a person will choose to work as unskilled labor. For all $\sigma > 0$.

$$(33) (c, 0) > (c + \sigma, 1) \text{ if } c \geq r$$

$$\text{and } (c + \sigma, 1) > (c, 0) \text{ if } c < r$$

The person is meant to maximize its preference by choosing c and e under the subject shown below:

$$(34) 2c \leq 2ew_U + (1 - e)w_S$$

Let w_u and w_s donate the market wages for, respectively, skilled and unskilled labor. Each person deals with these wages as provided. We solve this maximization problem and the outcomes are shown by:

$$(35) c(w_s) = \begin{cases} \frac{w_s}{2} & \text{if } w_s \geq 2r \\ w_U & \text{if } w_s < 2r \end{cases}$$

$$(36) e(w_s) = \begin{cases} 0 & \text{if } w_s \geq 2r \\ 1 & \text{if } w_s < 2r \end{cases}$$

It suggests that labor supply of skilled and unskilled labor, donated by S_S and S_U , are determined by:

$$(37) S_S(w_s) = \begin{cases} N & \text{if } w_s \geq 2r \\ 0 & \text{if } w_s < 2r \end{cases}$$

$$(38) S_U(w_s) = \begin{cases} 0 & \text{if } w_s > 2r \\ 2N & \text{if } w_s < 2r \end{cases}$$

(38) indicates that if all labor work as unskilled labor, in each periods, both labor supply from child and adult are provided in this economy, as a total $2N$.

We are now to trace the market demand for skilled and unskilled labor. During this process, the substitution axiom should be introduced under the subjection to an unskilled-labor-scaring, given by δ , where $\delta > 1$. So assume there are n identical firms existing in this economy and each of them produces a single consumption good. Each firm i 's production function is given by:

$$(39) x_i = f(\delta S_i + U_i), \quad f' > 0, f'' < 0,$$

Where x_i is firm i 's output of the consumption good, and S_i and U_i are respectively the numbers of skilled and unskilled laborers employed by firm i . The firm is a wage taker. Hence, firm i 's problem is as follows:

$$(40) \max_{\{S_i, U_i\}} f(\delta S_i + U_i) - S_i w_s - U_i w_u.$$

As the solution of this maximization problem (40), the firm will employ only skilled labor if $w_s/\delta < w_u$. And then it will employ only unskilled labor if $w_s/\delta > w_u$. If $w_s/\delta = w_u$, it has no differences between skilled and unskilled labor. Now we define w_s/δ the "effective skilled labor wage," which is the market unskilled labor wage per skilled labor-equivalent. Additionally, each firm will always follows that

$$(41) f'(\delta S_i + U_i) = \min \left\{ \frac{w_s}{\delta}, w_u \right\}.$$

The aggregate demand for skilled and unskilled labor, D^S and D^U , is derived by multiplying each firm's demand by n . Hence, $D^S = D^S(W^S, W^U)$ and $D^U = D^U(W^S, W^U)$ are given by;

$$(42) \text{ If } \frac{w^S}{\delta} > W^U \quad \text{then } D^S = 0 \quad \text{and } f' \left(\frac{D^U}{n} \right) = W^U.$$

$$\text{If } \frac{w^S}{\delta} < W^U \quad \text{then } D^U = 0 \quad \text{and } f' \left(\frac{\delta D^S}{n} \right) = \frac{w^S}{\delta}.$$

$$\text{If } \frac{w^S}{\delta} = W^U \quad \text{then } f' \left(\frac{\delta D^S + D^U}{n} \right) = W^U = \frac{w^S}{\delta}.$$

A *labor market equilibrium* in this simple model is a pair of wages, (W_s^*, W_u^*) , and it is shown below;

$$(43) D^S(W_s^*, W_u^*) = N, \quad \text{and } D^U(W_s^*, W_u^*) = S^U(W_s^*)$$

Here is a simple diagram representing this equilibrium.

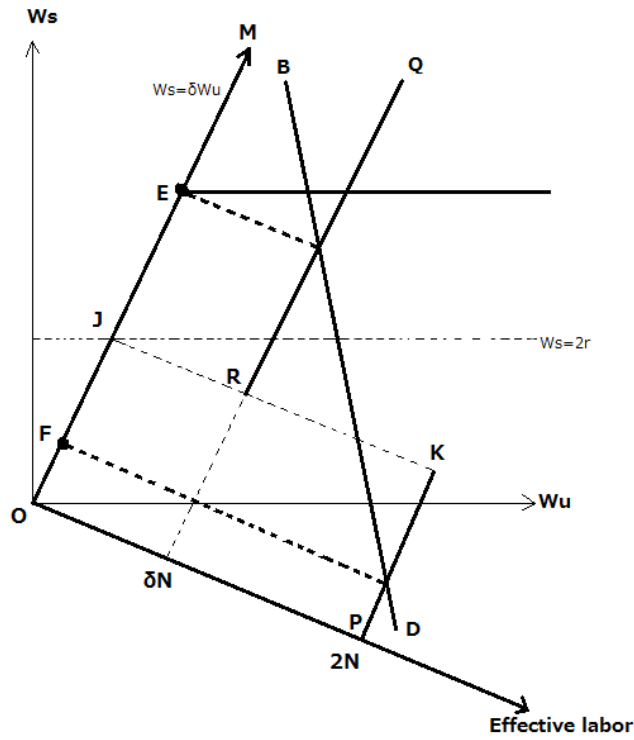


Figure 1

In figure 1, let's look at the (w_s, w_u) -space. The axes of this space are shown as O_{w_s} and O_{w_u} . If the wage pairs are above the horizontal line, people will work as skilled labor, $e=0$; and if they are below this line $e=1$. In this space, there is a line $\frac{w^s}{\delta} = w^u$ which is OM in the graph. It shows $w_s = \delta w_u$ and $1 < \delta < 2$. We shall call this line "ridge" from now on. The ridge is very significant since it decides how the demand for labor can be alternated by the other labor. If (w_s, w_u) is above the ridge, then the demand for skilled labor is zero; if (w_s, w_u) is below the ridge, then the demand for unskilled labor is zero.

Firstly, we focus on what will happen if the wage pair is on the ridge. It is also important to note "effective labor" demanded by a firm to be the total amount of labor which is evaluated in unskilled labor-equivalents. In following, if a firm i employs S_i skilled laborers and U_i unskilled laborers, its effective labor employment is given by $\delta S_i + U_i$. If the wages for both laborers exist on the ridge, each firm's effective demand for labor, L_i , is given by $f'(L_i) = \frac{w^s}{\delta} = w^u$. Hence, firm i with such wage pairs will employ both skilled and unskilled laborers in any combination of S_i , and U_i , under

$\delta S_i + U_i = L_i$. Because all n firms are identical, the aggregate effective labor demand in the market is $L = nL_i$. L can be determined by $f' \left(\frac{L}{n} \right) = \frac{w^S}{\delta} = w^U$.

Next, we see the ridge as the “vertical” axis and consider a line through O which is orthogonal to the ridge and going eastward as “Effective labor” in Figure 1. We define the two-dimensional Euclidean space, in which the “vertical” axis is the ridge and the “horizontal” axis effective labor, the “tilted Euclidean space.” In this space, all the wage pairs lying on the ridge mark out the firm’s effective labor demand on the axis marked “Effective Labor.” As a demand curve, the line BD represents the firm’s aggregate effective demand for labor and, moreover, this demand curve is only for wage pairs lying on the ridge as mentioned above. Hence, if (w_S, w_U) is point E , we can see the aggregate demand for labor is given by ON .

Let’s move on to another discussion. What happens if the wage pairs are not on the ridge in the (w_S, w_U) -space? To see this, suppose that the pair (w_S, w_U) exists vertically above E . That means skilled labor wage exceeds effective unskilled labor wage, $\frac{w^S}{\delta} > w^U$. Hence, from (42) and (43), the firm’s aggregate demand for skilled labor is ON . Thus the wage deciding the amount of effective labor demanded by firms equals to the unskilled labor’s wage. In other words, if the wage pair is at G , going vertically down from G to E on the ridge and then “horizontally” to the line BD gives you the aggregate effective demand for labor. Hence, the effective demand determined here is ON . If wage pairs are points above the ridge the effective demand is completely effective demand for unskilled labor. On the contrary, for all wage pairs below the ridge, only skilled labor is demanded. Therefore, given a wage pair at H , the demand for unskilled labor is zero and the demand for skilled labor is ON . In this case, people will prefer to be educated.

To the next step, we examine the supply curve in Figure 1. There is the effective labor supply with wage pairs that lie on the ridge. And significantly, for all wage pairs on the ridge above J , there is no supply of unskilled labor. Hence, in such cases the effective supply of labor is ON , where $\overline{ON} = \delta N$ and the entire labor is skilled labor. Contrarily, if the wage pair is below J , the aggregate effective supply of labor is $2N$ representing the entire labor is unskilled labor. Therefore, to sum up, the aggregate effective supply of labor in the tilted Euclidean space consists of the two line segments QR and KP .

In the process of searching equilibria in the Euclidean space, we determine equilibria that may lie on the ridge. There are two equilibria seen at the points of intersection

between the aggregate effective demand and supply curves. In Figure 1 there are two equilibria given by the wage pairs E and F. At F both skilled and unskilled laborers are employed, skilled labor wage is very low and unskilled labor's wage even lower. At E, skilled labor wage is high, unskilled labor is zero, and the demanded labor is only skilled labor. In such economies, there is high incentive to receive education in period 1 in anticipation of that they will surely be employed in the future. This is the standard case that has been seen in developed and industrial countries where people must complete compulsory education before start working in a society.

Then if a country's labor productivity is improved, so the aggregate demand curve, BD, shifts to the "right", the economy will have an interesting equilibrium where only skilled laborers work. On the other hand, if the labor productivity becomes lower, so BD shifts to the "left," there will be an equilibrium where unskilled labor exists inevitably.

It has been revealed that the skilled labor wage is, at all times, higher than the unskilled labor wage in this model. Moreover, the demand for skilled labor increases as the productivity improves in the economy. On the other hand, unproductive industries and firms prefer to employ unskilled labor and there are merely advantages in getting education in period 1. This phenomenon is likely to occur in developing countries causing mismatch between education and employment.

2. Possible Solutions in this model

There are two conceivable suggestions in education policy provided in this model. Firstly, if the quality of education rises, and δ increases and exceeds 2, the future utility as skilled labor will dramatically rise. That simply indicates that the higher the education quality level is, the more firms demand for skilled labor and the more people are likely to choose to be educated. Thus governments must consider investing in education not only in perspective of humanity but also they should keep in their mind that those investments will greatly push the economy up as it generates more educated laborers with higher productivity.

Secondly, let's take a step to the direct policy for those future unskilled laborers. What will happen if government promotes child's education by introducing compulsory education system? Scholarship or financial support might not be practicable since those financial aids would not convert people's expectation that skilled labor will not earn as much as they invest in education. On the other hand, because there is a huge incentive that the more skilled laborers are in the economy the more people start receiving education, the compulsory education system is considerably effective for increasing

skilled labor. However, here is again the issue that it will take at least several years or even decades to shift to this system and, moreover, the wage for unskilled labor will decrease during the process. Thus, as it has been proved by Basu and Van model above, governments need to deliberate the policy, the education system, before they conduct it. In addition, it seems much more successful if they have multiple courses to approach children's education such with NGO, NPO and other volunteer institutions that could also support government's finance.

V Conclusion

As a conclusion, this paper has discussed the possible prescriptions on eradicating child labor. Firstly it has been shown that the definition of child labor and the problem varies across countries, that each country has its own labor law, makes the national standard of child labor even more difficult to approve. The condition of working children is still misery according to the current data of child labor which points out 215 million children are caught for working as child labor and 115 million of them are in hazardous work. To identify the economics of child labor, the Basu and Van model is introduced and it has clearly shown the relation between child labor and fertility rate which is also a reflection of poverty. High fertility rate drives child labor active and that makes fertility even higher. However, there is still a possibility to diminish child labor by ban on child labor. Although it is ultimately a hard task for the economy to accomplish the complete ban on child labor, there will be only adults working and demanded by firms. Subsequently we discussed about education and child labor. There is continuingly a huge mismatching between education and employment. Moreover, quality improvement in education has been greatly required in poverty area since it will push up one's expectation for receiving education. As shown in the ban on child labor, the compulsory education system is effective when it is completed. However, partial enforcement exacerbates the economy to a different direction by making unskilled labor's wage even lower. Hence, in any cases, the policy must be profoundly deliberated and discussed before it is applied to actual situations. As last, this paper has been based on the personal belief of the author that child labor is unacceptable because it violates children from the perspectives of human rights, social morality and so on, but also from the strong point of view that an economy with child labor has less potential to grow and enrich one's economics in both long and short-term.

It is indeed a difficult issue to discuss, yet children are meant to receive their

education to irrigate their life and not to be trapped in abusive environments to feed their families. Child labor is the consequence of the highly distorted society where the weakest struggle to survive. But restricting the problem directly does not work as hoped for and this is the strongest point this paper has mentioned. At last, to refer to the assignments, it would be better and more practical if there were actual examples and cases to show in this paper. Also it has been confined to discussion of the outcomes analyzed in the model which is based on simple assumptions. It is obvious that, in order to look closer at the real situations, there need to be more variables and a complicated diagram to be implemented in the model.

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