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Child Labour and Economic Growth: A General Equilibrium Analysis

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Abstract

In this note, we construct a four sector static general equilibrium model of a small open economy with special consideration to the incidence of child labour. The paper examines the impact of FDI on the output levels of different sectors and also on the incidence of child labour. Here we have shown the possibility of expansion in the incidence of child labour. Finally we have shown that economic growth of our small open economy may immiserize due to trade liberalization.

Keywords: Foreign capital, Child labour, Partially developed informal sector, Immiserization.

JEL classification: F21, J10, I28.

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1. Introduction

The problem of child labour is a very common aspect for many less developed economies. More than 225 million children in the world today are involved in child labour. The existence of child labour in the developing economies is not only becoming a serious problem in the way of their own development but also on society as a whole. Though the developed countries have almost succeeded in eradicating the above mention problem, their counterparts, that is, the less developed countries till now are trying to find out the right path. In recent years the eradication of such problem is gaining more importance among the policy makers of less developed countries, specifically in the context of the relationship between trade liberalization and labour standards as mentioned by the World Trade Organization (WTO). Looking at the picture from the data published by the Bureau of Statistics of the ILO we find that the participation rates for children aged 10-14 years in 1995 was about 13.02% for the world as a whole and 14.3% for India. In most of the less developed countries the child workers are involved in agricultural sector. Apart from that, huge amounts of child labour are engaged in informal sector. According to ILO estimates in 2002 one in every six children aged between 5 and 17 years or 246 million are engaged as child labour.

Here we consider the flow of FDI to transitional economies. The issue is especially interesting for the developing economies as WTO has prescribed many of them to include structural reforms policies in their globalization programme packages, as that may be welfare improving for the economies. Thus the sectoral effects and effects on welfare due to inflow of foreign capital¹ are becoming crucial for policy makers and hence it requires careful investigation.

2. Select Review of Literature

Initially, we can offer a select review of literature in order to establish our departure from and contributions we will make to the existing literature. There are several works on the issue related to the concept of immiserization due to investment liberalization. Studies on immiserization due to FDI include Brecher-Alejandro (1977), Bhagwati and Brecher (1980), Grinols(1991), Beladi

¹ Here, FDI is treated as foreign capital inflow.

and Marjit (1992), Marjit, Broll and Mitra (1997), Gupta (1997, 2003), Chaudhuri (2005) etc. Similarly, there exist several literature related to the issue of incidence of child labour, like, Basu and Van (1998), Chaudhuri and Dwibedi (2002), Marjit and Gupta (2008) etc. However, there exist hardly any theoretical works which correlate the issues related to partially developed informal sector, incidence of child labour, service sector and immiserizing growth. Though Gupta (2003) has considered a four sector general equilibrium model in the presence of an urban informal sector and also he has shown the phenomenon of immiserizing growth. Apart from that he has not considered the presence of any service sector, rather in that model he has considered child labour as the fourth sector. On the other hand, in this paper we have shown the impact of inflow of foreign capital on the output levels of different sectors and on the incidence of child labour in the presence of a tariff protected import competing sector. In this model we have also shown that immiserization of economic expansion may possible even in the presence of a formal service sector. This note is organized in the following manner. Section 3 considers the model. The comparative static analysis is explained in section 4. Sections 4.1 and 4.2 consider the Foreign capital inflow, Sectoral effects, incidence of child labour and FDI, Immiserizing Growth respectively. Finally, the concluding remarks are made in section 5.

3. The Model

We consider a small open economy consisting of four sectors in a Heckscher-Ohlin-Samuelson framework. Actually our model is based on Beladi-Marjit (1992), and hence we can refer our model as modified Beladi-Marjit type of framework. Out of the four sectors, one is an agricultural sector(A)², which produces its output using labour(L) and child labour(C), the second sector is a partially developed informal sector (I) and it employees labour along with child labour and domestic capital for the production purpose, the third sector is a manufacturing sector(M), which produces output by using labour and domestic capital. This third sector is the import competing sector while the first sector, that is, sector A, is the export sector of the economy. Sector M is protected by tariff (t). K is perfectly mobile between sectors and M. The fourth sector is the formal service sector. Foreign capital (N) has been considered as specific to the foreign enclave (Z). This sector also uses the labour input(L) to produce output of the fourth

² We can treat the agricultural sector as a less developed informal sector.

sector. All these four sectors³ use labour which is perfectly mobile among them. In the manufacturing and service sectors we find that due to the existence of unionized labour force the wage rate is fixed on the level (\bar{w}) which is higher than the competitive wage rate (w).

Here sector A produces its output X_A , sectors I, M and Z produce output X_I , X_M and X_Z respectively. We assume that the agricultural sector is more labour-intensive compared to the partially developed informal sector⁴. The agricultural product is considered as the numeraire its price is set equal to unity. We assume that foreign capital income is fully repatriated. Production functions of each sector exhibit constant returns to scale with diminishing marginal productivity for each factor. The following notations are used in this model.

The following notations are used in this model.

X_i = product produced by the i th sector, $i = A, M, I, Z$

P_i = world price of the i th commodity, $i = A, I, Z$

P_M^* = world price of good M

$P_M = P_M^*(1 + t)$ = domestic price of good M

C = fixed number of child labour of the economy

L = fixed number of workers in the economy

N = foreign capital stock of the economy

K = domestic capital stock of the economy

a_{ji} = quantity of the j th factor for producing one unit of output in the i th sector, $j = L, K, N$ and $i = A, M, I, Z$

θ_{ji} = distributive share of the j th input in the i th sector

³ All the four sectors produce final commodities in this model.

⁴ Normally theorists are assumed that agricultural sector is more child labour intensive than partially informal sector. Interestingly, the sectoral effects will remain same under both assumptions.

λ_{ji} = proportion of the j th factor used in the production of the i th sector

t = ad-valorem rate of tariff on the import of commodity M

W = competitive wage rate

\bar{W} = contractual wage rate of the manufacturing and foreign enclave

r = rate of return to domestic capital

R = rate of return to foreign capital

D_i = consumption demand for the i th final commodity, $i = M$

Ω = national income at domestic price

$m_M = (P_M \delta D_M / \delta \Omega)$ marginal propensity to consume for commodity M,

here, $0 < m_M < 1$

ζ = import demand for commodity M

\wedge = proportional change

The equational structure of the model is as follows.

The competitive equilibrium conditions in the product market for the four sectors give us the following equations.

$$a_{LA}W + a_{CA}W_C = 1 \quad (1)$$

$$a_{LI}W + a_{KIR} + a_{CI}W_C = P_I \quad (2)$$

$$a_{LM}\bar{W} + a_{KMR} = P_M^*(1+t) \quad (3)$$

$$a_{LZ}\bar{W} + a_{NZ}R = P_Z \quad (4)$$

Sector specificity of service sector is given by the following equation

$$a_{NZ}X_Z = N \quad (5)$$

Perfect mobility of capital between sectors I and M can be expressed as

$$a_{KM}X_M + a_{KI}X_I = K \quad (6)$$

Full employment of labour implies the following equation

$$a_{LA}X_A + a_{LM}X_M + a_{LI}X_I + a_{LZ}X_Z = L \quad (7)$$

The supply function of child labour is given by

$$C = C(W, W_C, \Psi_L) \quad (8)$$

With $C_1 < 0$, $C_2 > 0$, $C_3 > 0$, where, $\Psi_L = (L - a_{LM}X_M - a_{LZ}X_Z)$

Perfect mobility of child labour between sectors A and I can be expressed as

$$a_{CA}X_A + a_{CI}X_I = C \quad (9)$$

The demand for commodity M and the volume of import are given by the following equations respectively.

$$D_M = D_M(P_Z, P_I, P_M, \Omega) \quad (10)$$

$$\zeta = D_M(P_Z, P_I, P_M, \Omega) - X_M \quad (11)$$

The national income of the economy at domestic prices is given by

$$\Omega = X_A + P_M X_M + P_I X_I + P_Z X_Z - RN + tP_M^* \zeta \quad (12.1)$$

$$\text{Or, } \Omega = WL + (\bar{W} - W)\{a_{LM} X_M + a_{LZ} X_Z\} + W_C C + rK + tP_M^* \zeta \quad (12.2)$$

The working of the model is as follows. The factor prices (W, r, W_C, R) are determined from the price equations numbered (1)-(4). Once the factor prices are determined, the variable factor coefficients can also be determined. Thus the output composition can be determined from the endowment equations (5)-(9) and hence C can be determined from equation (9). Thus as the output composition of different sectors are known, ζ and Ω can also be determined from equations (11)-(12).

4. Comparative Statics

We are now interested to analyze the impact of foreign capital inflow on the output levels of different sectors and growth aspect. According to the conventional wisdom an inflow of

foreign capital in a developing economy is growth reducing, that is, growth led by inflow of foreign capital is immiserized. This is based on the argument that inflow of foreign capital leads to an expansion of the tariff protected import-competing sector and there by decrease in national income by decreasing the volume of trade.

4.1. Foreign capital inflow, Sectoral effects and incidence of child labour

Let us examine the impact of inflow of foreign capital on the output levels of different sectors.

By differentiating equations (5),(6),(7), (8) and (9) we can get⁵

$$(\hat{X}_A / \hat{N}) = (1/\lambda) [\lambda_{KM} \lambda_{LZ} \{C_3 \lambda_{LI} - \lambda_{CI}\}] \quad (5.1)$$

$$(\hat{X}_M / \hat{N}) = (1/\lambda) [\lambda_{KI} \lambda_{LZ} \{C_3 \lambda_{LA} - \lambda_{CA}\}] \quad (6.1)$$

$$(\hat{X}_I / \hat{N}) = (1/\lambda) [\lambda_{KM} \lambda_{LZ} \{\lambda_{CA} - C_3 \lambda_{LA}\}] \quad (7.1)$$

$$(\hat{C} / \hat{N}) = - [C_3 \lambda_{LM} \hat{X}_M + C_3 \lambda_{LZ} \hat{X}_Z] / \hat{N} \quad (9.1)$$

Where, $|\lambda| = [\lambda_{KI} \lambda_{LM} (\lambda_{CA} - C_3 \lambda_{LA}) + \lambda_{KM} (\lambda_{LA} \lambda_{CI} - \lambda_{CA} \lambda_{LI})] < 0$, under the assumption that

agricultural sector is more child labour intensive than partially developed informal sector and $C_3 > (\lambda_{CA} / \lambda_{LA}) > (\lambda_{CI} / \lambda_{LI})$.

Since the factor prices are determined from the price system, factor prices remain unchanged due to inflow of foreign capital. If A is child labour intensive compared to sector I and the change in the supply of child labour as a result of a change in the number of families supplying child labour (C_3) is greater than the relative use of child labour compared to the use of usual labour in the production of one unit of partially developed informal sector ($\lambda_{CI} / \lambda_{LI}$), inflow of foreign capital leads to a fall in the production of X_A , that is, $\hat{X}_A < 0$. Similarly if C_3 is greater than the relative use of child labour compared to the use of usual labour in the production of one unit of agricultural sector ($\lambda_{CA} / \lambda_{LA}$), the impact of liberalization leads to a reduction in X_M , that is, $\hat{X}_M < 0$.

⁵ See Appendix A for detailed derivation.

0. By using similar arguments as we use in the earlier case we have shown that the inflow of FDI leads to an increase in X_I , that is, $\dot{X}_I > 0$.

Here the increase or decrease in the supply of child labour is dependent upon the change in the output levels of sectors M and Z due to inflow of foreign capital. Thus given X_M , an increase in X_F leads to reduction in the number of families supplying child labour and hence fall in the supply of child labour. We call it negative child labour effect. On the hand given supply of child labour may increase as X_M fall due to an inflow of foreign capital. We call it positive child labour effect. If the positive effect dominates over the negative effect we get an increase in the supply of child labour. Thus the following proposition is immediate.

Proposition 1: *An inflow of foreign capital with full repatriation of its earnings leads to: (i) an increase in X_I , X_Z and reduction in X_M , X_A ; (ii) an increase in the supply of child labour under some reasonable conditions.*

4.2. FDI and Immiserizing Growth

We are now going to analyse the impact of an inflow of foreign capital on national income.

Differentiation of equations (10), (11) and (12.2) gives us

$$\begin{aligned} d\Omega/dN = & (1/U) [(\bar{W} - W)\{a_{LM} (dX_M/dN) + a_{LZ} (dX_Z/dN)\} + W_C (dC/dN) \\ & - tP_M^* (dX_M/dN)] \\ (13)^6 \end{aligned}$$

From the above expression (13) we can argue that an inflow of foreign capital may expand national income due to expansion of the output level of service sector and increase in the supply of child labour. We call it positive force. Besides that an increase in N leads to a fall in X_M that is volume of import will increased, implies an increase in tariff revenue effect and hence an increase in Y. We call it tariff revenue effect. On the other hand the contraction of output level of the manufacturing sector due to an inflow of foreign capital leads to a fall in national income. We refer it as negative force. If this negative force dominates over other effects we get a fall in

⁶ See Appendix B for detailed derivation.

national income, that is, economic growth will also fall due to trade liberalization. Thus the following proposition can now be established.

Proposition 2: *Under some reasonable conditions the economic growth defined as the increase in capital stock may be immiserizing, if its entire rental income is repatriated.*

5. Concluding Remarks

The existence of child labour in a less developed economy is a very common feature and hence the expansion of these economies is also depends upon the increase or decrease in the supply of child labour. In this paper we have shown that an inflow of foreign capital leads to an increase in the output level of informal sector along with an increase in the supply of child labour. Finally, we have concluded that the economic growth of our stylized economy may be immiserized due to trade liberalization.

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Appendices

Appendix A. detailed derivation of different expressions

By differentiating equations (5), (6),(7), (8) and (9) we can get

$$\hat{X}_Z = \hat{N} \quad (5')$$

$$\lambda_{KI} \hat{X}_I + \lambda_{KM} \hat{X}_M = \hat{K} \quad (6.A)$$

$$\lambda_{LA} \hat{X}_A + \lambda_{LI} \hat{X}_I + \lambda_{KM} \hat{X}_M = -\lambda_{LF} \hat{N} \quad (7.A)$$

$$\lambda_{CA} \hat{X}_A + \lambda_{CI} \hat{X}_I = \hat{C} \quad (9.A)$$

By using matrix we can express the above equations as follows

$$\begin{bmatrix} 0 & \lambda_{KI} & \lambda_{KM} \\ \lambda_{LA} & \lambda_{LM} & \lambda_{LI} \\ \lambda_{CA} & \lambda_{CI} & C_3 \lambda_{LM} \end{bmatrix} \begin{bmatrix} \hat{X}_A \\ \hat{X}_M \\ \hat{X}_I \end{bmatrix} = \begin{bmatrix} 0 \\ -\lambda_{LZ} \hat{N} \\ -C_3 \lambda_{LZ} \hat{N} \end{bmatrix}$$

Cramer's rule gives us the following results

$$\hat{X}_A = (1/\lambda) [\lambda_{KM} \lambda_{LZ} \{C_3 \lambda_{LI} - C_I\}] \hat{N} \quad (A.1)$$

$$\hat{X}_M = (1/\lambda) [\lambda_{KI} \lambda_{LZ} \{C_3 \lambda_{LA} - \lambda_{CA}\}] \hat{N} \quad (A.2)$$

$$\hat{X}_I = (1/\lambda) [\lambda_{KM} \lambda_{LZ} \{\lambda_{CA} - C_3 \lambda_{LA}\}] \hat{N} \quad (A.3)$$

$$\hat{C} = - [C_3 \lambda_{LM} \hat{X}_M + C_3 \lambda_{LZ} \hat{X}_Z] \quad (A.4)$$

$$\text{Here, } |\lambda| = \begin{bmatrix} 0 & \lambda_{KI} & \lambda_{KM} \\ \lambda_{LA} & \lambda_{LM} & \lambda_{LI} \\ \lambda_{CA} & \lambda_{CI} & C_3 \lambda_{LM} \end{bmatrix} = [\lambda_{KI} \lambda_{LM} (\lambda_{CA} - C_3 \lambda_{LA}) + \lambda_{KM} (\lambda_{LA} \lambda_{CI} - \lambda_{CA} \lambda_{LI})]$$

Appendix B. Derivation of import function and national income

Differentiation of equations (10) and (11) gives us

$$d\zeta = (\delta D_M / \delta \Omega) d\Omega - dX_M \quad (11.A)$$

Totally differentiating equation (12.2) and inserting the value of dI we can derive

$$d\Omega = (1/U) [(\bar{W} - W)\{a_{LM} dX_M + a_{LZ} dX_Z\} + W_C (dC/dN) - tP_M^* dX_M] \quad (12.A)$$

where, $U = [1 - (t/1+t) m_M]$.