Foreign Capital, Return to Education and Child labour

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Abstract: This paper attempts to identify the different channels through which economic reforms can affect the incidence of child labour in a developing economy. Using a three-sector general equilibrium model it shows that inflows of foreign capital can lower the problem of child labour by raising the return to education and reducing the earning opportunities of children. It demonstrates how foreign capital produces favourable effect on the incidence of child labour although it affects wage inequality adversely.

Keywords: Child labour, general equilibrium, foreign capital, return to education, wage inequality.

JEL classification: F10, J10, J13, I28.

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1. Introduction

The developing countries have chosen free trade as their development strategy and been vigorously implementing economic reforms for the last two decades or so. However, the new development approach has not so far been an unmixed blessing. In their endeavour in implementing liberalized policies these economies have been facing some adjustment costs of which increasing skilled-unskilled wage inequality and persistence of poverty and incidence of child labour are worth mentioning. Advocates of economic liberalization with standard trade theoretical models in mind expected the wage inequality to improve in the developing economies and the incidence of child labour to fall through reductions in poverty. However, empirical studies reveal that the wage inequality and poverty have increased in many liberalizing economies[1] and the incidence of child labour has not decreased satisfactorily.

While there is a scanty theoretical literature[2] explaining the deteriorating wage inequality in the developing economies, such a literature on child labour is yet to emerge. The first and foremost task of this theoretical literature would be to identify the different channels through which economic reforms can affect the child labour problem. Empirical research e.g. Cigno et al. (2002) and Neumayer and Soysa (2005) has reported that trade and investment reforms have produced a favorable impact on child labour through the positive income effect. However, there are reasons to believe that the incomes of the poorer section of the working population have not at least increased in the developing economies during the liberalized regime.[3] Hence, whatever little impact on child labour the liberalized policies have so far made must have come through channels other than the income effect. The need for identifying these alternative routes has also been recognized by Neumayer and Soysa (2005). In the circumstances, the present paper using a three-sector general equilibrium model shows that inflows of foreign capital can indeed lower the problem of child labour by raising the return to education. It demonstrates how foreign capital

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[1] See, for example, Robbins (1996), Wood (1997).

[2] One may go through Chaudhuri and Yabuuchi (in press) for a complete list of works.

[3] See Khan (1998) and Tendulkar et al. (1996) among others.

produces favorable effect on the incidence of child labour even though it affects wage inequality adversely.

2. Household behaviour

We consider a two period optimising problem of the representative working family consisting of one adult member (the guardian) and a child. The guardian in the first period works in the adult labour market and earns wage W_0. In this period, he takes decision about his child's work effort and schooling. Total child time is 1, a part of which (l_C) is sent out to work at the wage rate W_C. Time not spent on working is spent in school[4]. Hence $(1-l_C)$ is the child's schooling. So, the l_C part of the child labour time earns the child wage ,(W_C), in the first period and the unskilled adult wage (W) in the second period while the $(1-l_C)$ fraction earns nothing in the first period but the skilled wage (W_S) in the second period.[5] In the presence of positive return on education, W_S is greater than W. In the second period, the guardian earns nothing and lives on the income he receives from his child who has become an adult worker by this time.

We assume that parent cares only about the lifetime family consumption and does not attach value to the child's leisure. The utility is therefore a function of consumption levels in the two periods (0 and 1) and is represented as follows.

$$U = \frac{C_0^{-\rho}}{-\rho} + \beta \frac{C_1^{-\rho}}{-\rho} \qquad -1 < \rho < \infty \tag{1}$$

β is the time discount factor and $(\frac{1}{1+\rho})$ is the constant intertemporal elasticity of substitution.

The first period's consumption (C_0) consists of wage income of the guardian and child wage from the working time of the child. i.e.,

$$C_0 = (W_0 + l_C W_C) \tag{2}$$

The second period's consumption (C_1) can be thought of as the sum of skilled wage of educated

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[4] This is a simplifying assumption that ignores the existence of non-labour non-school goers.

[5] Introduction of uncertainty in securing a skilled job in the second period would be an interesting theoretical exercise. However, the major results of the model still hold if the probability in finding a high-skill job is given exogenously.

adult (schooled in the first period) labour and unskilled wage of uneducated adult labour (worked in the first period).

$$C_1 = (l_C W + (1 - l_C) W_S) \tag{3}$$

We assume that the only cost of education is the opportunity cost in terms of forgone earnings of children.[6]

The guardian maximises the lifetime utility (Equation (1)) with respect to l_C and subject to (2) and (3). The maximization exercise leads to the following child labour function by each working family.

$$l_C = \frac{W_S - W_0 \left\{ \dfrac{\beta(W_S - W)}{W_C} \right\}^{1/(1+\rho)}}{W_C \left\{ \dfrac{\beta(W_S - W)}{W_C} \right\}^{1/(1+\rho)} + (W_S - W)}$$

For algebraic simplicity we consider the special case when $\rho = 0$ which means a logarithmic utility function giving unitary intertemporal elasticity of substitution[7]. The household child labour supply function then reduces to:

$$l_C = \frac{W_S}{(1+\beta)(W_S - W)} - \frac{\beta . W_0}{(1+\beta) W_C} \tag{4}$$

An increase in current income, W_0, (income from non-child source) raises C_1 and hence lowers l_C following a positive income effect. An increase in the child wage rate implies an increase in the opportunity cost of education and hence leads to more child labour supply (i.e. less schooling). Any changes in skilled and/or unskilled wage impinge on the return to education and therefore influences the guardian's decision regarding allocation of child time between his education and work. For example, an increase in skilled wage (W_S) or a decrease in unskilled wage (W) makes education more attractive and raises schooling time of the child thereby lowering the supply of child labour by the household.

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[6] One can incorporate direct schooling costs without affecting the qualitative results of the model.

[7] See Ranjan (1999) for a similar treatment.

3. The General Equilibrium Analysis

We consider a small open economy with three sectors. Sector 1 produces an agricultural commodity, X_1, using adult unskilled labour (L), child labour (L_C) and capital (K). Sector 2 uses unskilled labour and capital to produces a low-skill commodity, X_2. Finally, sector 3 produces a high-skill commodity, X_3, with the help of skilled labour (S) and capital. All are final commodities and their prices, P_is, are given internationally. Competitive markets, CRS technologies with diminishing marginal productivities and full-employment of all resources are assumed. Capital endowment of the economy consists of both domestic capital (K_D) and foreign capital (K_F) and these are perfect substitutes.

The usual price-unit cost equality conditions relating to the three sectors are as follows.

$$Wa_{L1} + W_C a_{C1} + Ra_{K1} = P_1 \tag{5}$$

$$Wa_{L2} + Ra_{K2} = P_2 \tag{6}$$

$$W_S a_{S3} + Ra_{K3} = P_3 \tag{7}$$

where a_{ji}s are input-output ratios; and, R is the return to capital.

Complete utilization of adult unskilled labour, child labour, capital and skilled labour imply the following four equations, respectively.

$$a_{L1}X_1 + a_{L2}X_2 = L \tag{8}$$

$$a_{C1}X_1 = L_C \tag{9}$$

$$a_{K1}X_1 + a_{K2}X_2 + a_{K3}X_3 = K_D + K_F = K \tag{10}$$

$$a_{S3}X_3 = S \tag{11}$$

Both unskilled and skilled working families are potential suppliers of child labour and their current wage incomes (W_0) are W and W_S, respectively. Using equation (4) the aggregate child labour supply in the economy is obtained as follows.

$$L_C = \left(\frac{1}{1+\beta}\right)\left[L\left\{\frac{W_S}{(W_S - W)} - \frac{\beta.W}{W_C}\right\} + S\left\{\frac{W_S}{(W_S - W)} - \frac{\beta.W_S}{W_C}\right\}\right] \tag{12}$$

4. General Equilibrium and Comparative Statics

The general equilibrium structure consists of eight equations ((5) – (12)) and the same number of variables namely; $W, W_C, W_S, R, X_1, X_2, X_3$ and L_C. This is an indecomposable system. So factor prices depend on both commodity prices and factor endowments. Totally differentiating equations (5) – (12) and solving by Cramer's rule the following proposition can be established.[8]

Proposition 1: An inflow of foreign capital worsens the skilled-unskilled wage inequality if the high-skill sector is capital-intensive (in a special sense) relative to the low-skill sector. The incidence of child labour, however, falls under the same sufficient condition.

Inflows of foreign capital lower the return to capital, R, as the supply rises given the demand. Both sectors 2 and 3 expand as they use capital but use two different types of labour. Sectors 1 and 2 have a miniature HOS system as they use both capital and unskilled labour. Sector 1 contracts following a Rybczynski effect as it is less capital-intensive vis-à-vis sector 2. The demand for child labour (skilled labour) falls (rises) in sector 1 (sector 3) as it is a specific factor. Consequently, the child wage (skilled wage) rate falls (rises). Saving on capital input raises the unskilled wage, W, in sector 2 (equation (6)). What happens to the skilled-unskilled wage inequality depends on the rates of increase in W_S and W. If sector 3 is capital-intensive in a special sense[9] the saving on capital input in sector 3 is more than that in sector 2, which in turn, implies an increase in the relative wage inequality. A fall in W_C means a decrease in the opportunity cost of education. On the other hand, the return to education rises as the wage inequality rises. Finally, the initial incomes from non-child source of both the unskilled and skilled working families increase which lower the supply of child labour by each family via the positive income effect. Hence, under the sufficient condition that the high-skill sector is capital-intensive all these three effects work in the same direction and lower the incidence of child labour in the society.

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[8] All qualitative results of the paper hold under a different sufficient condition even if sector 2 uses child labour.

[9] See Jones and Neary (1984).

5. Concluding remarks

This note has explained how foreign capital inflows might produce favourable effect on the incidence of child labour in a developing economy despite affecting wage inequality adversely. The family supply function of child labour has been derived from the intertemporal utility maximizing behaviour of the working households which send some of their children for consumption smoothing owing to non-existence of a market for loans against future earnings. Then the aggregate child labour function is derived and a three-sector general equilibrium model has been developed for the purpose of analysis. The interesting result is that inflows of foreign capital might exert a downward pressure on the child labour incidence by raising the return to education (relative wage inequality). Hence, the problem of child labour may improve even if poverty itself does not fall. All these results are consistent with empirical findings. However, the assumption of non-existence of any market for loans against future earnings is restrictive but simplifying. In defence, we may note that inflows of foreign capital in the presence of an informal credit market should improve the borrowing terms of the households and lower the cost of education and hence the incidence of child labour.

Appendix:

Totally differentiating equations (5) – (11) and arranging in a matrix notation one gets:

$$\begin{bmatrix} \theta_{L1} & \theta_{C1} & \theta_{K1} & 0 & 0 & 0 \\ \theta_{L2} & 0 & \theta_{K2} & 0 & 0 & 0 \\ 0 & 0 & \theta_{K3} & \theta_{S3} & 0 & 0 \\ \overline{S}_{LL} & \lambda_{L1}S^1_{LC} & \overline{S}_{LK} & 0 & \lambda_{L1} & \lambda_{L2} \\ \overline{S}_{KL} & \lambda_{K1}S^1_{KC} & A_2 & A_1 & \lambda_{K1} & \lambda_{K2} \\ (S^1_{CL} + A_3) & (S^1_{CC} - A_4) & S^1_{CK} & A_5 & 1 & 0 \end{bmatrix} \begin{bmatrix} \hat{W} \\ \hat{W}_C \\ \hat{R} \\ \hat{W}_S \\ \hat{X}_1 \\ \hat{X}_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ \hat{K} \\ 0 \end{bmatrix} \tag{A.1}$$

where:

$$\overline{S}_{LL} = (\lambda_{L1}S^1_{LL} + \lambda_{L2}S^2_{LL}) < 0;\ \overline{S}_{KL} = (\lambda_{K1}S^1_{KL} + \lambda_{K2}S^2_{KL}) > 0;$$

$$\overline{S}_{KK} = (\lambda_{K1}S^1_{KK} + \lambda_{K2}S^2_{KK} + \lambda_{K3}S^3_{KK}) < 0;\ \overline{S}_{LK} = (\lambda_{L1}S^1_{LK} + \lambda_{L2}S^2_{LK}) > 0;$$

$$A_1 = \lambda_{K3}(S^3_{SK} + S^3_{KS}) > 0;\ A_2 = (\overline{S}_{KK} - \lambda_{K3}S^3_{SK}) < 0;\ A_3 = (-B_1(L+S) + B_2LW); \tag{A.2}$$

$$A_4 = B_2(LW + SW_S) > 0;\ A_5 = (B_1(L+S) + B_2SW_S) > 0;$$

$$B_1 = \frac{W_S.W}{(1+\beta)L_C(W_S - W)^2} > 0;\ B_2 = \frac{\beta}{(1+\beta)L_CW_C} > 0.$$

S^k_{ji} = the degree of substitution between factors j and i in the k th sector, $j,i = L, S, L_C, K$; and, k = 1,2,3. $S^k_{ji} > 0$ for $j \neq i$; and, $S^k_{jj} < 0$; θ_{ji} = distributive share of the j th input in the i th sector; λ_{ji} = proportion of the j th input employed in the i th sector; '$\wedge$' = proportional change; and Δ is the determinant of the coefficient-matrix of (A.1).

From (A.1) it can be proved that:

(i) $\Delta < 0$ if $\theta_{K3} > \theta_{K2}$; and, $S^1_{LC} \geq S^1_{KC}$

(ii) $(\hat{W}_S - \hat{W}) > 0$ when $\hat{K} > 0$ if $\theta_{K3} > \theta_{K2}$

Differentiating (12) it may be checked that

$\hat{L}_C < 0$ when $\hat{K} > 0$ if $\theta_{K3} > \theta_{K2}$.

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