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# **Endogenous skill formation, foreign capital and education subsidy in a dual economy**

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**Abstract:** The present paper develops a three sector Harris-Todaro (1970) type general equilibrium model of unemployment by incorporating endogenous skill formation. Two types of labour are considered: skilled labour and un-skilled labour. We examine the effects of the inflows of foreign capital on the level of unskilled unemployment and skilled-unskilled wage inequality. We find that an inflow of foreign capital raises the skilled- unskilled wage gap and lowers the level of unemployment of the unskilled labour.

**Keywords:** skill formation, foreign capital, education subsidy, wage inequality, unemployment.

**JEL classification:** F13, J41, J 64, O15

# **Endogenous skill formation and education subsidy in a dual economy**

## **1. Introduction**

With the advent of globalization the services sector has been assuming growing importance in many developing economies. The service sector<sup>1</sup> is highly knowledge based and it needs highly skilled labour like doctors, advocates, computer experts, accountants. In a typical developing country there is scarcity of both capital and skilled labor. Therefore, economic growth induced by foreign capital inflows and skill formation are equally important from the perspective of these nations. However, most of the developing economies like India have a significant shortage of skilled labour. So, the formation of highly skilled labour should be given top priority in the growth process of the developing countries. Education works as catalyst to the process of skill formation. The spread of higher education enhances the speed of skill formation and thus a large volume of skilled labours can be generated in the economy. The poor cannot afford much for their education and in this situation, the role of the government is quite important here because it provides education subsidy to spread education and encourage skill formation.

Governments all over the world devote substantial resources to their education sector. This is especially true in developing countries. In 1995, public spending on education accounted for 15.7% of total government expenditure in developing countries (see Bedi and Garg (2000)). Furthermore, the majority of students in developing countries are educated in publicly funded and publicly managed educational institutions. According to Jimenez and Lockheed (1995), almost 90% of all primary and 70% of all secondary enrollments in developing countries are in public schools.

Now-a-days, in many developing economies the government plays a vital role in skill formation by providing education subsidy to the poor families. We observe this in many

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<sup>1</sup> This may be a healthcare sector providing healthcare facilities to the population.

Western countries also. Some developing countries employ statutory bodies to monitor the function of higher academic institutions. For example, in India there is the University Grant Commission (UGC) that has been coordinating, determining and maintaining standards of university education and teaching in the country for the last five decades or so. The UGC allocates grants to universities and colleges out of its own funds for their development or other general purposes and advises the central and state governments on disbursing grants to universities out of the Consolidated Fund of India. The education subsidy speeds up the rate of skill formation and this process has genuine effects on skilled-unskilled wage gap and unemployment of labour.

An important effect of the ongoing economic reforms is on the deteriorating skilled-unskilled wage inequality in the developing economies. Empirical studies strongly suggest that the skilled- unskilled wage gap has increased in many developing economies in the post reform period. The studies of Robbins (1994; 1995; 1996) and Wood (1997) etc. have shown that such wage inequality has downward trends in the East Asian countries, while in the Latin American countries like Mexico, Chile, Costa Rica and Columbia it has increased in the post reform period. The studies of Khan (1998) and Tendulkar et al. (1996) have also shown indirectly the increased wage inequality in many South Asian developing economies including India.

Theoretically, the deteriorating wage gap in the post reform period has been explained in the work of Feenstra and Hanson (1996), Marjit et al. (2004), Marjit and Acharyya (2003), Chaudhuri and Yabuuchi (2007) and Yabuuchi and Chaudhuri (2007). Feenstra and Hanson (1996) have shown that an inflow of foreign capital has led to the increased production of skilled intensive commodities in Mexico, thereby causing a falling relative demand for unskilled labour. Marjit et al. (2004) have shown that the nature of capital mobility between the formal and the informal sectors, the diverse trade pattern and market fragmentation in the world trade may adversely affect the skilled –unskilled wage gap in many developing economies. However, none of these papers analyze the process

of endogenous skill formation.<sup>2</sup> There is, however, a paper by Kar and Beladi (2004) that has studied the welfare implications of skill formation and international migration of both skilled and unskilled labor using a four-sector general equilibrium framework. However, they have not considered the inflow of foreign capital and its impact on skilled- unskilled wage inequality in the presence of skill formation.

Another important outcome of the reform programs has been significant rise in the unemployment problem. The unemployment problem may be voluntary or involuntary. But, economists and policymakers are concerned about the involuntary unemployment where unemployed workers are willing to work at a lower wage rate but cannot find any job owing to structural bottlenecks, insufficient demands, protectionist policies by the developed countries etc. Although in any general equilibrium model the existence of unemployment can be explained in different ways, the Harris-Todaro (1970) type unemployment has probably received the most attention because this structure captures quite a few number salient features of the developing countries e.g. economic dualism, labour market imperfection and the rural-urban migration phenomenon.

The present paper develops a three sector general equilibrium model by incorporating endogenous skill formation and unemployment of unskilled labour. Two types of labour are considered here: skilled and unskilled labour. The process of skill formation is generated on the part of the unskilled working families who determine the supply of unskilled workers on the basis of intertemporal utility maximization. The skilled labour is fully employed, whereas there is Harris-Todaro (1970) type unemployment of unskilled labour. The paper also assumes that the government provides an education subsidy which is financed by a part of the tariff revenues that reduces the cost of skill formation. Our theoretical analysis gives some interesting results. An inflow of foreign capital raises the price of the non-traded goods under some reasonable conditions. The non-traded sector may expand and the urban manufacturing sector may contract due to the inflow of foreign

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<sup>2</sup> As related, Stark (1998), Chau and Stark (1999) and Fan and Stark (2007) have studied skill formation and international migration by focusing on skill acquisition incentives created by the prospect of migration.

capital. The wage effect of the policy shows that both the skilled and the unskilled wage rates increase. However, the relative wage inequality (between skilled- unskilled labour) always worsens under some reasonable conditions. Further, an inflow of foreign capital may improve the urban unemployment problem of unskilled labour. The average unskilled wage (rural sector wage) increases and the urban unemployment level of unskilled labour may decrease. So, as a whole the economic conditions of the unskilled workers improve. However, as the relative wage inequality worsens, the income of the skilled labour rises more than that of unskilled labour. We have provided an explanation why the wage inequality deteriorates in the developing countries in a manner which is different from the Feenstra and Hanson (1996) paper. Besides, the urban unemployment problem of unskilled labour mitigates which is contrary to the standard Harris-Todaro (1970) result. The last but not least, the endogenous determination of the supply of unskilled labour has not much role to play in the whole theoretical exercise. Some of these results, especially that on unemployment is counterintuitive and new in the theoretical literature on trade and development and have important policy implications for a developing economy which is scarce in the supply of both skilled labour and unemployment.

## 2. The Model

In this model the supply of unskilled labour is endogenously determined from the intertemporal utility maximizing behaviour of the unskilled working families. We consider a small open dual economy consisting of  $\bar{L}$  and  $\bar{S}$  numbers of unskilled and skilled working families, respectively. The rural sector is the origin of all unskilled working families while the urban sector is the origin of the skilled working families. In each unskilled working family, there are  $n$  numbers of members. There are provisions for skill formation on the part of the unskilled workers. Each unskilled working family sends  $l_S$  number of members for skill formation while the remaining  $(n-l_S)$  members work as unskilled labour in period 1. In period 2,  $l_S$  members become skilled labour while the remaining  $(n-l_S)$  members continue to work as unskilled labour. We assume

that there is a separate capitalist class who are the owners of capital and they do not supply any labour. On the other hand, the question of skill formation on the part of skilled family members does not arise.

Our dual economy consists of three sectors: a rural sector and two urban sectors. The rural sector (sector 1) produces an agricultural commodity with the help of unskilled labour and capital. Sector 2 is an urban sector that produces a manufacturing commodity by means of both unskilled and skilled labour and capital. The unskilled labour market in sector 2 is imperfect. Here unskilled workers are organized and receive a higher unionized wage than what their counterparts receive in the agricultural sector. Due to the existence of a rural-urban wage gap some unskilled workers migrate to the urban sector to get jobs in the higher-paid sector 2. But all of them do not get jobs so that some of them remain as unemployed and hang around the urban sector with the hope that they would obtain jobs in the unionized sector in period 2. The skilled workers, however, receive a competitive wage. Sector 3 is the service sector that produces a non-traded high-skill product (services) by means of skilled labour and capital. So, unskilled labour is imperfectly mobile between sector 1 and sector 2. Skilled labour is mobile between sector 2 and sector 3 while capital is perfectly mobile among all the three sectors of the economy.

There is Harris-Todaro (1970) type unemployment of unskilled labour in the economy. Capital and skilled labour are fully utilized. Capital endowment of the economy consists of both domestic capital and foreign capital and these are perfect substitutes. Prices of commodities 1 and 2 are given by the small open economy assumption while price of commodity 3 is determined domestically. Competitive markets, except the urban market for unskilled labour, CRS technologies with diminishing marginal productivities of inputs are assumed. Finally, commodity 1 is taken to be numeraire.

The following notations will be used in the model.

$X_i$  = level of output produced in sector  $i$ ,  $i=1,2,3$ ;  $a_{ji}$  = amount of the  $j$ th input required to produce one unit of the  $i$ th commodity;  $\beta$  = time discount factor;  $L_i$  = level of employment in  $i$ th sector;  $P_1=1$  (commodity 1 is the numeraire);  $P_2$  = world price of commodity 2;  $P_3$  = domestically determined price of commodity 3;  $W$  = rural unskilled wage rate;  $W^*$  = unionized unskilled wage in sector 2;  $W_A$  = average unskilled wage rate;  $W_S$  = skilled wage rate;  $r$  = rate of return on capital;  $l_S$  = number of family members sent out for skill formation;  $\bar{L}$  = numbers of unskilled working families;  $\bar{S}$  = numbers of skilled working families;  $S$  = level of skilled workers;  $n$  = number of members in each unskilled working family;  $(n-l_S)$  = supply of unskilled labour by each unskilled working family;  $L=(n-l_S)\bar{L}$  = aggregate supply of unskilled labour in the economy;  $K$  = total stock of capital in the economy;  $K_D$  = stock of domestic capital in the economy;  $K_F$  = inflow of foreign capital in the economy;  $L_u$  = urban unemployment level of unskilled labour;  $\hat{\phantom{x}}$  = proportional change;  $V$  = level of utility enjoyed by each unskilled working family;  $C_i$  = consumption in the  $i$ th period,  $i=1,2$ ;  $B$  = the cost of skill formation per worker;  $E$  = amount of education subsidy provided by the Government;  $t$  = tariff rate;  $D_i$  = demand function for the  $i$ th commodity,  $i=1,2,3$ ;  $\theta_{ji}$  = distributive share of the  $j$ th input in the  $i$ th sector,  $i=1,2,3$ ;  $j=L,K,S$ ;  $\lambda_{ji}$  = proportion of the  $j$ th input employed in the  $i$ th sector,  $i=1,2,3$ ;  $j=L,K,S$ ;  $S_{jk}^i$  = the degree of substitution between factors  $j$  and  $k$  in the  $i$ th sector,  $i=1,2,3$  with  $S_{jk}^i > 0$  for  $j \neq k$  and  $S_{jj}^i < 0$ ;  $m$  = marginal propensity to consume the import good (commodity 2);  $Y$  = domestic factor income of the economy.



## 2.1 Household behaviour of unskilled working families and derivation of family supply function of unskilled labour

The supply function of unskilled labour by each working family is determined from its intertemporal utility maximizing behaviour. We consider a two period optimizing problem of the representative unskilled working family consisting of  $n$  members.  $l_S$  is the number of unskilled workers going for skill formation and they earn zero income in period 1. But in period 2 they earn the skilled wage  $W_S$  while  $(n-l_S)$  number of unskilled workers earns the unskilled wage  $W$  in both the periods. In the presence of positive return to skill formation, the skilled wage  $W_S$  is not at least less than  $W$ .<sup>3</sup>

We assume that each unskilled working family cares only about the lifetime family consumption. The utility is therefore a function of consumption levels in the two periods (1 and 2). For algebraic simplicity we assume a logarithmic utility function with unitary intertemporal elasticity of substitution.

$$V = \log C_1 + \beta \log C_2 \quad (1)$$

The first period's consumption ( $C_1$ ) consists of wage income of  $(n-l_S)$  number of family members that do not go for skill formation less the costs of skill formation of the  $l_S$  number of family members. The cost of skill formation per worker is  $B(E)$  which is a decreasing function of the amount of education subsidy,  $E$ , provided by the government. So,

$$C_1 = W(n-l_S) - l_S B(E) \quad (2)$$

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<sup>3</sup> This is because otherwise no one would be interested in skill formation.

The second period's consumption ( $C_2$ ) can be thought of as the sum of skilled wage of  $l_S$  members of the family who have been upgraded as skilled labour by that time and unskilled wage of  $(n-l_S)$  members who worked in period 1 as unskilled labour.

$$C_2 = W(n-l_S) + W_S l_S \quad (3)$$

So the costs of skill formation include both the opportunity cost in terms of forgone unskilled wage income of  $l_S$  members of the family plus direct costs,  $l_S B(E)$ .

The unskilled working family maximizes the lifetime utility (Equation (1)) with respect to  $l_S$  and subject to (2) and (3). Maximization gives the following first-order condition<sup>4</sup>

$$(W_S - W)(1 + \beta)l_S [W + B(E)] = Wn [\beta(W_S - W) - \{W + B(E)\}] \quad (4)$$

So, the family supply function of unskilled labour is<sup>5</sup>

$$(n-l_S) = \frac{n}{(1+\beta)} \left[ \frac{W_S}{(W_S - W)} + \frac{\beta B(E)}{\{W + B(E)\}} \right] \quad (5)$$

The aggregate supply function of unskilled labour in the economy is given by

$$L = (n-l_S)\bar{L} = \frac{n\bar{L}}{(1+\beta)} \left[ \frac{W_S}{(W_S - W)} + \frac{\beta B(E)}{\{W + B(E)\}} \right] \quad (6)$$

In general form, this function may be written as<sup>6</sup>

$$L = L(W, W_S, E) \quad (7)$$

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<sup>4</sup> Interested readers can check these results or can obtain proofs from the authors on request.

<sup>5</sup> Interested readers can check these results or can obtain proofs from the authors on request.

<sup>6</sup> Interested readers can check these results or can obtain proofs from the authors on request.

where  $\frac{\partial L}{\partial W} > 0$  if  $\left(\frac{\beta W_S - B}{W(1+\beta)}\right) \leq 2$

(This implies that  $W$  is not sufficiently low.)

$$\text{and } \left. \frac{\partial L}{\partial W_S} < 0, \frac{\partial L}{\partial E} < 0 \right\} \quad (8)$$

## 2.2. The general equilibrium structure of the model:

Now, we describe the general equilibrium structure of the model in the following way

The competitive profit conditions are given by the price unit cost equalities:

$$W a_{L1} + r a_{K1} = 1 \quad (9)$$

$$W^* a_{L2} + W_S a_{S2} + r a_{K2} = P_2(1+t) \quad (10)$$

$$W_S a_{S3} + r a_{K3} = P_3 \quad (11)$$

The capital endowment of the economy consists of both domestic and foreign capital, which, are perfect substitutes. Full employment of capital is given by

$$a_{K1} X_1 + a_{K2} X_2 + a_{K3} X_3 = K_D + K_F = K \quad (12)$$

Skilled labour is also fully employed and the full-employment condition is given by

$$a_{S2} X_2 + a_{S3} X_3 = S \quad (13)$$

However, unskilled labour is not fully employed. There is Harris-Todaro (HT) unemployment of unskilled labour and its endowment equation is as follows.

$$a_{L1} X_1 + a_{L2} X_2 + L_u = L(W, W_S, E) \quad (14)$$

The aggregate supply function of unskilled labour is endogenously determined and is given by

$$L = L(W, W_S, E) \quad (15)$$

It satisfies the following properties.  $\frac{\partial L}{\partial W} > 0$  if  $\left(\frac{\beta W_S - B}{W(1+\beta)}\right) \leq 2$ ;  $\frac{\partial L}{\partial W_S} < 0$ ,  $\frac{\partial L}{\partial E} < 0$ .

In an HT framework the unskilled labour allocation mechanism is such that in the labor market equilibrium, the rural wage rate,  $W$ , equals the expected wage income in the urban sector. Since the probability of finding a job in the urban low-skill manufacturing sector is  $(a_{L2}X_2 / (a_{L2}X_2 + L_u))$  the expected unskilled wage in the manufacturing sector is  $(W^* a_{L2}X_2 / (a_{L2}X_2 + L_u))$ . Therefore, the rural-urban migration equilibrium condition of unskilled labour is expressed as

$$(W^* a_{L2}X_2 / (a_{L2}X_2 + L_u)) = W ,$$

or equivalently,

$$a_{L1}X_1 + \frac{W^*}{W} a_{L2}X_2 = L(W, W_S, E) \quad (16)$$

The demand functions for commodity 2 and commodity 3 are respectively given as follows.

$$D_2 = D_2(P_2^*, P_3, Y) \quad (-) (+)(+) \quad (17)$$

and,

$$D_3 = D_3(P_2^*, P_3, Y) \quad (+) (-)(+) \quad (18)$$

As foreign capital income is completely repatriated the expression for national income at domestic prices is given by

$$Y = X_1 + P_2^* X_2 + P_3 X_3 - rK_F + tP_2 (D_2 - X_2) - E \quad (19)$$

or equivalently,

$$Y = WL(W, W_s, E) + rK_D + W_S S - rK_F + \{tP_2 (D_2 - X_2) - E\} \quad (19.1)$$

It is assumed that government's total revenue consists of tariff revenue. A part of the revenues is spent for providing educational subsidies and the remaining part is paid back to the consumers in a lump-sum manner.

The output of market 3 is non-traded. So its market must clear domestically by demand-supply mechanism. Thus, the market equilibrium condition for commodity 3 is given by

$$D_3(P_2^*, P_3, Y) = X_3 \quad (20)$$

There are three groups of unskilled workers in this system earning different wages. Unskilled workers employed in the rural sector and the organized urban sector receive a competitive wage,  $W$ , and the unionized wage,  $W^*$ , respectively while the unemployed urban workers earn nothing.

The average wage for unskilled labour is given by

$$W_A \equiv (W \lambda_{L1} + W^* \lambda_{L2}) \quad (21)$$

where  $\lambda_{L1}$  and  $\lambda_{L2}$  denote the proportion of unskilled labour employed in sectors 1 and 2, respectively. Using (16), equation (21) can be simplified to:<sup>7</sup>

$$W_A = W \quad (21.1)$$

Our model consists of eleven equations (9-16, 19, 20, 21.1) that determine eleven endogenous variables:  $W_s, W, W_A, r, P_3, X_1, X_2, X_3, L, L_u, Y$ . The general equilibrium properties of the model are described as follows.  $W_s$  and  $r$  are determined from

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<sup>7</sup> The average wage of the workers (unskilled workers in this case) in a Harris-Todaro (HT) economy is equal to the rural sector wage. This is a celebrated result in the development literature and is known as the 'envelope property' of the HT structure.

Equations (10) and (11) in terms of  $P_3$ . Plugging  $r$  in (9)  $W$  is determined. Using (17)  $Y$  is obtained as function of  $P_3$  from (19). The values of  $X_1, X_2$  and  $X_3$  are obtained as functions of  $P_3$  from equations (12), (13) and (16).  $P_3$  is solved from (20). Once  $P_3$  is known the equilibrium values of all the variables are known as functions of the system parameters. Finally,  $L$  and  $L_u$  are obtained from equations (15) and (14), respectively.

### 3. Comparative statics:

We are now going to examine the effects of inflow of foreign capital on the skilled-unskilled wage gap and unemployment of unskilled labour in our small open economy.

Totally differentiating Equations (9) – (13), (15) – (18), (19), (20) and using the Walrasian static stability condition in the market for commodity 3 and equation (21.1) and simplifying we can prove<sup>8</sup> the following result can be obtained.

**Proposition 1:** Even in the presence of endogenous skill formation an inflow of foreign capital raises the skilled–unskilled wage inequality in a developing economy.

The result as presented in proposition 1 can intuitively be explained as follows. In this indecomposable production system factor prices apart from commodity prices hinges on factor endowments. An increase in  $K_F$  implies a reduction in the return to capital,  $r$ , which in turn affects both the skilled wage and the competitive unskilled wage. The direction of relative wage movements crucially depends on the rates of wage increases in the two sectors. As the return to capital falls, from the zero-profit conditions for sector 1 and sector 2 it entails that saving on capital cost must lead to increases in both the wages, (rural unskilled wage and skilled wage). But which wage, skilled or unskilled, increases more must depend on the factor intensity conditions. As unskilled workers in sector 2 receive the exogenously fixed unionized wage, we should bring both sector 1 and sector 2

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<sup>8</sup> Interested readers can check these results or can obtain proofs from the authors on request.

in the picture. This is because for a change in capital cost the two wages (skilled and competitive unskilled wage) can change only if both of them are market determined. But, as two different types of labour are involved in this case we cannot say that one sector is skilled labour-intensive and the other is unskilled labour-intensive. However, as capital is the only common intersectorally mobile input and can vary freely due to any changes in system parameters we can still classify the two sectors in a very special sense of Jones and Neary (1984) in terms of distributive shares of capital. If  $(\theta_{K2} > \theta_{K1})$ , sector 2 is more capital-intensive and while sector 1 is less capital-intensive. In the case where  $(\theta_{K2} > \theta_{K1})$ , capital cost would decrease more in sector 2 than in sector 1. Consequently, under this special capital intensity condition the proportion of increase in skilled wage ( $W_S$ ) would be greater than that in competitive unskilled wage ( $W$ ). The relative wage inequality thus worsens.<sup>9</sup>

Again taking total differentials of equations (14) and using (11), (13), (15), (17) and (18) the following proposition readily follows.

**Proposition 2:** When unskilled manufacturing sector is less capital-intensive relative to the skilled service sector an inflow of foreign capital lowers the level of urban unemployment of unskilled labour in a developing economy if  $|\lambda| < 0$ .<sup>10</sup>

In this indecomposable production system factor prices apart from commodity prices depend on factor endowments. An increase in  $K_F$  implies a reduction in the return to capital,  $r$ , which in turn affects both skilled wage and competitive unskilled wage. Sector 2 and sector 3 jointly form a HOSS as they use two common inputs, skilled labour and

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<sup>9</sup> This result does not depend on the sign of  $|\theta|$ . We find that  $|\theta| = (\theta_{L1}\theta_{S2}\theta_{S3}(\frac{\theta_{K3}}{\theta_{S3}} - \frac{\theta_{K2}}{\theta_{S2}})) > (<)0$  according to  $(\frac{\theta_{K3}}{\theta_{S3}} > (<)\frac{\theta_{K2}}{\theta_{S2}})$ . See appendix for details.

<sup>10</sup> An inflow of foreign capital produces ambiguous effects on the unemployment of unskilled labour if  $|\theta| > 0, |\lambda| < 0$  or  $|\theta| < 0, |\lambda| > 0$ .

capital. In the migration equilibrium the expected urban wage for a prospective rural migrant equals the actual rural wage. We are considering the case where sector 3 is more capital-intensive vis-à-vis sector 2. Sector 3 might be services sectors like healthcare sector where the capital intensity of production is significantly high. In other words, this sector uses capital (skilled labor) more (less) intensively than sector 2. An inflow of foreign capital affects the migration equilibrium in two ways. First, the urban sector contracts when  $|\lambda| < 0$  as capital is drained out from sector 2 to other sectors. This leads to a decrease in the number of jobs available in this sector. Hence the expected urban wage for a prospective rural migrant,  $\{W^*/1 + (L_u/a_{L3}X_3)\}$ , falls as the probability of getting a job in this sector rises for every worker. This paves the way for reverse migration from the urban sector to the rural sector. This is negative the centrifugal force that instead of driving the rural workers to move away from the rural sector sends many of them back to the latter sector. If the rural sector wage remains unchanged, the number of new jobs abolished in the urban sector falls short of the number of new rural bound workers from the urban sector. In such a situation, the level of urban unemployment falls unambiguously. If the rural sector wage remains unchanged, the urban unemployment level plummets unequivocally. This is the contrary to the result as obtained in the two sector mobile capital HT model such as Corden and Findlay (1975). However, there is another effect in the picture too. The rural sector wage rises, which would attract people to remain in the rural sector. This is the positive centripetal force that prevents rural workers from migrating into the urban sector. Thus, both the the centripetal and the centrifugal forces work in the same direction. The urban unemployment level of unskilled labour decreases when  $|\lambda| < 0$ .<sup>11</sup>

However, if  $|\lambda| > 0$ , sector 2 expands and sector 3 contracts. More jobs are now created in the urban sector. The centrifugal force would now be positive leading to a fresh

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<sup>11</sup> Interested readers obtain proofs from the authors on request.



migration for the rural to the urban sector. As there are now two forces working in the opposite direction to each other, the net result would be ambiguous.

#### **4. Concluding remarks:**

Developing countries have placed a high priority on skill formation to overcome the scarcity of skilled labor. They have subsidized their education system and also allowed the inflow of foreign capital in the economy. In this circumstance, one pertinent question arises: how the inflow of foreign capital affects wage inequality and unemployment of unskilled labour in the presence of skill formation. The present paper is designed to provide answer to the above question in terms of a three-sector Harris-Todaro (1970) type general equilibrium model with endogenous skill formation and unemployment of unskilled labour. The process of skill formation is undertaken in the unskilled sector where each unskilled working family decides how many workers to send for skill formation on the basis of the intertemporal utility maximisation. This gives birth to the endogenous supply of unskilled labour. The process of skill formation entails some costs, a part of which is borne by the government's subsidy on education. So the average cost of acquiring skill is a decreasing function of the education subsidy provided by the Government.

Our analysis shows that under some reasonable conditions an inflow of foreign capital may raise the price of the non-traded goods. The urban manufacturing sector may contract whereas the non-traded sector may expand with the inflow of foreign capital. This policy pushes both the skilled and the unskilled wages upward and also raises the skilled-unskilled wage gap. Further, an inflow of foreign capital may lower the level of urban unemployment of the unskilled labour in a small open economy under some reasonable conditions. Some of these results are counterintuitive to the standard literature and these results may provide a theoretical foundation of the empirical findings regarding the behaviour of macroeconomic variables like unemployment, wage inequality and domestic price in the post reform period.

So, the unskilled labour force in isolation becomes better off as the unemployment level decreases and the average wage (rural sector wage) increases. But, if we compare their relative position with skilled labour, they become relatively worse off as the skilled-unskilled wage inequality worsens i.e. the skilled wage rises at a higher rate than the average unskilled wage. The result on unemployment of unskilled labour is contrary to conventional Harris-Todaro (e.g. Corden and Findlay (1975)) result that an urban development policy becomes counterproductive.

### **References:**

Bedi, A.S. and Garg, A. (2000) The Effectiveness of Private Versus Public Schools: The Case of Indonesia, *Journal of Development Economics*, 61, 463-494.

Chau, N. and Stark, O. (1999). Migration Under Asymmetric Information and Human Capital Formation, *Review of International Economics*, 7, 455–483.

Chaudhuri, S. and Yabuuchi, S. (2007) Economic Liberalisation and Wage Inequality in the Presence of Labour Market Imperfection, *International Review of Economics and Finance*, 16(4), 592-603.

Corden, W. M. and Findlay, R. (1975)) Urban Unemployment, Intersectoral Capital Mobility and Development Policy in a Dual Economy, *Economica*, 42, 59-78.

Fan, C. Simon and Stark, Oded. (2007). International Migration and “Educated Unemployment”, *Journal of Development Economics*, 83, 76–87.

Feenstra, R.C., Hanson, G.H. (1996) Foreign Direct Investment and Relative Wages: Evidence from Mexico’s Maquiladoras, *Journal of International Economics*, 42, 371-394.

Harris, J.R. and Todaro, M.P. (1970) Migration, Unemployment and Development: A Theoretical Analysis, *American Economic Review*, 60, 126-142.

Jimenez, E. and Lockheed, M. (1995) Public and Private Secondary Education in Developing Countries: A Comparative Study, World Bank Discussion Paper, no. 309. The World Bank, Washington, DC.

Jones, R.W. and Neary, P. (1984) Positive Theory of International Trade, Jones, R.W. and Kenen, P.B. (eds.), Handbook of Development Economics, Vol.1. North-Holland, Amsterdam, 1-62.

Khan, A.R. (1998) The Impact of Globalisation in South Asia, in A.S. Bhalla (ed.), Globalisation, Growth and Marginalisation, Macmillan India Ltd, New Delhi.

Marjit, S., Acharyya, R. (2003) International Trade, Wage Inequality and the Developing Economy-A General Equilibrium Approach, Germany:Springer-Verlag.

Marjit, S., Beladi, H. and Chakraborty, A.(2004) Trade and Wage Inequality in Developing Countries, Economic Inquiry, 42(2), 295-303.

Robbins, D. (1994) Malaysian Wage Structure and its Causes, Harvard Institute for International Development (HIID).

Robbins, D. (1995) Trade, Trade Liberalisation and Inequality in Latin America and East Asia: Synthesis of Seven Country Studies, HIID.

Robbins, D. (1996) Stolper-Samuelson Lost in the Tropics-Trade liberalisation and Wages in Columbia, HIID.

Stark, O., Helmenstein, C. and Prskawetz, A. (1998). Human Capital Depletion, Human Capital Formation and Migration: A Blessing or a Curse, Economics Letters, 60, 363–367.

Tendulkar, S., Sundaram, D.K. and Jain, L R. (1996) Macroeconomic Policies and Poverty in India 1966-67 to 1993-94, Manuscript. ILO, New Delhi.

Wood, A. (1997) Openness and Wage Inequality in Developing Countries: The Latin American Challenge to East Asian Conventional Wisdom, World Bank Research Observer, January.

Yabuuchi, S., Chaudhuri, S. (2007) International Migration of Labour and Skilled – Unskilled Wage Inequality in a Developing Economy, Economic Modelling, 24(1), 128-137.