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Abstract: The paper develops a three-sector specific factor model with Harris-Todaro type unemployment to examine the consequences of international factor mobility on the skilled-unskilled wage inequality and urban unemployment of unskilled labour in a small open dual economy. The theoretical analysis shows that the consequences of international factor mobility on wage inequality may not necessarily depend on the difference in the factor intensity condition. Only when the unskilled wage in the low-skill urban sector is positively related to the rural wage, factor intensity conditions do matter. An emigration of skilled labour or an inflow of foreign capital may move the wages in favour of the unskilled labour and lower the magnitude of urban unemployment only if the low-skill urban sector is capital-intensive (in a special sense). But, an immigration of unskilled labour produces exactly the opposite effects. The paper argues that provided the government undertakes supplementary measures to curb trade union power and prevent illegal immigration of unskilled labour, abundant inflows of foreign capital might be a solution to both deteriorating wage inequality and increasing unemployment of unskilled labour in the liberalized regime.

JEL classification: F13; J31

Keywords: Skilled labour; unskilled labour; foreign capital; wage inequality; Harris-Todaro type unemployment; Emigration (immigration) of labour; unionized wage

WAGE INEQUALITY IN A DUAL ECONOMY AND INTERNATIONAL MOBILITY OF FACTORS: DO FACTOR INTENSITIES ALWAYS MATTER?

1. Introduction:

Liberalized economic policies, according to the celebrated Stolper-Samuelson theorem, were expected to lower the skilled-unskilled wage inequality in the developing countries following increases in the prices of the export commodities as these are generally exporters of commodities that are intensive in the use of unskilled labour. But empirical studies strongly suggest that the wage inequality has increased in many developing economies during the liberalized regime. From the empirical studies of Robbins (1994, 1995, 1996) and Wood (1997) it has been found that while the inequality has narrowed in the East Asian countries, the Latin American countries like Mexico, Chile, Costa Rica and Columbia have experienced increasing skilled-unskilled wage gap following the liberalized trade and investment policies. Besides, there are some indirect studies e.g. Khan (1998) and Tendulkar et al. (1996), which point out that economic reforms have led to a deteriorating wage inequality in the South Asian countries including India as well.

The theoretical literature explaining the deteriorating wage inequality in the Southern countries includes works of Feenstra and Hanson (1996), Marjit, Broll and Sengupta (2000), Marjit, Beladi and Chakrabarti (2004), Marjit and Kar (2005), Chaudhuri and Yabuuchi (2006), and Yabuuchi and Chaudhuri (2006). They have shown how trade liberalization, inflows of foreign capital and international mobility of labour both skilled and unskilled might produce unfavourable effects on the wage inequality in the developing world given the specific structural characteristics of the less developed countries, such as features of labour markets, structures of production, nature of capital mobility etc. The paper of Feenstra and Hanson (1996) is based on the famous Dornbusch-Fischer-Samuelson continuum-of-goods framework. According to them, inflows of foreign capital induced greater production of skilled-intensive commodities in Mexico, thereby leading to a relative decrease in the demand for unskilled labour. Besides, Marjit, Broll and Sengupta (2000) have examined the impact of trade liberalization on the wage inequality in the presence of informal sectors. They have shown that the impact of trade on skilled-unskilled wage gap crucially hinges on the nature of capital mobility between the formal and informal sectors. An important piece of work in this area is that of Marjit, Beladi and Chakrabarti (2004) who have analyzed how diverse trade pattern and market fragmentation in world trade can adversely affect the skilled-unskilled wage inequality in the developing countries. They have also studied the

consequences of an improvement of terms of trade and inflows of foreign capital on wage inequality with or without trade fragmentation. The paper finds that without trade fragmentation improvements in terms of trade and/or inflows of foreign capital may worsen wage inequality if the vertically integrated skilled export sector is more capital intensive vis-à-vis the import-competing sector. Marjit and Kar (2005) have examined the consequence of emigration of skilled and unskilled labour on the wage inequality in an otherwise 2×3 specific factor model of Jones (1971). They have shown that unskilled (skilled) emigration worsens (improves) the wage inequality under the necessary and sufficient condition that the distributive share of the intersectorally mobile factor (i.e. capital) of the skilled sector is greater (lower) than that of the unskilled sector. Chaudhuri and Yabuuchi (2006), on the other hand, have found that an inflow of foreign capital and/or a policy of labour market reform may raise the competitive unskilled wage and improve wage inequality under reasonable factor intensity condition. The result of labour market reform is interesting as it is contrary to the conventional wisdom. Finally, Yabuuchi and Chaudhuri (2006) have studied the consequences of international mobility of both skilled and unskilled labour on the wage inequality in terms of a three-sector general equilibrium model with distortion in the market for unskilled labour and have found that an emigration (immigration) of either type of labour is likely to produce a favourable (an unfavourable) effect on the wage inequality. All these works highlight the importance of the difference in the factor intensity conditions in predicting the outcomes of the liberalized economic policies on the relative wage movements.

Unfortunately, the theoretical literature on trade and developed so far has adopted the full-employment framework and hence ignored the problem of unemployment, especially that of unskilled labour which is a salient feature of the developing countries. These economies are plagued by significant degree of skilled-unskilled wage inequality and high levels of unemployment of unskilled labour, especially in the urban areas. The developing economies have chosen free trade as their development strategy, opened up their economies to the outside world to a considerable extent and have been able to attract a substantial amount of foreign capital during the last two decades. Besides, the widening gap between consumption expectations and the available standard of living within structural constraints of the developing countries, combined with easy access to information and migration networks, have led to widespread emigration of skilled labour from these countries. Large-scale international migration of workers from a developing country, irrespective of whether skilled or unskilled, and/or inflows of foreign

capital should produce significant effects on overall employment and wages and consequently on the skilled-unskilled wage gap in that country.

The objectives of the present paper are to (i) construct a three-sector specific factor model with Harris-Todaro (1970) type unemployment that can be useful in analyzing the consequences of international mobility of factors of production on the skilled-unskilled wage inequality in a dual economy setup; (ii) examine the necessity of the difference in factor intensity condition in predicting the relative wage movements; (iii) analyze the outcomes of international factor movements on the problem of urban unemployment of unskilled labour; and, to (iv) suggest policy measures which can cause wages move in favour of unskilled labour and mitigate the problem of unemployment of unskilled labour. The analysis finds that the consequences of international factor mobility of factors on the wage inequality do not necessarily hinge on the difference in factor intensity condition and can be unambiguously predicted when the unionized unskilled wage in the urban sector is insensitive to the rural wage. In contrast, these effects crucially depend on the factor intensity conditions when the unionized unskilled wage is positively related to the rural wage. In the latter case, an emigration of skilled labour or an inflow of foreign capital improves the wage inequality if the low-skill urban sector is capital-intensive (in a special sense) vis-à-vis the high-skill sector. On the contrary, an immigration of unskilled labour worsens the wage inequality under the same capital intensity condition. Besides, an outflow of skilled labour or an inflow of foreign capital may lower the level of urban unemployment of unskilled labour while an immigration of unskilled labour unequivocally accentuates this problem. These results have important policy implications for an overpopulated developing economy like India.[1]

2. The Model

We consider a small open dual economy with two broad sectors: rural and urban. The urban sector is further subdivided into two sub-sectors: low-skill sector and high-skill sector so that in total we have three sectors. The rural sector (sector 1) produces a primary agricultural commodity using unskilled labour and land. Sector 2 produces a high-skill manufacturing commodity with the help of skilled labour and capital. Sector 3 uses unskilled labour and capital to produce a low-skill manufacturing product. So land and skilled labour are specific factors in sectors 1 and 2,

[1] This has been discussed in details in section 3.4.

respectively. Capital is perfectly mobile between sectors 2 and 3. Unskilled workers employed in the low-skill urban sector (sector 3) earn a unionized wage, W^*, while their counterparts in the rural sector earn a competitive wage, W. The two unskilled wage rates are related by the Harris-Todaro (1970) condition of migration equilibrium where the expected urban wage equals the rural wage rate and $W^* > W$. Production functions exhibit constant returns to scale with diminishing marginal productivity to each factor. Markets, except the urban unskilled labour market, are perfectly competitive. All the three commodities are traded internationally. Hence their prices are given internationally. The diverse trade pattern of the economy is reflected in the fact that it exports the primary agricultural and the high-skill manufacturing commodities while it is a net importer of the low-skill manufacturing commodity. Commodity 1 is chosen as the numeraire.

The following symbols will be used in the equations.

a_{ji} = amount of the capital-output ratio in the ith sector, $i = 2,3$;

a_{N1} = land-output ratio in sector 1;

a_{Li} = unskilled labour-output ratio in the ith sector, $i = 1,3$;

a_{S2} = skilled labour-output ratio in sector 2;

P_i = exogenously given relative price of the i th commodity, $i = 2,3$;

X_i = level of output of the i th sector, $i = 1,2,3$;

W_S = wage rate of skilled labour;

b = minimum unskilled wage sector 3;

W^* = unionized unskilled wage in sector 3;

W = competitive wage rate of unskilled labour in sector 1;

R = return to land;

r = return to capital;

E_W = elasticity of the unionized wage rate, W^*, with respect to the rural wage, W;

L = endowment of unskilled labour;

L_U = urban unemployment of unskilled labour;

S = endowment of skilled labour;

N = endowment of land;

K = capital stock of the economy (domestic plus foreign);

θ_{ji} = distributive share of the j th input in the i th sector for $j = L, S, N, K$ and $i =$ 1, 2, 3;

λ_{ji} = proportion of the j th input employed in the i th sector for $j = L, K$ and $i = 1,2,3$;

S_{ji}^{k} = the degree of substitution between factors j and i in the k th sector, $j, i = L, N, S, K$; and, $k =$ 1,2,3. For example, $S_{LN}^{1} \equiv (R / a_{L1})(\partial a_{L1} / \partial R)$, $S_{LL}^{1} \equiv (W / a_{L1})(\partial a_{L1} / \partial W)$ etc. $S_{ji}^{k} > 0$ for $j \neq i$; and, $S_{jj}^{k} < 0$;

'$\wedge$'= proportionate change.

A general equilibrium of the system is represented by the following set of equations:

$$Wa_{L1} + Ra_{N1} = 1 \tag{1}$$

$$W_S a_{S2} + ra_{K2} = P_2 \tag{2}$$

$$W^* a_{L3} + ra_{K3} = P_3 \tag{3}$$

$$a_{N1} X_1 = N \tag{4}$$

$$a_{S2} X_2 = S \tag{5}$$

$$a_{K2} X_2 + a_{K3} X_3 = K \tag{6}$$

$$a_{L1} X_1 + a_{L3} X_3 + L_U = L \tag{7}$$

Equations (1), (2) and (3) are the three competitive industry equilibrium conditions in the three sectors. On the other hand, equations (4) − (6) are the full-employment conditions for land, skilled-labour and capital[2], respectively. The unskilled labour endowment is given by (7).

Since the probability of finding a job in the low-skill urban manufacturing sector is $a_{L3} X_3 / (a_{L3} X_3 + L_U)$, the expected unskilled wage in the urban area is $(W^* a_{L3} X_3) / (a_{L3} X_3 + L_U)$. Therefore, the allocation mechanism of unskilled labour between rural and urban areas is expressed as

$(W^* a_{L3} X_3) / (a_{L3} X_3 + L_U) = W$,

[2] It is assumed that the capital stock of the economy consists of both domestic and foreign capital which are perfect substitutes. It may be mentioned that this assumption has been widely used in the theoretical literature on trade and development.

or equivalently,

$$(W^*/W)a_{L3}X_3 + a_{L1}X_1 = L \quad (8)$$

The low-skill urban sector faces a unionized unskilled labour market. The relationship for the unionized wage rate is specified as[3]:

$$W^* = b + F(W);\ b > 0;\ \text{and,}\ F'(.) \geq 0 \quad (9)$$

The unionized urban wage, W^*, is at least equal to the minimum unskilled wage, b. $W^* > b$ when W^* is a positive function of the rural wage, W. The firms in the low-skill urban sector have well-organized trade unions. One of the most important roles of the labour unions is to bargain with their respective employers in respect of the betterment of the working conditions. Trade union activities ensure that the minimum wage legislation of the government is binding so that the workers in the urban sector receive at least the minimum unskilled wage. Furthermore, through offer of negotiation, threat of strike, actual strike etc. they exert pressure on the employers (firms) in order to secure higher wages, reduced hours of work, share in profits and other benefits. Organized workers in large firms leave no stones unturned so as to reap wages higher than the stipulated minimum wage[4]. Therefore, it is sensible to assume that the unionized unskilled wage in sector 3 exceeds the competitive rural unskilled wage i.e. $W^* > W$. The unionized wage may increase if the rural sector wage rises. Finally, $E_W = ((\partial W^*/\partial W)/(W/W^*))$; and, $1 > E_W \geq 0$; where E_W is the elasticity of W^* with respect to W.

Using (9) equation (3) can be rewritten as

$$(b + F(W))a_{L3} + ra_{K3} = P_3 \quad (3.1)$$

Besides, using (4) and (5) equations (6) and (8) can be rewritten as follows.

$$a_{K3}X_3 + (a_{K2}S/a_{S2}) = K\ ;\ \text{and,} \quad (6.1)$$

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[3] Assuming that each formal sector firm has a separate trade union, the unionized wage function may be derived as a solution to the Nash bargaining game between the representative firm and the representative union in the low-skill manufacturing sector. For detailed derivation see Chaudhuri (2003).

[4] See Bhalotra (2002) in this context.

$$(W^*/W)a_{L3}X_3 + (a_{L1}N/a_{N1}) = L \qquad (8.1)$$

There are nine endogenous variables in the system: $W, W^*, W_S, R, r, X_1, X_2, X_3$ and L_U.[5] We note that this production structure does not possess the decomposition property. W, W_S, R, r and X_3 are determined by solving equations (1), (2), (3.1), (6.1) and (8.2) simultaneously. W^* is found from (9) once W is obtained as these are functions of factor price ratios. When the factor prices are known the factor coefficients, a_{ji} s, are also known. X_1 and X_2 are obtained from equations (4) and (5), respectively. Finally, L_U is found from (7).

There are three groups of unskilled workers in this system earning different wages. Unskilled workers employed in the rural and the low-skill urban sectors 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

$$W_A \equiv (W\lambda_{L1} + W^*\lambda_{L3}) \qquad (10)$$

where λ_{L1} and λ_{L3} denote the proportion of unskilled labour employed in sectors 1 and 3, respectively. Using (8.1), equation (10) can be simplified to:[6]

$$W_A = W \qquad (10.1)$$

3. Comparative statics:

We shall now examine the consequences of international mobility of different factors of production on the skilled-unskilled wage inequality as well as on the level of urban unemployment of unskilled labour. Although skilled labour, unskilled labour and capital move from one country to another simultaneously, to establish ideas we consider the effects of each of these changes one at a time.

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[5] W^* is an endogenous variable only if it is a function of the rural wage, W. Otherwise, it is a parameter.

[6] The average wage of the workers (unskilled workers in this case) in a Harris-Todaro economy is equal to the rural sector wage. This is known as the 'envelope property'.

3.1 ***International mobility of factors and wage inequality***

Totally differentiating equations (1), (2), (3.1), (6.1) and (8.1) and solving by Cramer's rule we derive the following expressions.[7]

$$\hat{W} = (\frac{\theta_{N1}\theta_{S2}\theta_{K3}}{\Delta})[(W * \lambda_{L3} / W)(\hat{K} - \lambda_{K2}\hat{S}) - \lambda_{K3}\hat{L}] \tag{11}$$

$$\hat{W}_S = (\frac{\theta_{N1}\theta_{K2}E_W\theta_{L3}}{\Delta})[(W * \lambda_{L3} / W)(\hat{K} - \lambda_{K2}\hat{S}) - \lambda_{K3}\hat{L}]; \tag{12}$$

$$\hat{r} = -(\frac{\theta_{N1}\theta_{S2}E_W\theta_{L3}}{\Delta})[(W * \lambda_{L3} / W)(\hat{K} - \lambda_{K2}\hat{S}) - \lambda_{K3}\hat{L}]; \text{ and,} \tag{13}$$

$$\hat{X}_3 = (\frac{\theta_{S2}}{\Delta})(\hat{K} - \lambda_{K2}\hat{S})[\theta_{L1}\theta_{K3}A_5 + \theta_{N1}E_W\theta_{L3}A_6 - \theta_{N1}\theta_{K3}A_4]$$

(+) (+) (+) (–)

$$+ (\frac{\theta_{N1}\hat{L}}{\Delta})[\theta_{K2}E_W\theta_{L3}A_3 + \theta_{S2}(E_W\theta_{L3}A_2 + \theta_{K3}A_1)] \tag{14}$$

(+) (+) (+) (+)

where: $A_1 = \lambda_{K3}S^3_{KL}E_W > 0;$

$A_2 = [\lambda_{K3}S^3_{KL} + \lambda_{K2}(S^2_{KS} + S^2_{SK})] > 0;$

$A_3 = \lambda_{K2}(S^2_{KS} + S^2_{SK}) > 0;$

$A_4 = [(W * \lambda_{L3} / W)(E_W - 1 - S^3_{LK}E_W) - \lambda_{L1}(S^1_{LN} + S^1_{NL})] < 0;$ (15)

$A_5 = \lambda_{L1}(S^1_{LN} + S^1_{NL}) > 0;$

$A_6 = (W * \lambda_{L3}S^3_{LK} / W) > 0$; and,

$$\Delta = \theta_{S2}\theta_{K3}[\theta_{L1}\lambda_{K3}A_5 + \theta_{N1}(A_1\frac{W*}{W}\lambda_{L3} - \lambda_{K3}A_4)]$$

(+) (+) (–)

$$+ \theta_{N1}E_W\theta_{L3}[\theta_{S2}(A_2\frac{W*}{W}\lambda_{L3} + A_6\lambda_{K3}) + \theta_{K2}A_3\frac{W*}{W}\lambda_{L3}] > 0 \tag{16}$$

(+) (+) (+)

[7] See Appendix I for detailed derivations.

Using (10.1), (11) and (12) one can write:

$$(\hat{W}_S - \hat{W}_A) = (\hat{W}_S - \hat{W}) = (\frac{\theta_{N1}}{\Delta})(\theta_{K2}E_W\theta_{L3} - \theta_{S2}\theta_{K3})[(\frac{W^*}{W})\lambda_{L3}(\hat{K} - \lambda_{K2}\hat{S}) - \lambda_{K3}\hat{L}] \quad (17)$$

Noting that $1 > E_W \geq 0$, from (17) one can easily obtain the following results:

$$\left.\begin{array}{l} \text{(i) } (\hat{W}_S - \hat{W}) < 0 \text{ when } \hat{S} < 0 \text{ if } (\theta_{K2}\theta_{L3} < \theta_{S2}\theta_{K3}); \\ \text{(ii) } (\hat{W}_S - \hat{W}) < 0 \text{ when } \hat{K} > 0 \text{ if } (\theta_{K2}\theta_{L3} < \theta_{S2}\theta_{K3}); \\ \text{(ii) } (\hat{W}_S - \hat{W}) > 0 \text{ when } \hat{L} > 0 \text{ if} (\theta_{K2}\theta_{L3} < \theta_{S2}\theta_{K3}) . \end{array}\right\} \quad (18)$$

We can now establish the following proposition.

PROPOSITION 1: An emigration of skilled labour or an inflow of foreign capital improves the skilled-unskilled wage inequality if the low-skill manufacturing sector is capital-intensive (in a special sense)[8] vis-vis the high-skill sector. An immigration of unskilled labour worsens the wage inequality under the same capital intensity condition.

Proposition 1 can be intuitively explained as follows. An emigration of skilled labour leads to an increase in the skilled wage rate, W_S as its supply in the economy decreases given the demand. To satisfy the zero profit condition in sector 2, the return to capital, r, falls. Producers in sector 2 substitute capital for skilled labour. So, a_{S2} falls and a_{K2} rises. As r falls given the relative price of commodity 3, the unionized unskilled wage, W^*, has to rise so as to satisfy the zero profit condition in sector 3. But, W^* can increase only if the competitive unskilled wage, W, rises. Why W and W^* increase is quite easy. Sector 2 contracts following an emigration of skilled labour and releases capital to sector 3 causing the latter to expand both in terms of output and employment (see equation (14)). The expected urban wage for a prospective rural migrant unskilled worker rises unambiguously that paves the way for a fresh migration into the urban sector. The availability of unskilled labour in the rural sector falls, which in turn causes the rural

[8] Here sectors 2 and 3 use two different types of labour. However, there is one intersectorally mobile input which is capital. So, these two industries cannot be classified in terms of factor intensities that are usually used in the Hechscher-Ohlin-Samuelson model. Despite this, a special type of factor intensity classification in terms of the relative distributive shares of the mobile factor i.e. capital may be used for analytical purposes. The industry in which this share is higher relative to the other may be considered as capital-intensive in a special sense. See Jones and Neary (1984) for details.

sector wage to rise. What happens to the skilled-unskilled wage inequality depends on the rates of increase in W_S and W. If $(\theta_{K3}/\theta_{L3}) > (\theta_{K2}/\theta_{S2})$ the saving on capital cost in the low-skill manufacturing sector (sector 3) is more than that in the high-skill sector, which in turn, implies that the rate of increase of the unionized unskilled wage, W^* (and hence that of W as $1 > E_W \geq 0$), is greater than that of the skilled wage, W_S. Thus, the wage inequality improves if the low-skill manufacturing sector is more capital-intensive vis-à-vis the high-skill sector. However, we note that the wage inequality may worsen in the opposite situation where the high-skill sector is capital-intensive.

On the other hand, an immigration of unskilled labour lowers the rural unskilled wage, W. As W decreases the unionized unskilled wage, W^*, in sector 3 also decreases. So, the return to capital, r, rises to satisfy the zero profit condition. This in turn lowers the skilled wage, W_S, in sector 2. The rate of decrease in W is greater than that in W_S under the condition that the low-skill manufacturing sector is capital intensive (in a special sense) relative to the high-skill sector. Consequently, the wage inequality deteriorates.

Finally, an inflow of foreign capital causes both the urban sectors to expand. The return to capital falls as its availability rises given its demand. Higher demand for skilled labour in the expanding high-skill sector raises the skilled wage, W_S. On the other hand, as the demand for unskilled labour in sector 3 rises, the expected urban wage for a prospective rural migrant rises that results in a fresh migration of unskilled labour into the urban sector. The rural sector wage, W, rises as a consequence which in turn raises the unionized unskilled wage in sector 3. Thus, we find that both W and W_S rise following an inflow of foreign capital. From (17), it is evident that the proportionate increase in the rural wage would be greater than that of the skilled wage if the low-skill sector is capital-intensive (in a special sense) thereby causing the relative wages to move in favour of unskilled labour.

3.2 ***International factor mobility and urban unemployment of unskilled labour***

We are now going to analyze the effects of international inflow/outflows of different inputs on the level of urban unemployment of unskilled labour.

Subtraction of (7) from (8) yields:

$$(\frac{W^*}{W}-1)a_{L3}X_3 = L_U \tag{19}$$

Differentiating (19), using (11) and (13) − (15) and simplifying, we can derive the following expression[9]:

$$\hat{L}_U = (\frac{\hat{K}-\lambda_{K2}\hat{S}}{\Delta})[\lambda_{L1}(S^1_{LN}+S^1_{NL})-(\frac{W^*\lambda_{L3}}{W^*-W})(1-E_W)\theta_{N1}](\theta_{S2}\theta_{K3})$$

(+) (+) (+) (>0)

$$+(\frac{\theta_{S2}\theta_{N1}\hat{L}}{\Delta})[(\frac{E_W\theta_{L3}}{\theta_{S2}})(\theta_{K2}A_3+\theta_{S2}A_2)+\theta_{K3}A_1+S^3_{LK}\lambda_{K3}E_W$$

(+) (+) (+) (+)

$$-(\frac{W^*\lambda_{L3}\lambda_{K3}}{W\lambda_{LU}})(E_W-1)\theta_{K3}] \tag{20}$$

(<0)

From (20) the following results trivially follow.

(i) $\hat{L}_U > 0$ when $\hat{L} > 0$;

(ii) $\hat{L}_U < 0$ when $\hat{K} > 0$ iff $[\lambda_{L1}(S^1_{LN}+S^1_{NL}) < (\frac{W^*\lambda_{L3}}{W^*-W})(1-E_W)\theta_{N1}]$; and,

(iii) $\hat{L}_U < 0$ when $\hat{S} < 0$ iff $[\lambda_{L1}(S^1_{LN}+S^1_{NL}) < (\frac{W^*\lambda_{L3}}{W^*-W})(1-E_W)\theta_{N1}]$. (21)

One can now establish the following proposition:

PROPOSITION 2: An immigration of unskilled labour unambiguously raises the urban unemployment level of unskilled labour[10] while an emigration of skilled labour or an inflow of

[9] See appendix II for detailed derivation of equation (20).

foreign capital improves the problem of urban unemployment if and only if $[\lambda_{L1}(S^1_{LN} + S^1_{NL}) < (\frac{W^* \lambda_{L3}}{W^* - W})(1 - E_W)\theta_{N1}]$.

We explain proposition 2 in the following manner. In the migration equilibrium the expected urban wage for a prospective rural migrant equals the actual rural wage. An immigration of unskilled labour causes the competitive rural sector wage to fall as the availability of this type labour rises given its demand. The unionized unskilled wage in the urban sector also falls. From the zero profit condition for the low-skill urban sector (equation 3.1) it follows that the return to capital, r, rises. The skilled wage, W_S, falls to satisfy the zero profit condition for sector 2 (equation (2)). As the wage-rental ratio in the high-skill sector falls, the skilled labour-output ratio in sector 2 rises. Consequently, sector 2 contracts and releases capital to the low-skill urban sector causing the latter to expand both in terms of output and employment of unskilled labour. The expected wage for a prospective rural migrant unequivocally increases. This leads to a fresh migration of unskilled labour into the urban sector. The level of urban unemployment unambiguously rises as the number of new migrants is greater than the number of new jobs created in sector 3. On the other hand, an emigration of skilled labour also affects the migration equilibrium in two ways. First, the high-skill sector contracts and releases capital to the urban low-skill sector causing the latter to expand both in terms of output and employment. This leads to an increase in the number of jobs available in this sector. Besides, as the endowment of skilled labour falls, the skilled wage rises which lowers the return to capital (equation 2). This raises both the competitive and unionized unskilled wages. Hence the expected urban wage for a prospective rural migrant rises which paves the way for a fresh migration from the rural to the urban sector. This is *the centrifugal force* that drives the rural unskilled workers to move away from the rural sector. But, as the competitive unskilled wage in the rural sector has also increased there is also *the centripetal force* that prevents rural workers from migrating into the urban sector. Thus, there are two opposite effects working on determination of the size of the unemployed urban workforce. Finally, as we have noted earlier an inflow of foreign capital raises both the skilled and unskilled rural wage and causes both the urban sectors to expand. So, in this case also there are two opposite effects. Our analysis shows that in both the above cases the *centripetal force* is stronger than the *centrifugal force* under the necessary and sufficient condition as stated in

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10 This is contrary to the standard result of the two sector mobile capital Harris-Todaro model (e.g. Corden and Findlay 1975) where an inflow of foreign capital unambiguously accentuates the problem of urban unemployment of labour.

proposition 2. Hence, the level of urban unemployment of unskilled labour may fall following either an emigration of skilled labour or an inflow of foreign capital.

3.3 ***A special case:***

We now consider a special case where the unionized unskilled wage is exogenously given and is strictly equal to the stipulated minimum wage. This implies that the unionized wage is insensitive to the competitive unskilled wage. This implies that $E_W = 0$. Putting $E_W = 0$ into (17) and (20) one finds the following expressions, respectively.

$$(\hat{W}_S - \hat{W}_A) = (\hat{W}_S - \hat{W}) = -(\frac{\theta_{N1}\theta_{S2}\theta_{K3}}{\Delta})[(\frac{W^*}{W})\lambda_{L3}(\hat{K} - \lambda_{K2}\hat{S}) - \lambda_{K3}\hat{L}] \tag{17.1}$$

and,

$$\hat{L}_U = (\frac{\hat{K} - \lambda_{K2}\hat{S}}{\Delta})[\lambda_{L1}(S^1_{LN} + S^1_{NL}) - (\frac{W^*\lambda_{L3}}{W^* - W})\theta_{N1}](\theta_{S2}\theta_{K3})$$

(+) (+) (+)

$$+ (\frac{\theta_{S2}\theta_{N1}\hat{L}}{\Delta})[\theta_{K3}A_1 + (\frac{W^*\lambda_{L3}\lambda_{K3}\theta_{K3}}{W\lambda_{LU}})] \tag{20.1}$$

(+) (+) (+)

From (17.1) and (20.1) the final proposition of the model can now be established.

PROPOSITION 3: When the unionized unskilled wage is insensitive to the rural sector wage, an emigration of skilled labour or an inflow of foreign capital unambiguously improves the skilled-unskilled wage inequality and lowers the level of urban unemployment of unskilled labour if and only if $\lambda_{L1}(S^1_{LN} + S^1_{NL}) < (\frac{W^*\lambda_{L3}}{W^* - W})\theta_{N1}$. On the contrary, an immigration of unskilled labour unequivocally raises the wage inequality and worsens the problem of urban unemployment of unskilled labour.

We, therefore, find that unlike the previous case we do no longer require the relative factor-intensity ranking condition between the two urban sectors for predicting the outcomes of international factor movements on the skilled-unskilled wage inequality in our small open dual economy. The explanations are as follows. As the unionized unskilled wage is now given exogenously, the return to capital and the skilled wage are determined from equations (3) and (2),

respectively and are insensitive to any changes in factor endowments. An emigration of skilled labour only leads to a contraction in the high-skill sector and releases capital to sector 3 causing the latter to expand both in terms of output and employment. On the other hand, an inflow of foreign capital leads to an expansion of sector 3 but it leaves sector 2 unaffected as the endowment of skilled labour has not changed. In either of the two cases, the availability of unskilled labour in the rural sector decreases which in turn raises the rural unskilled wage. Consequently, the skilled-unskilled wage inequality improves. Besides, we find that both the rural wage and the expected urban wages of unskilled labour have increased. So, there are again two opposite effects working on determination of the size of the unemployed urban workforce. The level of urban unemployment of unskilled labour falls if the proportionate increase in the rural wage (*the centripetal force*) is greater (stronger) than that in the expected urban wage (*the centrifugal force*). This happens under the condition as stated in the proposition.

In contrast, an immigration of unskilled labour lowers the competitive unskilled wage in the rural sector as its endowment grows given its demand. But, it cannot affect the return to capital and the skilled wage. Hence, the wage inequality unambiguously worsens. Moreover, the *centripetal force* gets weaker and the wage differential between the two sectors using unskilled labour widens as the rural wage falls. This paves the way for a fresh migration from the rural to the urban sector. But, the low-skill manufacturing sector in the urban sector has not changed in terms of output and employment. Consequently, the newly migrated workers only accentuate the problem of unemployment of unskilled labour in the urban sector.

3.4 Policy implications of results

Policy implications of the results of the paper are as follows. We have found that an immigration of unskilled labour is likely to be undesirable both on the grounds of deteriorating wage inequality and the problem of urban unemployment of unskilled labour. In contrast, an emigration of skilled labour or inflows of foreign capital are desirable on both ground unless the unionized wage is linked to the rural wage and the-skill sector is more capital-intensive (in a special sense) than the low-skill urban sector. In the circumstances, the government should take appropriate measures to curb the power of the trade unions so that they cannot link up the unionized wage to the rural wage. Besides, incentive schemes for wooing foreign capitalists must be undertaken so that foreign capital inflows take place in abundance. Strict policies to prevent illegal immigration of unskilled labour from bordering countries must be resorted to. It should be kept in mind that

the government cannot influence the factor intensities of the two urban sectors as these solely depend on technological and trade related factors. But, it can resort to labour market reforms and may not allow the trade unions to link up the wages of their members to the rural wage. If the urban unskilled wage is insensitive to the rural wage, the paper has shown that abundant inflows of foreign capital might be a solution to both deteriorating skilled-unskilled wage inequality and increasing urban unemployment problem of unskilled labour in the liberalized regime.

4. Concluding Remarks:

The paper has built up a three-sector specific factor model with Harris-Todaro (hereafter, HT) type unemployment for analyzing the consequences of international factor mobility both on the skilled-unskilled wage inequality and the problem of urban unemployment of unskilled labour in the setup of a small open dual economy. There are two urban sectors of which one is a low-skill manufacturing sector where unskilled workers receive a high unionized wage. The unionized wage is strictly equal to or greater than the stipulated minimum wage as determined by the authority. However, that can be greater than the minimum wage and may be linked positively to the rural sector wage if the trade unions can successfully negotiate with the firms and wrest some additional benefits for their members. In the other urban sector skilled labour is a specific input and there is perfect mobility of capital between the two urban sectors. In this set up, we have found that the outcomes of international factor mobility on the wage inequality may not necessarily depend on the difference in the factor intensity condition. In fact, when the unskilled wage in the low-skill sector is strictly equal to the minimum wage, an immigration of unskilled labour unquestionably worsens the wage inequality while an emigration of skilled labour or an inflow of foreign capital moves the relative wages in favour of unskilled labour. These effects, in contrast, crucially hinge on the factor intensity condition when the unionized unskilled wage is positively related to the rural wage. An emigration of skilled labour or an inflow of foreign capital improves the wage inequality if and only if the low-skill urban sector is more capital-intensive (in a special sense) vis-à-vis the high-skill sector. On the contrary, an immigration of unskilled labour worsens the wage inequality under the same capital intensity condition. Besides, the paper has also found that an emigration of skilled labour or an inflow of foreign capital may lower the level of urban unemployment of unskilled labour while an immigration of unskilled labour unequivocally accentuates the problem. These results have important policy implications for all migrant receiving developing countries including India where illegal immigration of people (unskilled labour) from neighboring poor economies through border areas is a serious and

mounting problem. The government of such a country should take stern actions in thwarting any attempt of illegal immigration of unskilled labour from bordering countries. Besides, it should resort to appropriate measures to curb the power of the trade unions so that they cannot link up the unionized wage to the rural wage. Furthermore, measures to woo foreign capitalists must be undertaken so that abundant foreign capital inflows take place. If these policies are undertaken successfully, the paper has shown that abundant inflows of foreign capital might be a solution to both deteriorating wage inequality and increasing urban unemployment problem of unskilled labour during the liberalized regime.

Appendix I:

Differentiating Equations (6.1) and (8.1) the following expressions are obtained, respectively.

$$A_1\hat{W} - A_2\hat{r} + A_3\hat{W}_S + \lambda_{K3}\hat{X}_3 = (\hat{K} - \lambda_{K2}\hat{S}) \tag{A.1}$$

$$A_4\hat{W} + A_5\hat{R} + A_6\hat{r} + (W * \lambda_{L3}/W)\hat{X}_3 = \hat{L} \tag{A.2}$$

where: $A_1 = \lambda_{K3}S^3_{KL}E_W > 0;$

$$\left.\begin{aligned} A_2 &= [\lambda_{K3}S^3_{KL} + \lambda_{K2}(S^2_{KS} + S^2_{SK})] > 0; \\ A_3 &= \lambda_{K2}(S^2_{KS} + S^2_{SK}) > 0; \\ A_4 &= [(W * \lambda_{L3}/W)(E_W - 1 - S^3_{LK}E_W) - \lambda_{L1}(S^1_{LN} + S^1_{NL})] < 0; \\ A_5 &= \lambda_{L1}(S^1_{LN} + S^1_{NL}) > 0; \\ A_6 &= (W * \lambda_{L3}S^3_{LK}/W) > 0. \end{aligned}\right\} \tag{15}$$

Totally differentiating equations (1), (2), (3.1)and using envelope conditions we can write those along with (A.1) and (A.2) in the following matrix form.

$$\begin{bmatrix} \theta_{L1} & \theta_{N1} & 0 & 0 & 0 \\ 0 & 0 & \theta_{K2} & \theta_{S2} & 0 \\ E_W\theta_{L3} & 0 & \theta_{K3} & 0 & 0 \\ A_1 & 0 & -A_2 & A_3 & \lambda_{K3} \\ A_4 & A_5 & A_6 & 0 & (W * \lambda_{L3}/W) \end{bmatrix} \begin{bmatrix} \hat{W} \\ \hat{R} \\ \hat{r} \\ \hat{W}_S \\ \hat{X}_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ (\hat{K} - \lambda_{K2}\hat{S}) \\ \hat{L} \end{bmatrix}, \tag{A.3}$$

Now, solving (A.3) by Cramer's rule and simplifying we can get (11) – (14). Deducting (11) from (12), one finally arrives at (17).

Appendix II:

The Harris-Todaro migration equilibrium condition is represented by the following equation.

$$L_U = (\frac{W^*}{W} - 1)a_{L3}X_3 \tag{19}$$

Alternatively, equation (19) can be represented as

$$\lambda_{LU} = (\frac{W^*}{W} - 1)\lambda_{L3} \Rightarrow (\frac{W^*\lambda_{L3}}{W\lambda_{LU}}) = (\frac{W}{W^* - W}) \tag{A.4}$$

where λ_{LU} and λ_{L3} denote the proportions of unskilled workforce remaining unemployed and employed in the urban sector, respectively.

Differentiation of (19) gives

$$\hat{L}_U = (\frac{\lambda_{L3}}{\lambda_{LU}})(\frac{W^*}{W} - 1)[(\hat{r} - E_W\hat{W})S^3_{LK} + (\frac{W^*\lambda_{L3}}{W\lambda_{LU}})(E_W - 1)\hat{W} + \hat{X}_3]$$

Using (11), (13), (14) and (A.4) and simplifying the above expression may be reduced to:

$$\hat{L}_U = (\frac{\hat{K} - \lambda_{K2}\hat{S}}{\Delta})[\theta_{S2}(\theta_{L1}\theta_{K3}A_5 + \theta_{N1}E_W\theta_{L3}A_6 - \theta_{N1}\theta_{K3}A_4)$$
$$+ (\frac{W^*\lambda_{L3}}{W\lambda_{LU}})(E_W - 1)(\theta_{N1}\theta_{S2}\theta_{K3}\frac{W^*\lambda_{L3}}{W}) - (\theta_{S2}E_W\theta_{N1}S^3_{LK}\frac{W^*\lambda_{L3}}{W})]$$
$$+ (\frac{\theta_{N1}\hat{L}}{\Delta})[E_W\theta_{L3}(\theta_{K2}A_3 + \theta_{S2}A_2) + \theta_{S2}\theta_{K3}A_1 + S^3_{LK}\lambda_{K3}E_W\theta_{S2}$$
$$- (\frac{W^*\lambda_{L3}\lambda_{K3}}{W\lambda_{LU}})(E_W - 1)\theta_{S2}\theta_{K3}]$$

Further simplifications and use of (15) yield

$$\hat{L}_U = (\frac{\hat{K} - \lambda_{K2}\hat{S}}{\Delta})[\lambda_{L1}(S^1_{LN} + S^1_{NL}) - (\frac{W^*\lambda_{L3}}{W^* - W})(1 - E_W)\theta_{N1}](\theta_{S2}\theta_{K3})$$
$$(+) \qquad (+) \qquad (+) \qquad (>0)$$
$$+ (\frac{\theta_{S2}\theta_{N1}\hat{L}}{\Delta})[(\frac{E_W\theta_{L3}}{\theta_{S2}})(\theta_{K2}A_3 + \theta_{S2}A_2) + \theta_{K3}A_1 + S^3_{LK}\lambda_{K3}E_W$$
$$(+) \qquad (+) \qquad (+) \qquad (+)$$
$$- (\frac{W^*\lambda_{L3}\lambda_{K3}}{W\lambda_{LU}})(E_W - 1)\theta_{K3}] \tag{20}$$
$$(<0)$$

References:

Bhalotra, S. (2002): 'The impact of economic liberalization on employment and wages in India', ILO. Geneva.

Chaudhuri, S. (2003): 'How and how far to liberalize a developing economy with informal sector and factor market distortions', *Journal of International Trade and Economic Development*, 12.

Chaudhuri, S. and Yabuuchi, S. (2006): 'Economic liberalization and wage inequality in the presence of labour market imperfection', *International Review of Economics and Finance* (in press).

Corden, W. M. and Findlay, R. (1975): 'Urban unemployment, intersectoral capital mobility, and development policy in a dual economy', *Economica* 42, 59-78.

Dev, M. (2000): 'Economic liberalization and employment in South Asia', *Economic and Political Weekly*, 40-51.

Feenstra, R. C., and Hanson, G. H. (1996): 'Foreign investment, outsourcing and relative wages'. In R. C. Feenstra, G. M. Grossman, and D. A. Irwin (Eds.), Political economy of trade policies: Essays in honor of J. N. Bhagwati (pp. 89-127). Cambridge, MA: MIT Press.

Feenstra, R. C., and Hanson, G. H. (1997): 'Foreign direct investment and relative wages: Evidence from Mexico's maquiladoras', *Journal of International Economics*, 42, 371-394.

Jones, R. W., and Neary, P. (1984): 'Positive theory of international trade'. In R. W. Jones & P.B. Kenen (Ed.), Handbook of development economics, Vol. 1 (pp. 1–62). Amsterdam: North-Holland.

Khan, A. R. (1998): 'The impact of globalization in South Asia'. In A. S. Bhalla (Ed.), Globalization, growth and marginalization. New Delhi: Macmillan India Ltd.

Marjit, S., and Kar, S. (2005): 'Emigration and wage inequality', *Economics Letters*, 88, 141-145.

Marjit, S., Beladi, H., and Chakrabarti, A. (2004): 'Trade and wage inequality in developing countries', *Economic Inquiry*, 42, 295-303.

Marjit, S., Broll, U. and Sengupta, S. (2000): 'Trade and wage-gap in poor countries: the role of the informal sector'. In: Bose, A., et al. (Eds.), Macroeconomics, Trade and Institutions: Essays in Honour of M.K. Rakshit. Oxford University Press, Kolkata.

Robbins, D. (1994): 'Malaysian wage structure and its causes', working paper. Harvard Institute for International Development.

Robbins, D. (1995): 'Trade, trade liberalization and inequality in Latin America and East Asia: synthesis of seven country studies', working paper. Harvard Institute for International Development.

Robbins, D. (1996): 'HOS hits facts: facts win: evidence on trade and wages in developing world', working paper. Harvard Institute for International Development.

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* 11 (1), 33–57.

Yabuuchi, S. and Chaudhuri, S. (2006): 'International migration of labour and skilled–unskilled wage inequality in a developing economy', *Economic Modelling* (in press).