FOREIGN CAPITAL, WELFARE AND URBAN UNEMPLOYMENT IN THE PRESENCE OF AGRICULTURAL DUALISM

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ABSTRACT: In a two sector mobile capital Harris-Todaro model, such as Corden and Findlay (1975), an inflow of foreign capital in the presence of protectionist policy is welfare deteriorating as well as unemployment accentuating. But, the developing countries have chosen liberalized investment and trade policies as their development strategies and have been able to attract a considerable amount of foreign capital during the last two decades. A relevant question is why these countries are yearning for foreign capital given its detrimental effects as predicted by the conventional theoretical literature on trade and development. This paper makes an attempt to address the above issue in terms of a three sector Harris-Todaro model with agricultural dualism and a non-traded final commodity. In the given setup, an inflow of foreign capital is likely to improve welfare and does not necessarily worsen the problem of unemployment. The paper may also be useful to explain as to why many of the developing economies have experienced 'jobless growth' in the liberalized regime.

Keywords: Foreign capital, rural-urban migration, welfare, urban unemployment, general equilibrium, import tariff, jobless growth.

JEL Classification: F2, F21, O17.

FOREIGN CAPITAL, WELFARE AND URBAN UNEMPLOYMENT IN THE PRESENCE OF AGRICULTURAL DUALISM

1. Introduction

In the traditional literature on development economics, a developing country (often called a less developed country, LDC) is typically described as a dual economy. A dual economy is broadly classified into two sectors: an industrialized (urban) sector and an agricultural (rural) sector. The labour market in a dual economy is stratified into two parts, with the workers in the industrial sector earning higher wages than their counterparts in the rural sector. Owing to this existence of wage differential, rural workers migrate to the urban sector at the risk of unemployment, although they can be fully employed in the rural sector at the current competitive wage rate. Harris and Todaro (1970) formulated this labor allocation mechanism, which is commonly observed between rural and urban areas in an LDC. The basic Harris-Todaro (1970) model (hereafter HT model) has been reanalyzed and extended by various authors in various directions.[1] However, most of the papers in this literature agree on the point that in the presence of a rural-urban wage gap, the urban development policies cannot avoid the problem of rising urban unemployment resulting from rural-urban migration; and therefore points to a rural development programme as a possible solution to the problem.

Two disconcerting results of the two sector mobile capital HT model (Corden and Findlay 1975) are as follows. An inflow of foreign capital with full repatriation of its earnings and tariff protection does not only worsen welfare[2] but also accentuates the problem of urban

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[1] See for example, Bhagwati and Srinivasan (1974), Fields (1975), Corden and Findlay (1975), Calvo (1978), Bhatia (1979), Khan (1980), Batra and Naqvi (1987), Beladi and Naqvi (1988), Chaudhuri (2003), Datta Chaudhuri (1989), Grinols (1991), Chandra and Khan (1993), Gupta (1993, 1995, 1997), Chao and Yu (1996), Yabuuchi (1993, 1998), Basu (2000), Beladi and Yabuuchi (2001).

[2] The effects of inflow of foreign capital in the developing countries have been investigated intensively by both trade and development theorists. Brecher and Alejandro (1977) in terms of a 2×2 full-employment model and Khan (1982) in terms of a two sector mobile capital HT model with urban unemployment have found that the inflow of foreign capital in a developing economy with full repatriation of its earnings is necessarily immiserizing if and only if the import-competing sector is capital-intensive (in physical and/or in value terms) and is protected by a tariff. However, in the absence of any tariff, welfare remains unaffected due to foreign capital. The welfare worsening effects of foreign capital have also been shown by Beladi and Marjit (1992a, 1992b) and Chandra and Khan (1993) using three sector models. However, it should be

unemployment.[3] However, a typical LDC is capital scarce and therefore adopts measures so that inflows of foreign capital take place in abundance in order to facilitate economic growth. It is important to mention that the developing countries have been able to attract a substantial amount of foreign capital during the last two decades by adopting liberalized investment and trade policies.[4] So, a pertinent question is why developing countries are yearning for foreign capital given the standard welfare deteriorating and unemployment accentuating effects of foreign capital.

It may be argued that a simple two sector mobile capital HT model, such as Corden and Finday (1975), may not appropriately describe the complex nature of an LDC. The existence of agricultural dualism and the presence of non-traded commodities are two of the salient features of such an economy.

Agricultural dualism is a common symptom of the developing countries. The distinction between advanced and backward agriculture can be made on the basis of inputs used, economies of scale, efficiency and elasticity of substitution. Many of the farmers in the agricultural sector of a developing economy stick to old and unscientific methods of cultivation although in other parts of the economy the introduction of the so called 'Green Revolution' technology brought about revolutionary changes with respect to production technologies and modern inputs use and the increase in factor productivity. However, the improved technology was designed for the best areas (irrigation, high soil fertility) with chemical intensive technology. Although, Green

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pointed out that Khan (1982) also examines the case where capital is specific to each sector. In this extended model, the standard immiserizing result holds only under a certain condition on the tariff rate. This automatically implies that if the condition does hold welfare may improve due to inflows of foreign capital.

[3] See Khan (1980, 1982) in this context. An inflow of foreign capital leads to an expansion of the capital-intensive urban sector both in terms of output and employment. This, in turn, raises the expected urban wage for a prospective rural migrant. As a consequence a fresh migration from the rural to the urban sector takes place and the level of urban unemployment increases as the number of new migrants into the urban sector outweighs the number of new jobs created in this sector.

[4] According to the World Development Report 1998-99, the amount of foreign direct investment (FDI) to the low income countries has increased from 1,502 millions of dollars in 1980 to 9,433 millions of dollars in 1996. The corresponding figures for South Asian countries are 464 and 3,479 millions of dollars, respectively. Besides, as per the UNCTAD (1999) and Oxfam (2002) reports, foreign capital accounts for 11 per cent of fixed capital investment (ten times the share in 1980), and almost one-third of that in the manufacturing sector.

Revolution has modernized agricultural technology, it is limited only to a few parts of a developing economy and only rich (large) farmers have been benefited from it. The small and marginal farmers continue to depend on rain-fed backward agricultural technique. Therefore, the adoption of the Green Revolution technology has led to an increase in the extent of agricultural dualism in a developing economy.

The existence of non-traded goods, the prices of which are determined domestically by demand-supply forces, is another essential feature of a developing economy. The non-traded goods may be either intermediaries or final commodities. There are many final agricultural commodities, which are consumed domestically and are produced mainly by small and marginal farmers using traditional techniques of production. On the other hand, all commercial crops and some of the foodgrains are produced by large cultivators using advanced techniques. A lion's shares of these commodities are exported to foreign countries and their prices are determined internationally.

The present paper should be regarded as an extension of the rigid wage version of the Khan (1982) model. Its basic objective is to examine the consequences of an inflow of foreign capital on the welfare and the magnitude of the urban unemployment in a developing economy in the setup of a three sector HT model with agricultural dualism and a non-traded sector. The paper shows that an inflow of foreign capital does not necessarily worsen welfare and aggravate the problem of urban unemployment in the developing countries In particular, this theoretical analysis justifies the desirability of the FDI in a developing economy from the view points of both welfare and unemployment problem. This theoretical exercise may also be useful in explaining as to why many developing countries including India have come across 'jobless growth' in the liberalized regime.[5]

2. The Model

[5] This point has been explained in details in section 3.2.

We consider a small open dual economy, which is broadly divided into an urban sector and a rural sector. The rural sector is further subdivided into two sub-sectors so that in all we have three sectors in our economy. Of the two rural sectors, there is an advanced agricultural sector (sector 1) which produces its output using labour and land-capital as inputs. This is the export sector of the economy. The other sector within the rural sector, we call it the backward agricultural sector, produces a non-traded final commodity using the same two inputs. The input 'land-capital' is broadly conceived to include durable capital equipments of all kinds.[6] It is sensible to assume that sector 2 is more labour intensive than sector 1. On the other hand, the urban sector (sector 3) produces a manufacturing commodity with the help of labour and capital. This is the import-competing sector of the economy and is protected by an import tariff. Capital is specific to sector 3 while land-capital is completely mobile between the two rural sectors. Labour is perfectly mobile between sectors 1 and 2 but is imperfectly mobile between the urban and the rural sectors. The urban sector faces an imperfect labour market in the form of a unionized labour market where workers receive a contractual wage, W^*,[7] while the wage rate in the two rural sectors, W, is market determined. The two wage rates are related by the Harris-Todaro (1970) condition of migration equilibrium where the expected urban wage equals the rural wage rate and $W^* > W$. The aggregate capital stock of the economy consists of both domestic and foreign capital and these are perfect substitutes. Income from foreign capital is completely repatriated. Production functions exhibit constant returns to scale with diminishing marginal productivity to each factor. Commodity 1 is chosen as the numeraire.

The following symbols will be used in the formal presentation of the model.

L = fixed number of workers in the economy;

N = economy's given endowment of land-capital;

K_D = domestic capital stock of the economy;

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6 See Bardhan (1972) in this context.

7 Assuming that each urban 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 industry. This function has been derived in details in Chaudhuri (2003).

K_F = foreign capital stock of the economy;

$K =$ economy's aggregate capital stock (domestic plus foreign);

L_U = level of urban unemployment;

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

j_i = amount of the j-th input employed in the i-th industry, $j = L, N, K$; and, $i = 1,2,3$;

a_{Li} = labour-output ratio in the ith sector, i = 1,2,3;

a_{Ni} = land capital-output ratio in the ith sector, i = 1,2;

a_{Ki} = capital-output ratio in sector 3;

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

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

$P_1 = 1$ (commodity 1 is the numeraire);

$P_3 =$ world price of good 3;

P_2 = domestically determined price of good 2;

P_3^* = domestic or tariff-inclusive price of commodity 3;

$t =$ ad-valorem rate of tariff on the import of commodity 3;

W = competitive wage rate in the two agricultural sectors;

W^* = institutionally given wage rate in the manufacturing sector;

R = rate of return to land-capital;

r = rate of return to capital (domestic and foreign);

D_i = consumption demand for the i th final commodity, $i = 1,2,3$;

E_{P2}^2 = own price elasticity of demand for commodity 2;

E_Y^2 = income elasticity of demand for commodity 2;

U = social utility;

Y = national income at domestic prices;

m_3 = marginal propensity to consume commodity 3;

M = import demand for commodity 3;

$\wedge$ = proportional change.

The general equilibrium structure of the model is as follows.

Given the assumption of perfectly competitive markets the usual price-unit cost equality conditions relating to the three sectors of the economy are given by the following three equations, respectively.

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

$$Wa_{L2} + Ra_{N2} = P_2 \tag{2}$$

$$W^* a_{L3} + ra_{K3} = (1+t)P_3 \tag{3}$$

Full utilization of land-capital and capital imply the following two equations, respectively.

$$a_{N1}X_1 + a_{N2}X_2 = N \tag{4}$$

$$a_{K3}X_3 = K_D + K_F = K \tag{5}$$

There is unemployment of labour in the urban sector. The labour endowment equation of the economy is given by the following.

$$a_{L1}X_1 + a_{L2}X_2 + a_{L3}X_3 + L_U = L \tag{6}$$

In a Harris-Todaro framework the 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 manufacturing sector is $(a_{L3}X_3/(a_{L3}X_3 + L_u))$ in the present case, then the expected wage in the manufacturing sector is $(W^* a_{L3}X_3/(a_{L3}X_3 + L_u))$. Therefore, the rural-urban labour allocation mechanism is expressed as

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

or equivalently,

$$(W^*/W)a_{L3}X_3 + a_{L2}X_2 + a_{L1}X_1 = L \tag{7}$$

The demand for the non-traded final commodity is given by

$$D_2 = D_2(P_2, P_3^*, Y) \quad (8)$$
$$(-)\ (+)\ (+)$$

We assume that commodity 2 is a normal good with negative and positive own price and income elasticities of demand, respectively. The cross-price elasticity is positive. So, we have $E^2_{P2} = ((\partial D_2 / \partial P_2)(P_2 / D_2)) < 0$; $E^2_Y = ((\partial D_2 / \partial Y)(Y / D_2)) > 0$; and, $E^2_{P3*} = ((\partial D_2 / \partial P_{3*})(P_{3*} / D_2)) > 0$.

The demand-supply equality condition for commodity 2 is
$D_2 = X_2$. Using (8), this can be rewritten as follows.

$$X_2 = D_2(P_2, P_3^*, Y) \quad (9)$$

The demand for the importables (commodity 3) and the volume of import are given by the following two equations, respectively.

$$D_3 = D_3(P_2, P_3^*, Y) \quad (10)$$
$$(+)\ (-)\ (+)$$
$$M = D_3(P_2, P_3^*, Y) - X_3 \quad (11)$$

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

$$Y = X_1 + P_2 X_2 + P_3^* X_3 + tP_3 M - rK_F \quad (12.1)$$

or equivalently,

$$Y = WL + RN + rK_D + tP_3 M \quad (12.2)$$

In equation (12.2), WL gives the total wage income of the workers employed in the different sectors of our Harris-Todaro economy.[8] RN is the rental income from land-capital. rK_D is the domestic capital income. Finally, tP_3M is the tariff revenue earned by the government from import of commodity 3, which is handed over to the consumers in a lump-sum manner.
Using (9), (11) and (12) equations (4) and (7) can be rewritten as follows.

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[8] In an H-T framework, the average wage of labour in the economy is equal to the rural sector wage. This special property is called the 'envelope property'.

$$a_{N1}X_1 + a_{N2}D_2(P_2, P_3^*, WL + RN + rK_D + tP_3(D_3 - X_3)) = N \tag{4.1}$$

$$a_{L1}X_1 + a_{L2}D_2(P_2, P_3^*, WL + RN + rK_D + tP_3(D_3 - X_3)) + (W^*/W)a_{L3}X_3 = L \tag{7.1}$$

The working of the system is as follows. The production structure does not possess the decomposition property but sectors 1 and 2 together form a Heckscher-Ohlin-subsystem (HOSS). r is determined from equation (3) as W^* is exogenously given. The equilibrium values of W and R are obtained from equations (1) and (2) as functions of P_2. X_3 is found from (5) as W^* and r are known. Inserting the values of W, R and X_3 into equations (4.1) and (7.1) and solving we can obtain the optimum values of P_2 and X_1. D_3, M and Y are found from equations (10), (11) and (12.2). D_2 and X_2 are obtained from (8) and (9), respectively. Finally, L_U is determined from (6).

The demand side of the model is represented by a quasi-concave social utility function. Let U denote the social utility that depends on the consumption demands for the three commodities[9] denoted by, D_1, D_2 and D_3. Thus, it is shown as

$$U = U(D_1, D_2, D_3) \quad . \tag{13}$$

The foreign capital income is fully repatriated. The balance of trade equilibrium requires that

$$D_1 + P_3D_3 = X_1 + P_3X_3 - rK_F, \tag{14}$$

or equivalently,

$$D_1 + P_2D_2 + P_3^*D_3 = X_1 + P_2X_2 + P_3^*X_3 - rK_F + tP_3M \tag{14.1}$$

Note that commodity 2 is a non-traded final consumption good. So, we have $D_2 = X_2$ in equilibrium.

3. Comparative Statics

[9] All the three sectors produce final commodities in this model.

We are now interested to analyze the effects of an inflow of foreign capital on national welfare and open unemployment in the urban area of the economy. According to the conventional wisdom an inflow of foreign capital in a developing economy is welfare reducing. This is based on the argument that an inflow of foreign capital leads to an expansion of the protected import-competing sector (the urban sector in the present case) thereby decreasing welfare by decreasing the volumes of trade. On the other hand, an inflow of foreign capital in a two sector mobile capital HT model amounts to an urban development policy. The expected urban wage for the prospective rural migrants increases, as the urban sector expands in terms of both output and employment. This leads to a fresh migration from the rural to the urban sector. The level of urban unemployment rises as the new migrants outnumber the new jobs created in the urban sector.

3.1 Foreign capital inflow and welfare

The aggregate stock of capital of the economy swells up owing to an inflow of foreign capital. The return to capital, r, does not change as it is determined from the zero profit condition for sector 3 (see equation 3). But the other factor prices, W and R, are affected through a change in the price of the non-traded final commodity, P_2. Differentiating equations (1) and (2) and solving we get

$$\left.\begin{aligned} \hat{W} &= -(\theta_{N1}/|\theta|)\hat{P}_2\text{; and,} \\ \hat{R} &= (\theta_{L1}/|\theta|)\hat{P}_2 \end{aligned}\right\} \qquad (15)$$

where $|\theta| = (\theta_{L1}\theta_{N2} - \theta_{L2}\theta_{N1}) < 0$ as sector 2 is more labour intensive relative to sector 1.

Totally differentiating equations (4.1) and (7.1) we have the following two expressions, respectively[10].

$$\lambda_{N1}\hat{X}_1 + A_1\hat{P}_2 = C_1\hat{K} \qquad (16)$$

$$\lambda_{L1}\hat{X}_1 + A_2\hat{P}_2 = C_2\hat{K} \qquad (17)$$

where

[10] See Appendix I for derivations.

$$A_1 = [\lambda_{N2}\{E_{P2}^2 + (E_Y^2 VtP_3P_2 / Y)(\partial D_3 / \partial P_2)\} - (1/|\theta|)(\lambda_{N1}S_{NL}^1 + \lambda_{N2}S_{NL}^2)$$
$$- (\lambda_{N2}E_Y^2 V / |\theta| Y)(\theta_{N1}WL - \theta_{L1}RN)];$$
$$A_2 = [\lambda_{L2}\{E_{P2}^2 + (E_Y^2 VtP_3P_2 / Y)(\partial D_3 / \partial P_2)\} + (1/|\theta|)(\lambda_{L1}S_{LN}^1 + \lambda_{L2}S_{LN}^2)$$
$$+ (\theta_{N1}\lambda_{L3}W^* / W|\theta|) - (\lambda_{L2}E_Y^2 V / |\theta| Y)(\theta_{N1}WL - \theta_{L1}RN)];$$
$$C_1 = (\lambda_{N2}E_Y^2 VtP_3X_3 / Y); \tag{18}$$
$$C_2 = \{(\lambda_{L2}E_Y^2 VtP_3X_3 / Y) - (W^* \lambda_{L3} / W)\};$$
$V = [(1+t)/\{1+t(1-m_3)\}] > 0;$ and,

$m_3 = (P_3 * \partial D_3 / \partial Y)$ is the marginal propensity to consume commodity 3

and $1 > m_3 > 0.$

We now define S_{jk}^i s. Here S_{jk}^i is the degree of substitution between factors in sector i, i = 1,2,3. For example, $S_{LL}^1 \equiv (W / a_{L1})(\partial a_{L1} / \partial W)$ etc. $S_{LN}^1 \equiv (R / a_{L1})(\partial a_{L1} / \partial R)$, $S_{jk}^i > 0$ for $j \neq k$; and, $S_{jj}^i < 0.$ We note that as the production functions are homogeneous of degree one, the factor coefficients, a_{ji} s would be homogeneous of degree zero in the factor prices. Therefore, the sum of elasticities for any factor of production in any sector with respect to factor prices must be zero. For example, for labour in sector 1 we have $(S_{LL}^1 + S_{LN}^1) = 0.$ All other mathematical terms have already been defined in section 2 immediately before the formal presentation of the model.

Solving (16) and (17) by Cramer's rule we obtain[11]

$$\hat{P}_2 = \{(\lambda_{N1}C_2 - \lambda_{L1}C_1) / \Delta\}\hat{K} \tag{19}$$

where $\Delta = (\lambda_{N1}A_2 - \lambda_{L1}A_1)$ and $\Delta < 0$ (see Appendix II).

Inserting the values of C_1 and C_2 from (18) into (19) we get

$$\hat{P}_2 = (\hat{K} / \Delta)[(\lambda_{N1}\lambda_{L2}E_Y^2 VtP_3X_3 / Y) - (W^* \lambda_{N1}\lambda_{L3} / W) - (\lambda_{N2}\lambda_{L1}E_Y^2 VtP_3X_3 / Y)] \tag{19.1}$$

So from (19.1) it follows that $\hat{P}_2 > 0$ when $\hat{K} > 0$ under the sufficient condition, $((W^* \lambda_{L3} / W) \geq (\lambda_{L2}E_Y^2 VtP_3X_3 / Y)).$ Now from (15) we find that $\hat{W} > 0$ and

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11 This has been derived in Appendix I.

$\hat{R} < 0$ when $\hat{K} > 0$ under the sufficient condition as stated above. This leads to the following proposition.

PROPOSITION 1: An inflow of foreign capital leads to: (i) an increase in the rural wage rate; (ii) a decrease in the return to land-capital; and, (iii) an increase in the price of the non-traded final commodity, if $((W * \lambda_{L3} / W) \geq (\lambda_{L2} E_Y^2 V t P_3 X_3 / Y))$.

We explain proposition 1 as follows. An inflow of foreign capital leads to an expansion of the import-competing sector (sector 3) as capital is specific to sector 3. For its expansion more labour is required, which is released by the two rural sectors[12] (HOSS). As the supply of labour to the HOSS decreases, sector 2 (sector 1) contracts (expands) following a *Rybczynski type effect* as sector 2 is more labour-intensive relative to sector 1. As the supply of the non-traded commodity produced by sector 2 decreases given its demand, its price, P_2, should increase to satisfy the demand-supply equality condition (equation 9). On the other hand, as sector 3 expands the volume of import of commodity 3 falls and this lowers the tariff revenue. So, other things remaining unchanged, the national income at domestic prices falls, which leads to a decrease in the demand for commodity 2 and, therefore, exerts a downward pressure on P_2, given the supply of good 2. Thus, there are two opposite effects on P_2. However, the first effect dominates over the second effect under the sufficient condition as stated in proposition 1. Then, an increase in P_2 produces a *Stolper-Samuelson effect* in the HOSS leading to an increase in the rural wage rate, W, and a decrease in the return to land-capital, R, as sector 2 is more labour-intensive vis-à-vis sector 1.

To analyze the welfare implication of an inflow of foreign capital totally differentiating equations (13) and (14.1) we get[13]

$$\begin{aligned}(1/U_1)(dU/dK) = V[&\underset{(+)}{(L_3 + L_U)}\underset{(+)}{(dW/dK)} + tP_3\{\underset{(+)}{(\partial D_3/\partial P_2)} + X_2\underset{(+)}{(\partial D_3/\partial Y)}\}\underset{(+)}{(dP_2/dK)} \\ &- tP_3(dX_3/dK)] \qquad (20)\end{aligned}$$

[12] Note that the expected urban wage for a prospective rural migrant has increased.

[13] This has been derived in Appendix III.

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An inflow of foreign capital with full repatriation of its earnings produces three effects on welfare in this model. First, the competitive rural wage increases, the rental to land-capital decreases but the rate of return to domestic capital remains unchanged. Anyway, the increase in aggregate wage income outweighs the decrease in the rental income to land-capital. So, the aggregate factor income rises and it produces a positive effect on welfare. Secondly, as the price of the non-traded final commodity, P_2, rises the relative domestic price of the importables in terms of P_2 falls. Thisd leads to an increase in the demand for the importables as different commodities are substitutes. Besides, the increase in aggregate factor income also raises the demand for commodity 3. So, these two effects tend to push up the import demand. This causes welfare to improve as the demand side distortionary cost of tariff falls. Finally, an inflow of foreign capital leads to an increase in the domestic production of commodity 3 and therefore tends to lower the import demand. Thus, the cost of tariff protection of the supply side increases which works negatively on welfare. The net result of all these three effects would be an increase in social welfare if the combined magnitude of the first two positive effects is stronger than the third effect. However, in the absence of any tariff, only the first effect exists and hence welfare improves unambiguously due to inflows of foreign capital. Therefore, the following proposition can now be established.

PROPOSITION 2: In an economy with a non-traded backward agricultural sector and a tariff-protected import-competing sector, an inflow of foreign capital with full repatriation of its earnings may improve social welfare. However, in the absence of any tariff welfare unequivocally improves due to growth with foreign capital.

3.2 Inflow of foreign capital and urban unemployment

We are now going to analyze the consequence of an inflow of foreign capital on the problem of urban unemployment.

Subtraction of (6) from (7) and use of (5) yield

$$L_U = [\{(W^*/W) - 1\}(a_{L3}K / a_{K3})] \tag{21}$$

Totally differentiating equation (21), using (15), (19.1) and (21) and simplifying one can derive the following expression[14].

$$(\hat{L}_U / \hat{K}) = \{W^* / \underset{(-)(-)}{|\theta|\Delta} \underset{(+)}{(W^* - W)}\}[\{\theta_{N1}((\underset{(-)}{|\lambda|}E_Y^2 VtP_3X_3 / Y) - (W^*\lambda_{N1}\lambda_{L3} / W)) + W^*\underset{(-)(-)}{|\theta|\Delta}\} - W\underset{(-)(-)}{|\theta|\Delta}] \tag{22}$$

From (22) it now follows that

$\hat{L}_U < 0$ when $\hat{K} > 0$ under the sufficient condition: $G \leq 0$, where $G = \{\theta_{N1}((|\lambda|E_Y^2 VtP_3X_3 / Y) - (W^*\lambda_{N1}\lambda_{L3} / W)) + W^*|\theta|\Delta\}$. This leads to the final proposition of the model.

PROPOSITION 3: An inflow of foreign capital lowers the level of urban unemployment if $G \leq 0$.

We explain proposition 3 in the following manner. In the migration equilibrium the expected urban wage for a prospective rural migrant equals the actual rural wage. An inflow of foreign capital affects the migration equilibrium in two ways. First, the urban sector expands as capital is specific to this sector. This leads to an increase in the number of jobs available in this sector. Hence the expected urban wage for a prospective rural migrant, $\{W^*/1 + (L_U / a_{L3}X_3)\}$, rises as the probability of getting a job in this sector rises for every worker. This paves the way for fresh migration from the rural to the urban sector. This is *the centrifugal force* that drives the rural workers to move away from the rural sector. If the rural sector wage remains unchanged, the number of new jobs created in the urban sector falls short of the number of new migrants into the urban sector. This is the standard result as obtained in the two sector mobile capital HT model of Corden and Findlay (1975). In such a situation, the level of urban unemployment rises

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14 See Appendix IV for its derivation.

unambiguously. But in the present setup, there is no capital mobility between the two broad sectors of the economy. There are two sub-sectors within the rural sector which use the same two inputs and one of these sectors produces a non-traded final commodity. Owing to foreign capital inflows, the price of the non-traded commodity rises and leads to an increase in the competitive rural wage (see proposition 1). This is *the centripetal force* that prevents rural workers from migrating into the urban sector. Thus, there are clearly two opposite effects working on determination of the size of the unemployed urban workforce. If the latter effect outweighs the former, the level of unemployment falls. This happens under the sufficient condition as mentioned in proposition 3.

Thus, an FDI is not necessarily unemployment worsening in a developing economy. We have seen that there are two opposite effects on the unemployment problem. An increase in the rural wage (*the centripetal force*) tends to reduce the gravity of the problem while an expansion of the urban sector (*the centrifugal force*) aggravates the unemployment situation. The relative strengths of the two forces determine the final outcome. It is quite possible that the relative magnitudes of the two opposite forces are more or less equal to each other, thereby producing little impact on the employment scenario. If this is the case, the country will experience a 'jobless growth'. In fact, many of the developing countries, including India,[15] have experienced such a type of growth in the liberalized economic regime.

4. Concluding Remarks

A conventional result in the theoretical literature on trade and development is that growth with foreign capital is immiserizing in a tariff-distorted small open economy. This result is valid even in a two sector mobile capital HT framework, like that of Corden and Findlay (1975), despite the presence of an additional distortion in the form of a unionized urban wage. Moreover, the problem of urban unemployment also aggravates as the urban sector expands both in terms of output and employment following an inflow of foreign capital. Given these detrimental consequences, as found in the conventional theoretical literature, a pertinent question is why the developing countries have adopted liberalized trade and investment policies as their development strategies and haven been able to attract a substantial amount of foreign capital during the last two

[15] See Indiresan (2002), S. Sen (2005) etc. in this context.

decades. This paper has made an attempt to provide a possible answer to the above question in terms of a three sector HT model with agricultural dualism and a non-traded final commodity. The paper finds that an inflow of foreign capital is likely to be welfare-improving and may not aggravate the problem of urban unemployment in the given setup. In the presence of agricultural dualism and a non-traded final agricultural commodity, the aggregate factor income and the demand for importables increase. The aggregate effect of these two may outweigh the deadweight loss caused by the protectionist policy on the economy. From the analysis it also follows that the level of urban unemployment does not necessarily increase due to foreign capital. Therefore, this model may also be useful in explaining as to why many of the developing economies have experienced 'jobless growth' in the liberalized regime.

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Mathematical Appendices

Appendix I: ***Detailed derivations of different expressions***

Using (5) equation (7.1) can be rewritten as follows.

$$(W^* a_{L3} K / W a_{K3}) + a_{L2} D(P_2, P_3^*, WL + RN + rK_D + tP_3(D_3 - X_3)) + a_{L1} X_1 = L \tag{A.1}$$

In this paper we consider the effects of an inflow of foreign capital only. As K_F rises K rises as well. But the return to capital, r, does not change as it is determined from equation (3) given W^*. So, we have

$$\hat{r}, \hat{a}_{K3}, \hat{a}_{L3} = 0 \text{ when } \hat{K} > 0 \tag{A.2}$$

Now from equation (5) we can write

$$\hat{X}_3 = \hat{K} \tag{A.3}$$

Total differentiation of (12.2) yields

$$dY = LdW + NdR + tP_3\{(\partial D_3 / \partial P_2)dP_2 + (\partial D_3 / \partial Y)dY - dX_3\}$$

or, $dY(1 - tP_3 \partial D_3 / \partial Y) = LdW + NdR + tP_3(\partial D_3 / \partial P_2)dP_2 - tP_3 dX_3$

or, $dY(1 - tm_3 /(1+t)) = LdW + NdR + tP_3(\partial D_3 / \partial P_2)dP_2 - tP_3 dX_3$

or, $\hat{Y} = (V / Y)[WL\hat{W} + RN\hat{R} + tP_3 P_2(\partial D_3 / \partial P_2)\hat{P}_2 - tP_3 X_3 \hat{K}]$ (A.4)

where $V = [(1+t)/\{1 + t(1 - m_3)\}] > 0$; and, $m_3 = (P_3^* \partial D_3 / \partial Y)$ is the marginal propensity to consume commodity 3,and $1 > m_3 > 0$.

Now, totally differentiating equation (4.1) one gets

$$\lambda_{N1}\hat{X}_1 + \lambda_{N1}(S^1_{NL}\hat{W} + S^1_{NN}\hat{R}) + \lambda_{N2}(E^2_{P2}\hat{P}_2 + E^2_Y\hat{Y}) + \lambda_{N2}(S^2_{NL}\hat{W} + S^2_{NN}\hat{R}) = 0 \tag{A.5}$$

Substitution of the values of $\hat{W}$, $\hat{R}$ and $\hat{Y}$ from (15) and (A.4) into (A.5) and simplification yield

$$\lambda_{N1}\hat{X}_1 + A_1\hat{P}_2 = C_1\hat{K} \tag{16}$$

where

$$A_1 = [\lambda_{N2}\{E^2_{P2} + (E^2_Y VtP_3P_2 / Y)(\partial D_3 / \partial P_2)\} - (1/|\theta|)(\lambda_{N1}S^1_{NL} + \lambda_{N2}S^2_{NL})$$
$$- (\lambda_{N2}E^2_Y V / |\theta| Y)(\theta_{N1}WL - \theta_{L1}RN)]; \text{ and,}$$

$$C_1 = (\lambda_{N2}E^2_Y VtP_3X_3 / Y).$$

Similarly, differentiating equation (A.1), using (15), (A.3) and (A.4) and simplifying we find the following expression.

$$\lambda_{L1}\hat{X}_1 + A_2\hat{P}_2 = C_2\hat{K} \tag{17}$$

where

$$A_2 = [\lambda_{L2}\{E_{P2}^2 + (E_Y^2 VtP_3P_2 / Y)(\partial D_3 / \partial P_2)\} + (1/|\theta|)(\lambda_{L1}S_{LN}^1 + \lambda_{L2}S_{LN}^2)$$

$$+ (\theta_{N1}\lambda_{L3}W^* / W|\theta|) - (\lambda_{L2}E_Y^2 V / |\theta| Y)(\theta_{N1}WL - \theta_{L1}RN)] \text{; and,}$$

$$C_2 = \{(\lambda_{L2}E_Y^2 VtP_3X_3 / Y) - (W^* \lambda_{L3} / W)\}.$$

Arranging equations (16) and (17) in a matrix notation we get

$$\begin{pmatrix} \lambda_{N1} & A_1 \\ \lambda_{L1} & A_2 \end{pmatrix} \begin{pmatrix} \hat{X}_1 \\ \hat{P}_2 \end{pmatrix} = \begin{pmatrix} C_1\hat{K} \\ C_2\hat{K} \end{pmatrix} \tag{A.6}$$

Now solving (A.6) using Cramer's rule and simplifying one gets

$$\hat{P}_2 = (\hat{K}/\Delta)[(\lambda_{N1}\lambda_{L2}E_Y^2 VtP_3X_3 / Y) - (W^* \lambda_{N1}\lambda_{L3} / W) - (\lambda_{N2}\lambda_{L1}E_Y^2 VtP_3X_3 / Y)] \tag{19.1}$$

where

$$\Delta = (\lambda_{N1}A_2 - \lambda_{L1}A_1) \tag{A.7}$$

Using the stability condition of the market for commodity 2 (derived in Appendix II) we find that $\Delta < 0$.

Appendix II: ***Stability condition of the market for commodity 2***

As commodity 2 is internationally non-traded its market must clear domestically through adjustments in its price, P_2.

The stability condition in the market for commodity 2 requires that $(d(D_2 - X_2)/dP_2) < 0$. This implies around equilibrium, initially, $D_2 = X_2$. Thus,

$$((\hat{D}_2 / \hat{P}_2) - (\hat{X}_2 / \hat{P}_2)) < 0. \tag{A.8}$$

Differentiating equation (8) we get

$$\hat{D}_2 = E_{P2}^2\hat{P}_2 + E_Y^2\hat{Y} \tag{A.9}$$

Using (A.4) and (15) and putting $\hat{K} = 0$ from (A.9) we can write

$$\hat{D}_2 = E_{P2}^2 \hat{P}_2 + E_Y^2 (V/Y)[-(WL\theta_{N1}/|\theta|) + (RN\theta_{L1}/|\theta|) + tP_3P_2(\partial D_3/\partial P_2)]\hat{P}_2$$

or, $$(\hat{D}_2/\hat{P}_2) = [(E_Y^2 V/|\theta|Y)(RN\theta_{L1} - WL\theta_{N1}) + \{E_{P2}^2 + (E_Y^2 V/Y)tP_3P_2(\partial D_3/\partial P_2)\}] \quad \text{(A.10)}$$

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[Note that as sector 1 is more land-capital intensive compared to sector 2 with respect to labour, we have $((N/L) < (a_{N1}/a_{L1}))$. This implies that $(RN\theta_{L1} - WL\theta_{N1}) < 0$.]

Now differentiating (4) and (7), simplifying and putting $\hat{K} = 0$ we get, respectively

$$\lambda_{N1}\hat{X}_1 + \lambda_{N2}\hat{X}_2 = (\lambda_{N1}S_{NL}^1 + \lambda_{N2}S_{NL}^2)(\hat{P}_2/|\theta|) \quad \text{(A.11)}$$

and,

$$\lambda_{L1}\hat{X}_1 + \lambda_{L2}\hat{X}_2 = -\lambda_{L1}\{S_{LN}^1 + \lambda_{L2}S_{LN}^2 + (W^*\lambda_{L3}/W)\}(\hat{P}_2/|\theta|) \quad \text{(A.12)}$$

Solving (A.11) and (A.12) using Cramer's rule we find

$$(\hat{X}_2/\hat{P}_2) = -(1/|\lambda||\theta|)[\lambda_{N1}\{\lambda_{L1}S_{LN}^1 + \lambda_{L2}S_{LN}^2 + (\theta_{N1}\lambda_{L3}W^*/W)\} + \lambda_{L1}(\lambda_{N1}S_{NL}^1 + \lambda_{N2}S_{NL}^2)]$$

(+)(−) (+) (+) (A.13)

where $|\lambda| = (\lambda_{N1}\lambda_{L2} - \lambda_{N2}\lambda_{L1}) > 0$ as sector 2 is more labour intensive vis-à-vis sector 1 with respect to land-capital.

Substituting the expressions for $(\hat{D}_2/\hat{P}_2)$ and $(\hat{X}_2/\hat{P}_2)$ from (A.10) and (A.13) into (A.8) one obtains

$$[(E_Y^2 V/|\theta|Y)(RN\theta_{L1} - WL\theta_{N1}) + \{E_{P2}^2 + (E_Y^2 V/Y)tP_3P_2(\partial D_3/\partial P_2)\}] + (1/|\lambda||\theta|)[\lambda_{N1}\{\lambda_{L1}S_{LN}^1 + \lambda_{L2}S_{LN}^2 + (\theta_{N1}\lambda_{L3}W^*/W)\} + \lambda_{L1}(\lambda_{N1}S_{NL}^1 + \lambda_{N2}S_{NL}^2)] < 0 \quad \text{(A.14)}$$

Thus, the stability condition in the market for commodity 2 is given by (A.14).

Now, substituting the expressions for A_2 and A_1 from (18) into (A.7) it is easy to check that

$$\Delta = |\lambda|\{(\hat{D}_2/\hat{P}_2) - (\hat{X}_2/\hat{P}_2)\} < 0. \quad \text{(A.15)}$$

[Note that $\{(\hat{D}_2/\hat{P}_2) - (\hat{X}_2/\hat{P}_2)\} < 0$ (see (A.14)) and $|\lambda| > 0$].

Appendix III: ***The change in welfare***

Differentiating (13) and (14.1), we have

$$dU/U_1 = dD_1 + P_2 dD_2 + P_3 * dD_3$$
$$= dX_1 + P_2 dX_2 + P_3 * dX_3 - rdK_F + tP_3 dM \,, \quad \text{(A.16)}$$

where $U_1 = \partial U / \partial D_1$.

Differentiating (12.1) we obtain

$$dY = [dX_1 + P_2 dX_2 + P_3 * dX_3 - rdK_F] + X_2 dP_2 + tP_3 dM \quad \text{(A.17)}$$

By differentiating production functions and considering (4), (5) and (7), we have

$$[dX_1 + P_2 dX_2 + P_3 * dX_3 - rdK_F]$$
$$= (F_L^1 dL_1 + F_N^1 dN_1) + P_2 (F_L^2 dL_2 + F_N^2 dN_2) + P_3 * (F_L^3 dL_3 + F_K^3 dK) - rdK_F$$
$$= (WdL_1 + RdN_1) + (WdL_2 + RdN_2) + (W * dL_3 + rdK) - rdK_F$$
$$= (WdL_1 + WdL_2 + W * dL_3)$$
$$= (L_3 + L_U) dW \quad \text{(A.18)}$$

[Note that $dN_1 + dN_2 = 0$; and, $dK = dK_F$. $P_i F_j^i$ is the value of marginal product of the j th factor in the i th sector, which is equal to the factor price.]

Using (A.17) and (A.18) we can write

$$dY = (L_3 + L_U) dW + X_2 dP_2 + tP_3 dM \quad \text{(A.19)}$$

Differentiating equation (11) and using (A.19), we obtain

$$dM = (\partial D_3 / \partial P_2) dP_2 + (\partial D_3 / \partial Y)[(L_3 + L_U) dW + X_2 dP_2 + tP_3 dM] - dX_3$$

or, $dM = (\partial D_3 / \partial P_2) dP_2 + (m_3 / P_3 *)[(L_3 + L_U) dW + X_2 dP_2 + tP_3 dM] - dX_3$

where $m_3 = P_3 * (\partial D_3 / \partial Y)$ is the marginal propensity to consume commodity 3.

Arranging terms one gets

$$dM = V[(\partial D_3 / \partial P_2) dP_2 + (m_3 / P_3 *)\{(L_3 + L_U) dW + X_2 dP_2\} - dX_3] \quad \text{(A.20)}$$

where $V = [(1+t)/\{1 + t(1 - m_3)\}] > 0$.

Using (A.18) and (A.20) from (A.16) we find

$$(dU / U_1) = dW(L_3 + L_U)\{1 + (tm_3 V / 1 + t)\} + tP_3 V\{(\partial D_3 / \partial P_2) + X_2(\partial D_3 / \partial Y)\}dP_2 - tP_3 VdX_3$$

or,

$$(1/U_1)(dU / dK) = V[(L_3 + L_U)(dW / dK) + tP_3\{(\partial D_3 / \partial P_2) + X_2(\partial D_3 / \partial Y)\}(dP_2 / dK) - tP_3(dX_3 / dK)] \tag{20}$$

[Note that $\{1 + (tm_3 V / 1 + t)\} = V$.]

Appendix IV: ***Derivation of equation 22***

Totally differentiating equation (21) we get

$$\hat{L}_U = -(W^* \lambda_{L3} / W\lambda_{LU})\hat{W} + \hat{K} \tag{A.21}$$

where $\lambda_{LU} = (L_U / L)$; and, $\lambda_{L3} = (a_{L3} X_3 / L)$.

With the help (15) and (19.1) one can rewrite (A.21) as follows.

$$(\hat{L}_U / \hat{K}) = [\{(W^* \lambda_{L3} / W\lambda_{LU})(\theta_{N1} / |\theta|\Delta)\}\{(|\lambda| E_Y^2 VtP_3 X_3 / Y) - (W^* \lambda_{N1}\lambda_{L3} / W)\} + 1] \tag{A.22}$$

From (21) we may write

$$(W^* \lambda_{L3} / W\lambda_{LU}) = \{W^* / (W^* - W)\} \tag{A.23}$$

With the help of (A.23), (A.22) can be rewritten as follows.

$$\begin{aligned}(\hat{L}_U / \hat{K}) &= \{W^* / |\theta|\Delta(W^* - W)\}[\theta_{N1}\{(|\lambda| E_Y^2 VtP_3 X_3 / Y) - (W^* \lambda_{N1}\lambda_{L3} / W)\} + (W^* - W)|\theta|\Delta] \\ &= \{W^* / |\theta|\Delta(W^* - W)\}[\{\theta_{N1}((|\lambda| E_Y^2 VtP_3 X_3 / Y) - (W^* \lambda_{N1}\lambda_{L3} / W)) + W^*|\theta|\Delta\} - W|\theta|\Delta]\end{aligned} \tag{22}$$