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FOREIGN CAPITAL ACCUMULATION AND NATIONAL INCOME: DOES UNEMPLOYMENT MATTER?

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Abstract: We consider a situation where growth in the stock of foreign capital employed in the export-sector leads to immiserization in a small economy with urban unemployment and a protected import-competing sector. Contrary to the usual presumption, the qualitative result is independent of the existence of unemployment. Using the Harris–Todaro structure we show that in spite of unemployment, welfare changes depend *only on* the extent of trade-distortion.

1. INTRODUCTION

The purpose of this paper is to reconsider the immiserizing effects of growth in the foreign capital invested in the export-sector of a "small" developing country which also has a protected import-competing sector. Recently Beladi and Marjit (1992) have shown that with full-repatriation of foreign capital income, growth in the foreign capital can lead to immiserization in the presence of tariff-distortion even if the foreign capital is employed in the export sector. This generalizes the main result in the existing literature which primarily focuses on foreign capital

movement in the protected sector of the economy.[1]

In this paper we introduce another distortion in the system through the rural-urban wage-differential and urban unemployment.[2] The interesting result we obtain is that the welfare results in this system depend entirely on the distortion in the trade-sector rather than on the extent of distortion in the labor market. In other words, in spite of the existence of unemployment, the condition for immiserization matches with that of a full-employment model and is independent from any employment effects. In this context, we provide an example, probably a rare one, where an additional distortion (assuming there is an initial tariff) does not alter the qualitative result obtainable without such a distortion.

Furthermore, we show how a Heckscher–Ohlin–Samuelson model with Harris–Todaro unemployment and foreign capital inflow can be basically reduced to a standard H–O–S model experiencing a reduction in domestic labor force through emigration. Hence the model satisfies the basic "separability"-property of the H–O–S model in that factor returns are completely determined by commodity prices through the price-unit cost-equilibrium conditions. In other words with the framework provided in this paper, we can identify an *envelope* property of the system even with unemployment. Given commodity prices, alterations in the composition of GNP *do not have* any effect on the value of GNP. This holds even when the economy is inside the PPF (Production Possibility Frontier). Such a property of the Harris–Todaro structure has been left unexploited in the literature. This is a new and an important result. In the development literature the influx of foreign capital into LDC's is a stylized fact.

The paper is divided into four sections. In the second section we discuss the model and the results. In section three we analyze the effects of indigenous capital accumulation on urban unemployment and welfare. The last section concludes the paper after some general remarks.

2. THE MODEL

Consider a small open developing economy with three sectors producing X_i, $i = 1, 2, 3$, where X_1 is the argicultural good produced in the rural sector and X_2, X_3 are manufacturing goods produced in the urban sector. Sectors X_1 and X_2 use domestic capital and labor. Workers in the rural agricultural sector earn less than the given urban wage rate. This wage differential generates rural-urban migration according to Harris and Todaro [1970]. The manufacturing good X_3 uses foreign capital and urban labor. The entire return to capital in this sector accrues to foreign capitalists and is repatriated. Domestic capital is full-employed and the

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[1] See the main papers in this area by Brecher and Alejando (1971), Brecher and Findlay (1983), Khan (1980) and Chao and Yu (1990).

[2] In a two-sector, full-employment model it is impossible to show that growth in the foreign capital employed in the export sector of a small economy will lead to immiserization. As shown in Jones and Marjit (1992), a 3×3 model of trade and production will lead to such a result.

return to this input is retained by the domestic owners.

We assume that goods X_1, X_3 are exported. The import competing sector X_2, is afforded tariff protection.[3] However, the tariff is not high enough to bar all imports of foreign manufacturers. World prices of these products are given. Production functions follow the usual neo-classical properties, i.e. constant returns to scale; each factor exhibits positive but diminishing marginal productivity. The three production functions are given by,

$$X_1 = X_1(L_1, K_1)$$

$$X_2 = X_2(L_2, K_2) \tag{1}$$

$$X_3 = X_3(L_3, K_3^*)$$

The goods market is assumed to be perfectly competitive, so that the zero-profit condition holds for all sectors. The following symbols will be used in the paper,

P_i – World price of the ith good, $i = (1, 2, 3)$.

W – Rural wage rate.

$\bar{W}$ – Urban wage rate (fixed).

$\bar{L}$ – Total stock of labor.

$\bar{K}$ – Total stock of domestic capital.

$\bar{K}^*$ – Total stock of foreign capital.

$r(r^*)$ – Return to the domestic (foreign) capital.

a_{Li} – Labor-output ratio in the ith sector, $i = 1, 2, 3$.

a_{Ki} – Capital-output ratio in the ith sector, $i = 1, 2, 3$.

$\tilde{P}_2 = P_2(1 + t)$, where $t > 0$, is the given tariff rate.

The model is described by the following set of equations. Competitive equilibrium implies that,

$$Wa_{L1} + ra_{K1} = P_1 \tag{1}'$$

$$\bar{W}a_{L2} + ra_{K2} = \tilde{P}_2 \tag{2}$$

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

Full-employment conditions also give us,

$$a_{K1}X_1 + a_{K2}X_2 = \bar{K} \tag{4}$$

$$a_{K3}X_3 = \bar{K}^* \tag{5}$$

We assume that workers move freely between the urban and rural sectors. While all workers in the rural sector are employed with the market-clearing wage W, the workers in the urban sector are paid with a fixed higher wage $\bar{W}$. Hence, urban

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[3] We implicitly assume the tariff is imposed for the purpose of obtaining revenue and preserving employment. But there are strong reasons to believe that tariffs are suboptimal instruments in this environment. To follow the usual premise of the literature we assume, without justification, the existence of a tariff.

unemployment emerges. Following Harris and Todaro (1970), labor migration between rural and urban sectors stops when the rural wage, W, is equal to the expected urgan wage, which is $\bar{W}$, times the probability of employment in the urban sector. Accordingly, the Harris–Todaro (HT) migration equilibrium is described by,

$$\bar{W}[(a_{L2}X_2+a_{L3}X_3)/(\bar{L}-a_{L1}X_1)] = W \tag{6}$$

which is written as,

$$(\bar{W}a_{L2}X_2 + \bar{W}a_{L3}X_3) + Wa_{L1}X_1 = W\bar{L} \tag{7}$$

In the present model foreign capital is treated as a specific factor to be employed only in the sector producing and exporting X_3 free from tariffs. Moreover, the sector is separated from the rest of the economy in the sense that its output and labor employment are completely independent of the changes in the endowment of indigenous factors and domestic production technologies. Consequently, changes in this sector's employment of capital and technologies leaves domestic sectors largely unaffected in the absence of tariffs and other distortions. Such a sector was characterized as a foreign "enclave" by old-time development economists. The system described above can now be solved in the following way.

From equations (1)′, (2) and (3), with given commodity prices, we can solve for W, r and r^*. These in turn determine a_{Li} and a_{Ki}. From equation (5) we can solve for X_3 and then using equations (4) and (7), X_1 and X_2 are determined.

Now, from equations (5) and (7) we obtain,

$$[a_{L1}X_1 + (\bar{W}/W)a_{L2}X_2] = \bar{L} - [(\bar{W}/W)(a_{L3}/a_{K3})\bar{K}^*] \equiv \bar{L}' \tag{8}$$

Differentiating equations (4) and (8) and using "^" to denote proportional change we can write,

$$\lambda_{L1}\hat{X}_1 + \lambda_{L2}\hat{X}_2 = \hat{\bar{L}}' \tag{9}$$

$$\lambda_{K1}\hat{X}_1 + \lambda_{K2}\hat{X}_2 = \hat{\bar{K}} \tag{10}$$

where,

$$\lambda_{L1} = [a_{L1}X_1/\bar{L}'], \qquad \lambda_{L2} = [(\bar{W}/W)a_{L2}X_2]/\bar{L}'$$

$$\lambda_{K1} = [a_{K1}X_1/\bar{K}], \qquad \lambda_{K2} = [a_{K2}X_2/\bar{K}]$$

It is interesting to note that the necessary and sufficient condition for the immiserization result is the existence of a capital-intensive protected sectro. We retain this condition here by assuming that,[4]

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[4] By this assumption, physical and value intensity are made to go hand in hand. If $(\bar{W}/W)$ is not too high, physical labor intensity of the rural sector will continue to ensure the condition given by equation (11). However, if $(\bar{W}/W)$ is very high, equation (11) may not hold even if the rural sector is physically labor intensive. Stability of the Harris–Todaro equilibrium is therefore guaranteed by condition (11). For an insightful analysis of this point see Neary (1981), and Cordon and Findlay (1975).

$$[a_{L1}a_{K2} - a_{K1}a_{L2}(\bar{W}/W)] > 0 \qquad (11)$$

Note that the intensity condition has to take account of the wage differential to convert one unit of urban labor in terms of rural labor. Now, the following proposition is immediate.

PROPOSITION 1.   *Growth in the stock of foreign capital must expand urban manufacturing good, X_2.*

Proof.   We can solve for $\hat{X}_2$ from equations (9) and (10) to obtain,

$$\hat{X}_2 = [\lambda_{K1}\lambda_{L3}\hat{\bar{K}}^*/|\lambda|] > 0$$

where,

$$|\lambda| = \begin{vmatrix} \lambda_{L1} & \lambda_{L2} \\ \lambda_{K1} & \lambda_{K2} \end{vmatrix} > 0$$

from equation (11), we have,

$$\lambda_{L3} = [(\bar{W}/W)a_{L3}X_3/\bar{L}'] , \quad \text{and hence} \quad \hat{X}_2 \text{ is positive as} \quad \hat{\bar{K}}^* > 0 \text{ Q.E.D.}$$

Also, following Caves and Jones [1985, 526–7], the change in welfare, y, can be measured by,

$$dy \equiv dD_1 + \tilde{P}_2 dD_2 + P_3 dD_3 \qquad (12)$$

where D_i $(i = 1, 2, 3)$ is the domestic consumption of the ith product and we choose X_1 as the numeraire. Balance of trade implies that,

$$D_1 + P_2 D_2 + P_3 D_3 = X_1 + P_2 X_2 + P_3 X_3 - r^*\bar{K}^* \qquad (13)$$

Where $r^*\bar{K}^*$ is the full repatriation of foreign capital income. Differentiating equation (13) and using $\tilde{P}_2 = P_2(1 + t)$ we get,

$$dD_1 + \tilde{P}_2 dD_2 + P_3 dD_3 = dX_1 + \tilde{P}_2 dX_2 + P_3 dX_3 - r^* d\bar{K}^* + tP_2(dD_2 - dX_2) \qquad (14)$$

And note that,

$$dX_1 + \tilde{P}_2 dX_2 + P_3 dX_3 = rd\bar{K} + Wd\bar{L} + r^* d\bar{K} \qquad (15)$$

Now from equation (7) we know that as the wage rate is held fixed, aggregate labor income does not change. Moreover, $\bar{L}$ and $\bar{K}$ are also fixed. Therefore, from equations (12), (14) and (15) we derive,

$$dy = tP_2(dD_2 - dX_2) \qquad (16)$$

where, $dD_2 = [(\partial D_2/\partial y) \cdot dy + (\partial D_2/\partial \tilde{P}) \cdot d\tilde{P}] = (\partial D_2/\partial y) \cdot dy$.

Let us now define $m_2 \equiv \tilde{P}_2(\partial D_2/\partial y)$ as the marginal propensity to consume importable good, X_2. Rewriting equation (16) as,

$$(dy/d\bar{K}^*) \cdot [1 - (tP_2 m_2/\tilde{P}_2)] = -tP_2 \cdot (dX_2/d\bar{K}^*)$$

or,

$$(dy/d\bar{K}^*) = \{-tP_2/[1-tm_2/(1+t)]\} \cdot (dX_2/d\bar{K}^*) \qquad (17)$$

The following proposition is now in order.

PROPOSITION 2. *With a capital intensive protected sector, immiserizing growth due to foreign capital accumulation is independent of factor market distortion.*

Proof. From Proposition 1, $(dX_2/d\bar{X}^*)$ is positive, hence, from equation (17), $(dy/d\bar{K}^*)$ is negative. Alternatively, using $e(P, u)$ to denote the minimum expenditure by households to reach the equilibrium utility, u, the equilibrium of the economy is given by the following equation,

$$e(P, u) = W\bar{L} + r\bar{K} + tP_2 \left[\frac{\partial e(P, u)}{\partial \tilde{P}_2} - X_2 \right] - r^*\bar{K}^*$$

In this framework, private domestic expenditure is set equal to private domestic income which is equal to domestic factor income plus the lump-sum transfer of tariff revenue by the government. From this equation one can derive the following condition,

$$\frac{\partial e(P, u)}{\partial u} \left[1 - \frac{tP_2 \dfrac{\partial^2 e(P, u)}{\partial u \partial \tilde{P}_2}}{\dfrac{\partial e(P, u)}{\partial u}} \right] du = -tP_2 \frac{\partial X_2}{\partial \bar{K}^*} d\bar{K}^* \qquad (18)$$

It is interesting to note that neither equation (17) nor (18) contain any term relative to unemployment. Again, a glance at (18) reveals that immiserizing growth is independent of factor market distortion.

The economic explanation of this result is simple. An increase in the stock of foreign capital draws labor into exportable sector, X_3. Since X_2, the importable sector, is capital-intensive, Rybczynski effect leads to an expansion in X_2. Now, at given terms of trade (small country assumption), an increase in the stock of foreign capital causes production of urban manufacturing good, X_3 to rise as well as employment in X_3. The income generated by the additional production is sector X_3 gets distributed through the system as foreign capital income, labor income and domestic capital income. Given commodity prices, the return to capital remains unchanged after full repatriation of foreign capital income.

Note that labor income in the exportable sector, X_3, increases; however, overall labor income does not change. The proof runs as follows. In view of equation (8), total labor income is given by, $[W\bar{L} - \bar{W}(a_{L3}/a_{K3})(\bar{K}^* - a_{K3}X_3)]$. On the other hand, this equals $W\bar{L}$ by virtue of equation (5) where W is determined by equations (1)' and (2), depending only on P_1, P_2 and $\bar{W}$. Also, a glance at equation (7) reveals that an increase in $\bar{K}^*$ does not alter W; hence, aggregate labor income does not change. Consequently, in the Harris–Todaro model with rigid urban

wage, there should not be any change in aggregate labor income. Moreover, the assumption of full-repatriation of foreign capital income implies no change in the value of produciton at domestic prices. The distortionary effect of a tariff is accentuated by an increase in X_2 which reduces the volume of imports, leading to a welfare loss.

It should be noted that foreign capital accumulation increases urban unemployment. In fact, under the assumed relative capital intensities given by equation (11), the inflow of foreign capital decreases employment in the agricultural sector thereby increasing urban employment. Since the rate of employment is determined by the ratio of $(W/\bar{W})$ from equation (6), the absolute level of unemployment, as well as that of employment, increases as a result of this disturbance. In spite of the increase in unemployment, total labor income remains unchanged because of the rural-urban wage differential arising from the Harris–Todaro labor framework.

3. INDIGENOUS CAPITAL AND WELFARE

With all these results at hand, we are now in a position to explore the effects of indigenous capital accumulation on urban unemployment and welfare. Equation (6) may be rewritten as,

$$(a_{L1}X_1 + a_{L2}X_2) + [(\bar{W}/W) - 1]a_{L2}X_2 + (\bar{W}/W)a_{L3}X_3 = \bar{L} \tag{19}$$

It is obvious from equation (19) that as the total stock of foreign capital increases the import competing sector, X_2 expands. Now, since $(\bar{W}/W)a_{L3}X_3$ and $\bar{L}$ are constant, and with $[(\bar{W}/W) - 1]$ being positive, $(a_{L1}X_1 + a_{L2}X_{x_2})$ must be negative, hence urban unemployment falls.

Let us now turn to the impact of indigenous capital accumulation on real income. Bhagwati (1958, 1968) and Johnson (1967) examined the possibility that a growth-induced deterioration in a country's terms of trade under some conditions causes a decline in real income. Using equations (15) and (16) and after a little manipulation we obtain,

$$(dy/d\bar{K}) = \{\tilde{P}_2/[1 - tm_2/(1 + t)]\}[(\partial X_2/\partial\bar{K})(A/B)] \tag{20}$$

Where $A = [\bar{W}t/(1 + t)](dL_2/d\bar{K})$ and $B = [1 - t(m_2 + 1)/(1 + t)]$. Equation (20) furnishes the effect of indigenous capital accumulation on welfare. In equation (20) we have $[1 - tm_2/(1 + t)] > 0$, $(\partial X_2/\partial\bar{K}) > 0$ and $(dL_2/d\bar{K}) > 0$. It is clear that the sign of $(dy/d\bar{K})$ is in general indeterminate. However, $(dy/d\bar{K}) \gtrless 0$ iff $(\partial X_2/\partial\bar{K}) \gtrless (A/B)$. So that, immiserization resulting from indigenous capital accumulation could occur when the distortion effect dominates the growth effect due to factor accumulation.[5] We now have the following proposition.

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[5] For a detailed discussion on the issue of immiserization resulting from domestic factor accumulation or economic expansion, see Bhagwati (1958, 1968) and Johnson (1967).

PROPOSITION 3. *Indigenous capital accumulation causes the urban unemployment to fall; however, it has an indeterminate effect on real income.*

At this point a few comments with regard to Proposition 3 are in order. It is well known that factor accumulation in any sector causes the output of that sector to rise at the expense of the output from the other sector. It should be noted that such an output response is a necessary condition for immiserizing growth in a small open economy. However, in an economy characterized by the Harris–Todaro framework the shadow price of capital is positive, though lower than the full employment value, and the shadow price of labor is positive, approximating the agricultural wage rate. Hence, immiserization resulting from indigenous capital accumulation *may not* occur in the Harris–Todaro model, even though the necessary condition of orthodox theory of wage-differentials is satisfied. As a result, our finding casts serious doubts on the hypothesis that economic expansion may be immiserizing in the presence of factor market distortions.

4. CONCLUDING REMARKS

This paper should be viewed as an example of where results valid in a model with full employment naturally carry over to the one with unemployment. Welfare effects from other types of disturbances in a full employment model typically do not apply without qualifications when one assumes unemployment. However, we have shown that the existence of unemployment does not always affect the result. If we carefully look at equation (17), it becomes clear that, even with unemployment, the impact on welfare is entirely dependent on the extent of tariff distortion. This is due to an interesting property of the Harris–Todaro labor migration framework which has been mostly unexplored in the literature. As long as the rural wage rate is unaltered, employment reallocations do not have any net effect on aggregate labor income. This is stated precisely in condition (8). In fact this is quite similar to the envelope condition we often use in the context of a full employment model.

The main contribution of the paper is two fold. First, we have demonstrated, within an acceptable framework, how welfare results in a model with unemployment depend *only on the extent of trade distortion*. This states that there are models where unemployment does not add any extra dimension to the welfare result of endowment shocks, contradicting a well established belief in the literature on trade policy. Second, we have shown how a H–O–S model with urban unemployment and influx of foreign capital can have properties identical to the standard H–O–S framework experiencing a fall in the labor force.

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