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The Possibility of Welfare Gains with Capital Inflows in A Small Tariff-Ridden Economy

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THE POSSIBILITY OF WELFARE GAINS WITH CAPITAL INFLOWS IN A SMALL TARIFF-RIDDEN ECONOMY

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Abstract

Capital inflows with full repatriation give rise to welfare improvement possibilities in a small tariff distorted economy when imperfect competition and increasing returns are allowed for in one sector of a two sector model. This is in contrast to the Brecher-Alejandro proposition that capital inflows with full repatriation are necessarily immiserizing for a small tariff-ridden economy. We find that welfare gains chances are greater (a) the higher the expenditure share of the capital intensive differentiated good; (b) the lower the substitutability between brands and (c) the lower the share of tariff revenue in national income.

1. INTRODUCTION

Economic theorists and policy makers have differed consistently over the welfare implications of growth induced and financed by foreign capital. Foreign capital inflows into LDCs and lately Eastern Europe indicate the popularity of some sort of 'equivalence between the rate of capital transfer and pace of economic development' argument among policy makers. On the other hand, building upon the demonstrations of Johnson (1967) and Bhagwati (1968), about the possible immiserization effects of growth in tariff-ridden economies, Brecher and Diaz-Alejandro (1977) demonstrated that foreign capital inflows with full repatriation are necessarily immiserizing for a tariff-ridden economy. The Brecher-Alejandro (henceforth BA) proposition is also robust for fragmented economies of the generalised Harris-Todaro (HT) variety (Khan 1987 discusses the HT model) and for extended HT economies with an informal sector (Chandra and Khan, 1993).

For generalised HT economies with urban unemployment, capital inflows with repatriation are (a) necessarily immiserizing with stable factor markets (Khan, 1981) and (b) conditionally immiserizing in the presence of sector specific capital (Brecher and Findlay, 1983). However, Grinols (1991) introduces an urban informal sector within the HT setup, arguing that immiserization effects are extreme parametrizations of generally welfare improving outcomes.

Chandra and Khan (1993), however, demonstrate in a Heckscher-Ohlin-Samuelson (HOS) variant of the BA model supplemented by an

informal sector, that Grinols' results are driven by the pressure of non-shiftable capital in the informal sector and demonstrate the relevance of the basic BA proposition under a variety of trade and input concentration regimes. Chandra and Khan highlight the robustness of the BA proposition : with generous but precise specifications of factor intensities, capital inflows with full repatriation under a tariff are immiserizing if and only if the import sector is capital intensive. The only case where the basic proposition breaks down is where immiserization occurs even without a tariff!

All the models above stress competitive markets and constant returns technology with endogenous employment in intermediate sector cases, with trade under HOS or Ricardo-Viner regimes. Given the recognition of gains from trade driven by returns to specialization through increasing returns in imperfectly competitive markets (Krugman, 1979; Helpman and Krugman, 1985) we introduce a sector with increasing returns and imperfect competition characterized by Dixit-Stiglitz (1977) preferences and product differentiation in a two factor model to analyze its implications for the BA proposition.

Our work is motivated by the findings of Venables (1982) that a tariff distortion in an imperfectly competitive small open economy is welfare improving with inter-industry trade. We model a two sector economy, dispensing with the intermediate sector to simplify exposition. Labour and capital are the inputs used, to produce a homogenous exportable good with CRS technology and

competition. The other good is a differentiated good whose production is subject to increasing returns due to the presence of fixed costs and is produced in a monopolistically competitive framework. The homogenous good is relatively labour intensive. The economy is tariff distorted and small (i.e. a price taker in the international market). Foreign brands of the differentiated good are imported. Trade is always balanced. There is no unemployment.

Given the controls prevalent in most LDCs in capital markets, capital is immobile, domestic rates of interest are endogenous. In this framework we find that the welfare effects of an inflow of foreign capital depends on three parameters : (a) the share of the differentiated goods in expenditure, (b) the monopoly power or elasticity of substitution between brands and (c) tariff revenue as a proportion of national income.

The paper is organised as follows. Section 2 describes the model, section 3 analyzes implications of a capital inflow, while section 4 concludes.

2. THE MODEL

The Consumers

The representative consumer who takes all market variables as given maximizes a Cobb-Douglas utility function increasing in consumption of the homogeneous good y which is also the numeraire, and an aggregate X of the differentiated good whose price is P :

$$u = X^{\alpha}y^{1-\alpha} \tag{1}$$

subject to the budget constraint

$$y + PX = \text{National Income (NI)} \tag{2}$$

The subutility function X is of the Dixit-Stiglitz variety

$$X = \left[\sum_{i=1}^{n} x_i^{\frac{\sigma-1}{\sigma}} + \sum_{j=1}^{n^*} x_j^{*\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \tag{3}$$

and P, the price index corresponding to X is

$$P = \left[\sum_{i=1}^{n} p_i^{1-\sigma} + \sum_{j=1}^{n^*} p_j^{*1-\sigma} \right]^{\frac{1}{1-\sigma}} \tag{4}$$

where x_i and p_i are respectively the domestic output (which equals domestic consumption) and price of brand i and n is the number of brands produced locally. n is large enough to enable us to ignore the integer constraint. Terms with asterisks denote foreign variables. $\sigma>1$ is the elasticity of substitution between brands. Below in (8a) we shall see that this would be the elasticity of demand facing each firm. σ^{-1} will in the large group case also be the share of fixed cost in total revenue. Since the economy is tariff-ridden, $p_j^* = (1+t)p_j^f$, where p_j^f is the price of the jth foreign brand and $t \geq 0$ the rate of tariff.

Solving (1) and (2) we obtain the expenditure shares on homogeneous and differentiated goods as

$$y = (1-\alpha)NI \tag{5a}$$

$$PX = \alpha NI \tag{5b}$$

Substitution into (1) yields the indirect utility function

$$V = (1-\alpha)^{1-\alpha} \left(\frac{\alpha}{P}\right)^{\alpha} NI \tag{6}$$

which serves as our index of welfare.

Next, maximizing (3) with respect to the budget constraint

$$\sum_{i=1}^{n} p_i x_i + \sum_{j=1}^{n^*} p_j^* x_j^* = PX \tag{7}$$

yields demands for individual brands as

$$x_i = p_i^{-\sigma} P^{\sigma-1} \alpha NI \tag{8a}$$

$$x_j^* = p_j^{*-\sigma} P^{\sigma-1} \alpha NI \tag{8b}$$

Since we shall be concerned with symmetric equilibrium, each firm will charge the same price (p_i) and produce the same output (x_i). The same is true for the foreign varieties (p^*_j, x^*_j) and hence we drop the subscripts. Also, following Venables (1982) we assume that the price and number of brands of the differentiated goods produced abroad can be treated as exogeneous. This completes the demand specification of our model.

The Producers

The homogeneous good Y is produced competitively using two inputs, labour(L) and capital(K) with constant returns technology. Competitive production implies the equality of price (unity for the numeraire) and marginal cost :

$$a_{LY}w + a_{KY}r = 1 \qquad (9)$$

where a_{ij} is the amount of factor i utilized in the production of unit output of sector j and w and r are respectively wage rate and return to capital.

The differentiated goods sector uses both labour and capital as variable inputs. Each firm takes all market variables (in particular P) as given. Variable costs are homogeneous of degree one in output. Profit maximization for each brand implies the mark up pricing rule

$$a_{Lx}w + a_{Kx}r = p(1-\frac{1}{\sigma}) \qquad (10)$$

Free entry in the differentiated goods sector drives supernormal profits down to zero (the Chamberlinian large group case). For each brand, therefore, excess of revenue over total variable cost exactly offsets the fixed cost incurred. We assume that capital is the only component of fixed cost. So we must have

$$a_{KF}r = \frac{1}{\sigma}px \qquad (11)$$

where a_{KF} denotes the amount of capital required as fixed input. The presence of fixed costs implies increasing returns in the differentiated goods sector. The factor market clearing equations are given by

$$a_{LY}\, Y + a_{Lx}\, nx = \bar{L} \tag{12}$$

$$a_{KY}\, Y + a_{Kx} nx + a_{KF} n = K^f + K^d \tag{13}$$

where $\bar{L}$ is the given endowment of labour and K^f (K^d) is the capital owned by foreign (domestic) residents. Without loss of generality we assume that all capital is foreign-owned. We then have $K^d = 0$ and write $K^f = K$.

Finally, the national income is given by

$$NI = Y + npx - rK + tn^*p^*x^* \tag{14a}$$

$$NI = wL + tp^*n^*x^* \tag{14b}$$

(14a) is a disaggregated version of (14b) which gives the income shares to labour and tariff. All returns to capital are repatriated in keeping with the Brecher-Alejandro tradition, and all tariff revenue rebated back to the consumer. This completes the specification of the model. We now turn to the effects of a change in foreign investment on our model.

3. CAPITAL INFLOW

In this section to facilitate analysis, we express the equations in terms of proportionate changes, where

$$\hat{x} = d\log x$$

From equations (5) and (8a) we have

$$\hat{y} = N\hat{I} \qquad (5a)'$$

and

$$\hat{x} = -\sigma\hat{p} + (\sigma-1)\hat{P} + N\hat{I} \qquad (8a)'$$

From (4)

$$\hat{P} = \frac{1}{1-\sigma}\beta\hat{n} + \beta\hat{p}$$

where β = npx/PX gives the share of domestic brands in total expenditure on the differentiated good

Similarly,

$$\hat{x}^* = (\sigma-1)\hat{P} + N\hat{I} \qquad (8b)'$$

and

$$N\hat{I} = \lambda\hat{w} + (1-\lambda)\hat{x}^* \qquad (14b)'$$

where λ denotes the share of labour income in national income.

Further, differentiation of the production cost equations give

$$\theta_{LY}\hat{w} + \theta_{KY}\hat{r} = 0 \qquad (9)'$$

$$\theta_{Lx}\hat{w} + \theta_{Kx}\hat{r} = \hat{p} \qquad (10)'$$

$$\hat{r} = \hat{p} + \hat{x} \qquad (11)'$$

where θ_{ij} is the share of the ith factor in variable cost in the production of the jth output as a proportion of marginal cost. Differentiation of the factor market clearing equations give

$$\gamma_{LY}\hat{Y} + \gamma_{Lx}\hat{n} + \gamma_{Lx}\hat{x} = (\hat{w}-\hat{r})\ (\gamma_{LY}\theta_{KY}\sigma_Y + \gamma_{Lx}\theta_{Kx}\sigma_Y) \qquad (12)'$$

$$\gamma_{KY}\hat{Y} + (1-\gamma_{KY})\hat{n} + \gamma_{Kx}\hat{x} = -(\hat{w}-\hat{r})\ (\gamma_{KY}\theta_{LY}\sigma_Y + \gamma_{Kx}\theta_{Lx}\sigma_x) \qquad (13)'$$

where γ_{ij} is the share of the i th input in the j th sector and σ_j is the elasticity of substitution(in production) in the j th industry.

We are now ready to solve for the effects of a capital shock on y, n and x. From (12)', (13)'and (A6) (the details are given in the Appendix)

$$\frac{\hat{x}}{\hat{K}} = \frac{\gamma_{LY}}{\Delta} \qquad (15)$$

$$\frac{\hat{n}}{\hat{K}} = \frac{\gamma_{LY}}{\Delta}\left[\frac{\lambda}{\beta}\left(1+\sigma\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}} + \frac{\theta_{KY}}{\theta_{Lx}}\right) - (\sigma-1)\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}}\right] \qquad (16)$$

where Δ is the determinant (the expression for Δ is given in the Appendix). Two sufficient conditions to ensure that Δ is < 0 are (a) the homogeneous goods sector (i.e.the exportables sector) is labour intensive as stated above. This implies

$$\gamma_{KY} < \gamma_{LY}$$

so that

$$1-\gamma_{LY} < 1-\gamma_{KY}$$

$$\gamma_{Lx} < 1-\gamma_{KY}$$

We thus have

$$\gamma_{KY}\gamma_{Lx} < \gamma_{LY}(1-\gamma_{KY})$$

This condition together with the added assumption (b) $\lambda > \beta$ is sufficient to ensure that $\Delta < 0$. Therefore

$$\frac{\hat{x}}{\hat{K}} < 0 \ , \ \frac{\hat{n}}{\hat{K}} > 0.$$

From (4)'we have upon simplification

$$\frac{\hat{P}}{\hat{K}} = \frac{\gamma_{LY}\beta}{(\sigma-1)\Delta}\left[\frac{\lambda}{\beta}\left(1+\sigma\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}} + \frac{\theta_{KY}}{\theta_{Lx}}\right)\right] < 0 \qquad (17)$$

and also

$$\frac{\hat{NI}}{\hat{K}} = \lambda\frac{\hat{w}}{\hat{K}} + (1-\lambda)\frac{\hat{x}^*}{\hat{K}} \qquad (18a)$$

$$= [-\lambda\frac{\theta_{KY}}{\theta_{Lx}} + 1 + \sigma\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}}]\frac{\gamma_{LY}}{\Delta} \qquad (18b)$$

From (17), we observe that the effect of a capital inflow lowers the price index: price per brand falls and the number of brands increases, so that the aggregate price index falls unambiguously. The effect on national income is ambiguous. On the one hand the wage rate increases and hence labour income rises, but on the other, as demand for foreign differentiated brands declines, tariff income falls. The effect on welfare is

$$\frac{\hat{V}}{\hat{K}} = -\alpha\frac{\hat{P}}{\hat{K}} + \frac{\hat{NI}}{\hat{K}} \qquad (19)$$

Using (17) and (18b) and simplifying we obtain

$$\frac{\hat{V}}{\hat{K}} = \frac{\gamma_{LY}}{\Delta}[1+\sigma\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}} - (\lambda + \lambda\frac{\alpha}{\sigma-1})(1+\sigma\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}} + \frac{\theta_{KY}}{\theta_{Lx}})] \qquad (20)$$

From (20) it is easy to see that

$$\frac{\hat{V}}{\hat{K}} \gtrless 0$$

according as $(\sigma-1)\frac{(1-\lambda)}{\lambda} \lesseqgtr \alpha$ (21)

Condition (21) is a sufficient condition.

Thus, whether welfare gains occur as a result of a capital inflow is conditional upon whether the gains due to a fall in the price level and increase in labour income are sufficient to offset the welfare loss resultant upon reduced tariff revenue.

It is clear from the above that ceteris paribus, the higher is λ (the share of labour income) the more likely it is that in a tariff-ridden economy a capital inflow would be welfare improving. A greater preference for differentiated goods reflected in higher expenditure shares in NI, α, also enhances chances of welfare gains. Finally, low σ values, reflecting low substitutability between brands and therefore, greater non-competitive behaviour, tend to be welfare enhancing. Note that as σ tends to infinity, the market tends towards greater competitiveness, and the Brecher-Alezandro immiserization result asserts itself.

4. CONCLUSION

It has been a longstanding practice in the developing countries to provide tariff protection for domestically located industries. Multinational countries moved to such countries to produce and sell in the sheltered market. What were the welfare implications of such a policy?

It was Brecher and Diaz-Alezandro(1977) who showed that in a standard trade model such a policy was welfare reducing if all

profits were repatriated and the country in question continued to import the capital-intensive good. Other writers have only reinforced the robustness of this proposition.

Is it true that the developing countries were shooting themselves in the foot by following such a policy? The answer is in the negative acccording to the model set out in this paper.

In this paper we modelled the industrial sector as a monopolistically competitive one which is probably more realistic than the specification of the earlier models and yet allows to do a general equilibrium analysis.

In contrast to the earlier models, in our model we then have two distortions present. An exogeneous increase in foreign-owned capital with full repatriation of profits is welfare increasing for reasonable parameter values.

To state the conclusion again, we found that in a two sector model where one of the sectors is monopolistically competitive an increase in the amount of foreign capital in the presence of tariffs is likely to increase welfare if the tariff revenue is small.

APPENDIX

Solving for (9)', (10)'and (11)'we obtain

$$\hat{w} = -\frac{\theta_{KY}}{\theta_{Lx}}\hat{x} \tag{A1}$$

$$\hat{r} = \frac{\theta_{LY}}{\theta_{Lx}}\hat{x} \tag{A2}$$

$$\hat{p} = \frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}}\hat{x} \tag{A3}$$

Further, from (8a), (8b) and(A3) we may write

$$\hat{x}^* = [1 + \sigma\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}}]\ \hat{x} \tag{A4}$$

so that from (14b)'we have upon substituting from (A1) and (A2)

$$\hat{NI} = [-\lambda\frac{\theta_{KY}}{\theta_{Lx}} + (1-\lambda)\ \{1+\sigma\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}}\}]\ \hat{x} \tag{A5}$$

Substituting into (8a)' gives

$$[\frac{\lambda}{\beta}(1 + \sigma\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}} + \frac{\theta_{KY}}{\theta_{Lx}}) - (\sigma-1)\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}}]\ \hat{x} + \hat{n} = 0 \tag{A6}$$

From (12)', (13)'and (A6) we get the expression for Δ,

$$\Delta = [\frac{\lambda}{\beta}(1 + \sigma\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}} + \frac{\theta_{KY}}{\theta_{Lx}}) - (\sigma-1)\frac{\theta_{Kx}-\theta_{KY}}{\theta_{Lx}}]\ [\ \gamma_{Lx}\gamma_{KY}$$
$$- \gamma_{LY}(1-\gamma_{KY})\ ] + \gamma_{LY}[\gamma_{Kx} - \frac{1}{\theta_{Lx}}(\gamma_{KY}\theta_{LY}\sigma_Y + \gamma_{Kx}\theta_{Lx}\sigma_x)\ ]$$
$$- \gamma_{KY}[\gamma_{Lx} + \frac{1}{\theta_{Lx}}(\gamma_{LY}\theta_{KY}\sigma_Y + \gamma_{Lx}\theta_{Kx}\sigma_x)\ ]$$

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