

# Export–Processing Zone and the Possibility of Welfare Gains with Foreign Capital Inflow : A Note

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## Abstract

It is shown in a simple model with 'export–processing zone' that exogenous inflow of foreign capital must increase welfare of an economy importing capital–intensive goods and following protectionary policy. It should also be added that this welfare effect depends on reasonable capital–labour ratio of the export–competing sectors in the country concerned.

## 1. Introduction

Over the last few decades, a considerable number of studies have been made on the welfare implications of an influx of foreign–owned capital. (See, for example, Johnson (1967) ; Brecher and Alejandro (1977) ; Khan (1982) ; Jones (1984) ; Batra (1986) ; Neary and Ruane (1988) ; and Beladi and Marjit (1992).) In their papers they have suggested the opposite results about the above problem. They have shown that welfare loss was a necessary outcome if the growth was induced by foreign capital inflow and the capital income was repatriated in full. However, it is still an open question whether an increase in foreign capital inflow harms the country when we think of the role of foreign capital in economic development. We can observe the fact that the developing economies are increasingly interested in wooing foreign capital.

Recently, two interesting papers by Marjit and Beladi (1996) and Marjit, Broll, and Mitra (1997) appear, and they use a simple model where one sector producing an intermediate input is protected and study the resulting welfare implications. The former shows that, if the protected sector produces an inter-

mediate input, positive welfare effects may emerge. The latter points out that in an unemployment–ridden economy, with a tariff–distorted intermediate sector, foreign capital inflow in the intermediate sector might be welfare improving. In both of these papers, the important point to note is that they have taken a position against the conventional perception about welfare effects of foreign capital that we are so familiar with. In this paper I follow up this line of conclusion, it is quite possible that the foreign capital investment would increase real national income.

This paper is naturally related to the substantial literature on foreign capital investment and national welfare. What I shall show in this paper is to furnish an argument against such a series of papers, from Johnson (1967) to Beladi and Marjit (1992). I introduce a very simple model, which is similar to Beladi and Marjit (1992). They focus on the welfare implications of establishing an 'export–processing zone' within an economy and show that the growth in such a region through an influx of foreign–owned capital reduces welfare for an economy importing capital–intensive goods and following a protective policy. The results of my investigation are contrary to those of theirs. I show that such a growth must be welfare improving under very reasonable conditions.

This paper is divided into three sections. The next section describes the model and the analysis. The last section offers some concluding remarks.

## 2. The model and the analysis

We assume a small open economy with three sectors. The first sector represents the export-processing zone (EPZ), which uses foreign-owned capital  $S$ , domestic capital  $K$  and labour  $L$  to produce  $x_1$ . Sectors 2 and 3 produce  $x_2$  and  $x_3$  using  $K$  and  $L$ . The  $S$  is specific to EPZ, so it is not allowed to flow into the other two sectors. We assume that entire foreign capital income is repatriated. The  $K$  and  $L$  move among all three sectors. We also assume that  $x_2$  is capital-intensive relative to  $x_3$ . Suppose the economy under consideration exports  $x_1$  and  $x_3$ , and imports  $x_2$ . By the small open economy assumption, the prices of all goods are given in the rest of the world. However, suppose, for political reasons  $x_2$ , is protected by a tariff  $T$ . Production technologies are of constant returns to scale with diminishing returns, resources are fully employed and markets are competitive.

Competitive equilibrium implies

$$\begin{aligned} (1) \quad & wa_{L1} + ra_{K1} + Ra_{S1} = P_1 \\ (2) \quad & wa_{L2} + ra_{K2} = (1+T)P_2 \\ (3) \quad & wa_{L3} + ra_{K3} = P_3. \end{aligned}$$

Full employment conditions imply

$$\begin{aligned} (4) \quad & a_{L1}x_1 + a_{L2}x_2 + a_{L3}x_3 = L \\ (5) \quad & a_{K1}x_1 + a_{K2}x_2 + a_{K3}x_3 = K \\ (6) \quad & a_{S1}x_1 = S. \end{aligned}$$

The following symbols are used in the above equations :

$$\begin{aligned} x_j & \text{--- production in the } j\text{-th sector, } j=1, 2, 3 \\ P_j & \text{--- world price of the } j\text{-th good, } j=1, 2, 3 \\ w & \text{--- wage rate} \\ r & \text{--- return to domestic capital } K \\ R & \text{--- return to foreign capital } S \\ a_{ij} & \text{--- factor-output ratio for the } j\text{-th sector,} \\ & i=L, K, S, j=1, 2, 3 \end{aligned}$$

$$\begin{aligned} L & \text{--- fixed labour supply} \\ K & \text{--- fixed stock of domestic capital} \\ S & \text{--- influx of foreign capital.} \end{aligned}$$

Let us now investigate the welfare implications of the growth in the EPZ through an influx of foreign-owned capital  $S$ .

From (6) we obtain  $x_1 = S/a_{S1}$ . Using this in (4) and (5) we get

$$\begin{aligned} (4') \quad & (a_{L1}/a_{S1})S + a_{L2}x_2 + a_{L3}x_3 = L \\ (5') \quad & (a_{K1}/a_{S1})S + a_{K2}x_2 + a_{K3}x_3 = K. \end{aligned}$$

Differentiating (4') and (5') with fixed domestic factor endowments we get

$$\begin{aligned} (7) \quad & \lambda_{L2}\hat{x}_2 + \lambda_{L3}\hat{x}_3 = -\alpha\hat{S} \\ (8) \quad & \lambda_{K2}\hat{x}_2 + \lambda_{K3}\hat{x}_3 = -\beta\hat{S}, \end{aligned}$$

where  $\alpha \equiv (a_{L1}/a_{S1}) \cdot (S/L)$ ,  $\beta \equiv (a_{K1}/a_{S1}) \cdot (S/K)$  and  $\lambda_{ij} \equiv a_{ij}x_j/i$ ,  $i=L, K, j=2, 3$ . The circum flex on a variable denotes a proportional change, that is,  $\hat{x} \equiv dx/x$ .

From (7) and (8) we get

$$(9) \quad \hat{x}_2 = -\{(\alpha\lambda_{K3} - \beta\lambda_{L3})\hat{S}\}/|\lambda|$$

or

$$(10) \quad dx_2/dS = -\{(\alpha\lambda_{K3} - \beta\lambda_{L3}) \cdot (x_2/S)\}/|\lambda|,$$

where  $|\lambda| \equiv \lambda_{L2}\lambda_{K3} - \lambda_{L3}\lambda_{K2} < 0$ , since  $x_2$  is capital intensive. Thus, as foreign capital  $S$  flows into EPZ, we can show that  $dx_2/dS < 0$  iff  $\alpha\lambda_{K3} - \beta\lambda_{L3} < 0$ , which boils down to  $(a_{K1}/a_{L1}) > (a_{K3}/a_{L3})$ .

We shall now discuss the welfare implication of a foreign capital inflow. Following Beladi and Marjit (1992), the change in welfare  $W$  is given by

$$\begin{aligned} (11) \quad dW &= P_1dD_1 + (1+T)P_2dD_2 + P_3dD_3 \\ &= [-TP_2/\{1 - (m_2T/1+T)\}] \cdot dx_2, \end{aligned}$$

where  $D_j$  is the domestic consumption level of  $x_j$ ,  $j=1, 2, 3$  and  $m_2$  is marginal propensity to consume  $x_2$  ( $0 < m_2 < 1$ ). From (11) the welfare effect of foreign capital inflow is represented by means of next expression :

$$(12) \quad dW/dS = [-TP_2/\{1-(m_2T/1+T)\}] \cdot (dx_2/dS).$$

From (12)  $dW/dS > 0$  if  $dx_2/dS < 0$ .

Now from (10) we have  $dx_2/dS < 0$  iff  $(a_{K1}/a_{L1}) > (a_{K3}/a_{L3})$ . Therefore, the following result will be obtained:

$$(13) \quad dW/dS > 0 \text{ iff } (a_{K1}/a_{L1}) > a_{K3}/a_{L3}.$$

We can now propose an answer to the problem that we had discussed.

**Proposition:** *When domestic factor endowments are fixed, an increase in foreign capital  $S$  with full repatriation of its income increases welfare iff  $(a_{K1}/a_{L1}) > (a_{K3}/a_{L3})$ .*

### 3. Concluding remarks

In this paper, by using a simple model we have been able to make a welfare judgement regarding the growth of the EPZ in a small economy. The paper denies a doubt about the role of expansion in the EPZs in economies importing capital-intensive goods.

The developing countries generally import capital-intensive goods and in most of these countries import-competing sectors are protected. In that case, the growth in the EPZs through an influx of foreign-owned capital in these countries must lead to unambiguous welfare improvement.

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