Trade Restrictions, Imperfect Competition and National Welfare with Foreign Capital Inflows

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Abstract

We look at the impact of foreign capital inflows on home welfare for an imperfectly competitive economy in the presence of 3 alternative kinds of trade restrictions: tariffs, quotas, and VERs. The results obtained differ significantly from those for a competitive economy. When the number of firms is fixed, a capital inflow is welfare enhancing under quantitative restrictions, but immiserizing in the presence of a distorting tariff. However, when there are economies of scale and the number of firms is endogenous, a capital inflow is immiserizing in the presence of a quota or a tariff.

Keywords: imperfect competition, capital inflow, welfare

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1. Introduction*

This paper looks at the impact of foreign capital inflows on home welfare for an imperfectly competitive economy in the presence of 3 alternative kinds of trade restrictions: tariffs, quotas, and VERs.

There has been, in the last few years, a huge inflow of foreign capital into middle and low income developing countries like India, China, Sri Lanka etc. Most of this inflow consists of private capital which goes to these developing countries in search of higher returns, and is not in the form of aid. According to the World Bank (1995) private capital inflows to low and middle income countries rose to $175 billion in 1994 from a meager $42 billion in 1989. In India alone portfolio equity flow has gone up from zero in 1991 to $1.8 billion in 1993, while Foreign Direct Investment increased from $79 million in 1980 to $273 million in 1993. Table 1 shows the increase in the foreign capital inflows, both FDI and Portfolio equity flows, into the developing countries in the last few years. While capital inflows have increased, the trade regimes of these countries remain restrictive. The levels of tariff and non-tariff barriers remain high. For instance, China and India, two of the major recipients of foreign capital, had average tariffs (unweighted) in 1992, of 43% and 47%, respectively. Table 2 presents evidence on the high level of tariff and non-tariff barriers in some of the large recipients of foreign capital inflows. It can be easily seen from Table 2 that most of the developing countries had very high levels of tariff and non-tariff barriers compared to the free trade economies like Singapore and Hong Kong.

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The welfare effects of exogenous inflows of foreign capital in the presence of trade restrictions have been extensively studied in the framework of perfect competition. Brecher and Diaz-Alejandro(1977) show that for a small open economy, when capital intensive imports are subject to tariffs, an introduction of foreign capital inflow accentuates the tariff distortion and hence reduces welfare. Findlay and Brecher(1983) employ a specific factors model to study the impact of endogenously determined inflow of foreign capital in the presence of a tariff. The results obtained are similar to the proposition of Brecher and Diaz-Alejandro(1977). Dei(1985) shows that in the presence of a quota instead of a tariff the shadow value of foreign capital is not distorted away from its market rental, hence a foreign capital inflow is not immiserizing. Neary(1988) uses a general framework to study tariffs, quotas, and VERs, both with and without international capital mobility, and finds the effect in case of quotas to be intermediate between those in the presence of tariffs and those in the presence of VERs. However, all these models are based on the assumptions of perfect competition and constant returns to scale (the only exception is Chao and Yu(1994) which uses an imperfectly competitive set up to analyze the impact of a capital inflow in the presence of a quota and urban unemployment). Such an assumption seems questionable in the current context since many of these economies are characterized by highly oligopolistic market structures and high concentration ratios (Rodrik, 1988). We therefore extend the existing literature by developing a simple general equilibrium model to examine the welfare consequences of exogenous capital inflows in an imperfectly competitive economy with trade restrictions.

We assume a capital intensive import competing sector and consider the impact of capital inflows in the presence of 3 alternative kinds of trade restrictions: tariffs, quotas, and voluntary export

restraints (VERs, henceforth). We also consider two alternate sources of imperfect competition: entry barriers and scale economies. In the first case the number of domestic firms is exogenously fixed while in the second it is determined endogenously.

The existence of imperfect competition and trade restrictions allows for a rich set of second best interactions rendering the analysis interesting. The welfare implication of a quota restriction is different from that of an equivalent tariff restriction (the equivalence is defined in terms of generating the same level of imports) even in the absence of any capital inflows. Further, the impact of a capital inflow on home welfare under different kinds of trade restrictions differs significantly from the ones obtained for a perfectly competitive economy (see Neary, 1988). When the number of firms is fixed (i.e.when entry barrier is the cause of market imperfection), a capital inflow in the presence of a quota or a VER is unambiguously welfare enhancing, but a tariff in excess of the second best level of optimal tariff makes it immiserizing.

When we have economies of scale in production and the number of firms is endogenous, the results become significantly different from the one obtained with a fixed number of firms. Now, a capital inflow is unambiguously immiserizing in case of a tariff or a quota because it causes excessive entry which drives firms up their cost schedule. In the case of VERs, however, there is a gain from a fall in premium on imports which has to be balanced against the loss from excessive entry.

The contribution of this paper lies in presenting a general framework to study the welfare implications of capital inflows under various kinds of trade restrictions for an imperfectly competitive economy, and deriving some policy conclusions therefrom. Also, we get several results which are different from the ones obtained for a competitive economy. It should be noted

that Chao and Yu (1994) also study the impact of capital inflow in an imperfectly competitive economy. However, they do their analysis only for a quota restriction and an exogenously given number of firms. Our paper is more general. The most striking result of our paper is that capital inflows are immiserizing even in the presence of a quota when the number of firms is endogenously determined. This is in sharp contrast to the results for a competitive economy where capital inflows leave welfare unaffected in the presence of a quota, and for an imperfectly competitive economy with fixed number of firms where capital inflows are beneficial.

The plan of rest of the paper is as follows: In section 2 we present the basic model of an imperfectly competitive economy with a fixed number of firms. Then we look at the welfare implications of different kinds of trade restrictions for this economy. We also look at these welfare implications in the presence of some foreign owned capital. In section 3 we look at the welfare implications of a capital inflow in the presence of trade restrictions. In section 3.1 we look at the impact of a capital inflow in the presence of a distorting tariff. Sections 3.2 and 3.3 discuss the case of a capital inflow in the presence of a quota and a VER, respectively. In section 4, we allow for increasing returns to scale, and endogenize the number of firms. In sections 4.2, 4.3, and 4.4 we discuss cases of tariffs, quotas, and VERs, respectively. Section 5 concludes the paper with some policy conclusions.

2. The Model

We assume a quasi- linear utility function in three goods x, y, and z. x and y are close substitutes of which x is domestically produced and y is imported. z is the numeraire good which is consumed domestically and exported to maintain trade balance. Production of x takes

place in an imperfectly competitive domestic industry with n firms. The import good y is supplied competitively in the world market at the world price, p_y. The utility function is as follows[1]:

$$U(x,y,z) = u(x,y) + z, \text{ and}$$
$$u(x,y) = ax - \left(\frac{b}{2}\right)x^2 + ay - \left(\frac{b}{2}\right)y^2 - cxy \qquad (1)$$

where $c \le b$. c measures the degree of substitution between x and y. If $c = b$ then they are perfect substitutes.

This utility function yields the following inverse demand functions:

$$p_x = a - bx - cy \qquad (2a)$$

$$p_y = a - by - cx \qquad (2b)$$

They in turn yield the following demand functions for the two goods:

$$x = \frac{a(b-c) - bp_x + cp_y}{b^2 - c^2} \qquad (3a)$$

$$y = \frac{a(b-c) - bp_y + cp_x}{b^2 - c^2} \qquad (3b)$$

There are two factors of production in the economy: capital, k, and labor, l. z is produced using labor only, and one unit of labor can produce one unit of z, so that the wage rate, $w = 1$[2].

[1] This form of utility function has been used extensively in trade and investment literature, e.g.Levy and Nolan (1992), Horstmann and Markusen (1986).

Sector x is an oligopolistic sector with the number of firms, n, given exogenously[3]. It uses both factors of production, labor and capital, and faces a constant marginal cost of production, $m(r,1)$, where, r, is the rental on capital. All firms are symmetric. We assume Cournot behavior on the part of oligopolistic firms. The model can be easily extended to a more general form of quantitative conjecture. Since all firms are alike, any equilibrium is necessarily symmetric.

The profit function for each firm is given by

$$\pi = p_x\hat{x} - m(r,1)\hat{x} \tag{4}$$

where π is per firm profit, and $\hat{x}$ is per firm output ($x = n\hat{x}$ in a symmetric equilibrium).

The first order condition for oligopolistic firms under Cournot conjecture is

$$p_x - \hat{x}\frac{dp_x}{d\hat{x}} - m(r,1) = 0 \tag{5}$$

The capital market clearing condition implies

$$n\hat{x}m_r = K \tag{6}$$

where m_r, by Shephard's Lemma, is equal to the amount of capital used per unit of output by each firm.

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[2] This assumption is made for algebraic simplicity. We can get all the results by having a general form of cost function for the numeraire sector: $g(w,r)$, where w is the wage and r is the rental. We only need the numeraire to be more labor intensive at all factor prices, i.e. $\frac{g_w}{g_r} > \frac{m_w}{m_r}$.

[3] Domestic market may be imperfectly competitive either because of entry restrictions or because of increasing returns to scale. We look at the case of increasing returns to scale in a later section when we endogenize the number of firms.

Equations (2a), (2b), (5), (6) along with the production function for x determine $p_x, \hat{x}, y, r, and$ the amount of labor used by x sector. The residual amount of labor is used by the z sector to produce the numeraire good. The social welfare in this model in a free trade situation is given by:

$$SWF = v(p_x, p_y, I) = u(x,y) + I - p_x x - p_y y;\ where$$
$$I = L + rK + n\pi \tag{7}$$

In the presence of trade restrictions I will include any revenue from tariffs or quota rents in income assuming that they are returned to consumers in a lump sum fashion.

It is easy to see that free trade is not optimal in this model. Due to the presence of a domestic distortion (price exceeds marginal cost) the first best policy is to give a production subsidy to domestic firms. However, in the absence of a production subsidy, possibly due to revenue constraints, trade intervention becomes a second best policy. A tariff on imports increases the output of domestic firms thereby reducing the existing domestic production distortion, however, it introduces a consumption distortion by raising the price of imports for consumers. The change in welfare in the presence of a tariff is given by

$$d(SWF) = dv = n(p_x - m(r,1))d\hat{x} + tdy \tag{8}$$

Starting from a free trade situation a small tariff has a positive first-order effect through the expansion in domestic output. There is no first-order terms of trade effect. There exists an optimal tariff which maximizes welfare. The level of optimal tariff is given by $t^* = -\dfrac{n(p_x - m)\,d\hat{x}/dt}{dy/dt} > 0$[4]. Any tariff in excess of this optimal second best tariff is distorting.

[4] It can be shown that at this level of tariff $\dfrac{d^2v}{dt^2} < 0$. So, t^* indeed maximizes welfare.

We will be looking at cases when the level of tariff is in excess of the optimal tariff. The reason for the existence of such a distortionary tariff can be found in the political economy of trade policy literature (see Rodrik, 1994 for an excellent survey).

However, the impact of a quantitative restriction is ambiguous in this model. A quota even in excess of the free trade level of imports is binding in the sense of generating a positive premium. Unlike the case of a tariff, any quantitative restriction has a first order terms of trade effect even if we start from a free trade situation. For small deviations of a quota away from the free trade level of imports (when the level of quota is close to the free trade level of imports) the change in welfare is given by

$$\frac{dv}{d\bar{y}} = n\left(p_x - m(r,I)\right)\frac{d\hat{x}}{d\bar{y}} + t \qquad (9)$$

Here, t is the quota premium at the free trade level of imports. While the first term on the right hand side in the above equation is negative, the second term is positive even when the initial quota is equal to the free trade level of imports, which makes the welfare change ambiguous.

We can easily show that a quota restriction generates lower output, and higher price and mark-up than an equivalent tariff[5].

In the presence of a quota of $\bar{y}$ the following four equations determine the variables of interest: $p_x, p_y, r,$ and x.

$$p_x = a - bx - c\bar{y} \qquad (10)$$

$$p_y = a - b\bar{y} - cx \qquad (11)$$

[5] Here the equivalence of tariffs and quotas is defined in terms of generating the same level of imports.

$$p_x - b\hat{x} = m(r,1) \tag{12}$$

$$n\hat{x}m_r = K \tag{13}$$

From (10) and (12) we get

$$\hat{x}_q = \frac{a - c\bar{y}}{(n+1)b} - \frac{m(r_q,1)}{(n+1)b} \tag{14}$$

In (14) subscript q denotes the variables under quota.

Putting (14) in (10) we get

$$p_{x_q} = \frac{a - c\bar{y}}{(n+1)} + \frac{n}{n+1} m(r_q,1) \tag{15}$$

From (13) and (14) we can determine the output and rental under quota restriction. We can determine the output and rental under an equivalent tariff restriction in the following way. In new equilibrium with a quota equivalent tariff the conditions (10), (11) and (13) are going to hold. The difference comes from the first order condition. The new first order condition for firms is

$$p_x - b'\hat{x} = m(r,1), \text{ where } b' = \frac{b^2 - c^2}{b}. \tag{16}$$

It is important to note the difference between the first order conditions (12) & (16). In case of a quota each domestic firm believes that when it restricts its output the attempt of consumers to shift their demand to imports is frustrated by a rise in the quota rent. The elimination of the substitution into imports makes the perceived demand for oligopolists steeper in case of quota compared to tariffs. This is captured by $b' < b$ in the present case. From (10) and (16) we get

$$\hat{x}_t = \frac{a - c\bar{y}}{nb + b'} - \frac{m(r_t,1)}{nb + b'} \tag{17}$$

(13) and (17) determine $\hat{x}_t$ and r_t.

It is shown in appendix that $\hat{x}_t > \hat{x}_q$ and $r_t > r_q$. Since $\hat{x}_t > \hat{x}_q$, it can be easily seen from (10) that $p_{x_t} < p_{x_q}$. Since output is higher and price is lower under a tariff than an equivalent quota (equivalent in the sense of same level of imports), a tariff dominates a quota in terms of welfare. Also, the price cost margin is greater in case of a quota compared to the equivalent tariff ($\frac{p_{x_q} - m(r_q,1)}{m(r_q,1)} > \frac{p_{x_t} - m(r_t,1)}{m(r_t,1)}$).

Starting from a free trade level of imports, the welfare implication of a VER is different from an equivalent quota because the rent from quantitative restriction accrues to the foreigners in case of a VER[6]. We assume that the government of the home country negotiates with exporters to voluntarily restrict the level of exports to home country to $\bar{y}$. The change in welfare in case of a VER is

$$\frac{dv}{d\bar{y}} = n(p_x - m)\frac{d\hat{x}}{d\bar{y}} - \bar{y}\frac{dt}{d\bar{y}} \qquad (18)$$

Again the impact on welfare is ambiguous because the first term in (18) is negative while the second term is positive. A quota always dominates a VER because both have the same impact on domestic industry, but domestic consumers are worse off in case of a VER because the rent goes to the foreigners.

The results obtained for the basic model can be summarized in a proposition as follows:

[6] We assume that the entire rent accrues to the foreigners. In reality a part of the rent might flow to the home country.

Proposition 1: In a small open economy with oligopolistic industry, fixed number of firms, and a capital intensive import competing sector, a small tariff is welfare enhancing. Also, a tariff dominates any quantitative restriction generating the same level of imports in terms of welfare. Among quantitative restrictions, a quota always dominates a VER.

Although these results are not entirely new they set the stage for a discussion of welfare implications of capital inflows.

It should be noted that the welfare implications of trade restrictions are different if there are some foreign owned capital in the economy. In the presence of some foreign owned capital any rise in the market rental on capital is welfare reducing because it leads to an increased payment to foreigners. The expression analogous to (18) is now

$$dSWF = -K^f dr + n(p_x - m)d\hat{x} + tdy \tag{19}$$

Here K^f is the amount of foreign owned capital.

Since the rental on capital is lower in case of a quota compared to an equivalent tariff, as shown in the appendix, a quota is better than a tariff on this account. The argument for a small second best level of tariff is not straightforward now because a tariff raises the rental on capital which is welfare reducing.

3.1 **Exogenous capital inflow and welfare**

Our main aim is to find out the impact of a capital inflow on home welfare under different kinds of trade restrictions. We assume there is no foreign owned capital in the economy to begin with. Next, we find out the shadow value of capital under different kinds of trade restrictions,

and see whether they differ from the market rental. If the shadow value of capital is less than the market rental, then any capital inflow is immiserizing.

We will first discuss the case of a distorting tariff, τ . The change in social welfare in the presence of a tariff is given by

$$d(SWF) = dv = rdK + n(p_x - m(r,1))d\hat{x} + \tau dy \tag{20}$$

The last term in the above equation arises because of tariffs. It is the standard volume effect of a tariff. Since a tariff restricts import to below its optimal level, any expansion in the import of y is beneficial.

The shadow value of capital is given by

$$\frac{dv}{dK} = r + n(p_x - m(r,1))\frac{d\hat{x}}{dK} + \tau\frac{dy}{dK} \tag{21}$$

It is clear from (8) that under an optimal tariff the last two terms will sum to zero, so the shadow value of capital will correspond to the market rental. However, in the presence of a distorting tariff they will be different from zero. Now we will find out $\frac{d\hat{x}}{dK}$ and $\frac{dy}{dK}$.

Totally differentiating (3a), (5) and (6) we get the following

$$dx = nd\hat{x} = -\frac{b}{b^2 - c^2}dp_x \tag{22}$$

$$n\hat{x}m_{rr}dr + nm_r d\hat{x} = dK \tag{23}$$

$$dp_x - m_r dr = b'd\hat{x} \tag{24}$$

By solving (22), (23), and (24) we get

$$\frac{d\hat{x}}{dK} = \frac{m_r}{n(m_r)^2 - n\hat{x}m_{rr}(1+n)b'} > 0 \tag{25}$$

In the above expression the numerator and the denominator both are positive because $m_{rr} < 0$ by the concavity of the unit cost function. This implies that an increase in the capital stock leads to an increase in the output of the capital intensive good. The intuition for this result is simple. An increase in the capital stock lowers the rental on capital, thereby reduces the marginal cost of firms. This reduction in marginal cost causes an expansion in the output of x and a reduction in the price of x. (This is the analogue of Rybczynski effect in this model. Since capital is used only in producing x, it is the capital intensive good in the model.).

It is easily seen from inverse demand equation (2) that in the presence of a tariff

$$\frac{dy}{dK} = -\frac{nc}{b}\left(\frac{d\hat{x}}{dK}\right) < 0 \qquad (26)$$

Imports fall in response to a capital inflow because x and y are substitutes in consumption, and the output of capital intensive good x expands in response to a capital inflow. From (25) and (26) it is clear that for a tariff in excess of the optimal second best tariff, the shadow value of capital is going to be less than its market rental. This happens because in the presence of a distorting tariff per firm output is greater than its optimal value while the level of imports is less than its optimal value. An inflow of capital worsens the existing distortion by increasing the level of output and decreasing the level of imports further. Therefore, a distorting tariff makes a capital inflow immiserizing.

3.2 Case of a Binding Quota

In this section we discuss the case of a binding quota on the import of y. Assume that this quota is $\bar{y}$. This results in a quota premium, which is denoted by t. It is easy to show that the shadow value of capital is given by

$$\frac{dv}{dK} = r + n\left(p_x - m(r,1)\right)\frac{d\hat{x}}{dK} \tag{27}$$

We should note the difference between (21) and (27) above. In the case of a quota the volume effect associated with a tariff is absent. Since the quantity of imports is fixed, any change in quota rent is offset by an exact change in consumer surplus as long as the quota is binding. Since the level of imports is fixed and binding, a capital inflow can not reduce it at the margin.

The difference in solving for $\frac{d\hat{x}}{dK}$ comes from the fact that p_y becomes endogenous, and the first order condition changes because of the reasons stated before. The analogue of (22) and (24) are the following

$$dx = nd\hat{x} = -\frac{1}{b}dp_x \tag{28}$$

$$dp_x - m_r dr = bd\hat{x} \tag{29}$$

The expression for $\frac{d\hat{x}}{dK}$ is given by

$$\frac{d\hat{x}}{dK} = \frac{m_r}{n(m_r)^2 - n\hat{x}m_{rr}\left(b(1+n)\right)} > 0 \tag{30}$$

Therefore, the shadow value of capital is greater than its market rental. This implies that an inflow of foreign capital is unambiguously welfare improving. This result is different from the one obtained for a competitive economy. In a competitive economy a quota does not distort the price of capital away from shadow value (see Dei, 1985, Neary, 1988).

Therefore, we see that the welfare implications of a capital inflow are diametrically opposite in the case of a distorting tariff compared to a quota. This happens because the nature of interaction with the existing distortion is different in two cases. The volume effect associated with a tariff is absent in the case of a quota. So, the only effect of a capital inflow is to expand the output of x and reduce its price p_x. Any increase in x is welfare enhancing in the presence of oligopolistic distortion($p_x > m(r,1)$).

It should be noted that the expansionary effect of a capital inflow on domestic output is less in case of a quota than an equivalent tariff. This can be shown by comparing (25) and (30) and using the results from section 2.2 that output is lower and price is higher in case of a quota compared to an equivalent tariff.

3.3 Case of Voluntary Export Restraints (VER)

In the case of VERs we get the following expression for the shadow value of capital

$$\frac{dv}{dK} = r + n\left(p_x - m(r,1)\right)\frac{d\hat{x}}{dK} - \bar{y}\frac{dt}{dK} \tag{31}$$

Here t is the rent which arises from VER (It is the rise in the price of imports above the world price of p_y^*). Since the rent accrues to the foreigners it enters social welfare with a negative sign. It causes a loss in consumer surplus without yielding any lump sum revenue to the consumers. The expression for $\frac{d\hat{x}}{dK}$ is same as in the case of a quota, and it is easily seen that $\frac{dt}{dK} < 0$. From (2) we get the following since y remains fixed

$$\frac{dt}{dK} = -c\frac{dx}{dK} = -nc\frac{d\hat{x}}{dK} \tag{32}$$

Since $\frac{d\hat{x}}{dK} > 0$, (32) implies that $\frac{dt}{dK}$ must be less than zero.

A capital inflow makes x cheaper which, in turn, shifts the demand away from imports. This reduces the premium on imports as long as the quantitative restriction is binding. This implies that the shadow value of capital exceeds its market rental by an amount which is larger than the one in the case of a quota.

The results obtained so far can be summarized in a proposition as follows:

Proposition 2: In a small open economy with oligopolistic industry, fixed number of firms, and a capital intensive import competing sector, an inflow of foreign capital is unambiguously beneficial in the presence of quantitative restrictions like quotas or VERs. However, in the presence of a distorting tariff (a tariff in excess of the second-best optimal tariff) any capital inflow is necessarily immiserizing.

4.1 Economies of scale and endogenous number of firms

So far we have assumed that the number of firms, n, is given exogenously. In this section we will endogenize the number of firms in the home economy and see how it affects the results derived above. To do so we introduce a fixed cost, F, for each firm. This fixed cost consists of both labor and capital costs, and is a function of the market rental on capital, r. We take a very general form of fixed cost function allowing for substitutability between labor and capital in response to a change in factor prices. The formulation with constant marginal cost and a fixed cost implies economies of scale in production. This will mean that an increase in per firm output allows firms to move down their average cost curve, and hence is welfare enhancing. We assume

the number of firms to be continuous for mathematical simplicity. Free entry condition implies that in equilibrium all active firms will make zero profit.

The expression for a change in social welfare is different now because the profits are zero. The new expression is given by

$$d(SWF) = dv = Kdr - xdp_x \tag{33}$$

Zero profit condition for each firm implies that in equilibrium the price of x equals the average cost of producing x

$$p_x = m(r,1) + \frac{F(r)}{\hat{x}} \tag{34}$$

The capital market clearing condition (10) now becomes

$$xm_r + nF_r = K^{7} \tag{35}$$

By Shephard's Lemma , $\hat{x}m_r + F_r$ is the per firm capital employed.

Totally differentiating (34) and substituting for dp_x in (33) using (35) we get the following

$$dv = Kdr - xdp_x = n\left(\frac{F}{\hat{x}}\right)d\hat{x} = n(p_x - m)d\hat{x} \tag{36}$$

(36) reflects the fact that in the presence of economies of scale any increase in per firm output is welfare enhancing. (36) can also be written as

$$dv = (p_x - m)dx - Fdn \tag{36'}.$$

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[7] By Shephard's Lemma F_r is the amount of capital used which does not vary with the level of output. Also, $F_{rr} < 0$ if substitution possibilities exist. If there are no substitution possibilities between labor and capital in fixed cost then $F_{rr} = 0$. Both these specifications of fixed cost yield same results.

Since price is greater than marginal cost due to domestic oligopoly, any expansion of domestic output is beneficial. However, due to economies of scale any entry is bad because it leads to a duplication of the fixed cost, which is captured by the second term on the right hand side of (36').

We will first look at the impact of a tariff on welfare. In the presence of a tariff the change in social welfare in (36) has an additional term τdy. The change in welfare with respect to a tariff, τ, is given by

$$\frac{dSWF}{d\tau} = \frac{dv}{d\tau} = n\frac{F}{\hat{x}}\frac{d\hat{x}}{d\tau} + \tau\frac{dy}{d\tau} \tag{37}$$

The first order condition remains same as in (16) which we recall is

$$p_x - m(r,1) = b'\hat{x} \tag{16}$$

From (16) and (34) we get $b'\hat{x} = \frac{F}{\hat{x}}$. Total differentiation of both sides of this expression yields a relationship between r and $\hat{x}$ as follows

$$dr = \frac{2b'\hat{x}}{F_r}d\hat{x} = \theta d\hat{x} \tag{38}$$

where $\theta = \frac{2b'\hat{x}}{F_r}$.

Total differentiation of the inverse demand functions (2a) and (2b) yields

$$\frac{dp_x}{d\tau} = -b\frac{dx}{d\tau} - c\frac{dy}{d\tau} \tag{39}$$

$$1 = -b\frac{dy}{d\tau} - c\frac{dx}{d\tau} \tag{40}$$

From the above two equations we get

$$\frac{dp_x}{d\tau} = \frac{c}{b} - b' \frac{dx}{d\tau} \tag{41}$$

By totally differentiating (16), (34), (35), and using (38)- (40) we get the following expression.

$$\frac{dx}{d\tau} = \phi \frac{d\hat{x}}{d\tau} \tag{42}$$

$$\text{Where } \phi = -\frac{xm_{rr}\theta + nF_{rr}\theta - n\frac{F_r}{\hat{x}}}{m_r + \frac{F_r}{\hat{x}}} > 0 \tag{43}$$

Solving for $\frac{d\hat{x}}{d\tau}$ we get the following expression

$$\frac{d\hat{x}}{d\tau} = \frac{c}{(b^2 - c^2)(1 + \phi + \frac{2\hat{x}m_r}{F_r})} > 0 \tag{44}$$

From (37) and (44) we can see that even with economies of scale and free-entry a small tariff is welfare enhancing. This is an interesting result because in a partial equilibrium setting with the same demand function, a tariff has no impact on the per firm output. It only causes entry (see Horstmann and Markusen, 1986 for an example). However, in general equilibrium there is a rise in the rental on capital which discourages entry. Even if there is positive entry, which depends on the magnitude of fixed cost relative to the variable cost, it is less than what it would be in a partial equilibrium. Also, from the first order condition (16) and the zero profit condition (34) we can see that the per firm output increases in equilibrium only if there is an increase in the fixed cost. This is exactly what happens in general equilibrium.

It is not straightforward to establish an argument for an optimal second best level of tariff as was done in section in 2. However, a large tariff is likely to be immiserizing because the

welfare loss arising from consumption distortion and entry is likely to outweigh the welfare gain from increase in the per firm output.

In case of a quota also it can be easily shown that the per firm output increases when a quota is tightened.

4.2 Capital inflows in the presence of a tariff

When the number of firms is endogenous the expression for the shadow value of capital is

$$\frac{dv}{dK} = r + n\left(\frac{F}{\hat{x}}\right)\frac{d\hat{x}}{dK} + \tau\frac{dy}{dK} \tag{45}$$

From (45) it is clear that the impact of a capital inflow on welfare depends on what happens to the per firm output in new equilibrium, along with the standard volume effect. We will use (16), (34), (35), (38) along with the demand functions to solve for the variables of interest, i.e. $\frac{dr}{dK}, \frac{dx}{dK}, \frac{dn}{dK}, \frac{d\hat{x}}{dK}$ and $\frac{dp_x}{dK}$.

Total differentiation of demand equation (3a) yields

$$dp_x = -b'dx \tag{46}$$

By totally differentiating (16), (34), (35) and using (38) and (46) we get the following results:

$$\frac{dx}{dK} = \frac{-(b' + m_r\theta)}{b'\theta(nF_{rr} + xm_{rr}) - \frac{nb'F_r}{\hat{x}} - (b' + m_r\theta)(m_r + \frac{F_r}{\hat{x}})} > 0 \tag{47}$$

$$\frac{d\hat{x}}{dK} = \frac{b'}{b'\theta(nF_{rr} + xm_{rr}) - \frac{nb'F_r}{\hat{x}} - (b' + m_r\theta)(m_r + \frac{F_r}{\hat{x}})} < 0 \tag{48}$$

(44) and (47) together imply that $\frac{dp_x}{dK} < 0$. Similarly, (38) and (48) imply that $\frac{dr}{dK} < 0$.

Also, (47) and (48) imply that $\frac{dn}{dK} > 0$.

Since $\frac{dx}{dk} > 0$, it is easily seen from (2b) that $\frac{dy}{dK} < 0$. So, the volume effect is negative in case of a tariff on imports.

Unlike the case of fixed number of firms, now a capital inflow leads to excessive entry which depresses the per firm output[8]. So, even the output effect of a capital inflow is negative with free entry. This is despite the fact that a small tariff itself leads to an increase in the per firm output. While a tariff discourages entry by increasing the rental on capital, a capital inflow encourages entry by decreasing the rental on capital. So, the welfare consequences of a capital inflow in the presence of a tariff are worse when the number of firms is endogenous as opposed to the case of no entry.

4.3 Case of a Binding Quota

In case of a binding quota the shadow value of capital is given by

$$\frac{dv}{dK} = r + n\left(\frac{F}{\hat{x}}\right)\frac{d\hat{x}}{dK} \tag{49}$$

(49) is different from (45) because the volume effect associated with a tariff is absent in the case of a quota restriction. Also, the determination of endogenous variables is different because now the quota premium becomes endogenous, and demand can not spill over from domestic goods to

[8] If fixed cost consisted of labor only then a capital inflow would cause only entry, leaving the per firm output unchanged in new equilibrium. This happens because in a zero profit equilibrium output depends only on the fixed cost which remains unchanged if it consists of only labor.

imports giving domestic firms greater market power. The expression for change in the per firm output is given by

$$\frac{d\hat{x}}{dK} = \frac{b}{b\theta(nF_{rr} + xm_{rr}) - \frac{nbF_r}{\hat{x}} - (b + m_r\theta)(m_r + \frac{F_r}{\hat{x}})} < 0 \qquad (50)$$

The only difference between (48) and (50) is that b' has been replaced by b, and therefore θ is also different in (50) : $\theta = \frac{2b\hat{x}}{F_r}$. This captures the increased market power of firms in the presence of a quota. The sign of (50) is same as the sign of (48), however, magnitudes differ.

(49) and (50) together imply that the shadow value of capital is less than its market rental in the presence of a quota restriction. Thus, a capital inflow in the presence of a quota restriction is unambiguously immiserizing. This is a new result which differs significantly from the existing literature on the impact of capital inflows on home welfare in the presence of quota restrictions. It was shown in a competitive framework by Dei (1985) and others that home welfare is unaffected by a capital inflow in the presence of a quota restriction.(Also see Neary, 1988). Chao and Yu (1994) showed that a capital inflow increases welfare under quota restriction for an imperfectly competitive economy which is similar to our result in section 3. They also assumed a fixed number of firms as we did in section 3. This implies that the structure of the market plays an important role in determining the welfare implications of a capital inflow in the presence of a quota restriction.

4.4 Case of VERs

In case of VERs the expression for the shadow value of capital becomes

$$\frac{dv}{dK} = r + n\left(\frac{F}{\hat{x}}\right)\frac{d\hat{x}}{dK} - \bar{y}\frac{dt}{dK} \tag{51}$$

Here the last term arises because the premium or rent accrues to the foreigners. The determination of endogenous variables is same as in the case of a quota. Since $\frac{dx}{dK} > 0$, it is easily seen from (2) that $\frac{dt}{dK} < 0$. Thus, in case of VERs there is a positive effect of capital inflow which comes from lowering of the premium on imports. Therefore, in this case the net effect on welfare is ambiguous. It depends on the relative strength of the two opposing forces. In any case this is the least harmful trade restriction in the presence of a capital inflow.

The results obtained in this section can be summarized as follows:

Proposition 3: In a small open economy with oligopolistic industry, economies of scale, free entry of firms, and a capital intensive import competing sector, an inflow of foreign capital is unambiguously immiserizing in the presence of quotas and tariffs. The first order welfare consequences are worse in case of a tariff compared to a quota. The consequences are ambiguous in case of a VER type restriction because of the positive terms of trade effect associated with it.

The presence of some foreign owned capital modifies the results on the welfare implications of capital inflows in the presence of trade restrictions. Any reduction in the rental on capital generates a welfare gain because the payment to the foreign owned capital is reduced. Since a capital inflow always reduces the rental on capital, this effect strengthens the welfare gain

associated with a foreign capital inflow in the case of entry barriers, and alleviates the welfare loss in the case of free entry and economies of scale.

5. Conclusions

We conclude that the welfare implications of an exogenous capital inflow for an imperfectly competitive economy depend in a non-trivial way on the source of imperfection. If the imperfection is there solely due to entry barriers then attracting foreign capital is a sound policy in the presence of quantitative trade restrictions, i.e. quotas, and VERs. However, any tariff in excess of the optimal second best level of tariff causes the capital inflow to be immiserizing. When the source of imperfection is the presence of economies of scale in production and there is free entry, then a capital inflow causes excessive entry and reduces the per firm output. This causes unambiguous welfare loss in the presence of a tariff or a quota. In the case of VERs there is a positive terms of trade effect in addition to the negative effect arising from a decline in the per firm output. Therefore, in the presence of economies of scale there may be a case for taxing the returns to foreign investment since they are in excess of their contribution to the economy. If this is not possible then there may be a case for active industrial policy in regulating entry to benefit from a foreign capital inflow.

The main message of the paper is that in the presence of trade restrictions the impact of capital inflows on welfare depends not only on whether there exist product market imperfections, but also, and more importantly, on the source of the imperfections. Therefore, when analyzing the impact of capital inflows on welfare in the presence of trade restrictions adequate attention should be paid to the market structures prevailing in the recipient economies.

Appendix: Determination of x and r under quota and an equivalent tariff

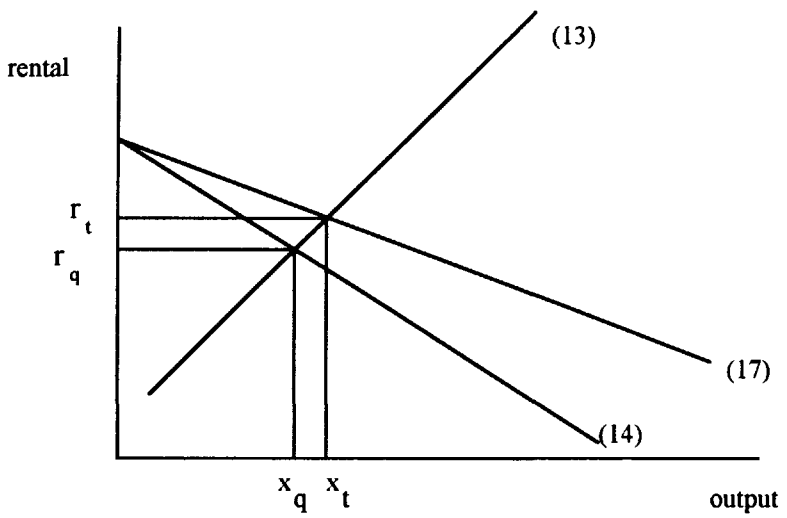
$$n\hat{x}m_r = K \tag{13}$$

$$\hat{x}_q = \frac{a - c\bar{y}}{(n+1)b} - \frac{m(r_q,1)}{(n+1)b} \tag{14}$$

$$\hat{x}_t = \frac{a - c\bar{y}}{nb + b'} - \frac{m(r_t,1)}{nb + b'} \tag{17}$$

(13) and (14) determine x and r in case of a quota while (13) and (17) determine the same variables in case of an equivalent tariff.

Determination of rental and output in case of a quota and tariffs



Totally differentiating (14) we can obtain $\frac{dr}{dx} = -\frac{(n+1)b}{m_r}$. While totally differentiating (17) we can get $\frac{dr}{dx} = -\frac{nb + b'}{m_r}$. Clearly the line corresponding to quota case is steeper than the one corresponding to the equivalent tariff case. Since they originate from the same point on the vertical axis we get the result that both x and r are lower under quota than an equivalent tariff.

References:

Bhagwati, J 1965, 'On the equivalence of tariffs and quotas' in R.E.Caves et. al. eds. Trade growth and balance of payments: Essays in honor of G. Haberler (Chicago: Univ of Chicago press).

Brecher, R.A. and C.F. Diaz Alejandro 1977, Tariffs, foreign capital and immiserizing growth, Journal of International Economics 7, 317-322.

Brecher, R.A and R. Findlay 1983, Tariffs, foreign capital and national welfare with sector specific factors, Journal of International Economics 14 , 277-288.

Chao, C and Eden Yu 1994, Foreign capital inflows and welfare in an economy with imperfect competition , Journal of Development Economics 45, 141-154.

Dei, F. 1985, Welfare gains from capital inflows under import quotas, Economics Letters 18, 237- 240.

Dixit, A 1984, Trade policy for oligopolistic industries, Economic Journal, 1984, 1-16.

Eaton, J. and G. Grossman 1986, Optimal trade and industrial policy under oligopoly, Quarterly Journal of Economics 101, 383-406.

Findlay, R 1984, Growth & Development in trade models, in Handbook of International Economics, Vol I, ed. by R.W. Jones & P.B.Kenen.

Helpman, E and P. Krugman 1989, Trade policy and market structure, M.I.T Press, Cambridge.

Horstmann, I and J. Markusen 1986, Inefficient entry and the new protectionism, Journal of International Economics 20, 225-247.

Krishna, K. 1989, Trade restrictions as facilitating practices, Journal of International Economics 26, 251-270.

Levinsohn, J., 1989 Strategic trade policy when firms can invest abroad: When are tariffs and quotas equivalent, Journal of International Economics 27, 1989.

Levy, S and S. Nolan 1992, trade and foreign investment policies under imperfect competition, Journal of Development Economics 37, 31-62.

Neary, J.P..1995, Factor mobility and International Trade, Discussion paper no.248, Centre for Economic Performance.

Neary, J.P. and F.P.Ruane 1988, International Factor Mobility, Shadow prices and the Cost of Protection, International Economic Review, 21, 571-585.

Neary, J.P. 1988, Tariffs, quotas, and voluntary export restraints with and without internationally mobile capital, Canadian Journal of Economics 21, 714-735.

Rodrik, D 1995, What does the political economy literature on trade policy (not) tell us that we ought to know? in Handbook of International Economics vol III, ed. by G.Grossman.

Rodrik, D 1988, Imperfect competition, scale economies, and trade policy in developing countries, in R.E. Baldwin, ed., Trade policy issues and empirical analysis (The University of Chicago Press, Chicago, IL).

The World Bank, 1995, World Development Report, Washington, D.C.

TABLE 1
FOREIGN CAPITAL INFLOWS
(millions of dollars)

	Net FDI (1980)	Net FDI (1989)	Net FDI (1993)	Portfolio equity flows (1980)	Portfolio equity flows (1993)
INDIA -	79	425	273	0	1840
CHINA	0	1400	25,800	0	2278
SRILANKA	43	27	195	0	0
PAKISTAN	63	170	347	0	185
INDONESIA	180	735	2004	0	1836
THAILAND	190	1650	2400	0	3117
MALAYSIA	934	1846	4351	0	3700
MOROCCO	89	167	522	0	0
CHILE	213	259	841	0	349
COLOMBIA	157	546	850	0	128
BRAZIL	1911	782	802	0	5500
MEXICO	2156	2241	4901	0	14297
VENEZUELA	55	77	372	0	45
ARGENTINA	678	1028	6305	0	3604
KOREA	6	453	516	0	6029

SOURCE: World Development Report, 1991 and 1995

TABLE 2
MEASURES OF TARIFF AND NON-TARIFF BARRIERS

	Mean Tariff	Average NTM	Min. Tariff	Max. Tariff	QR Incidence	Mean Tot. Charges
INDIA(1992)	42.6	61.3	40.7	44.6	48.9	76.6
CHINA(1993)	30.6	26.4	23.4	38.9	26.4	30.6
SRILANKA(1993)	23.7	11.2	19.1	28.7	11.2	26.1
PAKISTAN(1992)	56.2	24.7	45.2	68.2	24.7	68.7
INDONESIA(1992)	12.6	7.3	7.5	18.5	3.9	16.3
THAILAND(1991)	36.9	8.2	32.4	41.5	8.2	36.9
MALAYSIA(1992)	11.2	5.1	5.0	19.1	5.1	15.4
MOROCCO(1993)	19.0	n.a	12.7	25.1	n.a	n.a
CHILE(1992)	10.7	0.4	10.5	10.9	0.0	21.2
COLOMBIA(1992)	11.7	2.3	9.0	14.0	2.3	11.7
BRAZIL(1993)	14.7	14.3	9.7	18.3	14.3	16.9
MEXICO(1992)	12.3	19.0	9.3	14.9	17.2	15.8
VENEZUELA(1992)	14.6	2.8	10.8	18.0	1.0	16.2
ARGENTINA(1993)	9.7	3.1	8.2	10.3	3.1	16.6
HONGKONG(1993)	0.0	0.9	0.0	0.0	0.9	0.0
KOREA(1992)	10.0	3.0	9.2	10.5	2.9	14.1
SINGAPORE(1993)	1.9	0.7	0.9	3.9	0.7	1.9

SOURCE: Directory of Import Regimes, Part I, UNCTAD 1994.

NOTES:

Mean Tariff rates: average of the mean tariff rate at each CCCN heading belonging to the corresponding product category. The mean tariff rate at a CCCN heading is calculated by taking a simple average over all national tariff lines concorded to the heading.

Minimum tariff rates: Average of the lowest tariff rate within each CCCN heading belonging to the corresponding product category.

Maximum tariff rates: Average of the highest tariff rate within each CCCN heading belonging to the corresponding product category.

Mean Total charges: Same as the calculation of the mean tariff rates above with the addition of para-tariff charges (other measures that increase the cost of imports in a manner similar to tariff measures, i.e. by a fixed percentage or a fixed amount), excluding internal taxes on imports.

Average NTM: Incidence of NTM is the percentage of tariff lines within the corresponding product category that is affected by an NTM. The average is calculated in a way similar to the mean tariff rates.

QR Incidence: The incidence of quantitative restrictions is calculated in the same manner as that for NTMs.

All figures are weighted averages; the weights being the total imports of some 120 developing countries in 1985.

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