

Quantitative Restrictions and Foreign Investment in a Monetary Economy

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Abstract

This paper examines the welfare effect of foreign investment under quantitative restrictions for a host country with a cash-in-advance constraint. This constraint results in a divergence between the consumer virtual prices and the world prices. If the cash required for purchasing exportable goods exceeds that of the importable, additional foreign investment can widen the price divergence and, thus, reduce welfare. This result is contrary to the conventional view that foreign investment is non-immiserizing under quantitative restrictions. On the other hand, if the cash requirement is larger for buying importable goods, foreign investment can still promote welfare.

Key words: foreign investment; quantitative restrictions; cash in advance

JEL classification: F11; F21; E10

1. Introduction

The welfare effect of foreign investment under restricted trade measures has been extensively studied. For example, Brecher and Diaz Alejandro (1977) have shown that capital inflows in the presence of tariffs can reduce the welfare of a small open economy due to the subsequent fall in imports. It is, however, notable that the amount of imports is not affected by foreign investment when quantitative trade restrictions, e.g., quotas and voluntary export restraints (VERs), are in place. As shown by Dei (1985a, 1985b), additional foreign investment in the presence of quantitative restrictions unambiguously improves welfare for the host economy, as a result of a reduction of rental payments to foreign capital.

Over the past few decades, non-tariff barriers, especially quantitative restrictions, have been increasingly employed for a variety of reasons as well stated by

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Yarbrough and Yarbrough (2000, Ch. 7). It is not uncommon for countries to encounter difficulties in removing such trade barriers, which are mostly politically motivated. As a result of the difficulties, foreign capital inflows have been regarded as a second-best device for correcting, albeit partially, the trade barrier-induced distortions. The striking result of welfare-enhancing foreign investment by Dei is derived in the context of a pure exchange economy. Such an economy differs vastly from our real world in which money is used as a medium of exchange.

Thus, it is worthwhile to re-examine the welfare effect of foreign investment in a monetary economy characterized by a generalized cash-in-advance (CIA) constraint [Palivos and Yip (1997a, 1997b)]. We find that in such an economy, additional foreign investment under quantitative trade restrictions can be immiserizing. Our result stands in sharp contrast to that of Dei. The rationale for our result is simple. Capital inflows promote the production of the importable sector, thereby lowering its domestic prices and worsening the existing CIA-induced distortion in consumption. If the induced distortionary effect dominates the gain from reduced payments to foreign capital, capital inflows result in lower welfare.

This paper is organized as follows: Section 2 provides a model for a small open, monetary economy with quantitative restrictions. The model is then utilized to examine the welfare implications of foreign investment. The critical level of foreign investment that determines whether welfare is enhancing or reducing is also identified. Section 3 offers concluding remarks.

2. The Model

Consider an economy which produces two goods by using foreign capital in addition to domestic factors. Let good 1 be the exportable and good 2 the importable. An import quota or a VER is in place. Consumers purchase both goods in the amount of D_1 and D_2 . In this monetary economy, consumers need cash in advance for making transactions. Following Palivos and Yip (1997a, 1997b), a generalized CIA constraint is postulated as follows:

$$\phi_1 p_1 D_1 + \phi_2 p_2 D_2 \leq M, \quad (1)$$

where p_i is the price of good i and M is the cash balances held by consumers. According to (1), the purchase of good i must be financed by cash in a minimum amount determined by ϕ_i , where $0 \leq \phi_i \leq 1$. This CIA constraint is a generalization of the formulations in Stockman (1981) and Lucas and Stokey (1987). The constraint generates a consumption distortion, measured by the relative sizes of ϕ_1 and ϕ_2 . The special case that $\phi_1 = \phi_2$ simply implies non-existence of consumption distortion. Generally, we should have $\phi_1 \neq \phi_2$ for a variety of reasons and regulations. For example, foreign aid can be tied to the purchases of imports, and the government provides export credits to promote exports. Unequal ϕ_i 's are typical of developing economies and also verified by empirical studies [Palivos and Yip (1997a)].

Consumers choose the amount of good i (D_i) and the holding of money (M)

subject to the CIA constraint so as to minimize their total spending $p_1D_1 + p_2D_2 + M$ for a given level of utility $u(D_1, D_2) \geq u$. This yields the following expenditure function: $E[(1 + \phi_1)p_1, (1 + \phi_2)p_2, u] \equiv \min\{p_1D_1 + p_2D_2 + M : u(D_1, D_2) = u \text{ and } \phi_1p_1D_1 + \phi_2p_2D_2 = M\}$. By virtue of the linear homogeneity in prices, we can rewrite the expenditure function as: $E[(1 + \phi_1)p_1, (1 + \phi_2)p_2, u] = (1 + \phi_1)e(1, p_v, u)$, where $p_v \equiv p(1 + \phi_2)/(1 + \phi_1)$ represents the CIA-distorted domestic price ratio, or simply the virtual price of good 2 relative to good 1. Notice that p_v is relevant for consumers only and p_v equals the marginal rate of substitution between goods 2 and 1 in equilibrium. When $\phi_1 = \phi_2$, then $p_v = p$, where $p = p_2/p_1$ and $p_1 = 1$. By Shephard's lemma, $E_1 = (1 + \phi_1)e_1 = D_1$ and $E_2 = (1 + \phi_1)e_2 = D_2$, where E_i and e_i denote the partial derivatives with respect to the i th arguments in $E(\cdot)$ and $e(\cdot)$.

The production side of the model is represented by the revenue function: $R(1, p, K) = \max\{X_1 + pX_2 : (X_1, X_2) \in T(K)\}$, where $T(\cdot)$ represents the production technology and K is the total capital employment including domestic endowment \bar{K} and foreign capital $K - \bar{K}$. Here $R_2 (= \partial R / \partial p)$ is the domestic production of good 2, and $R_K (= \partial R / \partial K)$ is the domestic rate of return on capital. For simplicity, other production factors in fixed supplies are suppressed in the revenue function.

The equilibrium conditions for the economy can be described by the national budget constraint and the goods-market clearing condition. The national budget constraint is:

$$(1 + \phi_1)e(1, p_v, u) = R(1, p, K) + \bar{M} + (1 - \omega)(p - p^*)Q - R_K(1, p, K)(K - \bar{K}), \quad (2)$$

where \bar{M} is the stock of money supply, Q is the imports subject to quantitative restrictions, and p^* is the world price of the importable. Equation (2) states that the total spending on goods and the holding of money equals net income, which consists of production revenue and money endowment plus rent retention from imports minus rental payments to foreign capital. As pointed out by Anderson and Neary (1992) and Lahiri and Raimondos (1995), ω is the fraction of quota rents captured by foreigners, where $\omega = 0$ in the case of import quotas and $\omega = 1$ for VER.

We turn to the goods market. In equilibrium, consumer demand for good 2 is met by its domestic production and foreign supply:

$$(1 + \phi_1)e_2(1, p_v, u) = R_2(1, p, K) + Q, \quad (3)$$

where the import level, Q , is pre-determined under quantitative restrictions.

The equilibrium conditions in (2) and (3) have two endogenous variables, u and p , for a given K . The welfare effect of an increase in foreign capital can be obtained by totally differentiating (2):

$$(1 + \phi_1)e_u du = -(K - \bar{K})dR_K - \omega Q dp - (\phi_2 - \phi_1)e_2 dp, \quad (4)$$

where $e_u > 0$, denoting the inverse of the marginal utility of income. The welfare effect depends on the change in the rental payments to foreign capital, the quota

rents lost, and the direction and degree of the CIA distortion. When $\phi_2 > \phi_1$, the virtual price of good 2, $p_v = p(1 + \phi_2)/(1 + \phi_1)$, exceeds the free trade price of good 2, p^* , i.e., $p_v > p > p^*$. A rise (fall) in p widens (narrows) the price gap, leading to a welfare loss (gain) captured by the last term of (4).

The change in p plays a crucial role in (4) determining the welfare effect of foreign investment. To delineate the effect, we totally differentiate the goods-market equilibrium condition in (3):

$$(1 + \phi_1)e_{2u}du + [(1 + \phi_2)e_{22} - R_{22}]dp = R_{2K}dK, \quad (5)$$

where $e_{2u} > 0$, $e_{22} < 0$, and $R_{22} > 0$. Notice that $R_{2K} > (<)0$ when good 2 is capital (labor) intensive relative to good 1. Substituting (5) into (4) and utilizing $dR_K = R_{K2}dp + R_{KK}dK$, we obtain the effect of an increase in foreign capital on the domestic price of good 2:

$$dp/dK = (1 + \phi_1)e_u[R_{2K} + (e_{2u}/e_u)(K - \bar{K})R_{KK}]/\Delta, \quad (6)$$

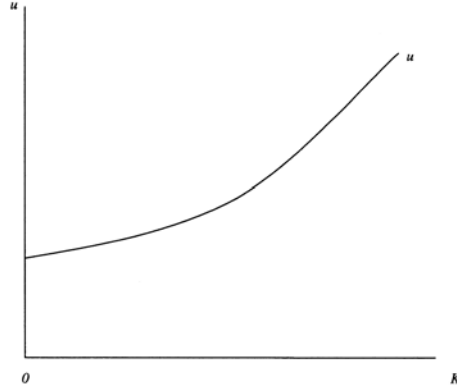
where $R_{KK} \leq 0$ and, as shown in the Appendix, $\Delta < 0$ is necessary for stability. There are two forces in determining the changes in p : an inflow of foreign capital expands the production of good 2 and hence lowers its price when good 2 is capital intensive relative to good 1 ($R_{2K} > 0$). On the other hand, the higher income via the reduced payments to foreign capital (i.e., $R_{KK} \leq 0$) pushes p up. In general, the price effect of foreign investment is indeterminate.

Our main task is to assess the welfare effect of foreign investment. Substituting (6) into (4) and using the reciprocity condition, $R_{2K} = R_{K2}$, we obtain:

$$\begin{aligned} du/dK = & - \{ (K - \bar{K})R_{2K}^2 + (K - \bar{K})R_{KK}[(1 + \phi_2)e_{22} - R_{22}] + \omega QR_{2K} \} / \Delta \\ & + (\phi_1 - \phi_2)e_2R_{2K} / \Delta. \end{aligned} \quad (7)$$

The first bracketed term on the right-hand-side of (7) captures the welfare effect of foreign investment in the absence of the CIA constraint. As shown by Dei (1985b, eq. 12), this effect is positive under quantitative restrictions attributable mainly to the fall in rental payments to foreign capital. The second term of (7) represents the welfare effect of the CIA constraint, which is positive (negative) depending on whether $\phi_1 < (>)\phi_2$.

Consider first the case that $\phi_2 > \phi_1$, in which the virtual price, $p_v = p(1 + \phi_2)/(1 + \phi_1)$, exceeds the world price, p^* . If foreign investment lowers p via the direct supply response, the price gap, $p_v - p^*$, shrinks. This effect reinforces the welfare gain of foreign investment. Hence, welfare is an increasing function of K , as depicted in Figure 1. This suggests that for $\phi_2 > \phi_1$, the optimal level of foreign capital is free trade in capital, i.e., foreign capital flows in until the domestic rate of capital return equals the world rate.

Fig. 1. Welfare Profile under $\phi_1 < \phi_2$ 

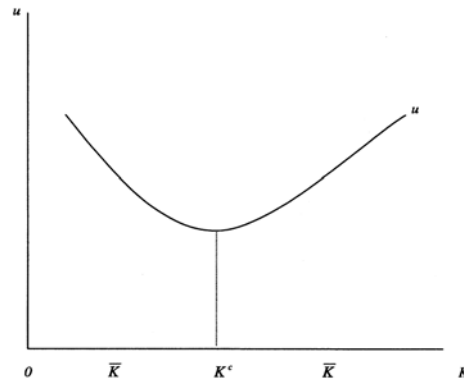
Secondly, when $\phi_2 > \phi_1$, the virtual price is below the world price [Palivos and Yip (1997b)]. The fall in p widens the price gap, generating a consumption loss, as indicated in the second term of (7). This loss can mitigate, offset, or even dominate the gain arising from the reduction in rental payments to foreign capital as indicated in the first term of (7). Hence, whether additional foreign investment is welfare-improving or reducing depends on the level of K relative to a critical level of capital, K^c , which is solved by setting $du/dK = 0$ in (7):

$$K^c - \bar{K} = R_{2K}[(\phi_1 - \phi_2)e_2 - \omega Q] / \{R_{2K}^2 + R_{KK}[(1 + \phi_2)e_{22} - R_{22}]\}. \quad (8)$$

In fact, this K^c gives a minimum of welfare, which can be proved by checking the curvature of the welfare function. Following the technique used by Neary (1993), we substitute (8) into (7) to yield:

$$du/dK = -\{R_{2K}^2 + R_{KK}[(1 + \phi_2)e_{22} - R_{22}]\}(K - K^c) / \Delta. \quad (9)$$

Hence, under $\phi_1 > \phi_2$, we have $du/dK < (>)0$ if $K < (>)K^c$, implying that u is a convex function of K . Figure 2 provides a graphical illustration: when K increases, welfare declines initially, reaches a minimum at the critical point K^c , and then starts to rise. Note that the larger the gap between ϕ_1 and ϕ_2 in (8), the higher the K^c . Furthermore, K^c can be larger or smaller than \bar{K} , as depicted in Figure 2, depending on whether $\phi_1 - \phi_2$ is bigger or smaller than $\omega Q/e_2$ in (8). Consequently, for $\bar{K} < (>)K^c$, additional foreign investment lowers (increases) welfare. This suggests that zero inflow of foreign capital is optimal if $\bar{K} < K < K^c$, whereas free trade in capital is optimal if $\bar{K} < K^c < K$. On the other hand, when $K^c < \bar{K}$, the optimal policy is also free trade in capital.

Fig. 2. Welfare Profile under $\phi_1 > \phi_2$ 

Note that under $\phi_1 > \phi_2$, immiserizing foreign investment occurs when initial foreign capital is not so large in the host economy (specifically, $\bar{K} < K < K^c$). This welfare implication appears to have a bearing on some developing countries, which export non-durable and import durable goods together with the fact that the cash required for the purchase of the non-durable exceeds that of the durable (i.e., $\phi_1 > \phi_2$). It follows that these countries may no longer rely on using foreign capital as a second-best device to correct the distortion caused by quantitative trade restrictions.

3. Concluding Remarks

This paper has considered a small open economy with quantitative restrictions on imports and a cash-in-advance constraint in consumption. These constraints result in a divergence between the consumer virtual price and the world price of importable goods. Additional inflows of foreign capital may widen the price gap, thereby reducing national welfare, when the cash required for the transaction of exportable goods exceeds that of the importable. This result is contrary to the conventional view that foreign capital is welfare-improving under quotas and VERs. Nevertheless, when the cash needed for buying importable goods exceeds that of the exportable, additional foreign investment enhances welfare. In this case, attracting foreign capital may still be used as a second-best device to correct trade distortions.

It is worthwhile to mention that the price effect, which narrows the CIA distortion, plays a crucial role in our welfare analysis. However, this price mechanism disappears in the case of tariffs, because domestic prices of importable goods in the host economy are fixed by the world prices and tariff rates. Thus, the traditional result of Brecher and Diaz Alejandro (1977) on the welfare effect of foreign investment remains.

Appendix

Following Dei (1985b), the adjustment of the domestic price of the importable is: $\dot{p} = \alpha Z_2(p)$, where the dot denotes a time derivative, α is a positive constant, and $Z_2 = (1 + \phi_1) e_2 - R_2 - Q$ is the excess demand for good 2. A necessary and sufficient condition for stability is $dZ_2 / dp < 0$. Using (4) and (5), we can obtain $dp / dZ_2 = (1 + \phi_1) e_u / \Delta$ where $\Delta = (1 + \phi_1) \{e_u [(1 + \phi_2) e_{22} - R_{22}] - e_{2u} [(\phi_2 - \phi_1) e_2 + (K - \bar{K}) R_{2K} + \omega Q]\}$. Hence, stability requires $\Delta < 0$.

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