PROTECTION, FOREIGN CAPITAL AND NATIONAL WELFARE IN THE PRESENCE OF UNEMPLOYMENT*

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Using the specific-factors model of a competitive small open economy, this paper shows how the standard welfare analysis of capital flows with tariffs and quotas are modified in the presence of unemployment. Employment of labor is endogenously determined and our analysis establishes a departure from the traditional results with full employment. We show several policy implications. Free trade does not necessarily lead to a welfare gain for the country and the optimal policy intervention is considered. This paper derives the conditions under which a capital inflow will help or harm a country in the cases of tariffs and quotas.

1. Introduction

It is well known that in a competitive small open economy tariffs and quotas are equivalent in the sense that an equilibrium generated by one type of trade restriction could also be generated by appropriately chosen values of the other type. Recently it has been known that the welfare effects of capital inflows with tariffs are different from those with quotas. Opinions seem to be converging on that a tariff-induced capital inflow harms the host country and a quota-induced capital inflow improves the host country.

Hamada (1974), Minabe (1974), Brecher and Diaz-Alejandro (1977), Brecher and Findlay (1983) and Srinivasan (1983) have examined the welfare effects of capital inflows in the presence of tariffs. Dei (1985a) and Buffie (1985) have examined the welfare effects of exogenous capital inflows in the presence of import quotas, and Dei (1985b) also in the presence of VERs (voluntary export restraints). Jones (1984) and Neary and Ruane (1988) have proved that a small increase in tariffs leads to a reduction in welfare in the case of endogenous capital flows. Neary (1988) has presented a general framework for comparing the effects of tariffs, quotas and VERs both with and without capital flows. Ogino (1990) has proved that quotas are preferable to tariffs in the context of the sector-specific factors model.

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Public policies such as tariffs and quotas protections are related to the problem of unemployment. Thus, a key benefit of foreign investment is supposed to be its impact on domestic unemployment. It is, therefore, worthwhile to re-examine the welfare analysis of capital flows by taking unemployment into consideration. However, most of the literatures assume full employment except for Khan (1982) and Srinivasan (1983, section 7). Khan (1982) has taken only the case of tariffs into consideration and Srinivasan (1983) only the case of free trade.\(^1\)

Our purpose is to show how the standard welfare analysis of capital flows in the specific-factor models with tariffs and quotas are modified by introducing simple type of real wage rigidity.\(^2,\)\(^3\) In our model, employment of labor can be increased or reduced by an increase in protection and foreign capital. Our analysis establishes a departure from the previous results and show several policy implications. Free trade does not necessarily lead to a welfare gain. Additional foreign capital does not necessarily harm the country in the case of tariffs. Additional capital does not necessarily help the country in the case of quotas.

The present paper is organized as follows. In section 2, we explain our framework to derive the expression for the welfare effect of an increase in protection and foreign capital stock when tariffs and quotas are in force. To allow for unemployment we introduce a minimum wage, which is specified in terms of exportables. In section 3, we examine the effects on national welfare of an increase in protection and consider the optimal policy intervention. If a foreign capital ratio is greater than the output elasticity of import goods, welfare is worsened. In section 4, we consider the effects of additional foreign capital with tariffs. An inflow of capital increases employment and welfare is not necessarily worsened. Welfare is improved if and only if the relative share of labor and capital is larger than the tariff rate. In section 5, we consider the effects of additional foreign capital with quotas. The price effect on employment is negative and additional capital is not always welfare-improving. A higher labor's share, a higher import demand elasticity and a higher foreign capital ratio tend to raise welfare. Finally, in section 6, some concluding remarks are offered.

2. The Model

We employ the specific-factors model of a competitive small open economy. There are two goods, X and Y. The host country imports good X and exports good Y. Each production function is represented by \(X = F(L,K_0 + K) = Lf(k)\) and \(Y = G(L_y, T)\), where \(X\) and \(Y\) are re-

\(^1\) A different set of issues associated with international capital movements in the presence of unemployment has been provided by Neary (1985), Brander and Spencer (1987), Brecher and Choudhri (1987) and Brecher (1989).

\(^2\) The difference between quotas and VERs (voluntary export restraints) is that in the former there is government revenue, \((p-p^*)M\), and in the latter there isn't. Thus, in the standard models it is usual that the level of welfare is higher under import quotas than under VERs. Since we are interested in welfare, the cases of quotas and tariffs are examined but VERs not examined in this paper. In the case of VERs the expression for the welfare effect of additional capital is easily derived and the results are slightly different from those in the case of quotas.

\(^3\) In the paper we examine the effects of a small increase in foreign capital. However we might consider an unrestricted capital flow instead of additional capital. We can easily extend the analysis in our paper to this case.
respectively outputs of importables and exportables, \( L \) is the amount of labor employed in the import goods sector and \( L_Y \) in the export sector, \( K_0 \) is the inelastically supplied stock of domestic capital stock, \( K \) is the amount of foreign capital and \( T \) is a specific factor in the export sector. Throughout the paper we assume that the economy is a net importer of capital service and the rental payments to foreign capital are untaxed. The average product of labor in the import sector is represented by the function \( f(k) \) of the capital-labor ratio, \( k = (K_0 + K)/L \), with this function assumed to have the conventional properties that \( f' > 0, f'' < 0 \).

To allow for unemployment we introduce a minimum real wage, which is specified in terms of exportables at some fixed level denoted by \( w \). The hiring of labor in each sector is determined by

\[
\begin{align*}
(1) \quad w &= pF_L(L, K_0 + K) = p(f(k) - kf''(k)), \\
(2) \quad w &= G_i(L_Y, T),
\end{align*}
\]

where \( p \) is the relative price of good \( X \) in terms of good \( Y \) which is numeraire. From (1), we have

\[
(3) \quad k = k(p) \quad \text{and} \quad k_p = \frac{dk}{dp} = \frac{w}{p^2kf''(k)} < 0.
\]

From the fact that \( T \) is fixed and (2), it follows that \( L_Y \) is fixed and so the output of \( Y \) is fixed. From (3) we have

\[
(4) \quad L = (K_0 + K)/k(p) = L(p, K).
\]

From (3) and (4), we have

\[
(5) \quad L_p = -Lk_p/k > 0,
\]

\[
(6) \quad L_K = 1/k.
\]

Since \( L_p > 0 \), unemployment is reduced by an increase of the domestic price of importables. From (3) and (4), we can rewrite \( X = Lf(k) \) as

\[
(7) \quad X = L(p, K)f(k(p)) = X(p, K).
\]

From (5), (6) and (7), we have

\[
(8) \quad X_p = L_pf' + Lf'k_p = wL_p/p > 0,
\]

\[
(9) \quad X_K = L_fk' = f/k.
\]

The hiring of capital in the import sector is determined by

\[
(10) \quad r = pF_K = pf''(k(p)).
\]

In this model the domestic return to capital, \( r \), depends on only domestic price. The home country's technology with unemployment is of the Heckscher-Ohlin kind in which endowment changes do not alter the local rates of return, while in the standard specific-factors model with full employment capital movements alters the domestic rental. From (3) and (10), we have

\[
(11) \quad r = r(p) \quad \text{and} \quad r_p = f' + pf''k_p = f/k.
\]

We assume that foreign capital invested at home earns the market rental on capital and repatriates it in full. Using (7) and (11), our model, which includes both import tariffs and import

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4) When the minimum wage is specified in terms of importables, the results are the same in the case of tariffs and not in the case of quotas.

5) Terms such as \( F_i \) and \( F_{ij} \) denote the first derivatives of \( F \) with respective to \( i \) and the second partial derivatives with respective to \( i \) and \( j \) respectively.

quotas policies, is represented by

\[(12) \quad E(p, u) = pX(p, K) + Y + (p - p^*)M - r(p)K,\]
\[(13) \quad M = E_p(p, u) - X(p, K),\]

where \(E\) is the expenditure function, \(u\) is national welfare, \(p^*\) denotes the fixed world price of good \(X\), \(M\) is the host country’s quantity of imports, \(E_p\) denotes the domestic demand of good \(X\). Eq. (12) expresses the budget constraint for the economy and is familiar as the income-expenditure equality. Eq. (13) defines \(M\) as \(E_p\) minus \(X\) and specifies market clearing for good \(X\).

Let \(t\) be the tariff on import. When tariffs are in force, \(M\) and \(u\) are determined by (12) and (13) under given \((p^* - p)\) and \(K\). In this case, the term \((p - p^*)M = tM\) is the tariff revenue. When imports are restricted by quotas, eqs. (12) and (13) represent import quotas policy. In this case \((p - p^*)M\) is the import quota revenue. Under given \(M\) and \(K\), \(u\) and \(p\) are endogenously determined by (12) and (13).

3. Unemployment and Protection

We examine the relationship between national welfare and an increase in the domestic price of importables when there is domestic unemployment. In this section we assume that foreign capital is fixed.

Differentiating (12) and (13) totally, we have

\[(14) \quad du = (pX_p - r_pK)dp + (p - p^*)dM + (pX_k - r)dK,\]
\[(15) \quad dM = (E_{pp} - X_p)dp + E_{pu}du - X_dKdK.\]

Using (14) and (15) and setting \(dK = 0\), the expression for the effect of a quota on the domestic price of importables is given by

\[(16) \quad dp/dM = -c/b < 0,\]

where \(c \equiv 1/[X_p(1 - m) + m r_pK/p - E_{pp}] > 0\), \(b \equiv 1/[1 - (p - p^*)E_{pu}] > 0\), \(m \equiv pE_{pu}\) is the marginal propensity to consume good \(X\) and \(0 < m < 1\). Thus, tightening of the quota constraint raises the domestic price of importables. Suppose that the home country initially pursues protection policy, and that the tariff on imports, \(t\), is raised or the import quota, \(M\), is lowered.

From (14), (15) and (16), the welfare effect of an increase in the domestic price of importables is represented by

\[(17) \quad du/dp = b[pX_p - r_pK + (p - p^*)(E_{pp} - X_p)].\]

6) The left-hand side of (14) is \(E_u du\). In the paper we set \(E_u\) to one for simplicity.
7) Since \(E\) is homogeneous of degree one in commodity prices and \(E_u\) is one, \(E(p, u) = E(1, p, u) = E_1 + p E_u\) and \(E_u = E_{1u} + p E_{pu} = E_{1u} + m = 1\) where \(E_{1u}\) is the marginal propensity to consume good \(Y\). We assume that two goods are normal, implying \(E_{1u} > 0\) and \(pE_{pu} = m > 0\). This leads to \(0 < m < 1\) and \(b > 0\).
8) The welfare changes in the case of both policies are respectively represented by

\[
\begin{align*}
\frac{du}{dt} & = b[pX_p - r_pK + (p - p^*)(E_{pp} - X_p)], \\
\frac{du}{dM} & = b[pX_p - r_pK + (p - p^*)(E_{pp} - X_p)]dp/dM.
\end{align*}
\]

Since the sign of the change in welfare of a small increase in tariff coincides with that of a small reduction in quota because \(dp/dM < 0\), we consider the welfare changes of both policies in view of eq. (17).
Of the three effects in this expression, the first equals \( wL_p \) because \( X_p = wL_p/p \). Since \( L_p \) is an increase in employment due to a rise in the domestic price, this term \((pX_p)\) is an increase in GDP due to an increase in employment and it tends to raise welfare. In the previous models with full employment, employment is not increased by a rise in the price of importables, so that this benefit does not exist.

Of the three effects in the above expression, the second and third exist in the previous models. These have been respectively referred to as the inframarginal effect and the volume-of-trade effect (see, for example, Grossman, 1984). The third shows the familiar consumption and production losses associated with change in tariff and quota protection.

Let \( a \) denote the share of capital owned by foreigners, i.e. \( a \equiv K/(K_0 + K) \) (with \( 0 < a < 1 \)). Noting that \( r_pK = (f/k)K = LfK/(K_0 + K) = X\alpha \), eq. (17) is rewritten as

\[
\frac{du}{dp} = bp^*(aX + \eta E_p)[X(\epsilon - a)/(\alpha X + \eta E_p) - (p - p^*)/p^*]/p,
\]

where \( \epsilon \equiv X_p/pX \) and \( \eta \equiv -E_{pp}p/E_p \) are respectively output and demand elasticities of good \( X \) with respect to its own price. We see immediately that if \( a \geq \epsilon \) and \( p \geq p^* \), an increase in the domestic price of importables is welfare-worsening. Since \( X\epsilon = pX_p \) and \( X\alpha = r_pK \), we find that welfare is lowered if the inframarginal effect is greater than the employment effect.

Note that \( X(\epsilon - a)/(\alpha X + \eta E_p) = (\epsilon(\epsilon - a))/(1 + \eta E_p/\alpha X) \). An increase in the domestic price of importables tend to raise welfare if the level of protection, the foreign capital ratio and demand elasticity are smaller and or if the output-demand ratio and output elasticity are larger.

It is well known that free trade is optimal in a competitive small open economy, and that free trade is not necessarily optimal when there are distortions or there is foreign capital. Since there is distortion, i.e., unemployment and foreign capital in our model, we find from (17) that free trade \((p = p^*)\) is not always optimal. Let \( t_{op} \) denote the optimal tariff rate or the optimal quota rate. From (18) we immediately get

\[
t_{op} = (p - p^*)/p^* = X(\epsilon - a)/(\alpha X + \eta E_p).
\]

This means that \( \text{sign}[t_{op}] = \text{sign}[\epsilon - a] \). Thus, we see that the sign of the optimal protection rate depends on a balance between the employment effect \((pX_p)\) and the inframarginal effect \((-r_pK)\) since \( X\epsilon = pX_p \) and \( X\alpha = r_pK \).

In the sections 4 and 5, we examine the welfare effects of additional foreign capital in the presence of tariffs and quotas. When the optimal tariff or quota is levied, the welfare changes with both policies are identical. In other words, in the case of the optimal tariff the welfare change is also expressed as that of quotas, and vice versa. Thus in the following sections, we do not

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9) I am grateful to an anonymous referee for pointing out the idea of using \( a \).

10) See Bhagwati and Tironi (1980) and Brecher and Bhagwati (1981).

11) Substituting (13) into (12), we get

\[
(11-1) \quad u = u(p(K), K).
\]

Differentiating (11-1) with respect to \( K \), we have

\[
(11-2) \quad du/dK = u_dp/dK + u_K,
\]

where \( u_K \) expresses the welfare change of a capital inflow in the presence of tariffs and \( U_p \) denotes the welfare change of an increase in the domestic price of importables. Thus, (11-2) expresses the welfare change of a capital inflow in the presence of quotas since \( p \) is endogenous. Thus, when the optimal
explicitly examine the welfare effects of additional foreign capital in the case of the optimal protection.

4. The Effects of an Inflow of Foreign Capital under Given Tariffs

We consider the welfare effect of additional foreign capital in the presence of tariffs. Setting \( dt = dp = 0 \) and using (9), (14) and (15), we have

\[
\frac{du}{dK} = b\left(\frac{w}{k} - \frac{tf}{k}\right).
\]

Here \( \frac{1}{k} = \frac{LK}{K} \) is an increase in employment. Since unemployment is reduced by an increase in capital, the expression \( \frac{w}{k} = pX_K - r \) is a net increase in GDP due to an inflow of capital. This benefit does not exist in the previous (full employment) models. The expression \( \frac{tf}{k} = tX_K \) is a reduction in tax revenue through an increase in the production of importables. It is called the volume-of-trade effect and tends to harm the country. If the technology is of the Heckscher-Ohlin kind in which capital flows do not alter the local rates of return, \( r_K = 0 \) and/or foreign capital is small such that there are no inframarginal gains, a capital inflow necessarily harms the country in the previous models (see, for example, Neary, 1988).

From (20) we can say that in free trade policy, that is \( t = 0 \), additional foreign capital always raises welfare. Furthermore, in the tariff policy, an inflow of foreign capital raises welfare if and only if the total employment effect \( \frac{w}{k} \) is greater than the tariff revenue loss \( -\frac{tf}{k} \). We can derive the necessary and sufficient condition for a welfare gain. Eq. (20) can be rewritten as

\[
\frac{du}{dK} = bp^*r\left[\frac{\theta_L}{\theta_K} - \frac{t}{p^*}\right]/p,
\]

where \( \theta_L = \frac{L_u}{pX} \) is the distributive share of labor in the import sector and \( \theta_K \) is that of capital. From (21), we see immediately that

\[
\frac{du}{dK} \geq 0 \quad \text{if and only if} \quad \frac{\theta_L}{\theta_K} \geq \frac{t}{p^*}.
\]

Thus a higher labor's share (a lower capital, \( s \)) and a lower tariff rate tend to raise welfare. In other words, the welfare effect depends on a balance between the relative share and the tariff rate.

5. The Effects of an Inflow of Foreign Capital under Given Quotas

We consider the welfare effects of additional foreign capital in the presence of quotas. Setting \( u_q = 0 \), the welfare change in the presence of quotas coincides with that of tariffs. For example, in our model substituting (19) into (21), we get (25). Since it is complicated and not important to derive (25), we omit the derivations.

12) Khan (1982) has shown that a capital inflow in the presence of tariffs is always immiserizing in the Haris-Todaro Model with two goods and two factors. Note that in his model a capital inflow increases unemployment in contrast to this paper.

13) A similar result has been derived by Srinivasan (1983).

14) The expression \( \frac{w}{k} - \frac{tf}{k} \) in (20) can be rewritten as follows:

\[
\frac{w}{k} - \frac{tf}{k} = \frac{w}{k} - \frac{p+rt}{pk} = \frac{w}{pk} - \frac{w}{p} + \frac{r}{p} = \frac{p^*r(\theta_L - rt/p^*)}{p}.
\]
\( dM = 0 \) and using (14) and (15), we have

\[(23) \quad \frac{du}{dK} = (p_X - r_K) \frac{dp}{dK} + \frac{w}{k},\]
\[(24) \quad \frac{dp}{dK} = -c[(1 - m)f/k + mf'] < 0.\]

From (24), a slight increase in foreign capital lowers the domestic price of importables. Because \( \frac{dr}{dK} = r_K \frac{dp}{dK} < 0 \), it is clear that an increased inflow depresses the domestic rental by lowering the domestic price, and there is an inframarginal gain. Since \( p_X \frac{dp}{dK} = w_L \frac{dp}{dK} < 0 \) from (8), we find that an inflow affects employment indirectly by lowering the domestic price and so this term tends to be decline in welfare. Thus, additional foreign capital raises welfare under given import quota if the sum of the direct employment effect \( \frac{w}{k} \) and inframarginal gain \( -r_K \frac{dp}{dK} \) is greater than the indirect employment effect \( p_X \frac{dp}{dK} \). In the traditional models in which a general framework is included, there is only inframarginal gain and welfare is always improved (see, for example, Dei, 1985a, and Neary, 1988).

Substituting (24) into (23) yields

\[(25) \quad \frac{du}{dK} = c\left[ \frac{\theta L \eta + X(-M + a)}{k} \right].\]

Although the welfare effect is ambiguous, we get the following sufficient condition for welfare improvement:

\[(26) \quad \varepsilon \theta_K \leq a.\]

If \( \varepsilon \leq a \), the inframarginal gain \( r_K \) is greater than the indirect employment effect \( p_X \) and welfare is raised. The third term \( w/k \) on the right side of (23) is rewritten as \( r(\theta_L/\theta_K) \). This means that the lower value of \( \theta_K \) leads to the larger direct employment effect. Thus, we see that even if \( \varepsilon \geq a \), welfare is improved if \( \theta_K \) is enough small.

Let \( \sigma \) be the elasticity of substitution between labor and capital. Noting that \( \varepsilon = \sigma \theta_L/\theta_K \) and \( M = E_p - X \), eq. (25) is replaced by

\[(27) \quad \frac{du}{dK} = c\left[ \theta_L M \eta + X(\theta_L (\eta - \sigma) + a) \right]/k.\]

We obtain the alternative sufficient condition for welfare-improving:

\[(28) \quad \eta \geq \sigma.\]

Thus, if the import demand elasticity is greater than the elasticity of substitution, additional foreign capital raises welfare.

Using \( p_X = w_L \) from (8), (23) can be replaced as

\[(29) \quad \frac{du}{dK} = w[L_p \frac{dp}{dK} + 1/k] - r_K \frac{dp}{dK}.\]

Since \( L_p \frac{dp}{dK} \) is the indirect price effect on employment and \( 1/k \) is the direct effect, the expression \( L_p \frac{dp}{dK} + 1/k \) is the total change in employment. Although the total impact on employment cannot be unambiguously signed, we get the following alternative sufficient condition for welfare improvement:

\[\text{References:}\]

15) In the full employment models with quotas, the price change is ambiguous since there is an inframarginal gain (see, for example, Dei, 1985a, and Neary, 1988).

16) I am grateful to an anonymous referee for pointing out this expression. In deriving \( \varepsilon = \sigma \theta_L/\theta_K \), the following information has been used: \( \sigma = d \ln k/d \ln \omega = -f'(f - kf')/kf'\), where \( \omega = w/r = (f - kf')/f' \); \( d \ln k/d \ln p = pk/k = (pf/rk)[f'(f - kf')/kf'^2] = -\sigma/\theta_K \); \( \varepsilon = d \ln X/d \ln p = p_XX = -\theta_L pk/k = \sigma \theta_L/\theta_K.\)

\[ \frac{dL}{dK} \equiv L_{p}dp/dK + 1/k \geq 0. \]

That is, welfare is improved if additional foreign capital leads to an expansion in employment.\(^{17, 18}\)

6. Concluding Remarks

The present paper has extended the welfare analysis of capital movements to allow for unemployment. As our analysis has demonstrated, the traditional results with full employment do not always hold and may be reversed when the standard specific-factors model is modified to incorporate unemployment. The key to these results is that an increase in foreign capital reduces unemployment and a decrease in the domestic price of importables increases unemployment. The limitation of the paper is its exclusive concern with the specific-factors model, a small open economy and the simple type of real wage rigidity. It is our belief that in spite of the limitation, our analysis has advanced the theory of international factor movements.

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\(^{17}\) It can be easily shown for a general specification of the economy’s technology that additional foreign capital improves national welfare if unemployment is reduced. We might consider the following. In this case we can rewrite eq. (12) as \(E(p, u) = G(L(p, K), p, K) + M(p - p^*) - KG_K(L(p, K), p, K)\), where \(G(L(p, K), p, K)\) is a GDP function, \(p\) is a vector of goods prices and \(L = L(p, K)\) is the level of employment and is endogenously determined since \(w = G_L(p, K, L)\). Suppose that \(K\) is zero for simplicity. From this equation we find that \(du/dK = G_L(L_pdp/dK + L_K) = G_KdL/dK\), where \(dL/dK \equiv L_{p}dp/dK + L_K\). Thus, \(sign[du/dK] = sign[dL/dK]\).

\(^{18}\) It is not undetermined whether the former condition (26) is more general than the above condition.


