Centre for the Study of International Economic Relations Working Papers

Centre for the Study of International Economic Relations

1987

Policy-Induced Inflows of Foreign Capital in the Presence of Rigid-Wage Unemployment

Richard A. Brecher

Citation of this paper:

Brecher, Richard A.. "Policy-Induced Inflows of Foreign Capital in the Presence of Rigid-Wage Unemployment." Centre for the Study of International Economic Relations Working Papers, 8706C. London, ON: Department of Economics, University of Western Ontario (1987).
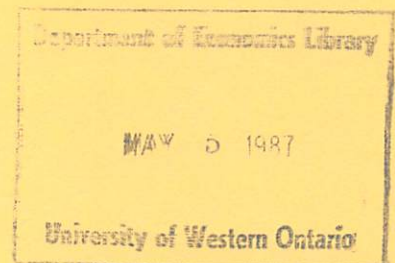
THE CENTRE FOR THE STUDY OF INTERNATIONAL ECONOMIC RELATIONS

WORKING PAPER NO. 8706C

POLICY-INDUCED INFLOWS OF FOREIGN CAPITAL
IN THE PRESENCE OF RIGID-WAGE UNEMPLOYMENT

Richard A. Brecher

Presented at

SIXTH ANNUAL CONFERENCE ON INTERNATIONAL TRADE THEORY

Spencer Hall
London, Ontario
April 11-12, 1987

*Sponsored by the Sloan Workshop in International Economics
and the Centre for the Study of International Economic Relations*

DEPARTMENT OF ECONOMICS
THE UNIVERSITY OF WESTERN ONTARIO
LONDON, CANADA
N6A 5C2

POLICY-INDUCED INFLOWS OF FOREIGN CAPITAL

IN THE PRESENCE OF RIGID-WAGE UNEMPLOYMENT*

Richard A. Brecher

Department of Economics
Carleton University
Ottawa, Ontario
Canada K1S 5B6

May 1986
Revised April 1987

POLICY-INDUCED INFLOWS OF FOREIGN CAPITAL

IN THE PRESENCE OF RIGID-WAGE UNEMPLOYMENT

Richard A. Brecher

I. Introduction

In the theory of international trade and investment, a great deal of attention has been devoted to the welfare consequences of using tariff policy to attract inflows of foreign capital. This important issue was analyzed in a pioneering paper by Mundell (1957)[1], in subsequent work of Bhagwati (1973), Hamada (1974), Minabe (1974)[2] and Brecher and Diaz Alejandro (1977), and in more recent studies by Brecher and Findlay (1983), Srinivasan (1983) and Jones (1984), among others. A central theme emerging from much of this literature is the serious risk of welfare loss from tariff-induced inflows of capital from abroad.[3]

Most (if not all) of the theoretical work on this topic has dealt with flexible-wage full-employment models.[4] In national debates about economic policy, however, a key benefit of foreign investment is supposed to be its impact on domestic unemployment. In this regard, the existing theory is not closely tailored to the concerns of policymakers.

To address these concerns, the present paper follows Brecher (1974a, 1974b) in allowing for unemployment caused by a real wage floor that is institutionally imposed throughout the entire labour market of the home economy, within a two-country two-good two-factor model of a world engaged in free international exchange of goods.[5] This model is then extended to permit unrestricted capital movements across national borders. Once the minimum-wage model of international trade and investment has been outlined in Section II, the employment and welfare

consequences of using trade policy to generate capital inflows (or outflows) are analyzed in Section III. Then, in Section IV, we explore the use instead of subsidies on foreign investment itself, as an alternative (more direct) policy for generating capital flows between countries. Next, allowing simultaneous taxes (subsidies) on international movements of both goods and capital, Section V determines the optimal policy package for the home country. Some concluding remarks are offered in Section VI.

II. The Basic Model

Let us begin with the standard Heckscher-Ohlin-Samuelson model of a trading world with two "large" countries that produce two consumer goods using two primary factors. Both the home and foreign economies have fixed endowments of capital and labour, which are perfectly mobile domestically but completely immobile internationally. The capital/labour endowment ratio is smaller at home than abroad. The two countries, however, have the same technology for goods X and Y that are produced under constant returns to scale, with the former good being capital intensive relative to the latter at any wage/rental ratio in common. Producers maximize profits while consumers maximize utility in a world characterized by perfect competition and no externalities.

To the entire labour market of the home economy, now add a real wage floor of $\bar{w}$ units in terms of (say) good Y. Assuming that this minimum wage rate is institutionally set above the full-employment level, we generate some home-country unemployment, which prevents the wage from

rising above the floor. In view of Samuelson's (1949) well-known one-to-one correspondence between product and factor prices, the relative price of good X (in terms of Y) within the home country remains fixed at (say) $\bar{p}$ and the real rental rate of capital at home stays correspondingly constant at $\bar{r}$ (in terms of good Y), given that home production is assumed to be incompletely specialized at all times. As we know from Brecher (1974a, 1974b), moreover, the product-transformation and trade-offer curves of the minimum-wage economy are both linear in the region of incomplete specialization, with total labour employment being positively (negatively) related to home output and excess supply of the labour-intensive (capital-intensive) good. Thus, assuming free international trade, we see that any excess world supply in the market for good Y (X) is cleared by a fall (rise) in home employment at constant prices.

Free trade, furthermore, ensures equality between the home product-price ratio (fixed at $\bar{p}$) and its foreign counterpart, denoted p*. Thus, from the Factor-Price Equalization Theorem, we also have equality between the home wage and rental rates ($\bar{w}$ and $\bar{r}$) on the one hand and their foreign counterparts w* and r* on the other, assuming that foreign production is also diversified at the outset. In other words, the wage floor in the home economy uniquely fixes relative product prices and real factor rewards for the world as a whole.

Now let capital become perfectly mobile internationally. Since the home and foreign rental rates are equal simply because of free trade in goods, capital is indifferent between flowing from and remaining in its country of origin.[6] This factor's world distribution needed to clear international product markets, moreover, is indeterminate: at fixed

prices (and constant employment of labour), shifting a unit of capital from one economy to the other would not lead to any imbalance in world markets, as we know from Mundell's (1957) reasoning. Since such a shift leads to no commodity-market disequilibrium, there would be no change in the level of home employment. Thus, all equilibrium distributions of the world's capital stock imply the same degree of (home) unemployment and a unique level of welfare for each country.

Without loss of generality, assume that the laissez-faire equilibrium is characterized by no actual movement of capital, and that we obtain the Heckscher-Ohlin pattern of trade with the relatively labour-abundant home economy exporting the labour-intensive good. International capital movements, however, will be induced by the various taxes and subsidies analyzed below.

III. Trade Policy

Suppose now that the home government imposes a tariff on imports of good X, thereby creating a wedge between the home and foreign prices of this good. Since the home price ratio is fixed at $\bar{p}$ by the minimum wage, p* must therefore fall by the amount of the tariff. Thus, in view of the Stolper-Samuelson Theorem, there is a corresponding decline in the foreign rental rate on capital. With r* less than $\bar{r}$ for this reason, we begin to have a rise in K, which denotes the net flow of capital services from the foreign to the home country.

To determine the resulting tariff-induced equilibrium, it is convenient to return temporarily to free trade with no actual movement of

capital, and then proceed via the following comparative-static
decomposition into two conceptual stages. First, before the tariff is
imposed, let the (indeterminate) level of foreign investment in the home
country be exogenously increased to the point at which home imports of
good X have fallen (in view of the Rybczynski Theorem) to zero. As we
saw above, adopting such a level of investment under free trade has no
impact on prices, employment or welfare. Second, levy the tariff, which
clearly has no effects since it is imposed on a zero level of imports.
This conclusion for the minimum-wage economy is a straightforward
extension of a full-employment result obtained by Mundell (1957).

A further inflow of capital with some significant consequences,
however, can be generated by adding also a home subsidy on exports of
good X. Given $\bar{p}$, p* falls by the amount of this subsidy, thereby pushing
r* below $\bar{r}$ as before. The resultant inflow of capital cannot cease as
long as both countries are incompletely specialized, since the rental
rate in each country would remain constant as would the positive
difference $\bar{r}$ - r*. Since we are assuming that home production stays
diversified, the foreign economy must eventually become completely
specialized. Because capital is leaving for the home country, moreover,
it is the capital-intensive good X that is no longer produced by the
foreign country, in view of the Rybczynski Theorem.

To determine the resulting equilibrium level of foreign investment,
it is convenient to return temporarily to free trade but let the
(indeterminate) level of K be arbitrarily set at $\bar{K}$, which denotes the
minimum capital flow needed to extinguish foreign production of good X.
Given $\bar{K}$, the rental rate of capital is still equalized internationally,

but any further inflow of this factor would raise r* above r̄ by the Law of Diminishing Marginal Productivity. Thus, K̄ is the only level of capital inflow consistent with equilibrium.

To determine the export subsidy's impact on employment and welfare, we therefore start with free trade and assume (without loss of generality) a capital inflow of K̄, which will not be affected by the policy action. Our basic model can thus be stated as follows, given the conventional assumption that the subsidy is financed in lump-sum fashion:

$$e(\bar{p}, u) = g(\bar{p}, \bar{K}, L) - \bar{r}\bar{K} + sx(\bar{p}, u, \bar{K}, L), \qquad (1)$$

$$e^*(\bar{p} - s, u^*) = g^*(\bar{p} - s, \bar{K}) + \bar{r}\bar{K}, \qquad (2)$$

$$x(\bar{p}, u, \bar{K}, L) + x^*(\bar{p} - s, u^*, \bar{K}) = 0, \qquad (3)$$

where s is the specific subsidy (in terms of good Y) imposed on home exports of good X, and hence $p^* = \bar{p} - s$; u is the level of home welfare; L is the level of home employment; e, g and x respectively are the home country's expenditure function, revenue function and compensated excess-demand function for good X;[7] and asterisks indicate the corresponding symbols of the foreign country.[8]

Taking total differentials in equations (1) through (3), we find that

$$
\begin{bmatrix}
-\bar{w} - sx_L & 1 - sx_u & 0 \\
0 & 0 & 1 \\
x_L & x_u & x_u^*
\end{bmatrix}
\begin{bmatrix}
dL \\
du \\
du^*
\end{bmatrix}
=
\begin{bmatrix}
x \\
x^* \\
x_p^*
\end{bmatrix}
ds,
\tag{4}
$$

where subscripts of a function indicate partial derivatives (e.g.,

$x_u \equiv \partial x / \partial u$ and $x_u^* \equiv \partial x^* / \partial u^*$); $e_u = e_u^* = 1$ at the initial position,

because marginal utilities there are set at unity, without loss of

generality; and we have used the well-known properties that $e_p^* - g_p^* = x^*$

and $g_L = \bar{w}$.

Using Cramer's Rule, we can solve equations (4) to find that

$$
\begin{bmatrix}
dL \\
du \\
du^*
\end{bmatrix}
(x_L + \bar{w}x_u)
=
\begin{bmatrix}
(1 - sx_u)\tilde{x}_p^* - xx_u \\
(\bar{w} + sx_L)\tilde{x}_p^* + xx_L \\
(x_L + \bar{w}x_u)x^*
\end{bmatrix}
ds,
\tag{5}
$$

where the uncompensated import-demand function for good X in the foreign

country is $\tilde{x}^*(\bar{p} - s, \bar{K}) \equiv x^*[\bar{p} - s, v^*(\bar{p} - s, \bar{K}), \bar{K}]$, with $v^*(\bar{p} - s, \bar{K})$

being a type of indirect utility function obtained by solving for u^* in

equation (2); and $\tilde{x}_p^* = x_p^* - x^* x_u^*$ from the Slutsky decomposition.

To investigate the effects of a "small" subsidy[9], we may set $s = 0$

in equations (5), thereby obtaining

$$
\frac{dL}{ds} = \frac{(\tilde{x}_p^* - xx_u)}{(x_L + \bar{w}x_u)},
\tag{6}
$$

$$\frac{du}{ds} = \frac{(\bar{w}\tilde{x}^*_p + xx_L)}{(x_L + \bar{w}x_u)} ,$$

(7)

$$\frac{du^*}{ds} = x^* .$$

(8)

When considering these equations, note that: $x = - x^* < 0$, since the home economy is exporting good X; $x_u > 0$, because we assume that neither good is inferior in home consumption; $\tilde{x}^*_p < 0$, given a well-behaved offer curve for the foreign country; and $0 < x_L$, which is simply minus the Rybczynski effect that a labour employment increase has on home production of good X.

As we can see from equation (6), $dL/ds \gtreqless 0$ as $m - n^* \gtreqless 0$; where $n^* \equiv - p^*\tilde{x}^*_p/x^*$, which is the uncompensated price elasticity of foreign import demand for good X; $m \equiv \bar{p}x_u/e_u$, which is the home country's marginal propensity to consume this good; and, at the initial equilibrium, $p^* = \bar{p}$ (since $s = 0$ there) and $e_u = 1$ (as assumed above). In other words, the subsidy raises employment if and only if we satisfy the well-known condition for the Metzler Paradox in the traditional flexible-wage model without international capital mobility.[10] This condition in the traditional model would ensure that a subsidy on exports of good X paradoxically lowers the home relative price of this product,

by creating an excess world demand for good Y at constant home prices. In the present minimum-wage model, however, this excess demand for the labour-intensive good would raise employment instead.[11] If the Metzler Condition is considered to characterize the "perverse" case, then the subsidy-induced inflow of foreign capital would "normally" be expected to accompany a reduction in home employment.

Although the subsidy's impact on employment cannot be unambiguously signed, we immediately see from equation (7) that $du/ds < 0$. Thus, even if the subsidy leads to an expansion in employment, this possible benefit is never large enough to offset the subsidy-induced deterioration in the terms of trade. In other words, the overall result of this policy is a decline in national welfare of the home country.

From equation (8), however, we know that $du^*/ds > 0$. This necessary improvement in the foreign country's welfare is not surprising, since the subsidy simply improves this country's terms of trade.

Because a subsidy to induce a capital inflow causes an unambiguous deterioration in home welfare and normally leads to a decline in employment, a natural question to ask is whether the minimum-wage economy can gain from trade policy designed to generate an <u>outflow</u> of capital. The simplest way to explore this question, without having to replace the foregoing set of equations (1) through (8), is to let X (instead of Y) be the labour-intensive good that the home country is initially exporting in the laissez-faire equilibrium. A subsidy on exports of good X reduces the relative foreign price of this product below $\bar{p}$ to $\bar{p} - s$ as before; but this reduction now pushes r^* above $\bar{r}$ (given the assumed change in

relative factor intensities of the two goods), thereby attracting home capital into the foreign country. Thus, K is now negative at its equilibrium level $\bar{K}$. At the same time, the Rybczynski effect - x_L becomes positive (under the new factor-intensity ranking), and the expression $x_L + \bar{w}x_u$ is correspondingly negative.[12]

Under these circumstances, equation (6) can be manipulated (in essentially the same way as before) to show that $dL/ds \gtreqless 0$ as $n^* - m \gtreqless 0$. Thus, in contrast to our previous case, a rise in employment is the normal result of subjecting exports to a subsidy that generates an outflow of home capital.

As might therefore be surmised, this subsidy may now raise home welfare. Since the numerator of equation (7) is equivalent to $- (\bar{w}n^* + \bar{p}x_L)x^*/\bar{p}$, we would have $du/ds > 0$ if (for example) the foreign offer curve is sufficiently elastic (i.e., n^* is sufficiently large).

At the same time, in view of equation (8), $du^*/ds > 0$ as before. In other words, an export subsidy imposed by the home government always raises foreign welfare, regardless of the relative factor intensity of home exports and irrespective of the direction of subsidy-induced movements of capital.

As the above results suggest, using trade policy to attract foreign capital is always welfare-inferior and normally employment-inferior to a laissez-faire strategy. Ironically, moreover, we saw that there are normally employment gains and possibly welfare improvements to be had

from a trade subsidy that induces an outflow of capital from the minimum-wage economy. Under either the inflow-attracting or outflow-generating policy, however, the foreign country benefits unambiguously.

IV. Subsidizing Foreign Investment

Suppose instead that the home government implements a subsidy on inflows of foreign capital, while pursuing free international trade in goods. When this subsidy is added to $\bar{r}$, the total return to foreign capital inflows exceeds r^* (still equal to $\bar{r}$ since $p^* = \bar{p}$). As before, the resultant inflows must eventually lead one country to specialize completely in production. Once again, we assume that the foreign country ceases to produce the capital-intensive good X, while home production remains diversified.

In equilibrium, we must have $\bar{r} + \sigma = r^*$, where σ is the specific subsidy (in terms of good Y) on inflows of foreign capital. This equality implies that K is a monotonic increasing function $k(\sigma)$ of σ, since the Law of Diminishing Marginal Productivity ensures that r^* is a monotonic decreasing function of the quantity of capital utilized within the foreign economy. Thus, our basic model can be respecified as follows:

$$e(\bar{p}, u) = g[\bar{p}, k(\sigma), L] - (\bar{r} + \sigma)k(\sigma), \tag{9}$$

$$e*(\bar{p}, u*) = g*[\bar{p}, k(\sigma)] + (\bar{r} + \sigma)k(\sigma), \tag{10}$$

$$x[\bar{p}, u, k(\sigma), L] + x*[\bar{p}, u*, k(\sigma)] = 0 . \tag{11}$$

Taking total differentials in these three equations, while recalling that foreign output of good X remains constant at zero (in which case $x_K^* = 0$), we find that

$$\begin{bmatrix} -\bar{w} & 1 & 0 \\ 0 & 0 & 1 \\ x_L & x_u & x_u^* \end{bmatrix} \begin{bmatrix} dL \\ du \\ du* \end{bmatrix} = \begin{bmatrix} -k - \sigma k' \\ k \\ -x_K k' \end{bmatrix} d\sigma , \tag{12}$$

where $k' \equiv dk/d\sigma$. Equations (12) can be solved by Cramer's Rule to obtain

$$\begin{bmatrix} dL \\ du \\ du* \end{bmatrix} (x_L + \bar{w}x_u) = \begin{bmatrix} (k + \sigma k')x_u - kx_u^* - x_K k' \\ -(k + \sigma k')x_L - \bar{w}(kx_u^* + x_K k') \\ (x_L + \bar{w}x_u)k \end{bmatrix} d\sigma . \tag{13}$$

To investigate the effects of a small subsidy[13], set $\sigma = 0$ in equations (13), which thus give

$$\frac{dL}{d\sigma} = \frac{[(x_u - x_u^*)k - x_K k']}{(x_L + \bar{w}x_u)} , \tag{14}$$

$$\frac{du}{d\sigma} = \frac{- [(x_L + \bar{w}x_u^*)k + \bar{w}x_K k']}{(x_L + \bar{w}x_u)} , \tag{15}$$

$$\frac{du^*}{d\sigma} = k . \tag{16}$$

Note that $k' > 0$, since K is a monotonic increasing function of σ ; and $x_K < 0$ by the Rybczynski Theorem.

If $x_u > x_u^*$ in equation (14), then $dL/d\sigma > 0$. In this case, the subsidy payments transferred from the home to the foreign country tend to create an excess world supply equal to $(x_u - x_u^*)k$ in the market for good X, because the marginal propensity to consume this good is lower in the (transfer-receiving) foreign economy than in the (transfer-giving) home country. This excess supply is increased by the amount $- x_K k'$, due to the subsidy-induced inflow of capital. To clear the world market for good X, we thus need a rise in employment. Alternatively, if $x_u < x_u^*$, there might be an excess world demand for this good, requiring a fall in employment. The present possibility of a rise in employment does not appear to be associated with any obviously paradoxical condition, in contrast to what we saw in the case of an export subsidy that induced an inflow of foreign capital within the previous section.

According to equation (15), the sign of $du/d\sigma$ cannot be unambiguously determined. Intuitively, although the subsidy payments to foreign capital detract from home income, employment may rise for reasons discussed above. Thus, unlike the subsidy on exports of the capital-intensive good in the previous section, the present subsidy on foreign investment may indeed raise home welfare.

In view of equation (16), $du^*/d\sigma > 0$. From the foreign perspective, the home country's subsidy is simply a transfer payment, whose size depends on the amount of foreign capital invested at home. Thus, as in the previous section, the foreign country can only gain from the home subsidy.

If a subsidy is put instead on outflows of home capital, we end up having k negative with foreign specialization complete in the capital-intensive good. To analyze this scenario without replacing equations (9) through (16), simply let σ now be negative (so that a fall in it represents a rise in the subsidy), and respecify Y again as the relatively capital-intensive good (so that r^* is still capital's marginal product in the industry operating abroad). Given the respecified factor-intensity ranking, $x_L + \bar{w}x_u$ becomes negative as before, x_K reverses its sign to become positive in view of the Rybczynski Theorem, and $x_L + \bar{w}x_u^*$ is now negative.[14] Note, however, that k' remains positive.

Thus, if $x_u > x_u^*$ in equation (14), then $dL/d(-\sigma) < 0$, meaning that the subsidy now lowers employment in contrast to what happens under the

opposite factor-intensity ranking. On the other hand, when $x_u < x_u^*$, the subsidy-induced change in employment is ambiguous in sign as before.

From equation (15), we see that $du/d(-\sigma) < 0$, meaning that the subsidy must diminish home welfare. Intuitively, this policy lowers r^* below $\bar{r}$ and hence reduces the repatriation of earnings by the initial stock of capital invested abroad. Evidently, this negative impact on welfare must outweigh any possible gain in employment. The present unambiguous conclusion regarding the subsidy-induced change in home welfare contrasts with the (ambiguous) result obtained under the previous factor-intensity ranking.

From the viewpoint of the foreign country, however, the subsidy is beneficial as before. As we can see from equation (16), $du^*/d(-\sigma) > 0$.

Thus, in comparing subsidies on foreign investment with those on international trade, we observe some differences and some similarities. As far as employment is concerned, the effects of a trade subsidy normally depend only on whether capital flows in or out, whereas the same thing cannot be said for an investment subsidy (if $x_u < x_u^*$). Regarding home welfare, the effect is negative or ambiguous when an inflow of foreign capital results from a subsidy on international trade or investment, respectively; but these conclusions must be interchanged when the subsidies induce outflows of home capital. In the case of foreign welfare, however, either type of subsidy has a positive impact, regardless of the direction in which capital is induced to move.

V. Optimal Policy

Let us now examine how taxes (subsidies) on international trade and investment can be simultaneously chosen to provide the minimum-wage country with its highest attainable level of welfare. (As we shall see, a third instrument will also be part of the optimal policy package.) Once again, home production will be assumed to remain diversified, whereas the foreign economy at the policy-induced equilibrium will produce only good Y and hence import X. For the sake of concreteness, moreover, our analysis will focus on the case in which X is the relatively capital-intensive good and the optimal flow of capital is from the foreign to the home country, although the discussion could be readily adapted for other circumstances.

The policy problem for the home government is to maximize $U(C_x, C_y)$ by choosing Q_x, p* and K subject to the following constraints:

$$C_x = Q_x - \tilde{x}^*(p^*, K) \ , \tag{17}$$

$$C_y = [\alpha (1 + K) - \beta Q_x] + p^*\tilde{x}^*(p^*, K) - R(K)K \ , \tag{18}$$

where U is the home country's social welfare function, assumed to be strictly quasi-concave with positive marginal utilities; C_x and C_y are the home consumption levels of goods X and Y, respectively; Q_x is home output of good X; r* may be expressed as a monotonic increasing function

$R(K)$ of K, for reasons given above; the home endowment of capital is set equal to 1 by choice of units; α represents the average product of capital in producing good Y at home; and β is the ratio of α to the average product of capital in good X within the home economy. As we know from Brecher (1974b), the expression in square brackets on the right-hand side of equation (18) gives the output of good Y along the minimum-wage product-transformation curve, which is a Rybczynski line (for changes in labour employment) whose intercept (α) and slope (β) are fixed by $\bar{w}$.

The first-order conditions for this maximization may be expressed as follows:

$$q = \beta , \qquad (19)$$

$$q - p^* = \frac{x^*}{\tilde{x}^*_p} , \qquad (20)$$

$$\alpha - r^* = [1 - (q - p^*)x^*_u]KR' , \qquad (21)$$

where $q \equiv U_x/U_y$, which gives the consumer price ratio at home; R' ($\equiv dR/dK$) > 0, since R is a monotonic increasing function of K; and, in view of Kemp's (1966) calculations, $\tilde{x}^*_K = x^*_u KR'$ since we now set $e^*_u = 1$ at the optimal (rather than initial) equilibrium. Recall, moreover, that $\tilde{x}^*_p < 0$, $x^* > 0$ and $K > 0$ under present assumptions. An examination of equations (19) through (21) will now enable us to characterize the optimal policy package.

The Rybczynski line for labour is known to be steeper than the domestic price line for producers, when goods X (capital-intensive) and Y (labour-intensive) are measured on the horizontal and vertical axes, respectively. In other words, $\beta > \bar{p}$. This inequality and equation (19) imply that $q > \bar{p}$. Thus, the optimal equilibrium requires a tax (equal to $q - \bar{p} > 0$) on production of good X.

From equation (20), $q < p^*$. Thus, we need also an optimal tax (of $p^* - q > 0$) on exports of good X. This call for a tax (rather than subsidy) on trade holds as well for the full-employment case analyzed previously by Kemp (1966) and Jones (1967) and more recently by Brecher (1983) and Brecher and Feenstra (1983).

Given equation (21), $\bar{r} - r^*$ is equivalent to $\bar{r} - \alpha + [1 - (q - p^*)x^*_u]KR'$. In this expression: $\bar{r} - \alpha < 0$, because the average exceeds the marginal product of capital; whereas $[1 - (q - p^*)x^*_u]KR' > 0$, since q falls short of p^* as we derived above. Thus, $\bar{r} - r^*$ is ambiguous in sign, implying that the optimal policy toward foreign investment may be either a tax (equalling $\bar{r} - r^* > 0$) or a subsidy (of $r^* - \bar{r} > 0$) on inflows of capital from abroad. This ambiguity does not apply to the full-employment case, in which foreign investment should be taxed under our assumption about specialization abroad.[15]

It is worth remarking also that the optimal policy package for a full-employment economy involves the simultaneous application of only two instruments, as opposed to the three required in the minimum-wage case. The extra policy in the presence of the wage floor is needed to eliminate the laissez-faire distortion between the consumer's domestic

rate of substitution, q (= $\bar{p}$), and the producer's domestic rate of transformation β (> $\bar{p}$).[16] Of course, if the minimum-wage economy were able to subsidize the hiring of labour directly, unemployment could be entirely eliminated, and the rest of the optimal policy package would be the same as for the full-employment case.

VI. Conclusion

The present paper has re-evaluated the costs and benefits of policy-induced inflows of capital from abroad, after adapting the standard trade-theoretic model to include minimum-wage unemployment within the policy-imposing country. The analysis has reconfirmed earlier reservations about the welfare effects of using trade policy to attract foreign capital, and has added to these reservations by showing that the capital inflows would normally correspond to a drop in employment. Ironically, moreover, employment gains would normally result if trade policy is adjusted to cause an outflow of home capital, in which case welfare might also improve. Alternatively, when international capital movements are induced instead by a direct subsidy on inflows or outflows of this factor, the employment effects are generally ambiguous in sign, whereas the welfare consequences are negative in the case of capital outflows but ambiguous for inflows. Although policy applied solely to either international trade or foreign investment may be incapable of improving home welfare, both types of instruments can be simultaneously applied to obtain an optimal policy package, which includes also a production tax.

Footnotes

1. Although Mundell's paper is remembered mainly for its proposition about substitutability between international commodity and factor movements, see also his section entitled "An Argument for Protection?".

2. Hamada's article and the article by Minabe draw attention to a related contribution of Uzawa (1969).

3. For the quite different consequences of foreign investment in the presence of an import quota (instead of a tariff), however, see Buffie (1985) and Dei (1985).

4. Although MacDougall (1960) did provide a few concluding comments on the employment gains from inflows of foreign capital, these comments were not related to the question of tariff policy.

5. Earlier analyses of departure from the standard flexible-wage full-employment assumption have been provided by Haberler (1950), Johnson (1965), Bhagwati (1968a), Findlay (1973, chapter 5) and Lefeber (1971). More recent treatments include, for example, Krueger (1977), Schweinberger (1978) and Neary (1985).

6. If we dropped our assumption that technology is identical for the two countries, generally at most one of them would be diversified in

production at the free-trade mobile-capital equilibrium, since only by chance would r* = r̄ when p* = p̄ under global diversification in this case. Nevertheless, relaxing the identical-technology assumption would not essentially affect our main results below, because they too involve completely specialized production for one country in the policy-induced equilibrium.

7. The properties of these functions are well known from duality theory; see, for example, the recent textbook by Woodland (1982). The value of x is negative when the home country exports good X (as in the present subsidy-induced equilibrium), but positive if the country imports this good (as in our laissez-faire situation described in Section II above).

8. Because the foreign use of labour remains constant at the full-employment level, it has been suppressed (without consequence) from the set of arguments of the g* and x* functions.

9. A "large" subsidy would have qualitatively the same effects, provided that we assume $1 - sx_u > 0$; where this inequality is simply the well-known Vanek (1965)-Bhagwati (1968b)-Kemp (1968) condition needed to ensure a unique value of x for each world price ratio along the subsidy-inclusive offer curve of the home country.

10. Kemp (1969, p. 96) provides a general statement of the Metzler Condition that, in present notation, may be expressed (for a specific

subsidy instead of an **ad valorem** tax on trade) as

$mp^*/(p^* + s) - (1 - sx_u)n^* > 0$ and simplified (for our small subsidy) to

$m - n^* > 0$.

11. Thus, trade policy's impact on employment in the presence of international capital mobility is qualitatively the same as what Brecher (1974a) found for the case in which capital does not move between countries.

12. This expression is the change in x for a small increase in L (given $\bar{p}$ and $\bar{K}$) under free trade, as may be readily verified by noting that $du/dL = \bar{w}$ when $s = 0$ in equation (1). Now that X is the labour-intensive good, an increase in employment lowers excess demand for this (normal) commodity.

13. Qualitatively the same effects would hold for a large subsidy.

14. To verify this last point, begin with the well-known facts that $\bar{p}x_L + y_L = - \bar{w}$ and $\bar{p}x_u^* + y_u^* = 1$; where $y[\bar{p}, u, k(\sigma), L]$ and $y^*[\bar{p}, u^*, k(\sigma)]$ are the compensated excess-demand functions for good Y at home and abroad, respectively. Given these facts, $x_L + \bar{w}x_u^* = - (y_L + \bar{w}y_u^*)/\bar{p}$, which is negative because $y_L > 0$ (by the Rybczynski Theorem) and $y_u^* > 0$ (given normality in consumption).

15. If both countries were diversified at the optimum, the function R(K) in equation (18) would be respecified as R(p*) with $R' \equiv dR/dp^* > 0$, and

the right-hand sides of equations (20) and (21) would be replaced respectively by $(x^* - KR')/\tilde{x}^*_p$ and $(q - p^*)\tilde{x}^*_K$. In this case, it might be optimal to subsidize both international trade and foreign investment simultaneously, in contrast to what Jones (1967) has shown for the full-employment model.

16. The point made in this and the next sentence have been established by Brecher (1974b) in the absence of international capital mobility.

References

Bhagwati, Jagdish N., 1968a, "The Theory and Practice of Commercial Policy: Departures from Unified Exchange Rates", Special Papers in International Economics (Princeton, N.J.: International Finance Section, Department of Economics, Princeton University), No. 8, January.

Bhagwati, Jagdish N., 1968b, "Gains from Trade Once Again", Oxford Economic Papers, 20, July, 137-48.

Bhagwati, Jagdish N., 1973, "The Theory of Immiserizing Growth: Further Applications", in Michael B. Connolly and Alexander K. Swoboda (eds.), International Trade and Money (Toronto, Ont.: University of Toronto Press).

Brecher, Richard A., 1974a, "Minimum Wage Rates and the Pure Theory of International Trade", Quarterly Journal of Economics, 88, February, 98-116.

Brecher, Richard A., 1974b, "Optimal Commercial Policy for a Minimum-Wage Economy", Journal of International Economics, 4, May, 139-49.

Brecher, Richard A., 1983, "Second-Best Policy for International Trade and Investment", Journal of International Economics, 14, May, 313-20.

Brecher, Richard A. and Carlos F. Diaz Alejandro, 1977, "Tariffs, Foreign
    Capital and Immiserizing Growth", Journal of International
    Economics, 7, November, 317-22.

Brecher, Richard A. and Robert C. Feenstra, 1983, "International Trade
    and Capital Mobility Between Diversified Economies", Journal of
    International Economics, 14, May, 321-39.

Brecher, Richard A. and Ronald Findlay, 1983, "Tariffs, Foreign Capital
    and National Welfare with Sector-Specific Factors", Journal of
    International Economics, 14, May, 277-88.

Buffie, Edward, 1985, "Quantitative Restrictions and the Welfare Effects
    of Capital Inflows", Journal of International Economics, 19,
    November, 291-303.

Dei, Fumio, 1985, "Welfare Gains from Capital Inflows Under Import
    Quotas", Economics Letters, 18, 237-40.

Findlay, Ronald, 1973, International Trade and Development Theory (New
    York, N.Y.: Columbia University Press).

Haberler, Gottfried, 1950, "Some Problems in the Pure Theory of
    International Trade", Economic Journal, 60, June, 223-40.

Hamada, Koichi, 1974, "An Economic Analysis of the Duty-Free Zone",
Journal of International Economics, 4, 225-41.

Johnson, Harry G., 1965, "Optimal Trade Intervention in the Presence of
Domestic Distortions", in Robert E. Baldwin et al. (eds.), Trade,
Growth and the Balance of Payments: Essays in Honor of Gottfried
Haberler (Chicago, Ill.: Rand McNally).

Jones, Ronald W., 1967, "International Capital Movements and the Theory
of Tariffs and Trade", Quarterly Journal of Economics, 81, February,
1-38.

Jones, Ronald W., 1984, "Protection and the Harmful Effects of Endogenous
Capital Flows", Economics Letters, 15, 325-30.

Kemp, Murray C., 1966, "The Gain from International Trade and Investment:
A Neo-Heckscher-Ohlin Approach", American Economic Review, 56,
September, 788-809.

Kemp, Murray C., 1968, "Some Issues in the Analysis of Trade Gains",
Oxford Economic Papers, 20, July, 149-61.

Kemp, Murray C., 1969, The Pure Theory of International Trade and
Investment (Englewood Cliffs, N.J.: Prentice-Hall).

Krueger, Anne O., 1977, "Growth, Distortions, and Patterns of Trade Among Many Countries", Princeton Studies in International Finance (Princeton, N.J.: International Finance Section, Department of Economics, Princeton University), No. 40, February.

Lefeber, Louis, 1971, "Trade and Minimum Wage Rates", in Jagdish N. Bhagwati et al. (eds.), Trade, Balance of Payments, and Growth: Papers in International Economics in Honor of Charles P. Kindleberger (Amsterdam: North-Holland Publishing Company).

MacDougall, G.D.A., 1960, "The Benefits and Costs of Private Investment from Abroad", Economic Record, 36, March 13-35.

Minabe, Nobuo, 1974, "Capital and Technology Movements and Economic Welfare", American Economic Review, 64, December, 1088-1100.

Mundell, Robert A., 1957, "International Trade and Factor Mobility", American Economic Review, 47, June, 321-35.

Neary, J. Peter, 1985, "International Factor Mobility, Minimum Wage Rates, and Factor-Price Equalization: A Synthesis", Quarterly Journal of Economics, 100, August, 551-70.

Samuelson, Paul A., 1949, "International Factor-Price Equalisation Once Again", Economic Journal, 59, June, 181-97.

Schweinberger, Albert G., 1978, "Employment Subsidies and the Theory of
Minimum Wage Rates in General Equilibrium", Quarterly Journal of
Economics, 92, August, 361-74.

Srinivasan, T.N., 1983, "International Factor Movements, Commodity Trade
and Commercial Policy in a Specific Factor Model", Journal of
International Economics, 14, May, 289-312.

Uzawa, H., 1969, "Shihon Jiyuka to Kokumin Keizai (Liberalization of
Foreign Investments and the National Economy)", Economisuto, 23,
106-22 (in Japanese).

Vanek, Jaroslav, 1965, General Equilibrium of International
Discrimination: The Case of Customs Unions (Cambridge, Mass.:
Harvard University Press).

Woodland, A.D., 1982, International Trade and Resource Allocation
(Amsterdam: North-Holland Publishing Company).

8501C   Greenwood, Jeremy and Kent P. Kimbrough. FOREIGN EXCHANGE CONTROLS IN A BLACK MARKET ECONOMY.

8502C   Horstmann, Ignatius and James R. Markusen. UP YOUR AVERAGE COST CURVE: INEFFICIENT ENTRY AND THE NEW PROTECTIONISM.

8503C   Gregory, Allan W. TESTING INTEREST RATE PARITY AND RATIONAL EXPECTATIONS FOR CANADA AND THE UNITED STATES.

8504C   Kuhn, Peter and Ian Wooton. INTERNATIONAL FACTOR MOVEMENTS IN THE PRESENCE OF A FIXED FACTOR.

8505C   Wong, Kar-yiu. GAINS FROM GOODS TRADE AND FACTOR MOBILITY.

8506C   Weller, Paul and Makoto Yano. FUTURES MARKETS, REAL INCOME, AND SPOT PRICE VARIABILITY: A GENERAL EQUILIBRIUM APPROACH.

8507C   Diewert, W.E. THE EFFECTS OF AN INNOVATION: A TRADE THEORY APPROACH.

8508C   Ethier, Wilfred J. FOREIGN DIRECT INVESTMENT AND THE MULTINATIONAL FIRM.

8509C   Dinopoulos, Elias. INSIDE THE BLACK BOX: (IN)TANGIBLE ASSETS, INTRA-INDUSTRY INVESTMENT AND TRADE.

8510C   Jones, Richard, John Whalley, and Randall Wigle. REGIONAL IMPACTS OF TARIFFS IN CANADA: PRELIMINARY RESULTS FROM A SMALL DIMENSIONAL NUMERICAL GENERAL EQUILIBRIUM MODEL.

8511C   Whalley, John. HIDDEN CHALLENGES IN RECENT APPLIED GENERAL EQUILIBRIUM EXERCISES.

8512C   Smith, Bruce. SOME COLONIAL EVIDENCE ON TWO THEORIES OF MONEY: MARYLAND AND THE CAROLINAS.

8513C   Grossman, S.J., A. Melino, and R.J. Shiller. ESTIMATING THE CONTINUOUS TIME CONSUMPTION BASED ASSET PRICING MODEL.

8514C   Romer, Paul R. TAX EFFECTS AND TRANSACTION COSTS FOR SHORT TERM MARKET DISCOUNT BONDS.

8515C   McCallum, Bennett T. ON CONSEQUENCES AND CRITICISMS OF MONETARY TARGETING.

8516C   Dinopoulos, Elias and Ian Wooton. A NORTH-SOUTH MODEL OF INTERNATIONAL JUSTICE.

8517C   Huffman, Gregory W. A DYNAMIC EQUILIBRIUM MODEL OF ASSET PRICES AND TRANSACTION VOLUME.

8518C   Huffman, Gregory W. AN ALTERNATIVE VIEW OF OPTIMAL SEIGNIORAGE.

8519C   Huffman, Gregory W. ASSET PRICING WITH HETERGENEOUS ASSETS.

8520C   Hercowitz, Zvi.   THE REAL INTEREST RATE AND AGGREGATE SUPPLY.

8521C   Davies, James and Michael Hoy.   COMPARING INCOME DISTRIBUTIONS
         UNDER AVERSION TO DOWNSIDE INEQUALITY.

8522C   Nguyen, Trien T. and John Whalley.   COEXISTENCE OF EQUILIBRIA
         ON BLACK AND WHITE MARKETS.

8523C   Clarete, Ramon and John Whalley.   INTERACTIONS BETWEEN TRADE
         POLICIES AND DOMESTIC DISTORTIONS: THE PHILIPPINE CASE.

8524C   Hamilton, Bob, Sharif Mohammad, and John Whalley.   APPLIED
         GENERAL EQUILIBRIUM ANALYSIS AND PERSPECTIVES ON GROWTH
         PERFORMANCE.

8525C   Huffman, Gregory W.   THE LAGGED EFFECTS OF POLICY ON THE
         PRICE LEVEL.

8526C   Laidler, David.   FISCAL DEFICITS AND INTERNATIONAL MONETARY
         INSTITUTIONS.

8527C   Goodfriend, Marvin.   MONETARY MYSTIQUE: SECRECY AND CENTRAL
         BANKING.

8528C   Nguyen, Trien T. and John Whalley.   GENERAL EQUILIBRIUM ANALYSIS
         OF PRICE CONTROLS A TWO-SECTOR COMPUTATIONAL APPROACH.

8529C   Heckman, James J. and V. Joseph Hotz.   AN INVESTIGATION OF THE
         LABOR MARKET EARNINGS OF PANAMANIAN MALES: EVALUATING SOURCES
         OF INEQUALITY.

8530C   Greenwood, Jeremy and Gregory W. Huffman.   A DYNAMIC EQUILIBRIUM
         MODEL OF INFLATION AND UNEMPLOYMENT.

8531C   Freeman, Scott.   INSIDE MONEY, MONETARY CONTRACTIONS, AND WELFARE.

8532C   Paderanga, Cayetano Jr. and Ian Wooton.   A POSITIVE VIEW OF
         INFANT INDUSTRIES.

8533C   St-Hilaire, France and John Whalley.   A MICROCONSISTENT DATA
         SET FOR CANADA FOR USE IN REGIONAL GENERAL EQUILIBRIUM POLICY
         ANALYSIS.

8534C   Whalley, John.   OPERATIONALIZING WALRAS: EXPERIENCE WITH RECENT
         APPLIED GENERAL EQUILIBRIUM TAX MODELS.

8535C   Melvin, James R.   THE GENERAL NON-EQUIVALENCE OF TARIFFS AND
         IMPORT QUOTAS.

8601C   Greenwood, Jeremy and R. Preston McAfee. EXTERNALITIES AND ASYMMETRIC INFORMATION.

8602C   Dinopoulos, Elias and Mordechai E. Kreinin. IMPORT QUOTAS AND VERS: A COMPARATIVE ANALYSIS IN A THREE-COUNTRY FRAMEWORK.

8603C   Clarete, Ramon and John Whalley. COMPARING THE MARGINAL WELFARE COSTS OF COMMODITY AND TRADE TAXES.

8604C   Wigle, Randy. CANADIAN TRADE LIBERALIZATION: SCALE ECONOMIES IN A GLOBAL CONTEXT.

8605C   Parkin, Michael. DOMESTIC MONETARY INSTITUTIONS AND FISCAL DEFICITS.

8606C   Dinopoulos, Elias and Ian Wooton. INTERNATIONAL TRADE AND THE ACQUISITION OF SKILLS.

8607C   Kawasaki, Seiichi and John McMillan. THE DESIGN OF CONTRACTS: EVIDENCE FROM JAPANESE SUBCONTRACTING.

8608C   Williamson, Stephen D. LIQUIDITY, BANKING, AND BANK FAILURES.

8609C   Grossman, Gene M. and Carl Shapiro. COUNTERFEIT-PRODUCT TRADE.

8610C   Deardorff, Alan V. WHY DO GOVERNMENTS PREFER NONTARIFF BARRIERS?

8611C   Horstmann, Ignatius and James R. Markusen. LICENSING VERSUS DIRECT INVESTMENT: A MODEL OF INTERNALIZATION BY THE MULTINATIONAL ENTERPRISE.

8612C   Thursby, Jerry G. and Marie C. Thursby. BILATERAL TRADE FLOWS, THE LINDER HYPOTHESIS, AND EXCHANGE RISK.

8613C   Clarete, Ramon and John Whalley. EQUILIBRIUM IN THE PRESENCE OF FOREIGN EXCHANGE PREMIA.

8614C   Wooton, Ian. TOWARDS A COMMON MARKET: FACTOR MOBILITY IN A CUSTOMS UNION.

8615C   St-Hilaire, France and John Whalley. SOME ESTIMATES OF TRADE FLOWS IN BANKING SERVICES.

8616C   Evenson, Robert E. and Cayetano Paderanga Jr. RURAL LABOUR MARKETS, TRANSACTION COST AND FERTILITY.

8617C   Fried, Joel and Peter Howitt. FISCAL DEFICITS, INTERNATIONAL TRADE AND WELFARE.

8618C   Trela, Irene, John Whalley, and Randy Wigle. INTERNATIONAL TRADE IN AGRICULTURE: DOMESTIC POLICIES, TRADE CONFLICTS, AND NEGOTIATING OPTIONS.

8619C   Markusen, James R. and Anthony J. Venables. TRADE POLICY WITH INCREASING RETURNS AND IMPERFECT COMPETITION: CONTRADICTORY RESULTS FROM COMPETING ASSUMPTIONS.

8620C   Hunter, Linda and James R. Markusen. PER-CAPITA INCOME AS A DETERMINANT OF TRADE.

8621C   Jones, Rich and John Whalley. A CANADIAN REGIONAL GENERAL EQUILIBRIUM MODEL AND SOME APPLICATIONS.

8622C   Freeman, Scott, and Gregory W. Huffman. INSIDE MONEY, OUTPUT, AND CAUSALITY.

8623C   Hamilton, Colleen, and John Whalley. DEALING WITH THE NORTH: DEVELOPING COUNTRIES AND GLOBAL TRADE NEGOTIATIONS.

8624C   Williamson, Stephen D. LAISSEZ FAIRE BANKING AND CIRCULATING MEDIA OF EXCHANGE.

8625C   Whalley, John. WHAT HAVE WE LEARNED FROM GENERAL EQUILIBRIUM TAX POLICY MODELS?

8626C   Bhatia, Kul B. SHORT RUN AND LONG RUN IN THE THEORY OF TAX INCIDENCE.

8627C   Jones, Rich, and John Whalley. REGIONAL EFFECTS OF TAXES IN CANADA: AN APPLIED GENERAL EQUILIBRIUM APPROACH.

8628C   Nguyen, Trien T., and John Whalley. GENERAL EQUILIBRIUM WORLD TRADE UNDER BILATERAL QUOTAS.

8629C   Clarete, Ramon L., and James A. Roumasset. THE RELATIVE WELFARE COST OF INDUSTRIAL AND AGRICULTURAL PROTECTION POLICIES USING PHILIPPINE DATA.

8701C   McMillan, John, John Whalley, and Zhu Li Jing. INCENTIVE EFFECTS OF PRICE RISES AND PAYMENT-SYSTEM CHANGES ON CHINESE AGRICULTURAL PRODUCTIVITY GROWTH.

8702C   Wooton, Ian. CAPITAL, SKILLS, AND INTERNATIONAL TRADE.

8703C   Ryan, Cillian. TRADE IN THE PRESENCE OF ENDOGENOUS INTERMEDIATION IN AN ASYMMETRIC WORLD.

8704C   Kennan, John and Raymond Riezman. OPTIMAL TARIFF EQUILIBRIA WITH CUSTOMS UNIONS.

8705C   Feenstra, Robert C., and Tracy R. Lewis. NEGOTIATED TRADE RESTRICTIONS WITH PRIVATE POLITICAL PRESSURE.

8706C   Brecher, Richard A. POLICY-INDUCED INFLOWS OF FOREIGN CAPITAL IN THE PRESENCE OF RIGID-WAGE UNEMPLOYMENT.