On the Choice Between Capital and Labor Mobility: The Small Country Case

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1. INTRODUCTION

International factor mobility has become a very important phenomenon during the last decades. Barriers to capital mobility have been decreased, so that capital now tends to go where the highest return is to be expected. Labor mobility is generally still restricted by the potential immigration countries. However, a tendency towards a global liberalization of labor mobility cannot be disputed. Many restrictions on emigration have fallen with the iron curtain in 1989, and the EU reform of 1992 has allowed the EU workers to move freely throughout Western Europe.

Despite these tendencies, international factor mobility is not seen without worries. People object against any kind of factor mobility. Capital outflow is viewed as a flight which may destroy domestic jobs or at least lower wages. Capital inflow is seen as a buy-out of the domestic economy, which becomes dependent on a foreign country’s goodwill. Labor immigration drives wages down, and native workers may be dismissed due to the arising competition. Labor emigration is regarded as a sign of weakness of the domestic economy.

It seems that any kind of international factor mobility will generate winners and losers. The question arises if it may be sensible for a government to control international factor mobility in order to take into account the interests of both the domestic winners and the domestic losers. Policy-makers may aim at maximizing total income which accrues to the country’s citizens. This income is called national income henceforward. Any policy which does not maximize national income is Pareto-dominated with respect to the country’s citizens if redistribution of income is enforceable at zero cost. Thus, it is plausible that politicians who are interested in the welfare of the electorate are trying to maximize national income.

Suppose the initial situation is characterized by autarky, i.e. the domestic economy produces only with domestic factors, and no factors are employed abroad. One good is produced by means of capital and labor. Initially, the wage rate in the country under consideration is higher and the interest rate is lower than in the rest of the world. Domestic

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capital owners can earn a higher return abroad since capital is more scarce in the rest of the world while foreign laborers want to immigrate. Two policies are at hand: First, capital exports may be allowed while keeping the borders shut for labor mobility in order to exploit the interest differential. Second, immigration can be admitted while keeping the borders closed for capital mobility since domestic capital owners' gains will exceed domestic workers' losses (Berry and Soligo [1969]). Which policy is superior?

This question has already been addressed by Ramaswami (1968). His answer was that the optimal immigration policy leads to a higher national income than the optimal capital export policy. This theorem has formally been proved by Calvo and Wellisz (1983). The optimal capital export policy is characterized by an effective restriction while the optimal labor immigration policy implies a taxation of foreign workers' wages.

Ramaswami's theorem has been demonstrated for a large country, i.e. for the case that factor mobility significantly affects the capital-labor ratio in the rest of the world. For most countries, however, the opposite assumption seems to be a closer approximation to reality. Therefore, this paper explores the question on the choice between capital and labor mobility for the case of a small country. Foreign factors are available in unlimited supply at given factor prices. It is shown that both policies are equivalent in this framework if all countries in the world share a common technology. If, however, the high wage country exhibits a technological superiority, the optimal labor immigration policy dominates the optimal capital export policy. Moreover, a policy which encourages immigration of both factors while at least taxing the inflow of one factor can increase national income without bounds.

Introducing an additional immobile factor «land» again changes the results. The optimal policy is always a laissez-faire policy towards the mobility of both capital and labor, and may involve unexpected directions of factor movement, such as the outflow of both mobile factors. Moreover, it is shown that the optimal capital export policy may lead to higher national income than the optimal labor immigration policy. Hence, Ramaswami's prediction can be reversed in such a framework.

2. THE BASIC MODEL

In the model there is one home country, called «Mancunia», and the rest of the world. $K$ and $L$ denote the initial endowments of Mancunia with capital and labor respectively. Mancunia produces one good with a constant returns to scale technology under full employment. Its autarkic income is given by

$$Y_a = F(K, L).$$ (1)
The production function $F$ exhibits positive but diminishing marginal returns, i.e. $F_K, F_L > 0$ and $F_{KK}, F_{LL} < 0$. Each factor is paid its marginal product. Thus, the autarkic wage rate in Mancunia is

$$w_a = F_L (K,L),$$

and the autarkic interest rate is

$$r_a = F_K (K,L).$$

Due to the constant returns to scale technology, factor prices in Mancunia only depend on the actual capital-labor ratio. Foreign and domestic factors are assumed to be perfect substitutes.

The rest of the world produces the same good and employs labor and capital at exogenously given prices $\bar{w}$ and $\bar{r}$. It is assumed that $w_a > \bar{w}$ and $r_a < \bar{r}$. Thus, there is an incentive for labor to immigrate into Mancunia while capital earns a higher return abroad.

If borders are opened, each factor tends to go to where it obtains its highest return. The quantity of labor migrating to Mancunia is denoted by $E$ while the amount of capital outflow from Mancunia is denoted by $Q$. It is assumed that the good can be transferred across borders. Hence, capital income can be repatriated from abroad.

Policy-makers in Mancunia have two instruments at hand. First, they can impose quantitative restrictions on factor mobility. In this case the migration quotas are not auctioned. Second, they are able to tax factor flows. Taxing factor flows does not necessarily mean that a single entry or exit fee is paid. Rather, the taxes which are discussed in a static framework correspond to payments per period. Hence, they can alternatively be interpreted as specific surtaxes. It is assumed that tax revenues are redistributed among Mancunia’s citizens. Negative taxes (i.e. subsidies) on factor flows are also admitted.

Two regimes are investigated. The first is characterized by identical technologies throughout the world. In this case an equalization of the prices of one factor causes the price differential of the other factor to vanish. The second regime is characterized by a technological superiority of Mancunia. This implies that if one factor price is equalized world-wide, the other will be higher in Mancunia than in the rest of the world.

3. IDENTICAL TECHNOLOGIES

This section will show that RAMASWAMI’s theorem does not hold should Mancunia be a small country, i.e. if it cannot influence the factor prices on the world market.

Let us begin with considering the optimal capital export policy. If labor is immobile, Mancunia’s national income is given by
\[ Y_c = F(K-Q,L) + \bar{r}Q. \]  

Note that (4) also holds if Mancunia taxes or subsidizes capital exports. Lemma 1 shows that it does not make sense to restrict capital mobility:

**Lemma 1** Free mobility of capital is the optimal capital export policy.

**Proof:** Differentiating (4) with respect to \( Q \) yields

\[
\frac{\partial Y_c}{\partial Q} = -F_K(K-Q,L) + \bar{r},
\]

which is positive as long as the capital-labor ratio in Mancunia is higher than in the rest of the world. Since free mobility of capital will lead to an allocation where the domestic marginal productivity of capital is equal to the interest rate abroad, the optimal capital export policy is characterized by laissez-faire.

Migration incentives for labor will also vanish if the laissez-faire policy is implemented.

Lemma 1 confirms the old result of Kemp (1962) that a country which is capital-abundant should not restrict capital mobility if capital exports do not influence the marginal productivity of capital abroad. It is in contrast to the large country case in which it is optimal to restrict capital outflow (KEMP [1962]; RAMASWAMI [1968]; BHAGWATI and SRI-NIVASAN [1983]). The divergence is due to the absence of the negative externality of capital exports on previous capital exports in the small country scenario under consideration.

Turning to the case of labor mobility, analyzing a quantitative restriction on immigration yields a similar result. If labor in amount of \( E \) is immigrating and capital does not move, Mancunia's national income is

\[ Y_l = F(K,L+E) - F_L(K,L+E)E. \]  

**Lemma 2** If Mancunia has to decide on a quantitative restriction on labor mobility, it is optimal to permit a free factor flow.

**Proof:** Differentiating \( Y_l \) with respect to \( E \) results in

\[
\frac{\partial Y_l}{\partial E} = -EF_{LL} > 0.
\]

In other words, any immigration of labor leads to an increase in Mancunia's national income.

Immigration of labor always raises the income of the domestic capital owners more than it reduces the native workers' wages. However, immigration will cease if the
marginal product of labor in Mancunia has been driven down to \( \bar{w} \). Again, no restrictions should be placed on factor mobility.

Note that free labor migration leads to the same income of the Mancunians as free capital mobility. However, labor mobility differs from capital mobility since Mancunia can collect a tax revenue from foreigners. If a tax of \( t \) is levied on every unit of immigrating labor, Mancunia’s national income turns out to be

\[
Y_t = F(K,L + E(t)) - E(t) [F_L(K,L + E(t)) - t],
\]

where \( E(t) \) is determined by the migration equilibrium equation

\[
\bar{w} = F_L(K,L + E(t)) - t.
\]

Lemma 3 shows that it is optimal to refrain from employing the tax instrument.

**Lemma 3** The optimal tax on labor inflow is zero.

**Proof:** Totally differentiating the equilibrium condition (9) shows that

\[
\frac{dE}{dt} = \frac{1}{F_{LL}} < 0,
\]

i.e. a higher tax leads to a lower number of immigrants. Differentiating (8) with respect to \( t \) yields

\[
\frac{\partial Y_t}{\partial t} = (t - EF_{LL}) \frac{dE}{dt} + E = \frac{t}{F_{LL}}.
\]

Thus, \( \frac{\partial Y_t}{\partial t} > 0 \) if \( t < 0 \) and \( \frac{\partial Y_t}{\partial t} < 0 \) if \( t > 0 \) hold. It follows that setting \( t = 0 \) maximizes national income, i.e. any tax or subsidy on labor import is detrimental to the Mancunians.

Again, the optimal labor import policy leads to the same income as the optimal capital export policy. There is no incentive for an international movement of capital in the migration equilibrium.

In contrast to the large country case (Ramaswami [1968]), it is not optimal to tax the labor inflow. This is a consequence of the foreign workers’ more elastic demand for migration in the current framework. Any higher tax revenue due to an increase in \( t \) is overcompensated by the loss of natives’ factors due to a lower immigration. Additional gains from a higher tax in case of a given inflow of labor are just offset by the direct loss of domestic factors due to the reduced immigration. However, since the number of
foreign workers in the country decreases, the tax revenue will not rise that far. Therefore, the total effect of raising the tax rate on Mancunia’s national income is negative. Conversely, any subsidy on labor imports turns out to be too expensive in view of the additional gain which accrues to the native factors.

It does not matter if Mancunia has the ability to discriminate directly against foreign workers in such a way that immigrants only receive a wage of $w$. If the Mancunian government then maximizes national income

$$Y_{ld} = F(K,L + E) - wE$$

(12)

with respect to the number of immigrants $E$, the corresponding first-order condition is $F_L - w = 0$. Thus, in any case immigrants are admitted until the discrimination vanishes since marginal productivity of labor reaches the foreign wage.

The results of this section can be summarized as follows:

**Proposition 1** If all countries share a common technology, both the optimal capital export policy and the optimal labor import policy lead to the same national income.

**Proof:** Since both policies lead to $w = \bar{w}$ and $r = \bar{r}$ in Mancunia, national income is identical under both policies. □


The strategy of importing the whole factor endowment of the rest of the world and paying the foreign factors their autarkic factor prices, which maximizes national income of a large country (Jones, Coelho and Easton [1986]), here also leads to an allocation with $w = \bar{w}$ and $r = \bar{r}$ in Mancunia. It has to be admitted, however, that this policy cannot be treated adequately while keeping the small country assumption.

4. TECHNOLOGICAL SUPERIORITY

If Mancunia possesses a technological superiority, matters look quite different. Again, the initial autarkic situation is supposed to be characterized by $r_a < \bar{r}$ and $w_a > \bar{w}$. Now technological superiority is defined as follows: For any given input combination, output in Mancunia is higher than abroad. Due to Euler’s theorem, this implies that if the wage rate in Mancunia was the same than in the rest of the world ($w_a = \bar{w}$), then Mancunia’s interest rate would exceed the interest rate in the world market ($r = \bar{r} > \bar{r}$). Conversely, if the interest rates were equalized ($r = \bar{r}$), then the wage rate in Mancunia, $w = \bar{w}$, would be higher than $\bar{w}$, the wage rate in the rest of the world.

As a consequence of this technological superiority, a migration incentive to Mancunia for at least one factor always remains if factor movements are not taxed.
Note that the Lemmas 1–3 are still valid. Thus, the optimal policies if only one factor is mobile are characterized by laissez-faire, and the factor price differential of the moving factor vanishes. However, the policy neutrality result of Proposition 1 no longer holds:

**Proposition 2** If Mancunia exhibits a technological superiority, the optimal policy with a quota on labor immigration and no capital mobility leads to a higher national income than the optimal policy with a quota on capital exports and no labor mobility.

**Proof:** The autarkic situation and the two policies under consideration share the common feature that every unit of Mancunian capital earns the same interest rate and every Mancunian worker receives the same wage rate. Thus, national income of the Mancunians is given by

\[
Y = w(k)L + r(k)K = L\left[f(k) - kf''(k) + ka f'(k)\right]
\]

where \(w(k)\) and \(r(k)\) denote the factor prices in Mancunia, dependent on \(k\), the capital-labor ratio in Mancunia, while \(f(k)\) represents production per unit of labor in Mancunia and \(k_a = \frac{K}{L}\).

Differentiating (13) with respect to \(k\) yields

\[
\frac{\partial Y}{\partial k} = Lf''(k) \cdot [k_a - k].
\]

Since \(f''(k) < 0\), it follows that \(\frac{\partial Y}{\partial k} > 0\) if \(k > k_a\). Conversely, \(\frac{\partial Y}{\partial k} < 0\) holds if \(k < k_a\).

Decreasing the capital-labor ratio beyond \(k_a\) by exporting capital or importing labor increases national income. \(w_l = \bar{w}\) and \(w_c = \bar{w}\) with \(\bar{w} < \bar{w} < w_a\) imply that \(k_i < k_c < k_a\), where the indices \(l\) and \(c\) refer to the optimal labor import policy and the optimal capital export policy respectively. Thus, the corresponding national incomes must fulfill \(Y_l > Y_c > Y_a\).

If every unit of Mancunian capital earns the same interest rate and if Mancunian laborers receive the same wage rate irrespective of their location of employment, the optimum factor price combination in Mancunia will be \((\bar{w}, \bar{r})\). This result follows from the general rule that the income of the average Mancunian factor combination rises if it becomes relatively more scarce. Accordingly, national income is minimized at the autarkic capital-labor ratio \(k_a\). Since the optimal capital export policy depresses the capital-labor ratio in Mancunia less than the optimal labor immigration policy, the latter is superior to the former. Factor price combinations outside the range determined by the capital-labor ratio interval \((k_i, k_a)\) can be attained, but, as a corollary of Lemma 3, inducing a capital-labor ratio \(k < k_i\) requires too much subsidies to foreigners to lead to a higher national income than \(Y_i\).
Proposition 2 is a counterpart of the result that Ramaswami's theorem also holds if a large high-wage country exhibits a technological superiority (Calvo and Wellisz [1983]; Ruffin [1984]). The difference lies in the feature that the optimal policies of a large country are always restrictive with respect to the moving factor. Moreover, a similar result has already been derived by Wong (1983) within a trade-theoretic framework where, however, somewhat more restrictive conditions with respect to the technology have been employed.

The technological gap suggests a third kind of policy towards factor mobility, namely encouraging the immigration of both factors. Since unrestricted immigration of both factors will not lead to a capital-labor ratio outside the range \([k_1, k_2]\), such a policy is not superior to the optimal pure labor immigration policy. If, however, the factor inflow can be taxed, a double immigration policy may well lead to a higher national income than the optimal labor immigration policy.

**Proposition 3** If taxes on capital imports or labor immigration are permitted, then Mancunia's national income can be increased without bounds (if the two factors are in unlimited supply in rest of the world) by adopting a policy of letting both factors move into the country and taxing at least one type of factor inflow.

**Proof:** Technological superiority implies that the capital-labor ratio in Mancunia can be kept in a range where both factor prices exceed their world market counterparts. Tax revenues can be increased without bounds if the two factors are in unlimited supply in the rest of the world since taxes can be chosen in such a way that the immigration incentives for both factors never vanish.

Proposition 3 rests on the assumption that the factor supply in the rest of the world is unlimited, which is, of course, unrealistic. It is clear, however, that if the rest of the world is sufficiently large and the technological gap is not negligible, a policy with immigration of both factors will dominate the optimal policy where only one factor moves. In a two-country world, the optimal policy consists of importing all foreign factors while paying them their autarkic factor prices (Jones and Easton [1989], [1990]).

Due to the technological superiority, Mancunia may also exhibit the higher interest rate under autarky. Clearly, Proposition 3 is not affected by such a change. If only quantity restrictions can be employed, a capital import policy would have to be compared to the optimal immigration policy. It is obvious that the optimal capital import policy may then achieve a higher national income than the optimal immigration policy. This result can be expected if the capital import policy increases the capital-labor ratio in Mancunia drastically while the immigration policy has only a negligible impact on \(k\) and the factor prices.
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5. INCLUSION OF AN IMMOBILE FACTOR

This section considers the situation in which there is a third factor of production, called «land», which is immobile. Land in Mancunia is exclusively owned by natives, and no Mancunian possesses land abroad. The supply of land in Mancunia is denoted by \( T > 0 \). Output under autarky is now given by

\[
Y = G(K,L,T)
\]

where the production function \( G \) is assumed to be strictly concave and subject to constant returns to scale. As usual, marginal productivities are positive but diminishing, i.e. \( G_i > 0 \) and \( G_{ii} < 0 \) for \( i \in \{K,L,T\} \). For convenience, the conditions

\[
\lim_{K \to 0} G_K = \lim_{L \to 0} G_L = \infty, \\
\lim_{K \to 0} G_K = \lim_{L \to \infty} G_L = 0,
\]

hold for any given \( T > 0 \). Moreover, it is assumed that \( G_{KL} = G_{LK} > 0 \), i.e. capital and labor are q-complements (see Bond [1989]).

Factor prices in Mancunia are again given by the marginal products:

\[
r = G_K(K - Q, L + E, T), \\
w = G_L(K - Q, L + E, T), \\
v = G_T(K - Q, L + E, T),
\]

where \( v \) represents the rental rate on land, and where \( Q \) and \( E \) denote net capital export and net immigration respectively. The world market factor prices \( \bar{r}, \bar{w} \) and \( \bar{v} \) are fixed. We still keep the assumption that \( w_a > \bar{w} \) and \( r_a < \bar{r} \), where the index \( a \) again indicates the autarkic factor price.

Proposition 4 provides a description of the allocation where the maximum of national income is reached given that taxation of factor flows is possible:

**Proposition 4** If taxation of factor flows is possible, there exists a unique allocation which maximizes national income. This allocation is characterized by \( w = \bar{w} \) and \( r = \bar{r} \).

**Proof:** If factor flows are taxed, any moving factor receives the world market price. Hence, national income of Mancunia can be written as

\[
Y = G(K - Q, L + E, T) + \bar{r}Q - \bar{w}E.
\]

Differentiating with respect to \( Q \) and \( E \) yields:
\[
\frac{\partial Y}{\partial Q} = -G_K + \bar{r},
\]
(22)

\[
\frac{\partial Y}{\partial E} = G_L - \bar{w}.
\]
(23)

Given that \(G\) is strictly concave, a unique maximum is characterized by the two equations

\[
G_K (K - Q^*, L + E^*, T) = \bar{r},
\]
(24)

\[
G_L (K - Q^*, L + E^*, T) = \bar{w}.
\]
(25)

The existence of this optimum is ensured by the conditions (16) and (17) in combination with the differentiability of \(G\).

Hence, national income is maximized when the factor prices of the mobile factors are equalized. This can be seen as a natural generalization of the results from the basic model.

Proposition 4 raises the suspicion that the optimal allocation can be reached by a free factor flow of both labor and capital. Indeed, a simple process of dynamic adjustment under free mobility of factors can be formulated where \((Q^*, E^*)\), the equilibrium of the dynamic system, turns out to be globally stable. Consider the following dynamic system:

\[
\dot{Q} = h_Q (r - \bar{r}),
\]
(26)

\[
\dot{E} = h_E (w - \bar{w}),
\]
(27)

where the functions \(h_Q\) and \(h_E\) satisfy \(h_Q (0) = h_E (0) = 0, h'_Q < 0, h'_E > 0\), while a dot on a variable indicates the derivative with respect to time. Hence, a factor inflow into Mancunia occurs if the respective factor price exceeds the world market price, and vice versa. Note that the introduction of dynamics only serves the purpose to demonstrate stability. Since the adjustment process is assumed to be completed almost instantaneously, there is no need to discuss taxation issues accounting for the period of adjustment.

The following Proposition 5 demonstrates the global stability of the laissez-faire equilibrium \((Q^*, E^*)\), and characterizes the possible directions of factor mobility when the resulting allocation is compared to the initial allocation. In contrast to the considerations from above, an inverse Ramaswami result can arise, i.e. capital exports may be preferred to labor immigration. In addition, the optimal policy may, also in contrast to the analysis in the preceding sections, require an outflow of both capital and labor:

**Proposition 5** If \(w_a > \bar{w}\) and \(r_a < \bar{r}\), the allocation which maximizes national income is reached by a laissez-faire policy. This optimal policy towards factor mobility may require (i) capital exports and labor immigration, (ii) capital exports and labor
emigration, (iii) only capital exports, (iv) only labor immigration, or (v) labor immigration and capital imports. The optimal policy is never characterized by (i) only capital imports, (ii) capital imports and labor emigration, or (iii) only labor emigration.

Proof: Consider the iso-price curves, i.e. the loci of combinations \((K - Q, L + E)\) where factor prices are constant. Differentiation of (24) shows that the slope of the curve \(r = \bar{r}\) is given by

\[
\frac{d(K - Q)}{d(L + E)}_{r = \bar{r}} = -\frac{G_{KL}}{G_{KK}} > 0,
\]

while differentiation of (25) reveals that the slope of the curve \(w = \bar{w}\) is

\[
\frac{d(K - Q)}{d(L + E)}_{w = \bar{w}} = \frac{-G_{LL}}{G_{LK}} > 0.
\]

Since the strict concavity of \(G\) requires \(G_{KK}G_{LL} - G_{LK}G_{KL} > 0\), it follows that

\[
\frac{d(K - Q)}{d(L + E)}_{w = \bar{w}} > \frac{d(K - Q)}{d(L + E)}_{r = \bar{r}}
\]

at any intersection of the two curves. Hence, at most one such intersection can arise. The existence of this point is an immediate consequence of Proposition 4.

Figure 1: Phase diagram
Now consider Figure 1: National income is maximized at the intersection of the curves \( w = \bar{w} \) and \( r = \bar{r} \). The initial factor combination \((K, L)\) is characterized by \( w > \bar{w} \) and \( r < \bar{r} \) and must therefore lie above the two curves. By an inspection of the phase diagram, it is obvious that any path which obeys the dynamic system (26)–(27) converges to the equilibrium \((Q^*, E^*)\). Hence, this equilibrium is globally stable. Moreover, all assertions on the directions of factor movements can be verified.

Figure 1 shows that if the initial allocation was given by point \( A \), the optimal capital export policy would maximize national income, while this cannot be achieved by a labor immigration policy. Hence, RAMASWAMI’s result can be reversed. Moreover, in the optimum unexpected directions of factor mobility can arise: If the initial allocation was given by point \( B \), the optimal policy would require both capital and labor exports from the high-wage country. Proposition 5 only rules out the existence of optimal factor flows where no moving factor has an incentive to move into the same direction under autarky.

The results on the directions of factor flows in Proposition 5 are similar to those in the large country case (KUHN and WOOTON [1987], BOND [1989]). The main difference between the two scenarios is again that optimal policies in the current framework always reflect laissez-faire policies.

Since the maximum national income without discrimination cannot exceed the maximum national income with taxation of factor flows, the Propositions 4 and 5 imply that the laissez-faire policy towards both kinds of factor mobility also constitutes the optimal policy if discriminatory taxation is not allowed.

Some patterns of factor movements can be excluded if the relative size of rentals of land under autarky is specified. Proposition 6 deals with the case of identical technologies throughout the world where it is assumed that all factors are q-complements, i.e. \( G_{ij} > 0 \) with \( i, j \in \{K, L, T\} \) and \( i \neq j \):

**Proposition 6** Suppose that technologies are identical world-wide, and all factors are q-complements. Moreover, \( w_a > \bar{w} \) and \( r_a < \bar{r} \) initially hold.
- If \( v_a = \bar{v} \), then the optimal policy towards factor mobility involves capital exports and labor immigration.
- If \( v_a < \bar{v} \), then the optimal policy towards factor mobility involves labor immigration, while capital may flow in either direction.
- If \( v_a > \bar{v} \), then the optimal policy towards factor mobility involves capital exports, while labor may flow in either direction.

**Proof:** The slope of the curve \( v_a = \bar{v} \) in the \((L + E, K - Q)\) diagram is given by

\[
\frac{d(K - Q)}{d(L + E)}|_{v = \bar{v}} = - \frac{G_{TL}}{G_{TK}},
\]

which is negative if all factors are q-complements.
If technologies are identical, the curve $v = \bar{v}$ cuts the curves $w = \bar{w}$ and $r = \bar{r}$ only once, namely at their intersection (see Figure 2): Due to the linear homogeneity of $G$, there exists at least one pair $(K - Q, L + E)$ for any $T > 0$ such that all factor prices in Mancunia are at their world market level. Since for given $T$ only one combination $(K - Q, L + E)$ exists where $w = \bar{w}$ and $r = \bar{r}$, this allocation must also exhibit the feature $v = \bar{v}$.

By an inspection of Figure 2, all assertions can be verified. Combinations $(L + E, K - Q)$ with $v < \bar{v}$ lie below the curve $v = \bar{v}$, while allocations with $v > \bar{v}$ are above the curve $v = \bar{v}$. The initial situation is again represented by a point $(L, K)$ which lies above the two curves $w = \bar{w}$ and $r = \bar{r}$.

Proposition 6 can be interpreted as follows: An outflow of both mobile factors can only be optimal if land is relatively scarce in the home country. In this situation, capital-labor ratios exist such that both mobile factors earn a higher return abroad. An outflow of capital can then lead to a situation with an emigration incentive for labor while the interest rate still falls short of its world market level. Conversely, an inflow of both mobile factors can only be optimal if land is relatively abundant in the home country. Immigration can then lead to a situation where the interest rate exceeds the world market level while the immigration incentive is still intact.

If Mancunia exhibits a technological superiority, then $v > \bar{v}$ holds at the intersection of the curves $w = \bar{w}$ and $r = \bar{r}$. Hence, even if $v_a > \bar{v}$, it will be possible that the optimal policy leads to an inflow of both factors. Last, the results for the situation in which both factor prices exceed their world market counterparts under autarky can be derived in a straightforward fashion. The optimal policy is again a laissez-faire policy and leads to an inflow of both mobile factors.
6. CONCLUSION

It has been shown that the optimal capital export policy is equivalent to the optimal labor import policy if there are only two factors of production and technologies are identical world-wide. In each case a free factor flow is permitted and the same wage-interest combination is reached. This neutrality result contradicts RAMASWAMI's theorem. The divergence is due to the assumption of fixed factor prices abroad. Restricting capital exports is not sensible here since capital exports do not harm previous capital exports, and labor immigration should not be taxed since the foreign workers' demand for immigration is more elastic here than in the large country case.

If, however, the high-wage country exhibits a technological superiority, which may be a more realistic description in many cases, then the optimal labor immigration policy leads to a higher national income than the optimal capital export policy. This result turns out since the former policy depresses the capital-labor ratio more than the latter policy so that the factor combination of the average native in the country becomes relatively more scarce.

If taxation of factor flows is possible, then the natives may gain even more by importing both factors and taxing at least one of them. Taxes can be chosen in such a way that migration incentives for both factors do not disappear until the country becomes large.

These results do not hold if there is a third immobile factor of production. The optimal policy then changes to permitting a free factor flow of both capital and labor. A consequence of this result is that situations may arise where RAMASWAMI'S result is reversed, i.e. the optimal capital export policy leads to a higher national income than the optimal immigration policy.

If immobile factors can be neglected, the analysis suggests that policy-makers in high-wage countries should levy a tax on factor inflows. If such a discriminatory policy is impossible for constitutional or other reasons, it will be a second-best policy to permit a free immigration of labor while restricting capital flows. However, if immobile factors are of importance, the government should follow a laissez-faire policy.

Two caveats against this conclusion should be mentioned: First, the assumption of full employment is crucial for the results. As BRECHER and CHOUDHRI (1987) have shown, international factor mobility may be detrimental to the native population in the high-wage country if minimum wage unemployment prevails. Second, the recommended policies can lead to lower wages and higher interest rates in the country, which may be an undesired consequence with respect to the policy-makers' distributional objectives.

In addition, other important aspects have been neglected in the analysis. Changes in the results may arise if international trade is taken into account, particularly if international factor movements affect the terms of trade. WONG (1983), SUZUKI (1989) and Firoozi (1994) presented models in which welfare implications of different policies towards factor mobility in the presence of trade are investigated. However, there is
no clear common tendency in these papers with respect to the question of optimal policies. Another interesting issue is that international factor movements can both have an impact on the demand for public and club goods and lead to a redistribution of the tax burden (for a recent discussion on these topics with respect to immigration see Weber and Straubhaar [1996]). Since possible changes in the results will depend on the specification of the public sector, it is uncertain in which direction these effects influence the welfare of the population in the small country.

Thus, despite the strong and clear results of the above analysis, paying attention to the specific circumstances remains necessary before choosing a particular policy towards factor mobility.

REFERENCES


**SUMMARY**

In this paper different policies of a small high-wage country towards factor mobility are studied. If technologies are identical throughout the world, then the optimal capital export policy leads to the same national income as the optimal immigration policy. In contrast, the optimal capital export policy is inferior to the optimal immigration policy if the country exhibits a technological superiority. Moreover, national income can be increased without limits by taxation of factor inflows if both factors are imported. If there exists a third immobile factor, permitting a free flow of labor and capital maximizes national income.

**ZUSAMMENFASSUNG**

In diesem Artikel werden verschiedene Politiken eines kleinen Hochlohnlands gegenüber Faktormobilität untersucht. Falls die Technologien weltweit identisch sind, führt die optimale Kapitalexportpolitik zum gleichen Nationaleinkommen wie die optimale Immigrationspolitik. Im Gegensatz dazu ist die optimale Kapitalexportpolitik der optimalen Immigrationspolitik unterlegen, falls das Land einen technologischen Vor­spring aufweist. Darüber hinaus kann das Nationaleinkommen durch Besteuerung der zuwandernden Faktoren unbegrenzt gesteigert werden, wenn beide Faktoren importiert werden. Existiert ein dritter immobiler Faktor, maximiert eine Politik der Freizügigkeit gegenüber der Wanderung von Arbeit und Kapital das Nationaleinkommen.

**RESUME**

Cet article porte sur l'étude des différentes politiques d'un petit pays à hauts salaires à l'égard de la mobilité des facteurs. Si les technologies sont identiques dans le monde entier, la politique d’exportation de capitaux optimale engendre le même revenu national que la politique d’immigration optimale. À l’opposé, la politique d’exportation de capitaux optimale est inférieure à la politique d’immigration optimale si le pays présente une avance technologique. De plus, le revenu national peut être augmenté sans limites
par l'imposition des flux de facteurs, si les deux facteurs sont importés. Si un troisième facteur immobile existe, une politique de laissez faire envers la mobilité de capital et de travail maximise le revenu national.