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THE THEORY OF INTERNATIONAL FACTOR FLOWS: THE BASIC MODEL*

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The striking comparison between the welfare effects of optimal restrictions on capital exports and those of optimal control over labor immigration that was pioneered by Ramaswami (1968) and, more than a decade later, discussed by a host of authors in a special issue of this *Journal* (1983), exploited properties of a model so starkly simple in its assumptions as to earn the description, "the basic model." It shares with many models in the field of international trade theory the reduction in dimension represented by limiting to two both the number of countries in the market and the number of productive factors. It goes beyond traditional simplification in its other characteristics. The two countries each produce the same single commodity with identical constant returns to scale technology.

As useful as the results in this early literature have been, the basic model is capable of yielding further insights into optimal strategy in a world in which simultaneous international mobility of capital and labor is possible. Ramaswami's argument established the superiority of restricting labor inflows while forbidding capital outflows over a policy of an optimal tax on capital exports coupled with a closing of the border to foreign workers. His is essentially a binary comparison between two policy options. It might seem reasonable to suppose that if restricting capital exports alone or taxing labor inflows alone each raises welfare, a joint use of both policies would be even better. Such is not the case. As we show, optimal strategy over the full range of options involves not a blend of tax on capital exports and

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restriction on labor inflows but rather an active policy of encouraging inflows both of labor and of capital. This may appear paradoxical since it involves paying foreigners a higher rate of return for the use of their capital than can be earned by that same capital at home. Furthermore, these arguments in the context of the Ramaswami model hinge on the ability of the active taxing country to obtain foreign labor at the (presumed) lower wages prevailing abroad. Should such a discriminatory policy towards foreign labor not be allowed, different policy options prove optimal. However, a primary result applies to both situations: a country capable of taxing capital outflows as well as controlling labor immigration will never find it optimal simultaneously to allow capital to flow out and labor to flow in.

The simplicity of the basic model allows use of a box diagram in the space of world factor supplies. We super-impose upon such a diagram a set of welfare contours for the taxing country in order to obtain and illustrate our results. These contours depend crucially on the rules of the game concerning the wage rate which must be paid to obtain foreign labor. Section I restates the original Ramaswami argument. The general argument of section II retains the traditional Ramaswami assumption whereby the home country is able to obtain foreign labor at the foreign wage rate, whereas in section III the rules of the game are altered so that foreign labor employed at home is paid the higher wage rate prevailing at home. Further remarks about the basic model, including the sensitivity of results to a weakening of the assumptions, are discussed in the concluding section.

I. The Ramaswami Argument

Let the active home country, which is assumed to be capital abundant but shares the same technology with the passive foreign country, initially close its borders to inflows of foreign labor but impose an optimal tax on outflows of its capital abroad. Although unlimited capital outflows would benefit the home country, some restriction (via a tax on earnings of home capital placed abroad) is even more desirable since it serves to raise the rate of return on home capital left abroad. The argument is similar to that used in support of an optimal tax on exports when a country can influence its terms of trade. Ramaswami then considers the welfare effect of the home country recalling all its capital which is located abroad but simultaneously allowing all the foreign workers previously employed with that capital to migrate to the home country. These workers could be paid precisely the amount they previously received (which matches their marginal product), since factor proportions abroad (and therefore factor prices abroad) are unaffected by the recall. If the repatriated capital plus the foreign workers are left to produce output exactly as they previously did in the foreign country, neither home nor foreign welfare will have changed.

But the home country can do better. The bundle of repatriated factors displays a relative abundance of labor compared to the original factor bundle employed in the high-wage home country. With traditional convex technology (bowed-in isoquants), it never pays to use two different techniques in producing the same good. By adopting a single technique intermediate in capital/labor proportions to those previously used at home and abroad, the home country could increase output. Furthermore, and this is crucial, the home country retains this output since foreign labor is still assumed to receive the same (low) wage rate prevailing abroad.

Ramaswami's argument establishes the superiority of allowing this particular labor inflow over a policy of optimal capital exports. Some other volume of labor inflow might prove even better (for the home country) than the quantity of labor previously employed with home capital used abroad. If so, optimal labor inflow even more strongly dominates a policy of allowing only capital exports.

II. *Policy Options when Migrants Receive Low Foreign Wage*

The Ramaswami argument can be put into perspective by considering a box diagram, the dimensions of which reflect the given *world* supplies of capital and labor. Since only one commodity is produced and technology is assumed to be identical between countries, the contract curve is the diagonal of the box. Point *A* in Figure 1 exhibits the initial endowment bundle; the active home country is assumed to be relatively capital abundant. A pair of isoquants for each country through point *A*, not drawn, would reveal a high wage rate in the labor-scarce home country and a high rate of return to capital abroad.

International mobility of factors allows each country's use of inputs to differ from autarky point *A*. For example, a move from *A* to a point vertically below, such as *H*, reflects an outflow of home capital to the foreign country (amount *AH*), where it receives a higher rate of return. The home country gains by such a capital flow. Figure 1 illustrates positions of welfare for the home country by the set of indifference curves rising from autarky point *A* (arrows indicate the direction of increasing home welfare). A movement of capital abroad until rates are equalized (at point *B*) would bring gains for the home country, but the home country could do even better by restricting the outflow of capital to point *C*.

There is no ambiguity about the meaning of home welfare that is being held constant along each indifference curve in Figure 1. It is the aggregate quantity of consumption by home residents (Y) of the single commodity produced in the world:

$$(1) \quad Y = \{wL + rK\} + \{r^*x - w^*z\}$$

The total supplies of labor and capital *employed* at home are denoted by L and K , and need to be distinguished from the original endowment bundle, (\bar{L}, \bar{K}) . The difference between these bundles represents the international flow of factor services, with x denoting capital exports from the home country, $(\bar{K} - K)$, and z the net flow of migrants from abroad, $(L - \bar{L})$. The first bracketed expression in (1) shows the value of home production, while the second represents an adjustment for net factor flows. w and r denote home wage and rental while w^* and r^* denote factor prices prevailing abroad.

The case of pure labor inflows can be illustrated in Figure 1 in a fashion parallel to that for capital outflows. Point F , showing sufficient flows of migrants to equalize wage rates in the two countries, allows a consumption level at home superior to that available at autarky point A . But some restriction of labor inflows would prove superior in that it would reduce to some extent the wage that would have to be paid to those foreign workers who are allowed in. Along pure-immigration line AF , point D is optimal.

The striking feature of the optimal immigration point is the orientation of the indifference curve tangent to line AF at D . It suggests that from D , the "Ramaswami point," home welfare could be improved *not* by sending a unit of capital abroad where it earns a higher return than at home but by attracting foreign capital to be utilized at home. To see why we have drawn the

indifference curves in this fashion consider a small move from D towards foreign origin O^* . This entails attracting both labor and capital from abroad in the proportions found abroad; such a hire would not disturb foreign factor prices since foreign factor proportions are undisturbed. Foreign factors are paid the value of their marginal products, and if the home country uses capital/labor ratio OD for one bundle and ratio DO^* for the hired bundle, home welfare would remain what it was at D . But switching to a single technique for all factors employed at home causes an increase in output, all of which accrues to home residents. This is precisely the Ramaswami type of argument, but now applied to illustrate that Ramaswami-point D does *not* represent the optimal strategy for the home country.

Figure 1 shows the determined drift of the home country's indifference curves towards the foreign origin.¹ The Ramaswami type of argument supports this construction. From any point in the box a move towards the foreign

¹ The text relies primarily on verbal reasoning in supporting the shapes of the indifference curves as drawn in Figure 1. To supplement these remarks more formally, differentiate (1) to obtain:

$$dY = \{(w-w^*)dz + (r^*-r)dx\} + \{xdr^* - zdw^*\}.$$

For any point above the diagonal the first bracketed term shows the change in world output accompanying a small relocation of factors (dx, dz). The second term, if positive, shows a net improvement in the "terms of trade" for the home country. Factor price changes (dw^*, dr^*) depend on the direction of factor relocation (dx, dz). Using a " $\hat{}$ " to denote relative changes,

$$\begin{aligned}\theta_L^* \hat{w}^* + \theta_K^* \hat{r}^* &= 0 \\ -\hat{w}^* + \hat{r}^* &= -\frac{1}{\sigma^*} \hat{k}^*,\end{aligned}$$

where θ_i^* is factor i 's distributive share, k^* is the capital/labor ratio actually employed abroad, and σ^* is the local value of the elasticity of substitution. Solutions reveal:

$$\hat{w}^* = \frac{\theta_K^*}{\sigma^*} \hat{k}^* \text{ and } \hat{r}^* = -\frac{\theta_L^*}{\sigma^*} \hat{k}^*, \text{ where } \hat{k}^* \text{ equals } \left\{ \frac{dx}{K^*} + \frac{dz}{L^*} \right\}.$$

These values can then be substituted into the expression for dY .

origin, involving an inflow of both labor and capital from abroad, must raise home welfare. Indeed, instead of starting this process from Ramaswami-point D , the home country could begin at autarky point A and, by hiring factors from abroad in the proportions found there, obtain *all* the gains from international factor mobility. Whereas Webb (1970) has analyzed an "all-or-nothing" strategy by the home country, and Bhagwati and Srinivasan (1983) have discussed a policy of taxing incoming foreign workers along AF in a perfectly discriminatory fashion, the move along AO^* involves no such discriminatory devices.²

As long as foreign factors can be hired at prevailing foreign factor prices, optimal strategy for the active home country requires bringing foreign capital as well as foreign labor to work at home. But suppose such a capital inflow is disallowed. The best the home country could then achieve would be Ramaswami-point D , where at least no home capital is shipped abroad. If, furthermore, the home country's aversion to inflows of factors from abroad spreads to labor as well as capital, Figure 1 suggests a return to point C , where home capital is located abroad.

In an article remarking on Ramaswami's contrast between optimal capital exports alone (C) and optimal labor inflows alone (D), Calvo and Wellisz (1983) point out that the higher home welfare level apparent at D can be achieved even without letting any foreigners in. They argue that home capital could be sent abroad to work with AD units of foreign labor, but a tax policy could be devised to prevent home capital from using the same techniques abroad as do foreign firms (as represented by ray O^*D). For example, if the original

² The autarky values for wages and returns to capital abroad minimize the value of the foreign endowment bundle compared with any other set of factor prices supported by the commonly-shared technology. Therefore the prices most favorable to the home country in hiring foreign factors are precisely the autarky factor prices w^* and r^* at point A , and perforce along ray AO^* .

tax on returns to capital sent abroad, which served to inhibit such capital outflow from AB to AC , were replaced by a home tax on the use of labor employed abroad, home capital operating abroad would hire less labor per unit of capital than would foreign firms. The solution proposed by Calvo and Wellisz is the employment of AD units of foreign labor abroad, with ray OD representing the capital/labor ratio used in common by home-owned firms operating abroad and firms operating at home. The welfare level at D in Figure 1 would thus be achieved without admitting foreign migrants.

This argument also sheds light on behavior of foreign investors which otherwise might seem puzzling. The superiority of the Calvo-Wellisz procedure is achieved because foreign investors deliberately use techniques different from those seemingly most appropriate at ruling foreign prices. Foreign investors are typically accused of just such a practice.³ Indeed, it is often the case that foreign investors seem to ignore the relatively cheap supply of labor in the host country in their adoption of techniques more appropriate to the high-wage home country. And it is precisely this kind of policy which the Calvo-Wellisz procedure involves. To obtain lower wage rates, *investors who exercise monopsonistic power abroad adopt more capital-intensive techniques than locally used in the host country.*⁴

To conclude on a technical point: We have not proceeded algebraically to develop equation (1) in the text. To do so would require differentiating Y totally and relating the changes in foreign factor prices, dw^* and dr^* , to associated international factor flows, dx and dz . If the optimum welfare point were at a (z,x) value within the box, it could be found by setting $\partial Y/\partial x$ and $\partial Y/\partial z$ both equal to zero. But we have shown that welfare rises

³ For example see the arguments compiled in Winston (1979).

⁴ For a discussion of foreign investment and monopsony see Itoh (1978).

monotonically along any ray towards the foreign origin so that there is no such internal optimal point. As we now proceed to demonstrate, this corner solution is no longer optimal when foreign workers who migrate are allowed to earn and retain the wage prevailing in the home country.

III. *Policy Options When Migrants Receive High Home Wage*

It is not always possible for an active country to arrange to hire foreign workers at a rate reflecting their opportunity costs. Indeed, some commentators (e.g., Bhagwati and Srinivasan (1983) and Ruffin (1984)) have remarked on the distasteful discriminatory flavor involved in singling out foreign workers to face a tax on earnings not paid by local workers. With less than completely open immigration allowed, there is a spread between home and foreign wages and the question is which national group gets to capture these "rents." Section II treated labor and capital symmetrically: The active home country received in license fees or taxes any discrepancy between home and foreign rates for both factors. Now we treat laborers differently. The active home country may set a limit on immigration, but those foreign workers allowed under the quota receive the prevailing home wage rate.⁵ Thus the program resembles a voluntary export restraint, with the home country surrendering the net revenue which a tax on immigration would collect.

With one exception this difference in the rules of the game completely alters the home welfare contours previously displayed in Figure 1. To deal with the exception first, note that if it is home workers from the capital-abundant home country who choose to seek employment abroad,⁶ they cannot

⁵ Of course foreign workers may have to pay their own local government for the right to work in the high-wage country. Thus the foreign country is here deemed to capture the wage spread although the foreigners actually employed in the home country may now be the ultimate recipients.

⁶ As it turns out, it is never optimal for them to do so.

expect to receive the high wage prevailing in their home country. In the language of the preceding section: If z is negative, w^* is the appropriate wage, whereas if z is positive (foreigners migrate to the high-wage home country), the wage paid is home w . Figure 2, which displays the home welfare contours with the revised rules of the game for labor migration, thus shows identical behavior as Figure 1 for that part of the diagram to the left of vertical line AB , i.e., in the region in which the capital-abundant home country contemplates subsidizing its own workers to seek employment abroad. (There is a discontinuity in the slope of the contours along AB in Figure 2, reflecting the finite spread between home and foreign wage rates.)

Suppose, now, that foreign migrants come to work at home and are paid home wages. Aggregate consumption available to home residents not including these migrants is shown by (2):

$$(2) \quad Y = \{wL + rK\} + \{r^*x - wz\}.$$

Any small change in factor flows yields a change in real income or consumption at home reflected by dY in (3):

$$(3) \quad dY = \{(r^*-r)dx\} + \{xdr^* - zdw\}.$$

A comparison with the previous rules of the game reveals two important dissimilarities. First, although the home country may be the active one in determining levels of factor flows, it does not collect the "rents" on a discrepancy between high home w and low foreign w^* . Second, the "terms-of-trade" effect, depicted by the second bracketed term in (3), shows a home loss when the *home* wage rises; in section II it is a rise in the *foreign* wage which serves to worsen the terms of trade faced by the home country.

In discussing the welfare contours in Figure 2 we begin with the point made by Ramaswami as well as by Bhagwati and Srinivasan: If no capital flows are permitted, the optimal strategy at home is to allow unrestricted immigration. The movement from A to F in Figure 2 monotonically improves welfare. From any point along AF the home country benefits by further labor inflows since these drive down the home wage. Having surrendered the "rents" represented by the gap between home and foreign wages, the home country can only gain by allowing more workers from abroad, thus improving the home country's "terms of trade." Gone now is the concern with "spoiling the market," which in Figure 1 supported the superiority of point D over point F .

As is further illustrated in Figure 2, for any given level of immigration along AF it never pays to seek capital from abroad. With reference to equation (3), from any point along AF (where x equals zero),

$$(4) \quad \frac{\partial Y}{\partial x} = (r^* - r) - z \frac{\partial w}{\partial x}.$$

The first unit of capital *sent* abroad gains the discrepancy between foreign and home capital rentals. This gain is enhanced by the fact that the home wage rate which must be paid migrants is reduced by the capital outflow. Thus it always pays to have *some* home capital sent abroad instead of obtaining capital from the foreign country. The Ramaswami argument, supporting the upward drift of the welfare contours towards O^* in Figure 1, vanishes once foreign workers receive the same rate of pay as do home laborers.

Does this argument support a complete liberalization of capital exports to points along diagonal BF ? Not necessarily. To appraise the issues involved, consider the situation the home country faces if initially there had

been no restrictions on labor or capital flows. Along the diagonal there is no discrepancy between factor prices ruling in each country. Consequently the first bracketed expression in (3) vanishes; any (small) restriction of capital exports or of labor inflows from an initial point on the diagonal affects home real incomes only *via* the effect of the restriction on the return to capital placed abroad (it rises), and on the home wage which must be paid to remaining migrant workers (it also rises). If capital exports are small relative to the extent of labor migration (points on the diagonal of Figure 2 near *F*), restriction is not advisable. By contrast, if relatively large amounts of home capital have been located in the foreign country compared with the extent of labor inflows (points near *B*), the beneficial effect of the increase in capital rentals earned abroad outweighs the harmful effect of the wage rise that must be paid to foreigners working in the home country; the home country can improve its welfare by restricting one or both types of factor flow.

The precise point along the diagonal where restriction becomes advisable is determined in Figure 2 by the following construction: Draw a ray from corner *N* through endowment point, *A*, hitting the diagonal at *G*. As we now prove, if international factor mobility achieves an allocation along the *diagonal* northeast of *G* (hence with immigration relatively large compared with capital exports), no restriction of capital is desirable for the given level of immigration. By contrast, in region *BG* it always pays to restrict capital by an amount which depends on the size of the (given) foreign labor force.

From (3), starting with any point along the diagonal, restriction of factor flows raises home welfare only if

$$(4) \quad \left\{ x \frac{dr^*}{dw} - z \right\} > 0,$$

since restriction of factor flows pushes up the home wage. Along the diagonal each country uses the same factor proportions so that

$$\frac{K}{K^*} = \frac{L}{L^*} \equiv \mu,$$

where μ indicates the relative size of production at home and abroad. With identical factor proportions as well as technology in the two countries, the effect of a change in k^* on r^* must exactly match the effect of a change in k on home r so that

$$\frac{dr^*}{\hat{k}^*} = \frac{dr}{\hat{k}}$$

But along the diagonal, (\hat{k}^*/\hat{k}) equals $-\mu$, so that condition (4) becomes:

$$\left\{-x \frac{dr}{dw} \mu - z\right\} > 0$$

Furthermore, term dr/dw equals (minus) the labor/capital ratio employed at home, (L/K) . Finally, substitution of (K/K^*) for μ yields:

$$(5) \quad \left\{\frac{x}{K^*} - \frac{z}{L}\right\} L > 0.$$

Inequality (5) confirms our previous assertion since the slope of NA in Figure 2 equals \bar{K}^*/\bar{L} and the slope of a chord connecting autarky point A to *any* point on the diagonal equals x/z . At point G these two slopes are equal, and therefore also equal to K^*/L . To the left of G , where capital exports relative to the total volume of capital employed abroad exceed the extent of

labor inflows relative to the labor force working at home, restriction of capital outflows and/or labor inflows puts the home country on a higher welfare contour.⁷

Thus far we have analyzed starting positions in which capital and labor are distributed on two edges of triangle AFB in Figure 2. Along AF the home country allows some labor inflow and real income would be improved by allowing at least some capital export as well. Along BF a world optimum is reached, but it would pay the home country to restrict capital flows (and immigration) if capital flows are relatively large (i.e., along the BG section of BF). Now turn to starting positions along AB --the home country has some of its capital stock located abroad. From any such position allowing a few foreign workers to enter must *harm* the home country. Equation (3) reveals that when initial z is zero (along AB) and x is held constant,

$$\frac{\partial Y}{\partial z} = x \frac{\partial r^*}{\partial z} .$$

Allowing some immigration must reduce the return which existing capital exports earn abroad. (Recall that under these rules of the game there is no offsetting gain from being able to hire workers at a lower rate abroad than need be paid at home.)

⁷ Ruffin (1984) raises the question whether some restriction on capital exports is desirable (in a model allowing technological differences between countries) and concludes that restriction would pay if there were no labor inflows (our point B), but might not raise welfare otherwise. In the basic model with technological parity we can go further in identifying dividing point G along the ray from corner-point N through endowment point A . To our knowledge Ruffin (1984) is the only source containing algebraic details of the model in which the rules of the game require payment of the home wage to foreign migrants, although Bhagwati and Srinivasan (1983) earlier pointed out the superiority of open immigration along AF , which in turn is dominated by the position of optimal restriction on capital flows with no immigration (point C in Figure 2).

The iso-welfare contours of the home country starting at A and moving south eastwards show higher and higher levels of welfare until the "free trade" contour HGF (extended) is reached. But these contours do not reflect the normal bowed-in curvature.⁸ As a consequence, the following all-or-nothing proposition regarding immigration policy emerges: If capital exports are restricted, optimal policy requires either no restriction on immigration or, if sufficient exports of capital are allowed, an absolute prohibition on the entry of foreign workers.⁹

Previously a policy of levying an optimal tax on capital exports when immigration is barred has been shown to lead to a higher welfare position at home than a policy allowing unrestricted factor flows, such as B or F in Figure 2. Our analysis now reveals that such a policy (leading to point C in Figure 2) also dominates *any* policy whereby capital exports are allowed simultaneously with positive levels of labor inflows. Thus whether foreign labor can be obtained at the low foreign wage or, instead, must be paid the higher home wage, it is never optimal home policy to permit two-way flows of factors.

⁸ Chord AG need not connect the minimum points along these contours (except for the right-hand derivative of the contour at A and the free trade contour at G), since, *inter alia*, the effects of changes in factor flows on factor prices away from the diagonal need not correspond between countries.

⁹ In Figure 2 point H denotes the critical value of restrictions on capital exports; if more than AH of such exports are allowed, it pays to prohibit immigration. Curve OHG joins the diagonal as the contour along which home welfare equals that achieved if no restrictions of any kind are imposed on factor flows.

IV. *Further Remarks*

In his recent survey article Ruffin (1984) has pointed out an asymmetry in the situation which would be faced by an active capital-importing country as compared to the case we have been assuming in which it is the capital-exporting country which has the power to impose controls on factor flows. Suppose the volume of international labor flows is fixed in either case. Should the active country restrict the international flow of capital? Yes, answers Ruffin, if the active country is the capital importer, but not necessarily if it is the capital exporter.

At issue is the distinction between the rules of the game explored in the preceding two sections. In our terminology, when Ruffin allows the capital importer to be active, he is assuming the rules of the game described in section II in which the active country can do all its shopping (and selling) at foreign factor prices. To fit this case to our diagrams, just relabel Figure 1, putting labor on the vertical axis and capital on the horizontal. In such a case a move from the diagonal westwards by a small amount from any point on *BF* must raise income. That is, it is unambiguously in the interests of the capital-importing country to restrict capital imports somewhat for any given level of emigration.¹⁰ By contrast, in the case of an active capital exporting country Ruffin assumes entering migrants must receive the high home wage--the rules of the game associated with section III. As illustrated in Figure 2, some restriction of capital exports is optimal only for range *BG* along the diagonal. Ruffin's asymmetry reflects a difference in the underlying rules of the game in the two cases.

¹⁰ This last proviso is necessary. For example if emigration is limited to *AR* in Figure 1, capital imports should be restricted only to level *S*.

It is possible to contemplate the implications of the basic model in higher dimensions than the one-commodity, two-factor setting. Suppose each country produces two commodities. If the terms of trade are fixed, a set of Hicksian composite-commodity isoquants could be drawn, the same set for each country. A typical isoquant has a "flat," reflecting the range of capital/labor ratios for which the economy would be incompletely specialized and factor prices rigidly linked to the given set of commodity prices. Inscribed in a production box whose dimensions represent world totals of labor and capital, these isoquants would be tangent to each other along these flats. That is, the extension of the diagonal contract curve in Figures 1 and 2 to the two-commodity case leads to a diamond-shaped "contract area" (split by the diagonal) formed by cones from each origin. This construction is familiar from the work of Lancaster (1957), Travis (1964), Dixit and Norman (1980), and utilized extensively in the recent treatise of Helpman and Krugman (1985). Such a contract area in our analysis is the "factor-price-equalization" region in theirs--the set of international factor allocations between countries that allows incomplete specialization in each at the set of commodity prices which would prevail in a world equilibrium with free trade and complete factor mobility.

Once the model admits more than one commodity, however, a potential disturbance to the terms of trade may have to be considered. Attention then centers on the interaction between factor mobility and the terms of trade, perhaps in optimizing models where only one factor is internationally mobile. Such a model was analyzed in detail in Kemp (1966) and Jones (1967). The basic model presented in this paper has, in freeing up the analysis from concerns with the terms of trade, allowed us to concentrate on the different

issues involved in comparing the consequences and desirability of one type of factor movement with another. The further simplification which the basic model assumes, of letting both countries share a common technology, has isolated the difference in factor endowment positions as the key characteristic determining the pattern of factor mobility. In this it parallels in spirit the neglect of inter-country differences in technology also found in the simple version of Heckscher-Ohlin models of commodity trade.

As for increasing the number of factors, the two-factor restriction obviously makes the geometry more tractable. But it serves to inhibit the applicability of the model to a world in which internationally mobile capital is sector-specific. Along somewhat different lines, the existence of other productive factors not mobile internationally raises the question whether the procedure whereby the active home country can hire some factors from abroad without disturbing factor prices (and thus "spoiling the market") is still valid.¹¹

This paper has analyzed the basic model in the literature on international factor mobility. Although its assumption of a common technology whereby countries produce a single identical commodity renders it mute for questions concerning the commodity terms of trade, the basic model sheds considerable light on the interaction between international labor and capital flows, especially when one of the trading parties attempts to exercise control over factor markets. Two alternative rules of the game concerning labor markets have been stressed. For each alternative a set of constant-real income (or consumption) contours for the home country was inscribed in the

¹¹ Srinivasan (1983) describes the possibility of recreating the Ramaswami result in a sector-specific model with internationally mobile labor and one type of capital also mobile across borders. The possibility of extending the Ramaswami reasoning to more general models is discussed in Jones and Coelho (1985).

production box, thus aiding in the search for first and second-best policy combinations.

Under the first set of rules the home country could exercise control over both factor markets, paying the low foreign wage to obtain workers. The Ramaswami result was demonstrated, whereby a policy of restricting immigration and preventing capital outflow was proved to be superior to a policy of only levying an optimal tax on capital exports and prohibiting immigration. But such a policy is not itself optimal; instead, it pays the home country to *hire* capital (as well as labor) from the high-priced foreign country. The Ramaswami argument can be extended to show how the home country could gain by hiring all the factors available abroad. This argument, building as well on recent work by Calvo and Wellisz, provides a rationale for the use abroad by a foreign investor of more capital-intensive techniques than those adopted by foreign firms.

The second set of rules compels the home country to pay foreign immigrants the high wage ruling at home. This leads to a new kind of optimal policy for the active home country, one involving no immigration and an optimal tax on capital exports; the Ramaswami argument for dominance of immigration controls is thwarted by the new rules. Indeed, for any given positive level of capital exports the first few migrants at the high home wage must lower home incomes. In these circumstances second-best policy (given the level of capital exports) towards immigration is all-or-nothing. For relatively low levels of given capital exports it pays to throw open the gates to unlimited immigration; although home income is lowered with the first few, following migrants drive down the wage payable to earlier immigrants. However, should capital exports be sufficiently large, the fall in the foreign

return to capital earned by foreign investors which would be induced by an inflow of migrants proves sufficiently severe that all immigration should be discouraged.

The position of a labor-abundant country intent on taxing international factor flows is more simple; being a natural labor exporter it can use the first set of rules described whereby it taxes inflows (of capital) and earns as well the higher wage rate ruling abroad. This is the situation potentially faced by countries experiencing a brain drain. The Ramaswami argument, applicable to the first set of rules, supports the view that restriction of emigration is preferable to taxing it, and such an argument can further be used to encourage foreigners to migrate to the labor-abundant country.

A concern about "spoiling the market" by driving up prices with excessive purchases or depressing prices with excessive sales provided the rationale for restricting policies towards international factor flows. And yet if controls could be exercised over labor inflows and over capital exports, under neither rules of the game did it prove optimal to allow both. If the home country can buy and sell at foreign prices, it should hire both factors from abroad in the proportions found there. If only labor were to be hired, the view that such purchases drive up prices and should therefore optimally be restricted would prove sound. By hiring foreign capital as well, albeit at a higher return than prevailing locally at home, the active country can achieve even greater gains than described by Ramaswami without paying the penalty of spoiling the market. The view that increasing the level of purchases causes price to be driven up is stood on its head when the second rules of the game apply. As more labor is hired from abroad, the home wage is driven down. This supports the result that if capital exports are arbitrarily

restricted to small amounts, it pays to have unlimited immigration, although in the first best solution capital exports represent the only international factor flow.

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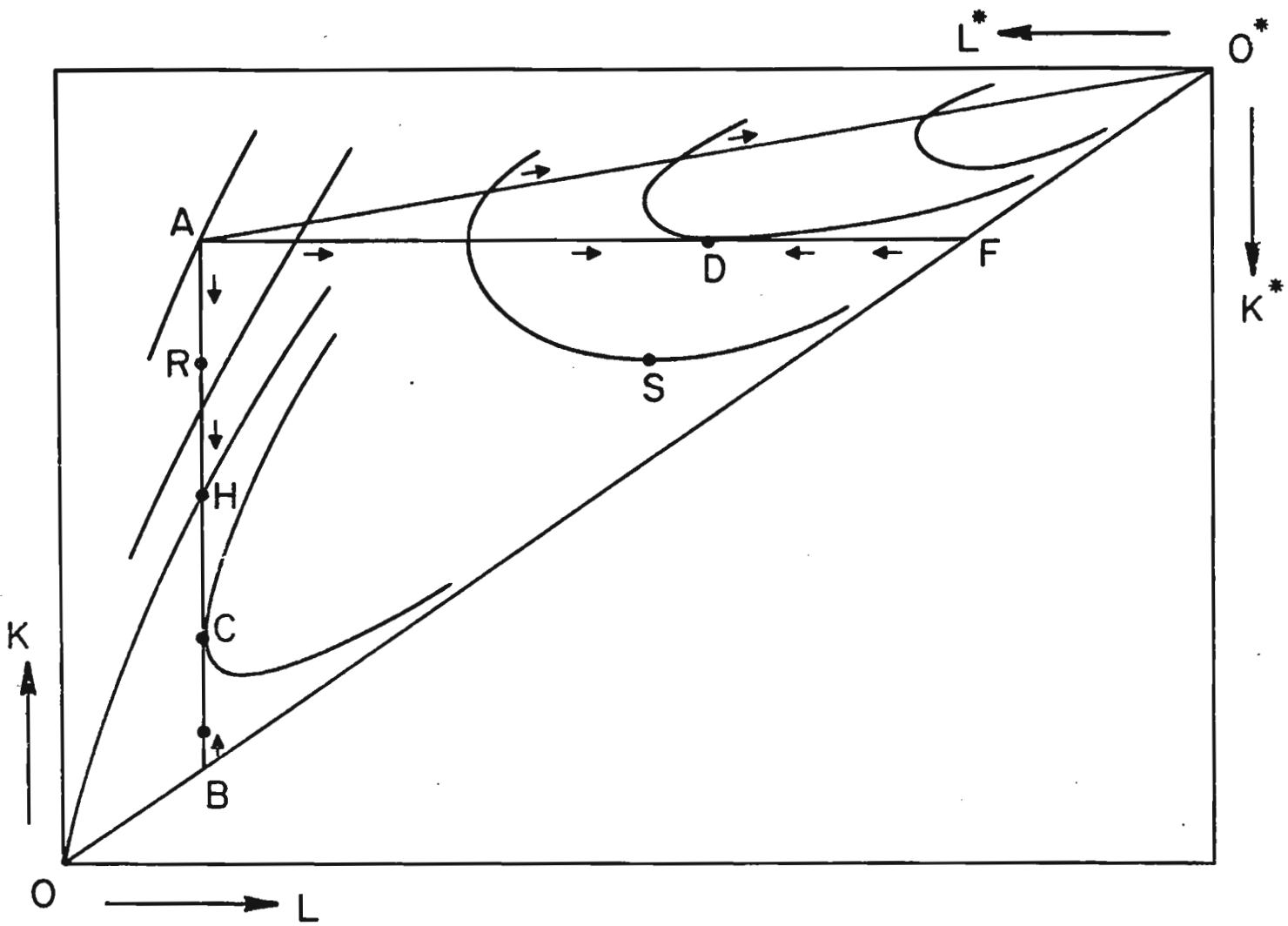


Figure 1 : Home Welfare Contours: Immigrants Paid the Foreign Wage

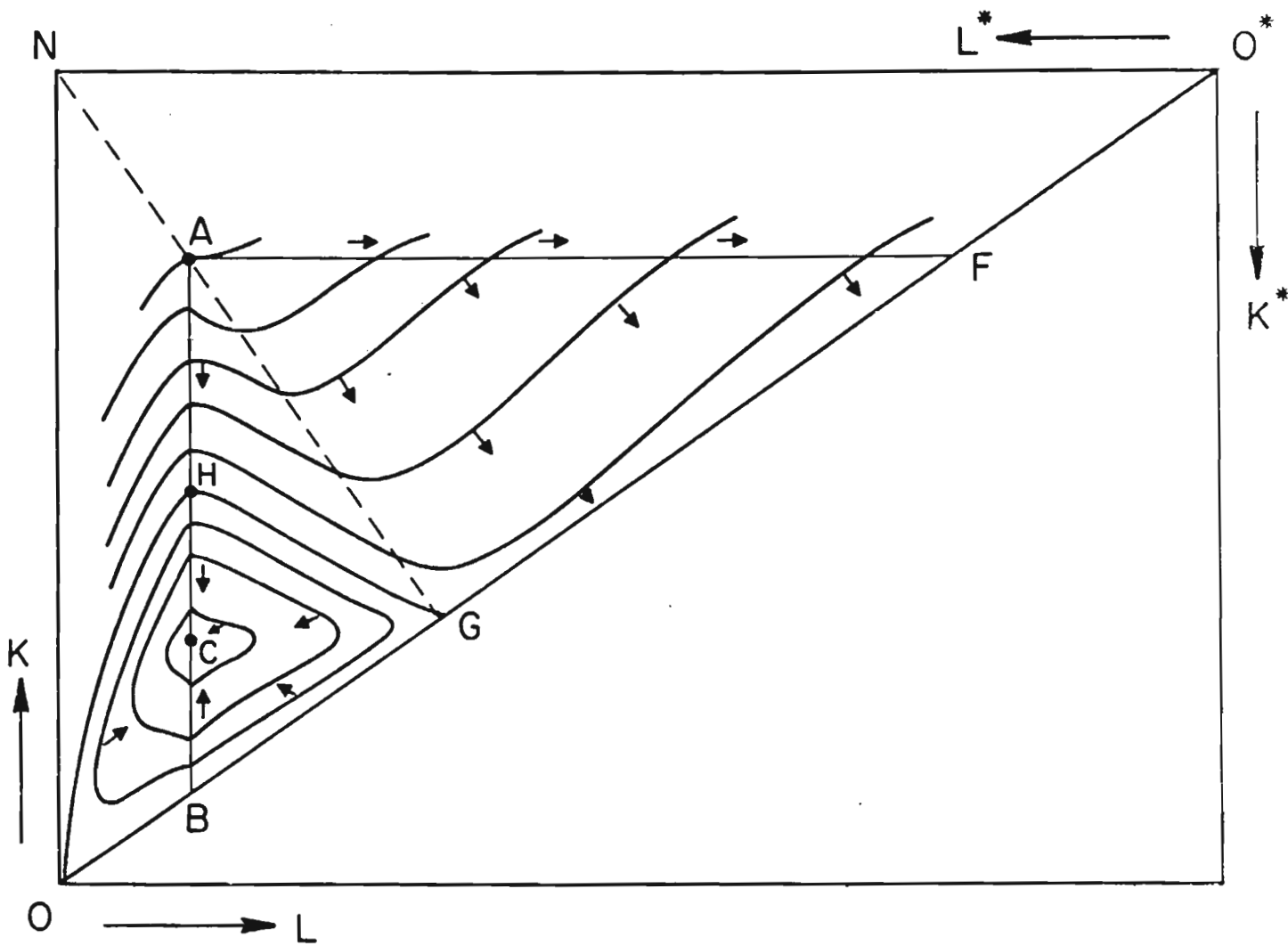


Figure 2: Home Welfare Contours: Workers Receive the Local Wage

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