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**TRADE IN SERVICES AND
THE FOREIGN DIRECT
INVESTMENT PROCESS:
SOME IMPLICATIONS FROM THE
SPECIFIC FACTORS MODEL**

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David F. Burgess

December 1987

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PROCESS: SOME IMPLICATIONS FROM THE
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1. Introduction

There are at least three questions that arise when one considers possible linkages between trade in services and the foreign direct investment process. First, there is the question of the extent to which -- and the reasons why -- firms in the service sector tend to satisfy a foreign demand for their product by establishing a facility abroad to provide the service there, or by allocating certain crucial inputs to the foreign market on a temporary basis, rather than expanding domestic production for export. Are international transactions in the service sector more likely to involve FDI than international transactions in manufacturing or the resource sector?

A second question is whether and to what extent trade liberalization in services is likely to promote foreign direct investment generally, not just FDI in the service sector itself. Intra-firm transactions may be more heavily dependent upon services than conventional arm's-length transactions. The performance of the multinational enterprise is contingent upon its ability to transact internationally in services ranging from management, accounting, legal counsel, marketing, advertising, research, engineering and data processing, not to mention the services one usually associates with arm's-length transactions -- finance, insurance, and transport. To what extent is the push for trade liberalization in services inspired by the potential gains that would accrue in the first instance to the multinational enterprise from the improved efficiency of intra-firm transactions?

Third, there is the question of whether and to what extent foreign direct investment itself represents trade in services. According to a leading

theory of why foreign direct investment occurs, a firm faced with a foreign demand for its product has chosen FDI over exports and licensing because FDI offers the best prospects for maximizing the return on the firm's unique, intangible asset -- a complicated package of capital, management skills, knowledge of production technique, marketing, distribution, etc. The transfer of this firm-specific asset by means of FDI is clearly one mode of international trade in services. The fact that the transaction occurs within the firm and not at arm's length creates problems for the proper evaluation of services being traded, and raises questions about whether host countries pay too much or too little for these services. Nonetheless, it should not obscure the central point that to a large extent FDI earnings represent the value of producer services transferred internationally.

The main purpose of this paper is to examine the welfare and distributive effects of trade liberalization in services in cases where it is not feasible to produce a service in one country and export it to another for consumption there. We assume that international trade in services requires that certain inputs crucial to the production of services in the exporting country cooperate with some intersectorally mobile inputs located in the importing country. As Hill (1977) has observed in an insightful paper, it is logically and not just technically impossible to store a service. Therefore, no matter what the future course of technological progress happens to be it will always be the case that the production and consumption of a service must occur simultaneously. Modern advancements in the technology of communication notwithstanding, it is still generally the case that the cost of transmitting most services across international borders is very high, making it necessary for production and consumption to occur at the same place as well as at the

same time.¹ If international trade in the outputs of service industries is ruled out on technical grounds then a service firm's choice of method for capitalizing on a foreign demand for its product is limited to (1) licensing the proprietary information about how to provide the service to a foreign firm, (2) establishing a subsidiary in the foreign country to provide the service there, or (3) allocating certain crucial inputs on a temporary basis to the task of satisfying the foreign demand for the service. The latter option may be chosen because it is often not efficient for firms to establish a permanent presence abroad. Consider, for example, the international transactions of management consultants, architects, engineers, lawyers, entertainers etc. In these cases, the crucial inputs themselves need not be permanently relocated abroad, and in some cases even a temporary presence abroad is unnecessary. Nevertheless, the services-specific inputs must cooperate with other inputs in the foreign country in order to provide the service abroad and the income payment they receive reflects the value of their contribution to the production of services abroad.

According to Dunning's (1977) eclectic "OLI" theory of why FDI occurs, the intangible asset possessed by the firm is more or less a public input within the firm; its application to the foreign market comes at little or no cost in terms of output foregone in the domestic market.² In this paper we follow Caves (1971, 1982) and assume that the firm-specific inputs being deployed abroad are private inputs within the firm in the sense that their allocation to the foreign market comes at some opportunity cost in terms of output foregone in the domestic market. This key assumption justifies if not legitimizes the use of the "specific factors" model of Jones (1971) and Samuelson (1971) as a vehicle for analysis of the trade in services question.

countries.³ Suppose we then modify the H-O-S model by assuming that one factor (capital) is sector specific and only labour is freely mobile. With capital specific to each sector it is possible to analyze the effects of trade liberalization in services when it takes the form of an influx of the services-specific factor from abroad. We shall think of trade liberalization in services as resulting in foreign direct investment by service firms with head offices abroad, although as emphasized in the introduction we could just as easily imagine that foreign service firms shift certain specific inputs to the home country on a temporary basis or that they simply deploy these inputs to the task of satisfying a foreign demand for services without any change in their location. The key point is that in the first instance trade liberalization in services creates employment opportunities for the mobile factor (labour) in the service sector of the home country rather than expanding employment opportunities for the mobile factor in the investing country.

A two-output version of the specific factors model in which both outputs can be traded at given world prices is summarized by the following system of five equations consisting of two unit cost equals price conditions and three factor market equilibrium conditions:

$$(1) \quad \phi^1(w, r) = p_T$$

$$(2) \quad \phi^2(w, s) = p_M$$

$$(3) \quad x_T \phi_w^1(w, r) + x_M \phi_w^2(w, s) = L$$

$$(4) \quad x_T \phi_r^1(w, r) = K_T$$

$$(5) \quad x_M \phi_s^2(w, s) = K_M$$

In this formulation p_T and p_N represent the prices for goods and services; w , r and s represent the returns to labour and the two types of capital; x_T and x_N represent the levels of output of goods and services; L , K_T and K_N represent the supplies of labour and the two types of capital; $\phi^i(\cdot)$ $i=1,2$ represents the unit cost of producing each output; and $\phi_j^i(\cdot)$ $i=1,2$, $j=w,r,s$ represents the cost minimizing per unit demand for the j^{th} factor in the production of the i^{th} commodity. Thus, according to equations (1) and (2) the unit costs of producing goods and services must equal their respective market prices, and according to equations (3)-(5) the demands for labour and capital specific to each sector must equal the given supplies.

If we choose the price of goods as numeraire so that $p_T = 1$ and let $p_N = p$ represent the world relative price of services the model can be solved for the competitive equilibrium prices of the three factors w , r , and s and the levels of output of goods and services x_T and x_N conditional on the endowments of the three factors and the world relative prices of services. It is then possible to determine the comparative statics effects of various shocks such as a change in the world relative price of services or a change in the amount of the services-specific factor supplied from abroad.⁴ Drawing on the analysis of Jones (1971) we can conclude that an increase in the supply of the services-specific factor will raise the real wage and lower the return to both specific factors if the relative price of services to goods remains unchanged. On the other hand, a reduction in the relative price of services will cause the return to the factor specific to the service sector to fall by a greater percentage, while the wage rate falls by a smaller percentage and the return to the factor specific to the goods sector increases.

However, suppose that services produced in one country cannot be consumed in the other because services cannot be stored and the cost of transporting or transmitting them instantaneously across national borders is prohibitive. Then the relative price of services becomes an endogenous variable whose value must be explained by equilibrating the domestic supply of services with the domestic demand for services. If we assume that the preferences of domestics are identical and homothetic then the demands for goods and services by the owners of factors employed within the economy can be represented by the following two equations:

$$(6) \quad D_T = e_1(1,p)I/e(1,p) + (1-\alpha)rK_T$$

$$(7) \quad D_N = e_2(1,p)I/e(1,p)$$

where $I = wL + \alpha rK_T + sK_N$ represents the national income, $e(\cdot)$ represents the minimum expenditure required for domestics to achieve a unit level of the utility index, and α represents the share of goods-specific capital that is owned by nationals.⁵ The partial derivative of the unit expenditure function with respect to the price of a commodity gives the expenditure minimizing per unit demand for that commodity. See e.g. Diamond and McFadden (1974) or Varian (1984, pp. 121-23). Thus, nationals spend part of their income on (non-traded) services, whereas foreign owners of factors employed in domestic production spend all of the income on (traded) goods.

Since the output of the service sector cannot be traded the demand for services by nationals must equal the competitive supply so that:

$$(8) \quad D_N(w,r,s,p) = x_N$$

Since the value of output must equal the value of factor payments the following accounting identity must hold:

$$(9) \quad p_T x_T + p_N x_N = wL + rK_T + sK_N = I + (1 - \alpha)rK_T$$

As well, by Walras' Law all income earned in the economy must be spent on either non-traded services or traded goods so that:

$$(10) \quad p_T^D + p_N^D = I + (1 - \alpha)rK_T$$

Combining equations (9) and (10) with equation (8) it follows that the demand for traded goods by nationals plus the demand by foreign owners of factors employed in domestic production must equal the competitive supply:

$$(11) \quad D_T(w, r, s, p) = x_T$$

If we now substitute equations (6)-(11) into equations (1)-(5) the model can be reduced to a system of five equations in just four endogenous variables, namely w , r , s , and p . However, the model is not overdetermined since one of the factor market equilibrium conditions can be shown to be redundant. To see why this is so, substitute equations (8) and (11) into equations (4) and (5) to obtain:

$$(4') \quad D_T(w, r, s, p) \phi_r^1(w, r) = K_T$$

$$(5') \quad D_N(w, r, s, p) \phi_s^2(w, s) = K_N$$

We know from Walras' Law that $p_T D_T(\cdot) + p_N D_N(\cdot) = wL + rK_T + sK_N$ so that

$p_T D_T - rK_T + p_N D_N - sK_N = wL$. Making use of (4') and (5') it follows that:

$$(12) \quad D_T(p_T - r\phi_r^1) + D_N(p_N - s\phi_s^2) = wL$$

But since ϕ^1 and ϕ^2 are both linear homogeneous in their arguments then $\phi^1 = w\phi_w^1 + r\phi_r^1$ and $\phi^2 = w\phi_w^2 + s\phi_s^2$. Recognizing that price must equal unit cost under perfectly competitive conditions (i.e., that equations (1) and (2) hold) the expressions in brackets in (12) are equal to $w\phi_w^1$ and $w\phi_w^2$ respectively. If we then divide both sides of (12) by w we obtain equation (3), which proves that the labour market will be in equilibrium whenever the markets for the two specific factors are in equilibrium and the zero profit conditions hold for each sector.

The fully specified model of the small open economy in which one of its outputs (services) cannot be traded consists of the two unit cost equals price conditions (1) and (2) together with the following two factor market equilibrium conditions for the two sector-specific factors that are obtained by substituting (6) and (7) into (4') and (5') respectively:

$$(13) \quad \left[\frac{e_1(1,p)}{e(1,p)} (wL + \alpha rK_T + sK_N) + (1-\alpha)rK_T \right] \phi_r^1(w,r) = K_T$$

$$(14) \quad \frac{e_2(1,p)}{e(1,p)} (wL + \alpha rK_T + sK_N) \phi_s^2(w,s) = K_N$$

Equations (1), (2), (13) and (14) contain the four endogenous variables w , r , s and p which depend upon the four exogenous variables α , L , K_T and K_N .

3. Welfare and Distributive Effects of Trade Liberalization in Services

We are now in a position to analyze the effects on the well being of various groups within the economy of an influx of the services-specific factor from abroad induced by measures to liberalize trade in services. The foreign supplier of the services-specific factor is assumed to earn the full pre-tax marginal product of his capital, but because he does not move with his capital and the output of the service sector cannot be traded his earnings must be repatriated in units of traded goods.⁶ We also assume that foreigners own a predetermined proportion $1-\alpha$ of the capital invested in the goods sector. However, in this section neither the supply of goods-specific capital nor the proportion of foreign ownership of the goods-producing sector is assumed to be affected by any change in the rate of return that trade liberalization in the service sector brings about.

If both outputs were traded at given world prices the influx of a specific factor would raise the return to the mobile factor (labour) and lower the returns to both specific factors. However, in the present context one output (services) cannot be traded so the price of this commodity must adjust to equilibrate supply and demand. An influx of the services-specific factor will raise the marginal product of labour in the service sector and cause labour to shift from the goods sector to the service sector at the initial commodity prices. Since output in the goods sector declines, the increase in the economy's gross domestic product will be smaller than the increase in the value of services output. But only part of any increase in GDP will be spent on services so there will be an excess supply of services and an excess demand for goods at the initial commodity prices. The decline in the relative price of services will cause the return on the services-specific factor to fall by a

wage rate is increased labour must be made unambiguously better off since the price of goods remains unchanged and the price of services has fallen. On the other hand, if $(1-\delta_N)\sigma_{12} < \sigma_2$ the rental rate on the goods-specific factor will increase making all owners of this factor (including foreign owners) unambiguously better off. Thus, an influx of the services-specific factor may distribute real income from owners of the goods-specific factor to labour or vice versa depending upon whether the elasticity of substitution between goods and services in domestic consumption multiplied by the share of national income spent on goods is greater than or less than the elasticity of substitution between the services-specific factor and labour in the production of services.

An influx of the services-specific factor may shift employment opportunities for labour from the service sector to the goods sector or vice-versa, and therefore the output of goods may either expand or contract. The need to pay foreign suppliers of the services-specific factor the full marginal product of their capital will contribute to an increase in the demand for goods, but the reduction in the domestic relative price of services will shift domestic expenditure away from goods so the overall impact on the output of goods is unclear a priori. The expression for the percentage change in goods output can be obtained by first noting from (4) that

$dx_T/x_T = -\theta_{1w}\sigma_1(dw/w - dr/r)$ and then substituting (15) and (16) which yields:

$$(19) \quad dx_T/x_T = \frac{-\theta_{1F}^2 \theta_{2w}\sigma_1}{\Delta} \left(\frac{1-\lambda}{\lambda}\right) [\sigma_2 - (1-\delta_N)\sigma_{12}] dK_N/K_N$$

Thus provided that σ_1 is positive the output of goods will expand or contract depending upon whether $\sigma_2 > (1-\delta_N)\sigma_{12}$.⁸

According to (17) and (18) the direction of change in both the return on the services-specific factor and the relative price of services depends upon parameter values, and in particular the proportion of domestic ownership of capital in the goods sector. If the goods sector were fully owned by domestics ($\alpha = 1$) there would be no ambiguity and both s and p would fall. However, if the proportion of foreign ownership of capital in the goods sector is high enough (the case where $\alpha = 0$ so that foreigners owned all of the capital in the goods industry would be an extreme case) it appears from (17) and (18) that s and p could actually increase for small enough values of σ_{12} , σ_1 and σ_2 . This situation can be ruled out provided that the corresponding dynamic model is locally stable.

If the wage rate falls in response to an influx of the services-specific factor the impact on labour's real income will depend upon how much the wage falls relative to the price of services and on the share of labour income spent on services. The real income of labour can be written as the ratio of the wage rate to the minimum expenditure needed to achieve a unit level of the utility index:

$$(20) \quad U_w = w/e(1,p)$$

The impact of a small influx of the services-specific factor on labour's real income is given by differentiating (20) with respect to arbitrary changes in w and p and then substituting (15) and (18):

$$(21) \quad dU_w/U_w = dw/w - \delta_N dp/p = - \frac{\theta_{1w} \theta_{1r} \theta_{2s} \delta_N}{\Delta} \left[\frac{1-\lambda}{\lambda} \frac{\delta_T}{\delta_N} (\sigma_{12} - \sigma_2) + \frac{\sigma_1}{\theta_{1r}} - (1-\alpha)(1-\lambda) \delta_w \right] dK_N/K_N$$

If we focus on the special case where there is no foreign ownership of the

goods industry then $\alpha=1$ and the last term in squared brackets in (21) disappears. A small influx of the services-specific factor from abroad (induced by measures to liberalize trade in services) will then cause the real income of labour to fall whenever σ_{12} and σ_1 are both small enough relative to σ_2 . In this case all of the benefits of trade liberalization in services will accrue to owners of capital in the goods industry and the rest of the domestic citizenry will be worse off.

To demonstrate the possibility that labour might be hurt by an influx of the services-specific factor from abroad is one thing; to demonstrate that labour is likely to be hurt is quite something else. There is no a priori reason for believing that the elasticity of substitution between goods and services in consumption is high or low, but to the extent that it is high (implying that goods and services are highly substitutable) labour will be made better off. Consider, for example, the extreme case where goods and services are perfect substitutes. Then σ_{12} will be infinite and we are effectively back in the standard specific factors model of a small open economy in which both outputs can be sold (traded) at given prices. The mobile factor necessarily benefits from an increase in the supply of a specific factor if commodity prices don't change.

The more highly substitutable are goods and services in consumption the less important it is to pay particular analytical attention to services as an output that cannot be traded. Consider then the other extreme where goods and services are perfect complements. The issue as to whether real wages rise or fall as a result of an influx of services-specific capital from abroad then depends upon whether $(1-\lambda)\sigma_2/\delta_N < \lambda\sigma_1/\delta_T\theta_{1r}$.

A neutral view about the technology for goods and services is that one

sector is no more or less labour intensive than the other, and also that it is just as easy (or difficult) to substitute labour for capital in one sector as in the other.⁹ If these conditions hold, the share of national income spent on services will be equal to the share of labour income earned in the service sector, which itself corresponds to the share of the labour force employed in the service sector. Thus, neutrality with respect to the technology implies that $\sigma_1 = \sigma_2$ and $\delta_N = 1 - \lambda$ so that $\delta_T = \lambda$. It is then easy to see that labour's real income will increase from an influx of the services-specific factor from abroad.

We conclude that in order for labour to be hurt by an influx of the services-specific factor from abroad it is necessary for the technology to be biased either in the sense that the service sector is substantially more labour intensive than the goods sector (so that $1 - \lambda > \delta_N$), or in the sense that the ease of substitution between labour and capital in the production of services is substantially greater than for goods (so that $\sigma_2 > \sigma_1$).

Now consider the impact of an influx of the services-specific factor on the real income of domestics as a whole. Domestic well-being can be expressed as the ratio of national income to the minimum expenditure necessary to achieve a unit level of the utility index:

$$(22) \quad U = (wL + arK_T + sK_N)/e(1,p)$$

The percentage change in the utility index resulting from arbitrary percentage changes in w , r , s , and p can then be written in the form:

$$(23) \quad dU/U = \delta_w dw/w + \delta_r dr/r + \delta_s ds/s - \delta_N dp/p$$

Substituting the expressions for the percentage changes in w , r , s , and p given in equations (15)-(18) and simplifying we obtain:

$$(24) \quad dU/U = (1 - \alpha) \lambda \delta_w dw/w$$

Two conclusions can be drawn from this expression. First, if all of the capital employed in the goods sector is owned by domestics then $\alpha = 1$ and a small influx of the services-specific factor from abroad will leave domestics as a whole just as well off as before no matter whether the wage rate rises or falls. Thus, under these circumstances domestics as a whole cannot be hurt by trade liberalization in services even if the foreign supplier of the services-specific factor earns the full (pre-tax) marginal product of his capital. Second, if part of the capital employed in the goods sector is owned by foreigners then $\alpha < 1$ and a small influx of the services-specific factor from abroad will raise or lower domestic well being depending upon whether dw/w is positive or negative, which according to (15) depends upon whether $(1 - \delta_N)\sigma_{12} > \sigma_2$.

The fact that domestics as a whole might actually be hurt by an influx of the services-specific factor from abroad if part of the capital employed in the goods sector is foreign owned is a novel and rather surprising result. The basic intuition behind the result can be explained as follows. If an influx of the services-specific factor causes the wage rate to fall, then the rate of return on the goods-specific factor must increase. As a consequence, foreign owners of the goods-specific factor will receive more domestic output than before and the extra output they receive will exceed the increase in GDP resulting from the influx of the services-specific factor. The transfer of income from domestics to foreigners is a hidden cost of an influx of the

services-specific factor that outweighs any inframarginal benefits from the influx itself.¹⁰

On the other hand, if an influx of the services-specific factor were to raise the wage rate then the rate of return on the goods-specific factor would fall and there would be a hidden benefit from the influx. An induced transfer of income from foreigners to domestics means that domestics as a whole would gain from the influx even if the inframarginal benefits were negligible.

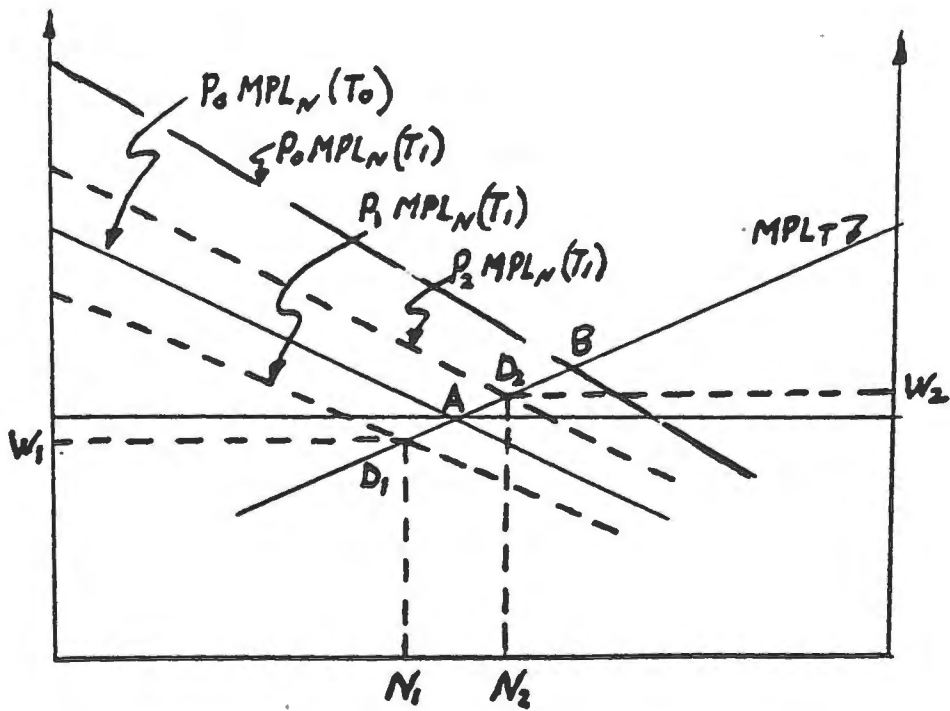
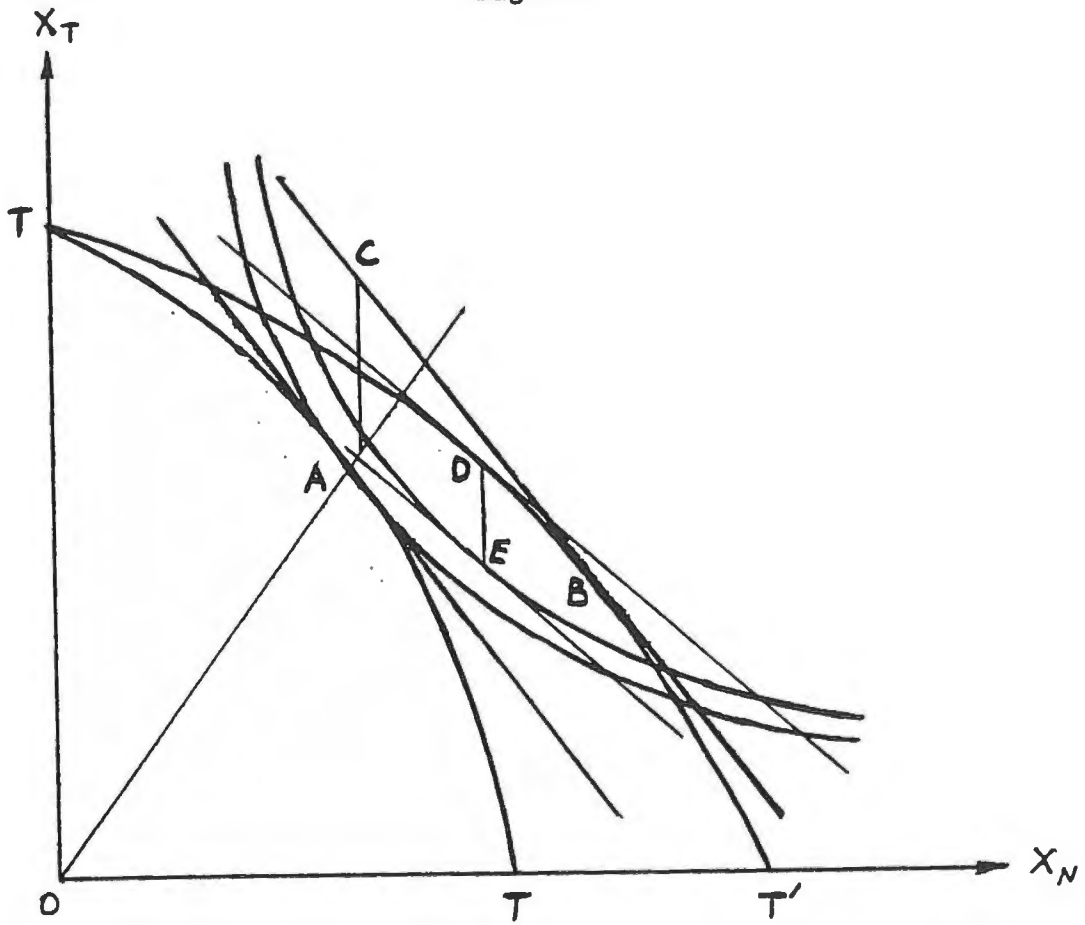
Previous discussions of the benefits and costs of an influx of foreign capital (see, e.g., MacDougall (1960)) have concluded that so long as the influx is voluntary and the economy is small, perfectly competitive and distortion free, domestics as a whole cannot be hurt. The results arrived at in this paper are not in conflict with this proposition. The reason why domestics as a whole might be hurt is that the economy has in place a constraint (a binding quota?) on the influx of additional foreign capital in its goods sector. It is the inability of foreigners to shift more goods-specific capital into the domestic economy in the face of an increase in the rate of return that gives rise to the possibility that domestics as a whole might actually be hurt. To put the point differently, if the government is unwilling to relax the constraint on foreign investment in the goods sector it must be prepared either to auction off the right to maintain the existing level of foreign investment in this sector to the highest bidder or to tax in full any increase in the earnings of the goods-specific factor that results from the influx of services-specific capital. Failure to introduce either one of these measures could result in domestics as a whole being made worse off by trade liberalization in services.

4. Diagrammatic Presentation

The impact of an influx of the services-specific factor on the domestic economy can be illustrated graphically using Figure 1. The top panel focuses on the impact on the economy's production frontier and the level of domestic welfare while the bottom panel focuses on the impact on the allocation of labour between sectors. The initial equilibrium is shown in both panels at point A where we have assumed that there is initially no foreign ownership of the economy. A is therefore a point of tangency between the production frontier and the highest attainable indifference contour, and the absolute value of the slope of the tangent at A is the initial domestic relative price of services. In the bottom panel A represents the division of the labour force between sectors such that the marginal value product of labour is equalized. It should be emphasized that the initial equilibrium at A does not rule out international trade in goods; it merely constrains this trade to be balanced in the sense that the value of goods exports equals the value of goods imports at the given world prices for goods.

An influx of the services-specific factor from abroad induced by efforts to liberalize trade in services will shift the production frontier to TT' and if the domestic relative price of goods remains unchanged the production point will move to B. The availability of more services-specific capital will increase the marginal physical (and value) product of labour in the service sector at the initial output prices and draw labour from the goods sector. Thus point B in the bottom panel represents the new allocation of the labour force which equalizes the marginal value product of labour between the two sectors at the unchanged relative commodity prices. The output of services will expand while the output of goods contracts.

Figure 1



Since the value of planned expenditure must equal the value of income the "notional" consumption point C must lie along the budget line through B tangent to TT' .¹¹ C will lie above and only slightly to the right of A for the following reason. The foreign supplier of the services-specific factor earns the full marginal product of his capital while domestics capture only the inframarginal benefits. Since foreigners must repatriate all of their earnings in units of tradeable goods their notional expenditure is represented by the vertical distance between C and the ray OA extended. Domestics will want to split their additional earnings between goods and services so their notional expenditure at the unchanged domestic relative price of services will be represented by the extension of the ray OA to the point where it intersects the vertical line through C.

A comparison of points B and C indicates that there will be an excess demand for goods and a corresponding excess supply of services at the initial domestic relative price of services. Therefore the price of services must fall in order to ensure that the additional output that results from the influx of the services-specific factor is willingly purchased by those who earn the additional income. As p falls the production point moves along TT' to the north-west of B and the notional consumption point moves toward the production point while staying on the same budget line as the production point. A new equilibrium is defined where the production and consumption points coincide. We have shown the new equilibrium in the top panel at D which is directly to the right of A. The domestic consumption point is at E directly below D and DE represents the amount of goods exported to pay the foreigner the full marginal value product of his capital. It should be noted that DE will be less than the vertical distance between C and the ray through

OA because the reduction in the relative price of services will reduce the real income of foreign owners of the services-specific capital.

The case where an influx of the services-specific factor leaves domestic output and employment in the goods sector unchanged is special, and we have seen that it depends upon the condition that $(1-\delta_N)\sigma_{12} = \sigma_2$. We know that domestics as a whole will be better off whether the new equilibrium lies to the left or to the right of D provided that there is no foreign ownership of the economy in the initial state. We also know that an equilibrium at D implies that both labour and owners of the goods-specific factor will be unambiguously better off since neither w nor r will have changed while p has fallen. Finally, we know that domestic owners of the service-specific factor will be worse off since if w does not change then s must fall by more than p .

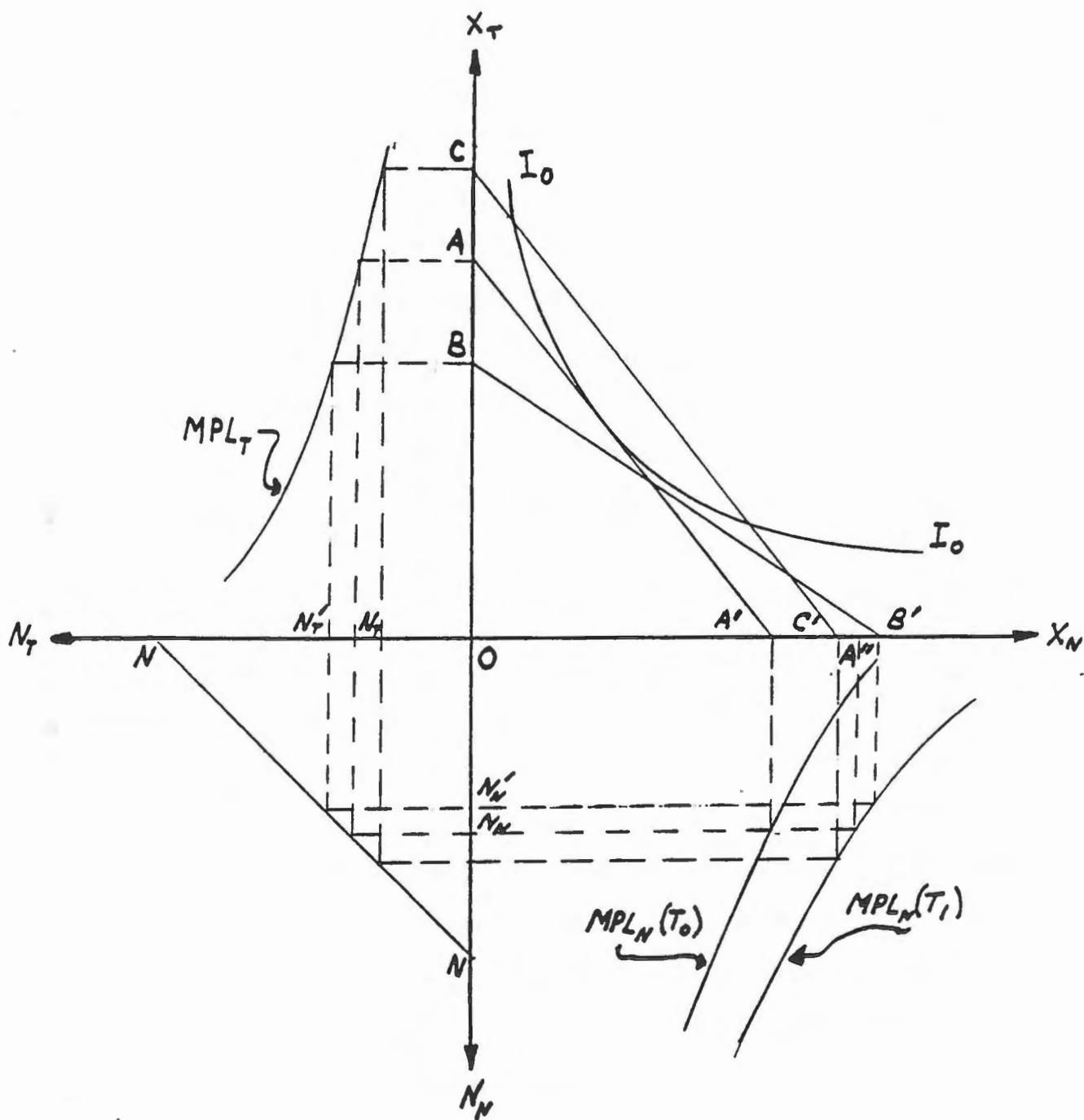
An outcome at D is consistent with the usual prediction about the distributive impact of an influx of services-specific capital; individuals who are able to adjust their employment opportunities to the change will be better off, while individuals whose income is tied to a particular sector will be worse off. However, our analysis has shown that the equilibrium could lie to the left or to the right of point D. If the equilibrium lies sufficiently to the left of D labour could actually be made worse off, whereas if the equilibrium lies sufficiently to the right of D owners of the goods-specific factor as well as owners of the services-specific factor could be made worse off. Thus, in the lower panel the market clearing reduction in the domestic relative price of services could shift the marginal value product of labour schedule in the service sector downward by more or by less than the initial influx of the services-specific factor shifts it upward. The new equilibrium

will be at a point like D_1 with a wage rate of w_1 and an allocation of the labour force of L_1 whenever $(1-\delta_N)\sigma_{12} < \sigma_2$. Alternatively it will be at a point like D_2 with wage rate of w_2 and an allocation of the labour force of L_2 whenever $(1-\delta_N)\sigma_{12} > \sigma_2$.

Figure 2 provides a graphical illustration of the case where labour is made worse off by an influx of the services-specific factor from abroad.¹² The top left and bottom right quadrants depict the marginal product of labour schedules in the goods and service sectors respectively, with the quantity of labour allocated to the goods sector measured along the horizontal axis to the left of the origin and the quantity of labour allocated to the service sector measured along the vertical axis below the origin. The straight line LL with slope equal to minus one in the lower left quadrant represents the full employment constraint for labour. In the initial equilibrium OL_T of labour is employed in the goods sector and OL_N of labour is employed in the service sector. Therefore the marginal product of labour in goods and services is represented by OA and OA' respectively, and AA' in the upper right quadrant represents the budget constraint for labour. Assuming that labour is efficiently allocated between the two sectors the slope of AA' represents the domestic relative price of services in the initial equilibrium. Labour's real income is represented by the highest attainable indifference contour, namely $I_0 I_0$.

An influx of the services-specific factor from abroad will shift the marginal product of labour schedule for services outward in the lower left quadrant. In particular, a one percent increase in the supply of the services-specific factor will raise the marginal product of labour by θ_{2s}/σ_2 percent. If the allocation of labour between sectors remained

Figure 2



unchanged the budget constraint for labour would be given by AA" (not drawn) and labour would be better off because AA" passes above and to the right of $I_0 I_0$. This outcome corresponds to the equilibrium at D in Figure 1. In this case a reduction in the relative price of services by θ_{2s}/σ_2 percent will increase the demand for services by precisely the amount necessary to absorb the increased supply. Suppose, however, that services could be costlessly exported and the relative price of services was determined exogenously in the world market. Then labour would shift into the service sector from the goods sector so that the marginal product of labour was higher in both sectors and by the same proportion. The new budget constraint for labour would be given by CC' parallel to AA'. Clearly, labour would be better off in this situation as well.

However, suppose that the output of the service sector cannot be exported and that the extra output that results from the influx of the services-specific factor holding the level of employment fixed exceeds the increase in demand for services when the price of services is reduced to equal its marginal (opportunity) cost. Then labour must shift from the service sector to the goods sector causing the marginal product of labour to fall in the goods sector and rise even further in the service sector. Suppose that OL'_T and OL'_N represents the new equilibrium allocation of the labour force so the marginal product of labour in the goods sector is now OB and the marginal product of labour in the service sector is OB'. Then the new budget constraint for labour will be represented by BB' and in the diagram BB' falls below and to the left of $I_0 I_0$ so that labour is made worse off. It is clear from the diagram that labour will be adversely affected by an influx of the services-specific factor only if the marginal product of labour schedule

in the goods sector is relatively steep and the marginal product of labour schedule in the service sector is relatively flat (both schedules being viewed from their respective labour axes). If the supply of the services-specific factor is increased by one percent (or if the quantity of labour in the service sector is reduced by one percent) the marginal product of labour in the service sector will increase by θ_{2s}/σ_2 percent, whereas if the quantity of labour in the goods sector is increased by one percent the marginal product of labour in the goods sector will fall by θ_{1r}/σ_1 percent. Under full employment conditions a one percent increase in employment in the goods sector corresponds to a $(1-\lambda)/\lambda$ percent reduction in employment in the service sector so that if the marginal product of labour in the goods sector declines by θ_{1r}/σ_1 percent the marginal product of labour in the service sector must increase by $(1-\lambda)\theta_{2s}/\lambda\sigma_2$ percent.

The combination of an increase in the supply of services-specific capital and a shift in labour from services to goods will cause a substantial reduction in the marginal product of labour in the goods sector and only a modest increase in the marginal product of labour in the service sector if σ_2 is large and σ_1 is small ceteris paribus. Even if these conditions are satisfied the diagram also confirms that labour's real income will fall only if the indifference curves representing labour's preferences have substantial curvature in the sense that the elasticity of substitution between goods and services σ_{12} is relatively low.

5. Some Implications of Perfectly Mobile Goods-Specific Capital

In section 3 we showed that an influx of the services-specific factor from abroad could make domestics as a whole worse off if foreigners own part of the goods industry, and even if there is no foreign ownership of the economy real wages could fall. However, these results depend upon the influx raising the real return to capital in the goods industry and the government being unwilling to permit additional foreign investment in this sector -- investment that would otherwise be attracted by the higher rate of return. We show in this section that whenever the level of foreign investment in the goods industry is free to adjust so that capital in this sector earns the exogenous world rental rate labour must always benefit from an influx of the services-specific factor from abroad, and domestics as a whole cannot be hurt unless there are tariffs or other distortions on trade in goods.

Since the price of goods and the rental rate on goods-specific capital are both determined in the world market, the competitive wage rate will be determined by equation (1) and be independent of any change in the supply of the services-specific factor. Equations (2), (3), (5) and (8) can then be combined to determine the impact of an influx of the services-specific factor on s , p , x_T and x_N , and equation (4) can be used to determine the impact on K_T . An influx of the services-specific factor will always reduce both s and p and increase x_N , but the impact on x_T can be positive or negative. The percentage change in x_T is given by:

$$(25) \quad dx_T/x_T = \left(\frac{1-\lambda}{\lambda}\right) \frac{\sigma_2 - (1-\delta_N)\sigma_{12}}{\sigma_2 + (1-\delta_N)\sigma_{12}} dK_N/K_N$$

so the output of goods will expand or contract depending upon whether

$(1-\delta_N)\sigma_{12} < \sigma_2$. Thus, a small open economy that experiences an influx of the services-specific factor from abroad as a result of efforts to liberalize trade in services will enjoy a lower price for services and a higher real wage, while the international competitive position of its goods industry will improve or deteriorate (and goods-specific capital will enter or exit the industry) depending upon whether $(1-\delta_N)\sigma_{12} < \sigma_2$.^{13,14}

If labour is always made better off by an influx of the services-specific factor from abroad what can we conclude about the impact on the real income of domestics as a whole? Recall that domestic real income can be expressed as $U = I/e(1,p)$. In the present context neither the wage rate nor the return on goods-specific capital will be affected by an increase in the services-specific factor so the percentage change in domestic well-being can be written $dU/U = \delta_s ds/s - \delta_N dp/p$. But it follows from the unit cost equals price equation for services that $ds/s = (1/\theta_{2s}) dp/p$, and substituting this into the preceding expression and noting that $\delta_s = \theta_{2s} \delta_N$ we find that $dU/U = 0$. Thus, a small influx of the services-specific factor from abroad will leave domestics just as well off as before.¹⁵

Up to this point we have assumed that services trade liberalization occurs in the absence of tariffs on goods or taxes on foreign investment earnings. To complete this section consider the case of a country that would become an importer of the services-specific factor if trade in services were liberalized, but unlike the previous case assume that the country is a net creditor rather than a net debtor in goods-specific capital. That is, the country is an exporter of goods-specific capital and an importer of goods prior to trade in services being liberalized. Moreover, it has in place a

tariff on goods imports. Quite apart from whether the tariff actually succeeds in increasing output and employment in the domestic goods industry, the question arises as to how the existence of the tariff affects the welfare analysis of an influx of the services-specific factor from abroad.¹⁶ Previous analysis of the welfare effects of international capital movements under protection (c.f. Brecher and Diaz-Alejandro (1977), Brecher and Findlay (1983) and Jones (1984)) have concluded that a small country will always be hurt if it permits capital to shift internationally in response to its protective policy.

The real income of domestics in the presence of a tariff can be expressed as $U = (I + \tau M) / e(1 + \tau, p)$ where I represents factor payments and τM represents the tariff revenue. The percentage change in domestic well being resulting from a small influx of the services-specific factor from abroad in the presence of the tariff can then be written in the form:

$$(26) \quad dU/U = \delta_s ds/s + \delta_R dM/M - \delta_N dp/p,$$

where δ_R is the share of tariff revenue in national income and dM/M is the percentage change in imports. The first and third terms cancel because $ds/s = (1/\theta_{2s}) dp/p$ from the unit cost equals price equation for services, and because $\delta_s / \theta_{2s} = \delta_N$. Therefore the percentage change in domestic real income becomes:

$$(27) \quad dU/U = \delta_R dM/M$$

Thus domestic welfare will increase or decrease as a result of a small influx of the services-specific factor from abroad depending upon whether it causes imports of goods to expand or contract.

We saw earlier that in the absence of protection the domestic production of goods will expand or contract with an increase in the services-specific factor depending upon whether $(1 - \delta_N) \sigma_{12} < \sigma_2$. The Appendix shows that when there is a tariff in place this condition must be modified slightly to take the form $(1 - \delta_N) \sigma_{12} < (1 + \tau \delta_N) \sigma_2$. Meanwhile, the domestic consumption of goods will tend to fall because an influx of the services-specific factor lowers the domestic relative price of services to goods. Therefore, imports of goods will fall whenever domestic production expands (i.e., whenever $(1 - \delta_N) \sigma_{12} < (1 + \tau \delta_N) \sigma_2$). In this case the economy as a whole will be made worse off if it permits an influx of the services-specific factor from abroad.

It should be emphasized that we have merely identified a sufficient condition for the economy to suffer a welfare loss from an influx of the services-specific factor in the presence of a tariff on goods. It is not a necessary condition because imports can fall even if domestic production of goods falls. However, the key point is that one cannot determine a priori whether a country will be better off or worse off if it permits an influx of the services-specific factor from abroad when it has a tariff in place.

So far we have analyzed the impact of an influx of the services-specific factor from abroad on domestic welfare in the presence of a tariff without considering whether the tariff makes it more or less profitable to shift the services-specific factor into the country. A key feature of the literature on international capital movements under protection is that the tariff induces a shift of capital between countries which necessarily exacerbates the welfare loss from protection. The question is whether this feature carries over to the present case.

A tariff on imports of goods will make it more profitable for

goods-specific capital to be invested in the economy and this will result in an expansion of domestic production of goods. However, employment opportunities in the goods industry may expand or contract because of the need to maintain equilibrium in the market for services. Since the economy is small, the tariff raises the domestic price of goods by the same percentage as the tariff rate; and since the rental rate on goods-specific capital is constrained to equal the given world rental rate the wage must increase by a greater percentage than the tariff rate. The higher price for goods will encourage domestics to shift some expenditure towards services which will increase the demand for services at any given price for services. Meanwhile, the higher wage rate will increase the cost of providing services and thereby reducing the supply of services at any given price for services. Therefore, the price of services will increase but the output of services may either rise or fall. If the output of services increases the tariff will have caused a net shift of labour from the goods sector to the service sector. In this case the rental rate on services-specific capital will increase by a greater percentage than the wage rate and owners of services-specific capital will gain more from protection than any other group in the economy. The tariff will clearly encourage foreign owners of the services-specific factor to shift their capital into the domestic economy under these circumstances.

Even if the tariff causes a net shift of employment opportunities from the service sector to the goods sector the rental rate on services-specific capital may increase making it more profitable for services-specific capital to be invested in the domestic economy. The appendix shows that the domestic price of services will always increase by a greater percentage than the tariff rate, and therefore by a greater percentage than the domestic price of goods.

Therefore, either the wage rate or the rental rate on services-specific capital (but not both) must increase by a greater percentage than the prices of all other commodities. If labour is shifted into the goods sector as a result of the tariff then the wage rate increases the most, but if labour is shifted into the service sector the rental rate increases the most. The appendix also confirms that while the rental rate on services-specific capital may rise or fall with the imposition of a tariff there is a strong presumption that it will increase making it more profitable to shift services-specific capital into the economy.

The overall implication of this section is that some of the apparent gains from trade liberalization in services may arise from the presence of tariffs and other restrictions on trade in goods which has a tendency to raise the rental rate on services-specific capital above its true social value. If countries accede to the pressure to liberalize trade in services by permitting an influx of services-specific capital from abroad in the presence of tariffs on trade in goods they run the risk of being made worse off as a result.

6. Conclusion

In this paper we have examined the welfare and distributive effects of trade liberalization in services on the assumption that an international service transaction involves the transfer of certain services-specific inputs between countries. For situations in which the outputs of service industries cannot be traded -- because services cannot be stored and the cost of transmitting them instantaneously across national borders is prohibitive -- there will be profitable opportunities for service-specific inputs owned in one country to be deployed in another. An international service transaction

may or may not involve foreign direct investment depending upon whether it is optimal for the specific inputs to establish a permanent presence abroad.

Incorporating the notion of industry specific inputs into a general equilibrium analysis of trade liberalization requires that we abandon the standard Heckscher-Ohlin-Samuelson model in which all primary factors are freely mobile between sectors. Using a version of the Ricardo-Viner or specific factors model in which the output of one industry (services) cannot be traded we find that an influx of the services-specific factor from abroad that results from efforts to reduce barriers to international trade in services may lower real wages and distribute real income from labour to owners of capital specific to the goods industry. If part of the goods industry is owned by foreigners then most of the benefit of trade liberalization may accrue to foreigners and domestics as a whole may actually be made worse off.

Both of these rather surprising results depend upon the assumption that the country is unwilling to permit additional foreign investment in the goods industry, investment that would be attracted to enter if the rate of return to capital specific to this sector is driven up as a consequence of reducing barriers to trade in services. If capital in the goods industry is freely mobile internationally then labour will always benefit from an influx of the services-specific factor from abroad and domestics as a whole cannot be hurt. However, if the country has imposed a tariff to protect domestic goods production (or a tax on the earnings of foreign capital invested in the economy) there is a presumption that the return on the services-specific factor will increase. If the government then permits an influx of the services-specific factor from abroad in response to its higher rate of return the volume of goods imports could fall thereby reducing national welfare. The

paper thus serves to emphasize that there can be no guarantee of a welfare gain to service-importing countries from removing barriers to international trade in services if there are other trade-distortions in place. It provides an additional rationale for the perceived reluctance on the part of many of these countries to support efforts to liberalize trade in services in the absence of further progress towards the achievement of freer trade in goods.

Canada is a small, open economy with a history of tariff protection of manufactures and a substantial degree of foreign ownership of this sector. Much of Canada's service sector is also highly regulated and it has been sheltered from international competitive pressures in part by domestic regulation and in part because of natural barriers to trade in services. Technological innovations are eroding many of these natural barriers and there is a growing recognition that domestic regulation has often tended to protect domestic service producers from foreign competition rather than improving overall efficiency and product quality in the service sector. More liberalized trading arrangements for services can impact on a services-importing nation like Canada in a variety of ways depending upon whether the output of the service sector can be traded or the inputs that are crucial to services production in the services-exporting country are free to cooperate with other non-crucial inputs in the services-importing country to produce services. Focussing on the latter mode of international trade in services the analysis of this paper suggests that the potential costs and benefits of trade liberalization in services to a services-importing nation like Canada may well be greater than what one normally associates with freer trade in goods, especially if such liberalization occurs in the presence of tariffs and other distortions on trade in goods or if it occurs in the

presence of a binding constraint on the degree of foreign ownership of the goods-producing sector.

FOOTNOTES

¹It has been argued that some services actually can be stored since they can be embodied in goods like films, records, tapes, or diskettes. Trade in such "services" is then analytically equivalent to trade in goods and raises no new issues. Notable exceptions to the high cost of international transmission of services include telecommunications, data processing and storage, and insurance. Here it is possible to export the service in the traditional sense of producing it in one country and consuming it in another. The analysis of this paper is most appropriate for contact services like many types of business and professional services including banking, construction engineering, health, education and other personal services, live entertainment, etc.

²Markusen (1986) has recently analyzed foreign direct investment as trade in producer services on the assumption that the firm-specific intangible asset is in the form of knowledge capital which may be predominately a public input within the MNE.

³In a two-output version of the H-O-S model in which one output (services) cannot be traded an influx of capital (induced perhaps by the removal of barriers to trade in services) must necessarily raise real wages in the capital-importing country no matter whether services are capital or labour intensive. If services are labour intensive then the influx of capital will shift resources into the goods-producing sector at the unchanged domestic relative price of services thereby creating excess demand for services and

causing a market clearing increase in the relative price of services which raises real wages. If services are capital intensive then resources will be shifted into the service sector at the unchanged domestic relative price of services thereby creating excess supply of services and causing a market-clearing reduction in the relative price of services which will also raise real wages.

⁴A multi-output version of the specific factors model would yield results identical to the simpler two-output model used here. The major advantage of the multi-output model is that trade in goods could be introduced explicitly and the impact of trade in services on the pattern and volume of trade in goods could be analyzed. Since this is not our major concern here we avoid this generalization for analytical simplicity. The price of goods can be interpreted as a composite of the prices of individual traded commodities since relative goods prices do not change; and the return to the factor specific to the goods sector can be interpreted as a composite of the returns on individual factors specific to each traded goods sector. It should be emphasized that what is crucial to our analysis is that the production of each output -- whether traded or non-traded -- requires both mobile and specific factors. Thus, if there were m traded goods whose production depends only on m freely-mobile factors then an influx of a factor specific to the service sector would leave the returns to the freely-mobile factors unaffected provided that all m goods remained productive, but the price of services would fall. Therefore, the real incomes of all mobile factors would increase unambiguously and the return to the services-specific factor alone would fall.

⁵Given the preference function $U(c_T, c_N)$ one can derive the expenditure function $E(p_T, p_N, U_0)$ as:

$$\text{minimum}_{\{c_T, c_N\}} \{p_T c_T + p_N c_N, \text{ subject to } U(c_T, c_N) \geq U_0\}$$

If preferences are homothetic the expenditure function is multiplicatively separable of the form $e(p_T, p_N)U$ where $e(\cdot)$ is the minimum expenditure necessary to achieve a unit level of the utility index. Since expenditure equals income I it follows that $e(p_T, p_N)U = I$ so that $U = I/e(\cdot)$. If we then differentiate the expenditure function partially with respect to the price of a commodity we obtain the expenditure minimizing demand for that commodity. Thus $\partial E(\cdot)/\partial p_T = (\partial e(\cdot)/\partial p_T)(I/e(\cdot)) = D_T$ and $\partial E(\cdot)/\partial p_N = (\partial e(\cdot)/\partial p_N)(I/e(\cdot)) = D_N$.

⁶If the effort to liberalize trade in services results in an influx of one unit of services-specific capital there will be rent to be captured equal to the difference between the marginal product of capital in the host country and the world rental rate on this type of capital. We are assuming that the host country government makes no attempt to appropriate this rent so that it accrues to the service exporting country.

⁷It is, of course, an empirical question whether owners of the mobile factor are in the majority or in the minority. The identification of labour as the mobile factor and capital as the specific factor is purely for ease of presentation; much of the labour force is, after all, sector specific owing to the nature of its skills and training. The point is that the common perception that services trade liberalization will hurt only those individuals

whose incomes are tied to the service sector and benefit everyone else (through lower services prices) can be quite misleading. Our analysis shows that even though the price of services falls individuals who are free to earn income in any sector may be hurt; and even if they are not, individuals whose incomes are tied to other non-service sectors may be hurt.

⁸ If the impact of trade liberalization in services was a reduction in the domestic price of services through the competitive pressure of foreign firms' exports of services then the output of services would contract and the only clear losers would be the domestic owners of services-specific factors. Owners of all other sector-specific factors would benefit and there is a presumption that owners of the mobile factor would also benefit, although there is a possibility that they might be hurt. However, if the impact of trade liberalization in services is an influx of services-specific factors from abroad then services prices will fall but employment opportunities in the service sector may expand rather than contract. As well, while there is an even stronger presumption that labour will benefit there is also a possibility that labour might lose, and even if labour does benefit the owners of all factors specific to non-service sectors might be adversely affected.

⁹ See Ruffin and Jones (1977) for the application of this definition of neutrality or unbiasedness to the impact of a tariff-induced change in relative commodity prices on real wages. The definition of labour intensity used here should not be confused with the definition of labour intensity used in the Heckscher-Ohlin model, i.e., the capital-labour ratio. Here we are simply assuming that labour's share of the value of output in each sector is

the same. Since the rental rates on the two types of capital will not generally coincide it does not follow that whenever labour's share of output is equal in each sector the capital-labour ratios must be equal. Thus our unbiasedness assumption is fully consistent with a difference in production functions between sectors.

¹⁰The comparative statics analysis in this paper is conducted about the point where the supply of the services-specific factor contributed by foreigners is zero. An obvious extension would allow foreigners to own a positive amount of the services-specific factor in the initial equilibrium. Since s falls relative to both w and r when there is an influx of the services-specific factor from abroad there would be an additional transfer of income from foreigners to domestics that would have to be taken into account. This transfer could more than offset any transfer of income from domestics to foreigners that results in situations where r rises relative to w .

¹¹The word "notional" is used to indicate the consumption bundle that would be chosen if the relative price of services to goods were to remain unchanged as it would if the output of the service sector could be traded at given prices. Since services output cannot be traded any discrepancy between the notional consumption point C and the notional production point B must be eliminated through a change in relative commodity prices.

¹²For further discussion of the impact of commodity price changes and endowment changes on real wages in the specific factors model using this figure see Melvin (1987).

¹³If both outputs could be traded at given world prices and if goods-specific capital were either completely immobile or somewhat less than perfectly immobile internationally then the influx of the services-specific factor would expand the output of services and contract the output of goods, raise the marginal product of labour in both sectors, and lower the marginal product of both specific factors. Here we show that if the output of the service sector cannot be traded and the factor specific to the goods sector is perfectly mobile internationally then the influx of the services-specific factor may either expand or contract the output of goods, must raise the real wage (because labour's marginal product increases in the service sector but remains unchanged in the goods sector), and must raise the real income of domestic owners of goods-specific capital (because the marginal product of goods-specific capital remains unchanged while the relative price of services to goods decreases). The only group that would be hurt by the influx is the domestic owners of the services-specific factor.

¹⁴There is an interesting corollary of this result that is of relevance to a service-exporting country like the United States. If services trade liberalization results in improved access for U.S. service firms abroad the reallocation of services-specific factors to the foreign market may either encourage goods-specific capital to flow into or out of the U.S. Thus, services trade liberalization may either contribute towards an expansion of the U.S. industrial sector and an improvement in its international competitive position, or the opposite, depending upon whether $(1-\delta_N)\sigma_{12} > \sigma_2$.

¹⁵A large (finite) increase in the supply of services-specific factor from abroad will increase domestic welfare because domestics will capture the inframarginal benefits. A domestic welfare change of zero arises because there is no foreign ownership of the services-specific factor in the initial equilibrium.

¹⁶The present model does not differentiate between different types of tradeable goods -- exportables and importables. Therefore a tariff on goods imports is equivalent to a tax on the earnings of goods-specific capital invested abroad.

REFERENCES

1. Bhagwati, J.N. and R.A. Brecher "Foreign Ownership and the Theory of Trade and Welfare" Journal of Political Economy Vol. 89 No. 3 June 1981, pp. 497-511.
2. Brecher, R.A. and C. Diaz-Alejandro "Tariffs, Foreign Capital and Immiserizing Growth" Journal of International Economics Vol. 7, Nov. 1977, pp. 317-322.
3. Brecher, R.A. and R. Findlay "Tariffs, Foreign Capital and National Advantage with Sector-Specific Factors" Journal of International Economics, Vol. 14, 1983, pp. 277-88.
4. Burgess, D.F. "On the Distributional Effects of Foreign Direct Investment", International Economic Review, Vol. 19, Oct. 1978, pp. 647-64.
5. Caves, R.E. "International Corporations: The Industrial Economics of Foreign Investment", Economica, Vol. 38, Feb. 1971, pp. 1-27.
6. Caves, R.E. Multinational Enterprise and Economic Analysis, Cambridge, London, U.K., 1982.
7. Diamond, P.A. and D.L. McFadden "Some Uses of the Expenditure Function in Public Finance" Journal of Public Economics, Vol. 3, 1974, pp. 3-21.
8. Dunning, J.H. "Trade, Location of Economic Activity and MNE: A Search for an Eclectic Approach" in B. Ohlin et al (eds) The International Location of Economic Activity London, Macmillan, 1977.
9. Hill, T.P. "On Goods and Services" Review of Income and Wealth, Vol. 23, Dec. 1977, pp. 315-338.

10. Hindley, B.V. and A. Smith "Comparative Advantage and Trade in Services" The World Economy, Vol. 7, December 1984, 369-90.
11. Jones, R.W. "A Three Factor Model in Theory, Trade, and History" in Trade, Balance of Payments and Growth J. Bhagwati et al (eds) Amsterdam, North Holland, 1971.
12. Jones, R.W. "Protection and the Harmful Effects of Endogenous Capital Flows" Economics Letters Vol. 15, 1984, pp. 325-30.
13. MacDougall, G.D.A. "The Benefits and Costs of Private Investment from Abroad: A Theoretical Approach" Economic Record Vol. 36, 1960, pp. 13-35.
14. Markusen, J.R. "Intra-Firm Service Trade by the Multinational Enterprise" DRIE Discussion Paper Series on Trade in Services, December 1986.
15. Melvin, J.R. "The Specific Factor Model and the Neoclassical Ambiguity: Some Further Results" mimeo, University of Western Ontario, January 1987.
16. Melvin, J.R. "Trade in Services: A Heckscher-Ohlin Approach" DRIE Discussion Paper Series on Trade in Services, January 1987.
17. Ruffin, R. and R. Jones "Protection and Real Wages: The Neoclassical Ambiguity" Journal of Economic Theory Vol. 14, No. 2, April 1977, pp. 337-348.
18. Samuelson, P.A. "Ohlin was Right" Swedish Journal of Economics Vol. 73, 1971, pp. 365-384.
19. Shelp, R.K. Beyond Industrialization: Ascendancy of the Global Service Economy, New York, Praeger, 1981.
20. Varian, H.R. Microeconomic Analysis 2nd Edition, New York, W.W. Norton (1984).

APPENDIX

The purpose of this appendix is to derive the expressions for the percentage changes in factor prices and the domestic relative price of services resulting from a small percentage increase in the supply of services-specific capital from abroad.

Consider first the case where the quantity of goods-specific capital is held fixed. Differentiate the unit cost equals price equations (1) and (2) to obtain the following equations of change:

$$\phi_w^1 dw + \phi_r^1 dr = 0; \quad \phi_w^2 dw + \phi_s^2 ds - dp = 0$$

Expressing the equations of change in percentage terms and noting that the first partial derivative of the unit cost function with respect to the price of a factor gives the cost minimizing per unit demand for that factor we obtain:

$$(A1) \quad \theta_{1w} dw/w + \theta_{1r} dr/r = 0$$

$$(A2) \quad \theta_{2w} dw/w + \theta_{2s} ds/s - dp/p = 0$$

where θ_{ij} represents the cost share of the j th factor in the i th sector.

Since cost shares must sum to unity within each sector,

$$\theta_{1w} + \theta_{1r} = 1 = \theta_{2w} + \theta_{2s}$$

Differentiate the factor market equilibrium conditions (13) and (14) to obtain the following equations of change:

$$x_T \phi_{rw}^1 dw + x_T \phi_{rr}^1 dr + \phi_r^1 \left[\frac{e_1}{e} (Ldw + \alpha K_T dr + K_N ds) \right. \\ \left. + \frac{1}{2} (e_1 e_{12} - e_1 e_2) dp + (1-\alpha) K_T dr \right] = -s \phi_r^1 dK_N$$

$$x_N \phi_{sw}^2 dw + x_N \phi_{ss}^2 ds + \phi_s^2 \left[\frac{e_2}{e} (Ldw + \alpha K_T dr + K_N ds) + \frac{1}{2} (e e_{22} - e_2 e_2) dp \right] = dK_N$$

The second cross partial derivatives of the unit cost and expenditure functions can be expressed terms of the first partial derivatives and the elasticities of substitution as follows:

$$\phi_{rw}^1 = \phi_r^1 \phi_w^1 \sigma_1 / \phi^1; \quad \phi_{sw}^2 = \phi_s^2 \phi_w^2 \sigma_2 / \phi^2; \quad e_{12} = e_1 e_2 \sigma_{12} / e.$$

Moreover, all second own partial derivatives can be expressed in terms of cross partials as

$$\phi_{rr}^1 = -w \phi_{rw}^1 / r; \quad \phi_{ss}^2 = -w \phi_{sw}^2 / s; \quad e_{22} = -\phi^1 e_{12} / \phi^2.$$

Expressing the equations of change in percentage terms and making the above substitutions we obtain:

$$(A3) \quad (\theta_{lw} \sigma_1 + \alpha \theta_{lr} \delta_T \delta_w / \delta_r) dw/w + (\theta_{lr} (1-\alpha \delta_N) - \theta_{lw} \sigma_1) dr/r + (\alpha \theta_{lr} \delta_T \delta_s / \delta_r) ds/s \\ + (\alpha \theta_{lr} \delta_N \delta_T (\sigma_{12} - 1) / \delta_r) dp/p = -(\alpha \theta_{lr} \delta_s / \delta_r) dK_N / K_N$$

$$(A4) \quad (\theta_{2w} \sigma_2 + \delta_w) dw/w + \delta_r dr/r + (\delta_s - \theta_{2w} \sigma_2) ds/s - (\delta_T \sigma_{12} + \delta_N) dp/p = dK_N / K_N$$

where

δ_T represents the share of national income spent on (tradeable) goods

δ_N represents the share of national income spent on (nontradeable) services

- δ_w represents the share of wages in national income
- δ_r represents the share of goods-specific capital earnings in national income
- δ_s represents the share of services-specific capital earnings in national income

Consequently $\delta_T + \delta_N = 1 = \delta_w + \delta_r + \delta_s$. Equations (A1)-(A4) can then be solved for the percentage changes in the wage rate, the rental rates on the two sector-specific factors, and the relative price of services given by equations (15)-(18) of the text.

The expression for Δ is complex and extremely tedious to derive in the general case where $0 < \alpha < 1$, but in the special case where $\alpha = 1$ so there is initially no foreign ownership of the economy it is relatively straightforward to derive the following expression:

$$(A5) \quad \Delta = -(2-\lambda)\delta_w\theta_{1r}\sigma_{12} - \theta_{1r}\theta_{2w}\delta_N\sigma_{12}\sigma_2 - \theta_{1w}^2\theta_{2s}\delta_T\sigma_{12}\sigma_1 - \theta_{1w}^2\theta_{2w}\sigma_1\sigma_2$$

which is unambiguously negative. If some of the capital employed in the goods sector is owned by foreigners then the condition that $\Delta < 0$ must continue to be satisfied in order for the competitive equilibrium to be (locally) stable.

Now consider the case where goods-specific capital is in perfectly elastic supply to the economy. With the rental rate r determined exogenously the competitive wage w must satisfy the condition that unit cost equals the given world price for (tradeable) goods. Thus, an influx of services-specific capital cannot affect either w or r , and hence it will not affect the cost-minimizing per unit demands for capital and labour in the goods sector. If the influx of services-specific capital causes the relative price of

services to fall it must cause the rental rate on services-specific capital to fall by an even greater percentage given that the competitive wage rate is predetermined. Differentiating equation (2) and expressing all variables of change in percentage terms we have:

$$(A6) \quad \theta_{2s} ds/s - dp/p = 0$$

which is just equation (A2) under the constraint that the wage rate cannot change.

Since the supply of goods-specific capital is now an endogenous variable we must focus on the equilibrium conditions for labour and services-specific capital given by equations (3) and (5). Differentiating these conditions and expressing all variables of change in percentage terms we obtain:

$$(A7) \quad \lambda dx_T/x_T + (1-\lambda)\theta_{2s} \sigma ds/s + (1-\lambda)dx_N/x_N = 0$$

$$(A8) \quad -\theta_{2w} \sigma ds/s + dx_N/x_N = dK_N/K_N$$

where λ represents the proportion of labour employed in the production of goods.

Finally, since the domestic demand for services must equal the domestic supply of services we can substitute equation (7) into equation (8) and differentiate the resulting condition totally with respect to the variables of change to obtain:

$$(A9) \quad \delta_s ds/s - (\delta_T \sigma_{12} + \delta_N) dp/p - dx_N/x_N = 0$$

The system of equations (A6) - (A9) can then be solved for the percentage changes in s , p_T , x_T and x_N that result from a small

percentage change in K_N . The result of greatest interest is the response in the output of goods, since the direction of change in all the other variables is unambiguous. The percentage change in the output of goods is given by equation (25) of the text. The amount of capital employed in the production of goods will be proportional to the output of goods since the cost-minimizing per unit demands for capital and labour will be unaffected. Therefore, an influx of services-specific capital from abroad will result in an expansion or contraction of output, employment and foreign investment in the goods industry depending upon whether $(1-\delta_N)\sigma_{12} < \sigma_2$.

The market clearing condition for services must be modified slightly when there is a tariff in place and therefore tariff revenue to distribute to the private sector. Letting τ be the tariff rate and M be the volume of imports we have the following revised equilibrium condition for services:

$$(A10) \quad \frac{e_2(1+\tau, p)}{e(1+\tau, p)} (I+\tau M) - x_N = 0$$

where $M = D_T - x_T$ and $D_T = \frac{e_1(1+\tau, p)}{e(1+\tau, p)} (I+\tau M)$.

Substituting the expression for M into (A10) and solving explicitly for M we obtain:

$$(A11) \quad M = \left(\frac{e_1}{e} I - x_T \right) / \left(1 - \tau \frac{e_1}{e} \right)$$

Substituting (A11) into (A10) and simplifying we obtain the following revised equilibrium condition:

$$(A12) \quad \frac{e_2}{e} I - x_N + \tau \left(\frac{e_1}{e} x_N - \frac{e_2}{e} x_T \right) = 0$$

Differentiate (A12) totally with respect to the variables of change to obtain:

$$\begin{aligned} \frac{e_2}{e} dI + \frac{I}{e^2} (ee_{22} - e_2e_2)dp - dx_N + \tau \left[\frac{e_1}{e} dx_N - \frac{e_2}{e} dx_T \right. \\ \left. + \frac{x_N}{e^2} (ee_{12} - e_1e_2)dp - \frac{x_T}{e^2} (ee_{22} - e_2e_2)dp \right] = 0 \end{aligned}$$

Note that $dI = K_N ds$ since both w and r remain unchanged. Expressing all variables of change in percentage terms and letting $m = M/D_T$ represent the proportion of domestic goods consumption contributed by imports we obtain:

$$\begin{aligned} (A13) \quad \delta_s ds/s - (\delta_T \sigma_{12} + \delta_N - \frac{\tau}{1+\tau} \delta_T \sigma_{12}) dp/p - \frac{\tau}{1+\tau} (1-m) \delta_T dx_T/x_T \\ + \left(\frac{\tau}{1+\tau} \delta_T - 1 \right) dx_N/x_N = 0 \end{aligned}$$

Equation (A13) can now be combined with equations (A6)-(A8) to obtain the following expressions for the percentage changes in s and x_T that result from a small increase in the supply of the services-specific factor from abroad:

$$(A14) \quad ds/s = - \frac{1}{\Delta} \left\{ \frac{\tau \delta_T}{1+\tau} (1-m+m\lambda) - \lambda \right\} dK_N/K_N$$

$$(A15) \quad dx_T/x_T = - \frac{(1-\lambda)\theta_{2s}}{\Delta} \left\{ \frac{\delta_T}{1+\tau} (\sigma_{12} + \tau\sigma_2) - \sigma_2 \right\} dK_N/K_N$$

where $\Delta' < 0$.

Now consider the impact of a small influx of the services-specific factor on domestic well-being when there is a tariff in place. The expression

for domestic welfare is given by $U = (I+\tau M)/e(1+\tau, p)$. Substituting to eliminate M and simplifying we obtain:

$$(A16) \quad U = \frac{I - \tau x_T}{e(1+\tau) - \tau e_1(1+\tau)}$$

Differentiating (A16) with respect to the variables of change we obtain:

$$(A17) \quad dU = \frac{T ds - \tau dx_T}{e - \tau e_1} - \frac{I - \tau x_T}{(e - \tau e_1)^2} e_2 (1 - \tau \frac{e_1}{e} \sigma_{12}) dp$$

Expressing all variables of change in percentage terms and noting that

$$(1+\tau)e_1/e = \delta_T; \quad pe_2/e = \delta_N; \quad (1+\tau)x_T = (1-m)\delta_T I';$$

$$I/I' = (1 - \frac{\tau m}{1+\tau} \delta_T); \quad \text{and} \quad I' = I + \tau M, \quad \text{we obtain:}$$

$$(A18) \quad \frac{dU}{U} = \frac{\delta_s ds/s - \frac{\tau}{1+\tau} (1-m)\delta_T \frac{dx_T}{x_T} - \delta_N (1 - \frac{\tau}{1+\tau} \delta_T \sigma_{12}) dp/p}{1 - \frac{\tau}{1+\tau} \delta_T}$$

The direction of impact on domestic welfare depends only on the sign of the numerator since the denominator is positive. From the unit cost function for services we know that $\theta_{2s} ds/s = dp/p$ and $\theta_{2s} \delta_N = \delta_s$. Therefore we can write the expression for the change in domestic welfare in the form:

$$(A19) \quad \frac{dU}{U} = \frac{1}{1+\tau\delta_N} \{ \delta_s \sigma_{12} ds/s - (1-m) dx_T/x_T \} dK_N/K_N$$

We know that ds/s will always be negative if dK_N/K_N is positive so that whenever dx_T/x_T is non-negative we know that domestic welfare will fall. But according to (A15) dx_T/x_T will be non-negative if and only if $(1+\tau\delta_N)\sigma_2 \geq \delta_T\sigma_{12}$. The latter is a sufficient but not a

necessary condition for a country to suffer a net welfare loss from an influx of the services-specific factor from abroad.

Now consider the percentage changes in w , s , p , x_T and x_N resulting from the imposition of a small tariff at percentage rate $d\tau$.

Differentiating the system of equations (1), (2), (3), (5) and (8) totally with respect to a small increase in the tariff rate we obtain:

$$(A20) \quad dw/w = -\frac{1}{\Delta''} \{ \theta_{2s} \delta_T \sigma_{12} + \theta_{2w} \sigma_2 \} d\tau$$

$$(A21) \quad ds/s = -\frac{1}{\Delta''} \{ (\theta_{1w} - \theta_{2w}) \delta_T \sigma_{12} + \theta_{2w} \sigma_2 + m^2 \lambda \delta_w \} d\tau$$

$$(A22) \quad dp/p = -\frac{1}{\Delta''} \{ \theta_{1w} \theta_{2s} \delta_T \sigma_{12} + \theta_{2w} \sigma_2 + m^2 \lambda \theta_{2s} \delta_w \} d\tau$$

$$(A23) \quad dx_T/x_T = -\frac{1}{\Delta''} \left\{ \frac{1-\lambda}{\lambda} [\theta_{1r} \delta_T \sigma_{12} - m^2 \lambda \delta_w] \sigma_2 + \theta_{1r} \sigma_1 [\theta_{2s} \delta_T \sigma_{12} + \theta_{2w} \sigma_2] \right\} d\tau$$

$$(A24) \quad dx_N/x_N = -\frac{\theta_{2w} \sigma_2}{\Delta''} \{ \theta_{1r} \delta_T \sigma_{12} - m^2 \lambda \delta_w \} d\tau$$

where $\Delta'' = -\theta_{1w} \{ \theta_{2s} \delta_T \sigma_{12} + \theta_{2w} \sigma_2 \} < 0$ and where m represents the proportion of domestic goods consumption contributed by imports.

Combining (A22) with the expression for Δ'' we have:

$$(A25) \quad dp/p - d\tau = -\frac{1}{\Delta''} \{ \theta_{2w} \theta_{1r} \sigma_2 + m^2 \lambda \theta_{2s} \delta_w \} d\tau$$

which confirms that the domestic price of services increases by more than the domestic price of goods.

Combining (A20) with the expression for Δ'' we have $dw/w = d\tau/\theta_{1w}$

which confirms that the wage rate always increases by a greater percentage than the domestic price of goods. To determine whether the real wage rises or

falls recall that the real income of labour can be written in the form $U_w = w/e(1+r,p)$ on the assumption that labour receives none of the tariff revenue. The percentage change in labour's real income is then given by $dU_w/U_w = dw/w - \delta_T d\tau - \delta_N dp/p$ and making use of (A20) and (A22) we obtain:

$$(A26) \quad dU_w/U_w = -\frac{1}{\Delta^n} \{ \theta_{1r} \delta_T (\theta_{2s} \sigma_{12} + \theta_{2w} \sigma_2) - m^2 \lambda \delta_s \delta_w \} d\tau$$

so that labour's real income will increase under protection unless both σ_{12} and σ_2 are negligible and m is sufficiently large.

According to (A24) the output of services will expand or contract depending upon whether $\sigma_{12} < m^2 \lambda \delta_w / (1+m) \delta_r$. If the output of services expands, the rental rate on services-specific capital must increase by more than the price of services and hence by more than the price of any other commodity. Even if s increases by less than p , it is clear from (A21) that s is likely to increase rather than fall.

