Services Tradability, Trade Liberalization and Foreign Direct Investment

By Charles van Marrewijk, Joachim Stibora
and Albert de Vaal

Erasmus University Rotterdam and Tinbergen Institute

We analyse a two-country general equilibrium model. The countries are identical, except for the existence of an efficiently operating market for producer services in one country, which allows it to gain cost advantages by using differentiated services as an intermediate input in the production process. Foreign manufacturers can only use these if there is international exchange in services products or services technology. The welfare effects of liberalizing trade in services are mixed. Not only the distinction between trade in services output and foreign direct investment (FDI) is important, but also the specific mode by which FDI is conducted.

INTRODUCTION

Services play an increasingly important role in the world economy, as observed, for instance, by the growing share in employment, production, exports and foreign direct investment (FDI) (see e.g. Hoekman 1993; OECD 1993 and UNCTAD and World Bank 1994). This growing importance of services in domestic economies and international trade is due largely to an increase in the production of producer services, that is private services satisfying business of intermediate demand (see Grubel and Walker 1989 and OECD 1992). Firms increasingly delegate costly, knowledge-intensive inter- mediate-stage processing activities in their production processes to specialized outside producers in order to gain cost advantages. In comparison with in- house cost centres, external producers are forced by market conditions to pro- duce efficiently. Moreover, they will be able to exploit more fully the scale economies that are often associated with the provision of knowledge-intensive producer services.

Countries generally differ in the extent to which producers in final goods sectors have the opportunity to gain cost advantages by using knowledge- intensive producer services. For instance, services markets are among the most regulated markets of an economy, and it is therefore reasonable to argue that the extent of a coherently and efficiently operating market for producer ser- vices depends crucially upon how stringent the regulatory barriers are. The country with the developed producer services sector is therefore the country that has invested in the required technology and allows market forces to work within a well defined regulatory framework. This argument seems to have spe- cial relevance for Eastern European countries in transition, where for historical reasons a producer services market has not arisen. Alternatively, one can argue that the absence or limited size of an efficiently operating market for knowl- edge-intensive producer services is a matter of development, and that it is therefore a distinguishing feature of less developed countries.[1]

Nevertheless, the observation that countries differ in the extent of their services markets has not received due attention. In this paper we therefore

concentrate on trade patterns between countries that are similar in all respects, except that one country lacks a producer services sector. Of course, in reality there are all sorts of gradations in the structure of the market for producer services between countries, but our exposition is facilitated by focusing on this polar case. To that purpose, we develop a general equilibrium model in which a home country and a foreign country both produce a manufactured good and a basic commodity called 'food'. Labour is the sole production factor, and the production technology of each good is the same for both countries. However, the existence of an efficiently operating market for knowledge-intensive producer services in 'Home' allows its producers of manufactures to use a variety of differentiated producer services as intermediate inputs in their production processes. Producers of manufactures in 'Foreign' do not have that opportunity as long as there is no international exchange in services products or services technology. In other words, with respect to the manufactured good, there is a *de facto* production technology difference between the two countries. Only upon the opening up to trade in services does this difference disappear as the producers of manufactures in Foreign can now make use of the imported producer services in their production processes.[2]

Inspired by the conceptual literature on trade in services,[3] we allow for two modes of trade in services: (i) in the goods-like sense and (ii) by means of foreign direct investment. This is in contrast to the analytic literature on trade in services, which focuses either on the first trade channel or on the temporary movement of the factor that provides the services. Moreover, there the central concern has been to explain trade patterns between countries that both use producer services in final goods production.[4] The setup allows us to investigate whether or not both countries gain from liberalizing trade in services. As we will show, both countries have conflicting interests with respect to how far to liberalize trade. Whereas opening up to trade in final goods leads to unambiguous gains for Foreign but mixed results for Home, opening up to trade in goods *and* services reverses this order. The results of trade in goods and FDI in services are truly mixed; depending on the exact mode by which FDI takes place, both countries may lose or gain.

The paper is organized as follows. Section I describes the production structure of Home, derives the production possibility frontier (PPF) and determines the autarky equilibrium. The PPF is second-best owing to a positive externality involved with the production of services, which is not taken into consideration by the producers of manufactures. Section II describes the economy of Foreign. Here the PPF is always first-best. In Section III we investigate how the difference in availability of producer services affects the trade pattern between the two countries. Section IV analyses trade patterns when trade in services is also allowed for. We thereby concentrate on free trade in services output and in final goods. Section V analyses three ways of modelling FDI in services when final goods are tradable. In Sections IV and V the welfare effects of trade and trade liberalization are examined. Section VI concludes.

I. The Home Country

Consider the economy of a country called Home that produces two final goods, manufactures (X) and food (Y), and take the latter as numeraire. The X-sector

consists of many small firms, each of which produces a manufactured good subject to constant returns to scale by means of labour, L_x, and a variety of differentiated producer services, S_j, according to the Dixit–Stiglitz (1977) approach. Upon aggregation, the production function of sector X can thus be given by

$$(1) \qquad X = L_x^{1-\alpha} \left(\sum_{j=1}^{n} S_j^{\gamma} \right)^{\alpha/\gamma},$$

where $0 < \alpha, \gamma < 1$.[5] Note that the differentiated producer services are imperfect substitutes for each other, as measured by the elasticity of substitution parameter γ. More specifically, firms delegate formerly in-house-provided activities to specialized outside producers. As such, cost advantages can be achieved as market conditions force the latter to produce more efficiently in comparison with in-house cost-centres. In Home, firms thus not only have the possibility to relinquish inputs to an external source, but also are equipped with the knowledge necessary to transform the new input mix into a final output.

The production of services requires labour only and is characterized by a fixed cost F and a constant marginal cost b, both expressed in terms of labour. The production technology of a services firm is thus given by

$$(2) \qquad F + bS_j = L_j \qquad j = 1, \ldots, n \text{ and } S_j > 0.$$

The existence of scale economies limits the production of each variety to at most one firm, charging the price v_j. If a single variety were to be produced by two firms, they would have to share profits. Hence there is always an incentive for one of the two firms to produce a new variety. Under monopolistic competition, and if the number of varieties is large, the elasticity of demand for producer services is constant and equal to $\varepsilon = 1/(1 - \gamma) > 1$.[6] Equilibrium in the services market is reached if marginal revenue equals marginal cost:

$$(3) \qquad \left(1 - \frac{1}{\varepsilon} \right) v_j = \gamma v_j = bw \qquad \text{for } j = 1, \ldots, n.$$

As a result, for a given wage rate, all suppliers of producer services charge the same price v_j and sell the same quantity of services S_j; i.e. $v_j = v_i = v$ and $S_j = S_i = S$ for all i, j.[7]

Producers of manufactures maximize profits by choosing the optimal input mix of services and labour, taking the number of services firms n, the relative price of good X, p, the wage rate w and the price of the services v_j as given, subject to production function (1). By using the information of the services market equilibrium, the first-order condition of profit maximization for a producer of good X is given by

$$(4) \qquad \frac{nS}{L_x} = \frac{\alpha}{(1 - \alpha)} \frac{\gamma}{b}.$$

Hence the service–labour ratio is fixed, which stems from the fixed mark-up of the price of a service over marginal cost (= wage cost associated with services) as derived in (3).

Equation (4) allows us to calculate the unit cost function of good X at given factor prices. For good X to be produced, unit costs must equal revenue p, yielding

(5) $Bwn^{-\sigma} \geq p$ with equality if $X > 0$,

where $B \equiv (1 - \alpha)^{-(1-\alpha)} \alpha^{-\alpha} (b/\gamma)^{\alpha}$ and $\sigma \equiv \alpha/(\varepsilon - 1)$. Obviously, an increase in the number of producer services, *ceteris paribus*, reduces the cost of good X and therefore enables a rise in the wage rate. In the following we will refer to (5) as the *relative cost equation* (R), which depicts a positive relation between the number of services firms and the wage rate, given the relative price p.

The production of food takes place under decreasing returns to scale (DRS), presumably because of the presence of a factor of production in fixed supply, say land. For the sake of concreteness, and in line with the specification of the production function for manufactures, we take

(6) $Y = A(L_y)^{\beta}$ $0 < \beta < 1$.

If, for notational convenience, we define $\delta \equiv 1/(1 - \beta)$, then it follows from profit maximization in the Y sector that labour demand is given by

(7) $L_y = (\beta A/w)^{\delta} \equiv L_y(w)$.

In the long run, new services firms enter the services market until the marginal services firm, and thus by symmetry all other services firms as well, breaks even. For $j = 1, \ldots, n$, we thus get

(8) $vS_j = wL_j = w(F + bS_j)$.

Combining the zero profit condition for the services sector with (3), the unit output of a single service firm is constant and equals

(9) $S = (\varepsilon - 1)F/b$,

which after substitution into (8) gives εF, the amount of labour per unit of services output. From (4) we obtain total labour employed in the services sector, nL_j, as

(10) $n(F + bS) = nF + [\alpha\gamma/(1 - \alpha)]L_x$.

Combining this expression with the full employment condition,

(11) $L_x + L_y + \sum_{j=1}^{n} L_j = L$,

yields the so-called *no-entry equation* (E), which determines the number of services firms in the economy:

(12) $n = \dfrac{\alpha}{\varepsilon F}[L - L_y(w)]$.

This is the second relation between the number of producer service varieties and the wage rate, given the relative price p. When taken together, the relative cost equation and the no-entry equation determine the equilibrium number of service varieties and the equilibrium wage rate, for given p, L and A. Both
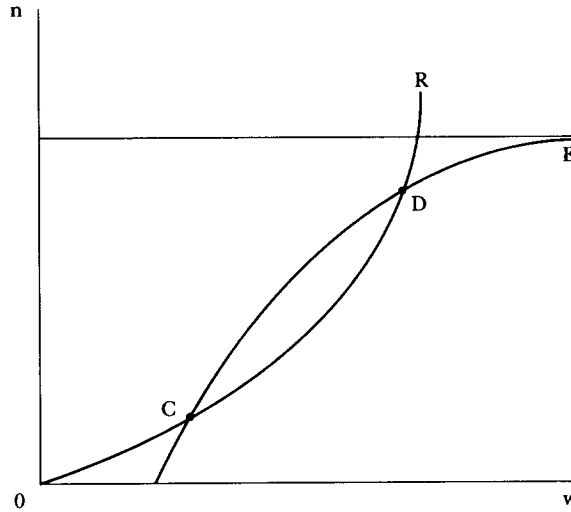
FIGURE 1. Production equilibrium, Home.

equations are depicted in (w, n)-space in Figure 1. The no-entry equation is always concave, while the relative cost equation is convex if and only if $\sigma < 1.$[8] The slope of the no-entry equation can be explained as follows: an increase in n requires additional labour for the services sector, which must be attracted from the food sector. Consequently, marginal productivity of labour in the food sector increases and the wage rate goes up. With respect to the relative cost equation, an increase in the wage rate increases the cost of producing X for given n and p. The only way to reduce costs and facilitate production of X again is to increase the number of services used, which is in line with the upward sloping R-curve.

As can be seen from Figure 1, there are generally two points of intersection of the relative cost curve and the no-entry curve, illustrated here by C and D. The answer to the question which of these two equilibria is operative will be resolved when we discuss the PPF of Home, where it will be shown to depend to a large extent on the value of the elasticity of substitution of producer services.

To close the model and determine the autarky equilibrium of Home, we assume Cobb–Douglas preferences. As a consequence, a fixed share of income, μ, is spent on manufactures, while the remainder, $1-\mu$, is spent on food. National income consists of total labour income plus the profits that arise in the Y sector, which are due to the DRS technology and can be interpreted as the remuneration for the factor in fixed supply.[9] Income thus becomes

$$(13) \qquad I(w) = wL + [Y - wL_y(w)] = wL + A^\delta(\beta^{\beta\delta} - \beta^\delta)w^{-\beta\delta},$$

and we derive the demand for manufactures (X^d) as a function of w and p:

$$(14) \qquad X^d(w, p) = \mu I(w)/p = (w/p)[\mu L + \mu A^\delta(\beta^{\beta\delta} - \beta^\delta)w^{-\delta}].$$

By using the production function, the first-order condition for profit maximization and the relative cost equation, we also derive the supply of X (X^s) as a

© The London School of Economics and Political Science 1996

function of w and p:

(15) $X^s(w, p) = (w/p)(L - L_y(w))$.

Similarly, the supply and demand functions for good Y are, respectively, $Y^s = A^\delta \beta^{\beta\delta} w^{-\beta\delta}$ and $Y^d = (1 - \mu)I(w)$. The market for X, and by Walras's Law the entire economy, is in equilibrium if and only if

(16) $w = A\theta^{1-\beta}[(1 - \mu)L]^{-(1-\beta)}$,

where $\theta \equiv \mu\beta^{\beta\delta} + (1 - \mu)\beta^\delta$. Given the equilibrium wage rate, the no-entry equation (12) gives us the equilibrium number of services firms, and, by using the relative cost equation (5), we subsequently arrive at the autarky price of manufactures.

   These results enable us to derive the PPF of Home, yielding all production combinations of manufactures and food for which the labour market is cleared, i.e.

(17) $X = B(\gamma/b)^\alpha(\alpha/\varepsilon F)^\sigma[L - (Y/A)^{1/\beta}]^{\sigma+1} \equiv f(Y)$,

with $f' < 0$. Note that we are dealing with a second-best PPF, as producers of X do not take into account the positive externality associated with the number of services varieties in the production of manufactures.[10] Moreover, given the ambiguous sign of the second derivative, the PPF is concave up to the unique inflexion point $\tilde{Y}$, which can be calculated to equal $A[(1 - \beta)L/(\sigma + 1 - \beta)]^\beta$, and is convex thereafter. In other words, from the inflexion point onward the influence of increasing returns to scale (IRS) in manufactures production dominates the curvature of the PPF.[11] Finally, the marginal rate of transformation (MRT) is given by $-f'(Y)$, while the marginal rate of substitution (MRS) is given by $1/p$ as there is no consumption externality. By using (6), (15) and (17), the ratio of both at the autarky equilibrium equals

$$\frac{MRT}{MRS} = \sigma + 1 > 1 \Leftrightarrow MRT > 1/p.$$

As a consequence, in autarky the economy will produce and consume too much food and not enough manufactures.[12] Figure 2 visualizes the PPF of Home.

   It is obvious that for stability reasons we would like the economy to be on the concave part of the PPF. It can be shown that this will be the case if, and only if, the following condition holds:

(K1) $\dfrac{\beta}{1-\beta}\dfrac{1-\mu}{\mu}\sigma < 1.$

This condition, which we will refer to as the *concavity condition*, is independent of the labour endowment and the productivity parameter (land endowment) A, and holds for a sufficiently high elasticity of substitution of producer services. The concavity condition also resolves our earlier question concerning which of the two equilibria in Figure 1 is operative. It can be easily checked that fulfilment of the concavity condition also means that the slope of the relative cost equation exceeds that of the no-entry equation. As such, any equilibrium on the concave part of the PPF corresponds to an equilibrium point like D in Figure 1, and *vice versa*.[13]
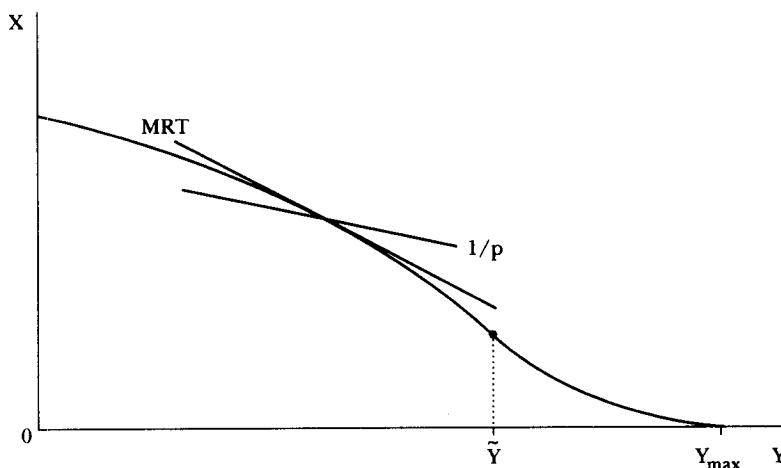
FIGURE 2.   The production possibility frontier of Home.

II. THE FOREIGN COUNTRY

In this section we analyse the economy of the other country in the world, Foreign, whose structure mimics that of Home except for one important difference: Foreign does not have an extensive producer services market. Any service necessary for the production of good X, which again takes place under constant returns to scale, has to be provided 'in-house':[14]

$$(18) \qquad X^* = L_x^{*(1-\alpha)} L_x^{*\alpha} = L_x^* .$$

The first part of the production function refers to labourers directly involved in the production of good X, while the second part refers to labourers engaged in activities that would have been delegated to services firms, had a services market existed. Obviously, as a result of this production function, the costs of producing one unit of good X in Foreign just equals the wage rate:

$$(19) \qquad c^*(w^*) = w^*,$$

and good X is produced if its price is equal to the wage rate, i.e. if $w^* = p^*$.

The production technology in the Y sector in Foreign is identical to that in Home. Hence

$$(20) \qquad Y^* = A^* L_y^{*\beta}, \qquad 0 < \beta < 1.$$

Consequently, the structure of income and labour demand in the Y sector are also the same as in Home:

$$(21) \qquad L_y^* = (\beta A^*/w^*)^\delta \equiv L_y^*(w^*),$$

$$(22) \qquad I^*(w^*) = w^* L^* + [Y^* - w^* L_y^*(w^*)].$$

© The London School of Economics and Political Science 1996

Straightforward calculations then show that the equilibrium wage rate, assuming that a share μ^* is spent on the consumption of manufactures, is given by

$$(23) \qquad w^* = A^* \theta^{*1-\beta}[(1-\mu^*)L^*]^{-(1-\beta)},$$

where $\theta^* \equiv \mu^* \beta^{\beta\delta} + (1-\mu^*)\beta^\delta$. The PPF for Foreign can then be derived analogously to that of Home, although the absence of a services sector leads Foreign to operate on its first-best PPF which is strictly concave to the origin.[15]

It must be emphasized that, despite the fact that Home can make use of a more efficiently working services market, the structure of the equilibrium wage rate equation is identical for both countries. Therefore, for otherwise identical countries, i.e. assuming that the supply of land, the fraction of income used on the purchase of good X and the size of the labour force are equal in Home and Foreign ($A = A^*$, $\mu = \mu^*$ and $L = L^*$, respectively), the equilibrium wage rate in autarky is the same: $w = w^*$. However, owing to the existence of a services market in Home, the price of good X will differ between the two countries. In fact, comparing (19) with the unit cost function of good X for Home reveals that the autarky price of good X will be lower in Home than that in Foreign if and only if

$$(K2) \qquad n > \left[\alpha \frac{\gamma}{b}(1-\alpha)^{(1-\alpha)/\alpha} \right]^{-[\gamma/(1-\gamma)]} \equiv \bar{n}.$$

This relation, which we will henceforth refer to as the *critical variety condition*, generally holds: (i) when services are at least of some importance in the production of good X, i.e. when α is not too low; (ii) when the marginal cost of services provision b is not too high, thus making services relatively attractive *vis-à-vis* hiring labour; and (iii) when γ is not too high, i.e. when the cost gains from an extra type of service are relatively high. Moreover, the knife cuts at both ends as the requirements listed also ensure a large value of n. Note also, however, that the requirements of a not too high γ and a not too low α are contrary to what is needed for the concavity condition of Section I to hold. Apparently, services must be important and diverse enough to yield cost advantages to Home's manufacturing sector, but such that Home operates on that part of its PPF which is similar to Foreign's PPF.

III. INTERNATIONAL TRADE IN GOODS[16]

The trade pattern that would occur if the two countries open up to international trade in goods is straightforward and follows directly from a comparison of the unit cost functions of both countries, (5) and (19). Hence, if everything is the same in the two countries and if the critical variety condition holds, Home exports manufactures and imports food.[17]

An intricacy involved in analysing trade in goods relates to the convex–concave nature of Home's PPF. As a consequence of that, the effect of a trade-induced change in the relative price of good X does not necessarily lead to the intuitively plausible trade and specialization patterns. It can be easily checked, however, that if the critical variety condition holds, any international price that lies in between the two autarky prices will lead to the expected trade

pattern if and only if Home is initially on the concave part of its PPF. More-over, it can then be shown that the international trade equilibrium is locally stable.[18]

The welfare effects of engaging in trade are analysed by making use of the direct utility functions. Following Markusen and Melvin (1984), we therefore totally differentiate both utility functions and divide through by $(1-\mu)U/Y^d$ and $(1-\mu^*)U^*/Y^{d*}$, respectively, to obtain two expressions that give a measure of the change in utility in terms of good Y:

(24) $dW = p\,dX^d + dY^d$

(25) $dW^* = p^*\,dX^{d*} + dY^{d*}.$

By making the relevant substitutions and taking into consideration the condition for balanced trade as well as the relation between MRT and p as obtained earlier, these two equations reduce to $dW = -\sigma\,dY^s + (X^s - X^d)\,dp$ and $dW^* = (X^{s*} - X^{d*})\,dp^*$, respectively. Given that the concavity condition holds, then, if the critical variety condition is satisfied, so that Home becomes a net exporter of manufactures $(X^s - X^d > 0)$, produces less food $(dY^s < 0)$ and witnesses a higher price for X than it would in autarky $(dp > 0)$, Home will gain from trade. If, however, the extent of the market for services is not large enough, so that Home becomes a net importer of manufactures, it follows that Home may well lose from trade, as then the production of the good that contains a positive externality shrinks. Foreign, in contrast, always gains from trade in goods, irrespective of the trade pattern that occurs. We summarize the results of allowing for trade in goods in the following proposition.

Proposition 1. Consider two countries, Home and Foreign, that are identical in all respects, except that Foreign lacks a market for producer services. If the extent of the market for services in autarky is large enough, i.e. iff $n_a \geq \bar{n}$, then in a locally stable trade equilibrium Home exports manufactures and gains from trade in goods. If the variety of services is below $\bar{n}$, then Home exports food and might lose from trade. Foreign always gains from trade in goods.

IV. International Trade in Goods and Services

The first issue to be addressed upon introducing international trade in services relates to the nature of such trade. On many occasions, and as widely noted in the literature on the conceptual issues of services trade, international trade in services requires either the movement of the producer of the service to the foreign consumer, or the movement of the foreign consumer to the home producer, or the movement of both. For example, in the case of producer services such as banking and advertising, often foreign direct investment (FDI) is the mode by which services trade takes place (see Hoekman 1994). However, it has also been noted that, especially in the case of knowledge-intensive producer services such as accounting and management consulting, services trade takes place in the traditional goods-like sense, that is without the (permanent) movement of either producer or consumer. It is unfortunate that the literature on the modelling of international services trade has largely ignored the issue of how services trade takes place. Services trade has generally been treated as commodities crossing country-borders. In this paper, however, we take

account of the different modes by which services trade takes place. In addition to analysing services trade in the goods-like sense, which is done in this section, we will later also focus on trade in services that require FDI.[19]

To introduce international trade in services in the current set-up, we recall our assumption that it is Foreign's lack of a services market that has prevented it from using services in the production of good X, and not a lack of technical sophistication. In other words, the technology of manufactures production in Foreign, once services are available from Home through trade, becomes the same as that for Home. Services trade, if it occurs, therefore always takes place from Home to Foreign, and as such there are three trade scenarios that can be conceived of: (i) Y and services tradable, X non-tradable; (ii) X and services tradable, Y non-tradable; and (iii) X, Y and services tradable. As it will appear that the effect on each country's welfare of trade in services is essentially the same for each trade scenario, we will confine ourselves to a discussion of scenario (iii), in which both goods and services are traded. First, however, we analyse how incorporating trade in services affects some of the basic relations of the model developed in the previous sections.

Given the assumption about Foreign's technology of manufactures production, we rewrite the production function of X for Foreign as

$$(26) \qquad X^* = (L_x^*)^{1-\alpha} \left[\sum_{j=1}^{n} (S_{jf})^{\gamma} \right]^{\alpha/\gamma},$$

where S_{jf} is the part of services output j produced in Home that is exported to Foreign (f). Thus, the total services output of producer j is divided between the demand of the domestic manufactures producer and its foreign counterpart,

$$(27) \qquad S = S_h + S_f,$$

where the subscript h refers to Home, and where subscript j has been omitted as the amount of services produced is the same for each variety. The demand for Home-produced services by manufactures producers from Foreign is derived from the first-order conditions and equals

$$(28) \qquad nS_f = \frac{\alpha}{1-\alpha} \frac{w^* L_x^*}{v},$$

thus depending on the wage bill of direct labour employed, $w^* L_x^*$, and the services price v. Note, in particular, that the ratio of labour to services is not constant for the Foreign producer of manufactures—in contrast to Home producers—because the price of services is a mark-up on Home wages, while the price of labour is denoted in Foreign wages. Equation (28) enables us to calculate the new unit cost function for good X producers in Foreign:

$$(29) \qquad B w^{*1-\alpha} w^{\alpha} n^{-\sigma} \geq p^* \qquad \text{with equality if } X^* > 0.$$

While Home's unit cost function does not change, Foreign's unit cost function now depends positively on both Home's and Foreign's wage rates, and negatively on the number of services, which indicates that the abolishment of

hindrances to trade in services also gives Foreign the opportunity to benefit from arm's-length services provision.

In Home, the amount of labour needed to produce a unit of services output does not change but total labour employed by the services industry alters as a result of additional foreign demand. By using (4), (10), (11) and (27), we obtain

$$(30) \qquad n = \frac{\alpha}{\varepsilon F} \left[(L - L_y(w)) + (L^* - L_y^*(w^*)) \frac{w^*}{w} \right]$$

as the new no-entry equation in Home. The first part of (30) denotes domestic demand for services and the second part, demand from abroad. It is easy to see that, in terms of Figure 1, the new no-entry equation always lies above the one in autarky.

The supply function of X for Home changes accordingly and becomes

$$(31) \qquad X^s = \frac{w}{p} \left[(L - L_y(w)) - \frac{\alpha}{1-\alpha} \frac{w^*}{w} (L^* - L_y^*(w^*)) \right],$$

whereas the demand function for X is still given by (14), owing to an unchanged expression for national income I. Similarly, the demand for and supply of food and manufactures in Foreign are given by

$$(32) \qquad Y^{*d} = (1 - \mu^*) I^*(w^*), \qquad Y^{*s} = A^{*\delta} \beta^{\beta\delta} w^{*-\beta\delta},$$

$$(33) \qquad X^{*d} = \mu^* I^*(w^*)/p^*, \qquad X^{*s} = (1 - \alpha)^{-1} w^* L_x^* / p^*.$$

Notice that for given p foreign demand for services reduces the supply of Home X production because more labour is required to match the additional demand for services. Therefore, less labour is left for the production of final goods, inducing the PPF to shift inward. However, trade in services also implies a larger variety of available producer services, causing a shift of the PPF outward. In this way, trade in services can be seen as reducing the distortive effect of the externality associated with the use of services in X production as it encourages the production of a larger variety of services than in autarky.[20] Also, Foreign's PPF shifts because of trade in services. Here, however, the positive productivity effect of having services at one's disposal is not countered by a decrease in labour available to final goods production so that Foreign's PPF generally shifts outward.[21]

The structure of the trade equilibrium consists of 11 equations, as contained in (5) and (29)–(33). Allowing free trade in services is reflected in Home's supply function of X and the unit cost function of Foreign. However, to have services at its disposal, Foreign has to purchase them from Home as it has no services market of its own. In the trade scenario that we will discuss—the one in which both final goods and services are tradable—the import of services is paid for by the export of either manufactures, or food, or a combination of both. A convenient property of this particular trade scenario, however, is that a moment's thought reveals that it is analytically the same as the trade scenario in which only manufactures and services are tradable. To see this, realize that in any international trade equilibrium in which both X and Y are traded, the

relative price of manufactures in each country must equalize. Upon inspection of the relative cost equations, it then follows that the wage rates, and hence labour employment in the food sector, will also be equal in the two countries. As this implies equal food production and national income as well, there will be no international trade in food and we can proceed as if Y is non-tradable.

The equilibrium conditions for Foreign, and by Walras's Law for Home as well, can then be summarized by

$$(34) \qquad p^*(X^{*^s} - X^{*^d}) - vnS_f \equiv 0 \qquad \text{and} \qquad Y^{*^d} = Y^{*^s}.$$

The first expression represents balanced trade—the export value of manufactures by Foreign must equal its import value of services—and the second expression gives market equilibrium for the non-traded good. As the equilibrium wage rate of each country is determined by market-clearing in the food sector, the expressions for w and w^* become exactly the same as those derived for the autarky equilibria of Sections I and II, a result that follows directly from the Y sector's property that it does not use services as an input in its production process. As a consequence, the expressons for Y, Y^*, L_y, L_y^* and L_x^* will also be the same as in autarky, just as each country's national income does not change. A comparison of (12) and (30)—the no-entry equations before and after trade—then immediately shows that as a result of trade the number of services doubles. Consequently, the relative price of X in Home decreases and income in terms of manufactures goes up so that demand for X increases. The effect of trade on the supply of X in Home is not clear though, owing to two counterbalancing effects that follow from the increase in the number of services. On the one hand, the doubling in services variety pulls labour away from the X sector, thus affecting manufactures production negatively, whereas on the other hand the increase in the number of services firms yields a positive productivity effect on X producers. Whatever the case, in view of the balance of payments condition, an increase in manufactures production will always be less than the demand increase.

It is now time to turn to the welfare effects of trade in goods and services. For Home these are unambiguously positive, as demand for food has remained the same whereas demand for manufactures has increased. More formally, for any level of food production (= consumption), the consumption of manufactures has gone up, thus yielding a consumption possibility frontier that always lies above the autarky one. The welfare effect for Foreign is not clear, though, as the increase in services variety leaves the effect on p^* undetermined. Thus, upon comparison of (19), the autarky unit cost function, and (29), the services-ridden unit cost function, it appears that unit costs go down only if the *critical variety condition* (K2) is satisfied, that is if the extent of the services market is large enough.[22] As we know that the move from autarky to trade leaves Foreign's income and demand for food unaffected, welfare increases only if demand for manufactures goes up. As this requires a decrease in p^*, Foreign gains from services trade only if the critical variety condition (K2) is satisfied. We note, however, that with the doubling of the number of services the fulfilment of (K2) will be more easily achieved than in autarky. Moreover, the fulfilment of the condition may be enhanced by first allowing for trade in final goods only, as this by itself can increase the extent of the market considerably (see Proposition 1). Finally, note that the ambiguity in the welfare effect for

Home that appeared in the previous section has now been handed over to Foreign. As such, the results so far point to conflicting interests with respect to the extent to which both countries are prepared to liberalize trade. We summarize our findings in the following proposition.

Proposition 2.[23] Consider two countries, Home and Foreign, that are identical in all respects, except that Foreign lacks a market for tradable producer services. Opening up to trade in final goods and producer services leaves both countries self-sufficient in food and doubles the number of services provided. Home exports services in exchange for manufactures and unambiguously gains from trade. Foreign's welfare increases if, and only if, the extent of the market for services is large enough, i.e. iff $n_t = 2n_a \geq \bar{n}$.

V. INTERNATIONAL TRADE AND FDI IN SERVICES

As mentioned in the previous section, a great many services are non-tradable, and international transactions in producer services often imply the movement of the services provider to the place where the service is being consumed, and as such entices FDI in services. This section analyses the extent to which, and under which circumstances, the inclusion of FDI in non-tradable services alters the conclusions of Section IV, where we considered services that were tradable in a traditional goods-like sense. To that purpose we discuss three ways of modelling FDI, referred to as the (free) transfer of technology scenario, the subsidiary scenario and the labour movement scenario.[24] Moreover, as in Section IV, we restrict the analysis to the case in which both final goods are tradable.

The (free) transfer of technology scenario
In the transfer of technology scenario it is assumed that FDI consists of Home services firms transferring their know-how to set up services firms in Foreign in return for the profits to be made there. The fixed and variable labour requirements for services provision abroad is entirely in foreign labour and identical to the requirements at home. Naturally, services firms in Home will continue to transfer technology until the profits from doing so are driven to zero so that the transfer of technology is free in equilibrium. Given that everything else is the same, Foreign thus becomes a replica of Home and the number of services firms, the wage rate and the relative price of manufactures will be the same in the two countries. Opening up to trade in final goods will therefore not result in any actual trade flows, just as Home's welfare is not affected by the transfer of technology. (Income and prices are the same as in autarky.) Welfare in Foreign might increase, however, which as before depends on the extent of the market in autarky. This is summarized in Proposition 3.

Proposition 3. Consider two countries, Home and Foreign, that are identical in all respects, except that Foreign lacks a market for non-tradable producer services. If services provision abroad takes place by a transfer of service technology, opening up to trade makes Foreign a replica of Home and leaves both countries self-sufficient in final goods. Home's welfare does not change, while welfare in Foreign increases if, and only if, the extent of the market for services in Foreign is large enough, i.e. iff $n_t^* = n_a \geq \bar{n}$.

The subsidiary scenario

In the subsidiary scenario we assume that FDI consists of Home services firms transferring their know-how by establishing subsidiaries abroad, which are to be operated by labourers from Foreign, but which do not involve additional fixed costs. As an example, one can think of a chemical cleaning company where the fixed cost represents investment in technical know-how to clean up appropriately, while the actual cleaning can be done by either domestic or foreign labourers following company guidelines. In a sense, the fixed costs are thus the costs of developing a new variety, as in Helpman and Grossman (1991). The subsidiary abroad faces an identical elasticity of demand and therefore charges the same mark-up over marginal production costs. The latter are in terms of Foreign labour, however, so that the foreign price for services is higher than in Home if, and only if, the wage rate is higher in Foreign than in Home. The subsidiary always makes (excess) profits as the price it charges exceeds marginal production cost, whereas it does not have to account for the fixed costs of production. These profits are repatriated to the company's headquarters in Home, where they are used to cover part of the fixed costs. Naturally, services firms in Home will enter the market until the profits of their worldwide operations are driven to zero, with in equilibrium domestic losses exactly compensated for by foreign profits.

What then are the effects of trade in goods and services in the subsidiary scenario? From the above, it is clear that in equilibrium Foreign must have a trade surplus to offset the stream of repatriated profits by Home. Moreover, in equilibrium prices must equalize between the two countries as we assume that both final goods are tradable. By the relative cost equation of each country, and given world market-clearing for Y, it follows that wages must equalize at the autarky levels so that the income of each country does not change and Y is *de facto* not traded.[25] Moreover, as it can be shown that the no-entry equation is given by (30) as well, the subsidiary scenario replicates the trade equilibrium of Section IV in that the number of services firms becomes exactly twice the autarky number. The intuition behind this result relates to the fact that with equal wages, and thus equal services prices, in the two countries it should not matter where the variable services production takes place.[26] The welfare effects of opening up to trade in goods and services are thus also the same as in Section IV, as a comparison of utility before and after trade would show. Proposition 4 summarizes the results.

Proposition 4. Consider two countries, Home and Foreign, that are identical in all respects, except that Foreign lacks a market for non-tradable producer services. If services provision abroad takes place by Home firms setting up subsidiaries abroad, opening up to trade leads to trade patterns and welfare effects that mimic those when services are tradable. Home thus imports manufactures and unambiguously gains from trade, while Foreign exports manufactures to offset the stream of repatriated profits, and gains, if, and only if, the extent of the market for services is large enough, i.e. iff $n_t = 2n_a \geq \bar{n}$.

The labour movement scenario

In the labour movement scenario we assume that the technical know-how associated with the production of services is embodied in the fixed component

of services labour, which is essential to setting up services firms abroad. To provide producer services in Foreign therefore Home labourers are required for the fixed-cost component while labourers from Foreign can provide the variable-cost component. We furthermore assume that Home labourers employed abroad are always being paid the higher of the two wages, and that income earned abroad is spent in Home.[27]

The effects of opening up to trade in both goods turn out to depend on the actual trade pattern that evolves between the two countries. Given that Foreign always imports services, the two obvious outcomes are that Foreign either exports food or exports manufactures.[28] The trade pattern chosen imposes a restriction on the wage rates in each country. For instance, if food is to be exported by Foreign, its wage rate must fall short of the wage rate at Home, as only then will the food sector's labour requirements in both countries comply with the desired trade pattern. As such, the choice of trade pattern also settles the wage rate that is being paid to those labourers of Home that have moved abroad to provide for the fixed-cost component of foreign services firms: if food is exported by Foreign (Home), then these labourers are being paid Home (Foreign) wages.

The calculations we made show that it is in particular the elasticity of substitution parameter γ that is of crucial importance in determining which trade pattern evolves.[29] To see how this is consistent with what we obtained above, let us conduct the following thought experiment. Suppose that the wage in Foreign is higher than that in Home, so that Foreign imports food and services, and exports manufactures. To be able to do so, Foreign needs to expand its manufactures sector, which requires a rise in services inputs. This is enhanced if services are relatively cheap *vis-à-vis* direct labour, i.e. if the mark-up over marginal costs is low, for which, as we know, a high level of γ is instrumental.[30] The results are summarized in Figure 3, which shows the numerically determined relation between the ratio of Home to Foreign wages, w/w^*, and the elasticity of substitution parameter γ, which lies between 0 and 1. The figure shows that, for values of γ in either the lower range or the higher
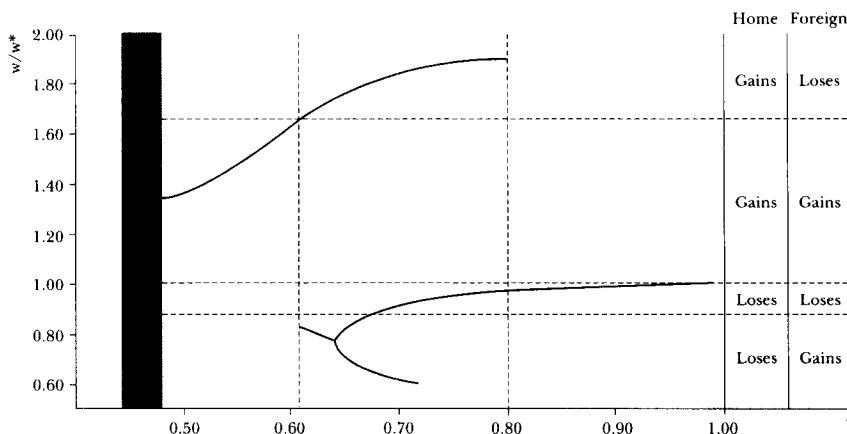

FIGURE 3.   Wage differentials and welfare effects.

range, a unique solution is obtained, but values in the middle range yield multiple equilibria.[31] The direct link between the trade pattern and the wedge in wages is not indicated in the figure, but we recall that if the wage rate at Home exceeds the wage rate in Foreign, Home exports manufactures and imports food, and *vice versa*.

The range of values of γ for which both trade patterns yield an equilibrium also marks the change in welfare effects. This is indicated in the columns on the right-hand side of the figure. It appears that outside the range with multiple equilibria the welfare effects are clear, and can be explained directly be means of the by now familiar 'extent of the market' argument. For instance, for a sufficiently high value of γ, Home imports manufactures and thus must have reduced its X sector considerably. Consequently, it has to forgo the beneficial effects associated with the services-induced IRS character of manufactures production. Though Foreign should derive benefits from this effect as it exports manufactures, it does not necessarily gain from such trade, as any such gain depends on the growth of the services sector (from scratch in autarky to some positive level now). Given the small change in wages in the higher range of γ, the ratio of both wages approximates the autarkic one; it follows that the number of labourers employed in the food sector approximates the autarky number so that the market for services will be too small to generate gains to Foreign. By applying similar reasoning, it can be verified that both countries gain from trade in goods and services once γ is sufficiently low.

The welfare effects inside the range of multiple equilibria can be explained by the 'extent of the market' argument as well. Starting with the trade pattern where manufactures are exported by Home, i.e. when $w/w^* > 1$, all values of γ in the range give rise to a positive welfare effect for Home and a negative effect for Foreign. Exporting manufactures thus always implies welfare gains for Home, as it then can reap the same IRS-related type of gains as alluded to in earlier trade scenarios. The welfare effects for Foreign are negative throughout the range, however, and only when γ decreases to a sufficiently low level also in Foreign is the extent of the market for services large enough to induce welfare gains. Something similar, but opposite, is going on when the equilibrium is such that it is Foreign that exports manufactures, i.e. when $w/w^* < 1$. In that case, a welfare-improving extent of the market can be reached only in Foreign, and that occurs once enough labour is pulled out of the food sector. Under this trade pattern, Home will never gain from trade in goods and services.

As the results in this trade scenario were derived mainly by means of numerical exercises, we abstain from summarizing the results of the labour movement scenario in the form of a proposition. We nevertheless want to emphasize that, in order to determine the welfare effects, it is the same basic message that sounds through: only if the extent of the market for services in a country exceeds some critical threshold level do welfare gains accrue. But there is one more important conclusion to be drawn from the welfare effects in this particular scenario, one that hints at policy implications. From the welfare effects in the figure, it appears that Home and Foreign have conflicting interests when it comes to the choice of trade pattern in the intermediate range of γ. If this is the case, it is conceivable that countries will engage in a distortive

game of favouring their own manufacturing sector in order to appropriate the welfare gains of trade in goods and services.

VI. CONCLUDING REMARKS

Countries generally differ in the extent to which producers in final goods sectors can make use of knowledge-intensive producer services, owing to differences in services market regulation, or because the provision of knowledge-intensive services requires a certain level of development. To investigate the structural difference of the producer services sectors on trade patterns and welfare, we develop a general equilibrium model in which two countries, Home and Foreign, are similar in all respects, except that in Home there is an efficiently operating market for knowledge-intensive producer services. Both countries produce two goods, manufactures and food, and, whereas Home manufacturers can establish efficiency gains by delegating specific tasks to outside services producers, Foreign initially lacks such a possibility and generally faces a comparative disadvantage in the manufactured good.

Opening up to trade in goods is not necessarily beneficial to both countries: whereas Foreign always gains, Home may lose if the extent of the market for services is not large enough. Opening up to trade in goods *and* services reverses this result. Now it is Home that always gains, whereas Foreign needs a sufficiently large number of imported services in order to gain. The results of trade in goods and FDI in services—services are often non-tradable—are truly mixed, and depend on the exact mode by which FDI takes place. We thereby distinguish between three ways of modelling FDI, referred to respectively as the (free) transfer of technology scenario, the subsidiary scenario and the labour movement scenario. In the first scenario it is the technology of services provision that is transferred from Home to Foreign—in return for the profits made in the Foreign services sector—so that in the trade equilibrium Foreign becomes a replica of Home-in-autarky. Consequently, welfare in Home remains the same *vis-à-vis* autarky, and Foreign gains only if the extent of Foreign's services market is large enough. In the second scenario, the transfer of technology takes place in the form of Home's services firms establishing subsidiaries in Foreign. It then follows that the welfare effects for each country are the same as if services are tradable, so that setting up subsidiaries for services abroad is a perfect substitute for trade. Home thus always gains, while Foreign gains only if the extent of the market for services is large enough. The distribution of the welfare gains changes dramatically if we consider the third scenario, in which it is assumed that the know-how required for the production of services is embodied in its fixed-cost component. As such, there is Home labour involved in the production of services in Foreign. It then appears that either country may win or lose from trade. In general, it is the country that in equilibrium exports the manufacturing good that gains from free trade. However, whereas this is a sufficient condition for Home to gain, in Foreign this is true only if the export of manufactures is accompanied by a large enough services market.

Finally, we hint at some policy implications of our analysis. First, as we have seen that the welfare effects of free trade in services qualitatively depend

upon the nature of the services involved, countries will differ in their prefer-
ences regarding the liberalization of each specific services category, irrespective
of whether or not they have a services sector. Consequently, in order to achieve
success, any negotiating procedure to liberalize trade in services must acknowl-
edge the fact that different types of services require different types of treatment.
Although this statement has been made before, so far it has lacked analytical
substantiation. Second, within the group of non-tradable services, it depends
on the particular mode of services provision to which country the welfare
effects accrue. As such, trade negotiations between a country with a producer
services sector and a country that lacks such a sector can be expected to take
a long time. Moreover, once such an agreement is reached, if it involves perma-
nent cross-border labour movements it is conceivable that countries will sub-
sequently engage in a distortive game of favouring their own manufacturing
sector, as it is this sector that is instrumental in order to seize the welfare gains
of trade liberalization.

ACKNOWLEDGMENTS

NOTES

1. To quote Markusen (1989, p. 85): 'Many producer services are both differentiated and knowl-
   edge-intensive. Knowledge intensity in turn suggests strong scale economies in that knowledge
   must be acquired at an initial learning cost, after which knowledge-based services can be
   provided at a very low marginal cost.'
2. This paper therefore implicitly acknowledges differences in production technology as a source
   of trade. See Bowen et al. (1987) for empirical evidence.
3. See e.g. Sampson and Snape (1985), UNCTAD and World Bank (1994) and, for a recent
   survey, Sapir and Winter (1994).
4. Exceptions are the contributions of Burgess (1990) and Jones and Ruane (1990), which come
   closest to our setup, in that they also emphasize the effects of these two trade channels with
   respect to welfare. In contrast to our analysis, however, they concentrate on producer services
   as intermediates produced with constant returns to scale in a perfectly competitive market.
5. In order to keep the analysis tractable, we abstract from using other inputs in the production
   function. See van Marrewijk et al. (1993) for a more general treatment involving, in particular,
   the use of capital.
6. See e.g. Helpman and Krugman (1985, ch. 6). Moreover, and as usual, we ignore integer
   problems.
7. Notice that the way we incorporate producer services in the model captures nearly all specific
   features that are usually associated with services: services are labour-intensive, involve a fixed
   cost in production along with some marginal cost, imply a unique exchange, and are differen-
   tiated products *par excellence* as the close interaction of producer and consumer at the time
   of services production implies. Only non-storability and the reputation aspect of services is
   not incorporated as we are dealing with a static model.
8. The fairness of $\sigma \equiv \alpha/(\varepsilon - 1) < 1$ becomes clear in the light of empirical estimates on the elas-
   ticity of demand as reported by Gasiorek et al. (1991). Using a similar framework, they found
   values for ε that ranged from 5·8 to 35 (a value for γ of at least 0·85).
9. Unless otherwise specified, the term 'income' always refers to income in terms of good Y.
10. The second-best nature of Home's PPF leads to a too large share of labour employed directly
    in the production of good X and therefore to a too low number of services. This becomes
    clear if we calculate the command optimum of the economy. A comparison of the command
    optimum outcome with the market outcome then shows that, while the market economy allo-
    cates $L_x = (1 - \alpha)(L - L_y)$ of the labour force directly to the production of good X, it is optimal

© The London School of Economics and Political Science 1996

to allocate $L_x = (1 - \alpha)(L - L_y)/(\sigma + 1)$ directly and use the remainder of the labour force for the production of services. As a consequence, the command optimum PPF will always lie to the right of the market PPF.

11. Given the value of the inflexion point, we can define the concave proportion of the PPF by the ratio $\hat{Y}/Y_{max} = [(1 - \beta)/(\sigma + 1 - \beta)]^{\beta}$, which depends only on the parameters α, β and γ. This proportion rises if the externality of the service sector becomes less important (through a fall in α or a rise in γ) or if the alternative use of labour generating the externality becomes less productive (β falls).

12. The optimal tax rate on food to correct for this shortcoming equals $\sigma = \alpha/(\varepsilon - 1)$ and depends positively on the marginal productivity of the services sector (α) and negatively on the elasticity of substitution between producer service varieties (ε). If we take, for instance, a moderate share of services in the production of manufactures, say 50%, and the elasticities of substitution found by Gasiorek *et al.* (1991), say $\varepsilon = 6$, we still need a substantial tax of 10% on the production of good Y to correct for the divergence between the MRT and MRS.

13. Intuitively this can be checked by looking at what happens if the relative price of manufactures rises. If the economy is on the concave part of its PPF, a rise in p leads to the required normal reaction in the sense that the production of manufactures increases. This can only be the case if labour employment in the X sector, and thus the variety of services, rises. The wage rate must therefore also rise in order to force food producers to dismiss labour. As in Figure 1 a rise in p takes the form of a shift of the R-curve to the right, equilibrium point D (not C) gives the required changes in n and w.

14. We will denote all variables relating to the foreign country by an asterisk.

15. The PPF of Foreign equals $X^* = L^* - (Y^*/A^*)^{1/\beta}$. Comparing this with the PPF of Home makes it clear that for identically endowed countries, which we will focus on in the rest of the paper, the presence of a services sector at Home does not imply that for any level of food production, the production of manufactures in Home is larger than that in Foreign. Although it is quite easy to derive a formal condition that settles this point, the only useful information such an exercise would disclose is the lack of a direct link with the concavity condition (K1).

16. The notational convention we will use throughout the paper when discussing international trade patterns is as follows. Unless otherwise specified, symbols always refer to international trade values. Only to prevent confusion do we occasionally add a subscript t to distinguish trade values from autarky values (denoted by subscript a).

17. However, once we allow for differences in either of the exogenous variables between the two countries, the trade pattern could as well be reversed, which would become clear by doing some comparative statics for both countries in autarky.

18. To investigate local stability, we consider the two expressions that together determine international equilibrium: $\dot{n} = g(EP) = g(\alpha(L - L_y(w)) - n\varepsilon F)$ and $\dot{p} = h(EDY + EDY^*)$ with $g(0) = h(0) = 0$, where $g'(0) > 0$ and $h'(0) < 0$. Whereas the former is in fact a simple reformulation of the no-entry equation, and tells us that in steady state the excess profits (EP) of the services sector must equal zero, the latter gives the requirement for dynamic stability in the world markets for goods ($EDY + EDY^*$ is the world excess demand for Y). A detailed description of the stability analysis is delegated to the appendix, which is available from Charles van Marrewijk upon request.

19. We must confess that earlier versions of this paper also ignored FDI as the prominent mode by which services trade takes place. We therefore express our gratitude to the anonymous referee for making the fruitful suggestion to incorporate FDI in the analysis.

20. The exact way in which Home's PPF shifts cannot be derived analytically, whereas it also depends on the trade pattern under analysis. See the appendix upon request for further details.

21. The PPF of Foreign can get a convex-concave shape like the PPF of Home. In fact, the particular form of Foreign's PPF becomes a mirror-image of the shape of Home's PPF in the sense that it is convex below some level of food production, and concave, if at all, only thereafter. This reflects the fact that the inclusion of services in manufacturing production does not pull labour away from the food sector directly, and involves a cost only in terms of imports. As a consequence, at low levels of food production, a decrease in production of manufactures by 1 unit does not release as much labour as it would at Home, so that in Foreign the IRS of the manufacturing sector dominates the DRS of the food sector for almost the entire range of food production. In fact, it can be shown that the trade-ridden PPF of Foreign will be convex all over as long as services are important enough in the production structure of manufactures. See the appendix upon request for further details.

22. This requirement is also a sufficient condition for the PPF of Foreign to shift outward as a result of trade in goods and services. Given that Y production remains the same, the trade-ridden PPF can be written as the multiplication of the autarky one by $(w_a^*/((1 - \alpha)p^*)$. As $(1 - \alpha) < 1$, the trade PPF therefore always exceeds the autarky PPF when $w_a^*/p^* > 1$, which is the case if the critical variety condition holds.

23. A similar proposition can be derived for the trade scenario with food tradable and manufactures non-tradable. Also in that case Home always gains from trade in services, whereas

Foreign might lose. The condition that settles the welfare effect for Foreign is in that case an augmented version of the critical variety condition (K2), the particular form of which makes it impossible to show whether it is more or less stringent than (K2).

24. Details of the calculations underlying the claims made in this section are delegated to the appendix that is available upon request.

25. The relative cost equation of Foreign is similar to Home's autarkic one: $Bw^*n^{-\sigma} \ge p^*$. Note that, because foreign services firms are subsidiaries, the number of services firms abroad is always the same as in Home.

26. The subsidiary scenario differs from the trade scenario of Section IV with respect to the X sector, however, as part of variable services production now takes place in Foreign. Consequently, at Home labourers that were formerly employed in the services sector will now be directly involved with manufactures production and the X sector will expand. This increase in Home production of manufactures is exactly offset by a decrease in the production of manufactures in Foreign, where an identical part of the labour force is transferred from the manufacturing industry to the services sector.

27. Whereas the former assumption has consequences for the way the model has to be adapted (see also n. 29), the latter assumption is not restrictive if both final goods are traded and therefore goods prices are equal across countries.

28. The outcome with Foreign exporting both goods cannot occur as this violates the full employment condition.

29. A numerical analysis was needed, as with both goods traded it is not possible to derive analytic outcomes for the equilibrium values of both wage rates. Moreover, the results have been obtained by combining the results of two separately performed numerical analyses, which differ in their presupposition with respect to which wage rate is to be paid to domestic labour abroad. For the complete analysis, we refer to the appendix that is available upon request.

30. Our thought experiment is confirmed if we start out by supposing that the Home wage exceeds the Foreign wage. Then there is no need for Foreign to boost the manufactures sector, and a low γ will do. Moreover, there is an incentive for Foreign to minimize the number of services used as the fixed-cost component in services production is paid the higher Home wage.

31. Values of γ lower than 0·48 are excluded from the figure as in that case the concavity condition (K1) is violated. Moreover, the values of the other parameters underlying Figure 3 are: $\alpha = 0·4$, $\beta = 0·6$, $\mu = \mu^* = 0·4$, $b = 1$, $F = 1$, $A = A^* = 1$, $L = L^* = 1000$.

REFERENCES

Bowen, H. P., Leamer, E. E. and Sveikauskas, L. (1987). Multicountry, multifactor tests of the factor abundance theory. *American Economic Review*, **77**, 791–809.

Burgess, D. F. (1990). Services as intermediate goods: the issue of trade liberalization. In R. W. Jones and A. D. Krueger (eds), *The Political Economy of International Trade*. Oxford: Basil Blackwell, pp. 122–39.

Dixit, A. K. and Stiglitz, J. E. (1977). Monopolistic competition and optimum product diversification. *American Economic Review*, **67**, 297–308.

Gasiorek, M., Smith, A. and Venables, A. J. (1991). Completing the internal market in the EC: factor demands and comparative advantage. In A. L. Winters and A. J. Venables (eds), *European Integration: Trade and Industry*. Cambridge University Press, pp. 9–30.

Grubel, H. G. and Walker, M. (1989). *Service Industry Growth*. Vancouver: Fraser Institute.

Helpman, E. and Grossman, G. M. (1991). *Innovation and Growth in the Global Economy*. Cambridge, Mass.: MIT Press.

—— and Krugman, P. R. (1985). *Market Structure and Foreign Trade*, Cambridge, Mass.: MIT Press.

Hoekman, B. M. (1993). New issues in the Uruguay Round and beyond. *Economic Journal*, **103**, 1528–39.

—— (1994). Conceptual and political economy issues in liberalizing international transactions in services. In A. V. Deardorff and R. M. Stern (eds), *Analytical and Negotiating Issues in the Global Trading System*. Ann Arbor, Mich.: University of Michigan Press, pp. 501–38.

Jones, R. W. and Ruane, F. (1990). Appraising the options for international trade in services. *Oxford Economic Papers*, **42**, 672–87.

Markusen, J. R. (1989). Trade in producer services and in other specialized intermediate inputs. *American Economic Review*, **79**, 85–95.

—— and Melvin, J. R. (1984). The gains-from-trade theorem with increasing returns to scale. In H. Kierzkowski (ed.), *Monopolistic Competition and International Trade*. Oxford: Clarendon Press, pp. 10–33.

Organisation for Economic Co-operation and Development (1992). *Industrial Policy in OECD Countries*, Annual Review 1992, Part 4. Paris: OECD, pp. 167–91.

——(1993). *Industrial Policy in OECD Countries*, Annual Review 1993. Paris: OECD.

SAMPSON, G. P. and SNAPE, R. H. (1985). Identifying the issues in trade in services. *The World Economy*, **8**, 171–82.

SAPIR, A. and WINTER, C. (1994). Services trade. In D. Greenaway and L. Alan Winters (eds), *Surveys in International Trade*. Oxford: Basil Blackwell, pp. 273–302.

UNCTAD and World Bank (1994). *Liberalizing International Transactions in Services*. Geneva: United Nations.

VAN MARREWIJK, C., STIBORA, J., VIAENE, J.-M. and DE VAAL, A. (1993). *Producer Services, Comparative Advantage, and International Trade Patterns*. Tinbergen Institute Discussion Paper no. TI 93-155, Tinbergen Institute, Rotterdam.