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# DYNAMIC EFFECTS OF TRADE IN FINANCIAL SERVICES


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An overlapping generations model is used to examine the dynamic implications of trade in financial services. The model highlights the role of finance, through capital accumulation, in the growth process. Emphasis is placed on the dynamic relationship between financial intermediation and the evolution of the capital stock. This relationship has positive implications for the paths of income and consumption and for the inter-generational distribution of income. The results provide formal support for the argument that liberalizing trade in financial services implies dynamic effects grounded in the basic sources of comparative advantage. [F11, F43]


## 1. INTRODUCTION

This paper formally examines some of the implications of trade in financial services, placing particular emphasis on the dynamic relationship between financial intermediation and the evolution of the capital stock. While the new growth theories highlight innovation and returns due to specialization, the emphasis in this paper on investment and capital accumulation seems appropriate in the present context. To put it succinctly, "Finance is the key to investment and hence to growth. Providing saved resources to others with more productive uses for them raises the income of saver and borrower alike."[1] Financial intermediation and brokering activities, broadly defined to include the finance, insurance, and real estate (FIRE) sectors, accounted for 7.4 percent of private sector employment and 7.5 percent of private sector payroll compensation in the United States in 1990. For sectors that facilitate the transfer of financial and physical assets, the redistribution of risk, and the functioning of payments mechanisms, the FIRE sectors place a non-trivial demand on the resources that they handle.

While there has been a great deal of recent interest in trade in services, there has little emphasis in the theoretical trade literature on trade in financial services. Cho (1988) does discuss some of the implications of trade in insurance services, while Francois (1993a) examines trade in financial intermediation services under imperfect competition. In general, though, the literature has instead been focused on three issues: the pattern of trade in services broadly defined (Bhagwati 1984a; Deardorff

*This paper solely represents my own opinions. It is not meant to represent, in any way, the views of any institution with which I may happen to be affiliated, particularly the WTO and its members.

[1] *World Development Report 1989*, p. 25

1985; Francois 1990a, 1993b; and Sampson and Snape 1985); the relationship of the services sector to returns due to specialization (Francois 1990b, 1990c; Markusen 1989, and Rivera-Batiz and Rivera-Batiz 1992); and the correlation between service prices and per-capita income levels (Bhagwati 1984b; Clague 1985; Falvey and Gemmell 1991; and Panagariya 1988).

Financial intermediaries provide a variety of important services related to the evaluation, administration and monitoring of loans and investments, risk sharing, the transfer of assets, and payment mechanisms. These activities are all critical to the operation and development of modern market-based economies. They have also been at the center of the policy debate on GATT-related liberalization of trade in financial services. However, while it is generally recognized that inefficient intermediation can lead to substandard investment and reduced rates of capital accumulation and development (see Baltensperger 1980; Baltensperger and Dermine 1987; Santomero 1984, 1989; and Walter 1988), the formal literature linking modern analyses of financial intermediation to the results of the older capital accumulation literature and the growth and development literature is itself fairly recent (Bencivenga and Smith, 1991; Greenwood and Jovanovic, 1990; Lacker 1990; King and Levine, 1993).

The results presented here formally demonstrate that trade in financial services offers the opportunity to benefit, in both a static and dynamic sense, by expanding an economy's opportunity set. Of course, such opportunities must be viewed in the broader context of issues related to financial restructuring and stability, and to government imposed financial market distortions. The remainder of the paper is organized as follows. Section 2 develops a simple overlapping generations model, explicitly incorporation financial intermediation as a determinant of the path of the capital stock. The implications of trade in services then are analyzed in Sections 3 and 4, while the paper is summarized in Section 5.

## 2. THE MODEL

In this section, a dynamic model characterized by overlapping generations, financial intermediation, and neoclassical growth is developed. The model consists of two generations. In any time period, one generation works, while the other generation is retired. The labor supply is thus determined by the size of the working generation, $L$. In the first period, workers save a share of their income, investing these savings in the real economy. At the end of the second period, retired workers then liquidate their portfolios and consume the entire proceeds, including rents earned on capital. Formally, there are two factors of production, capital and labor, designated $K$ and $L$. The economy produces a single good $Q$ using these factors.

### *The Structure of the Economy*

I present a simple story of financial intermediation. However, the exact



specification is not critical in the present context. Rather, in the model developed here, the important point is that the cost of these activities drives a wedge between the resources channelled into the investment process and the resources then embodied in the resulting capital. The literature on financial intermediation is extensive, and offers numerous alternative explanations for the phenomenon. Intermediation may, for example, result because of monitoring costs due to informational asymmetries (Diamond 1984, 1991; Leland and Pyle 1977; and Williamson 1987a, 1987b), or alternatively may simply be due to scale economies, as when investment projects involve high fixed costs or otherwise require large minimum amounts of capital, as in Freeman (1986).

At the beginning of each period, a heterogeneous class of entrepreneurs presents potential investment projects to investors, where each project requires $\Phi$ units of capital. Successful projects become production units. Each production unit $j$ then employs labor and produces in each period according to the production function

$$Q_j = f(L_j),\ \partial f / \partial L_j > 0,\ \partial^2 \partial L_j^2 < 0 \tag{1}$$

Time subscripts are suppressed.

Investors are assumed to be risk averse. In the absence of project evaluation, there is a known probability $\rho$ that a new project will be successful, meaning that the entrepreneur is able to organize another production unit for production of commodity $Q$. If an entrepreneur proves unsuccessful, his project is liquidated, and investors receive back $\mu\Phi$ of their initial investment $\Phi$, where $1 > \mu > 0$. The share $(1 - \mu)$ thus represents liquidation costs associated with failed projects. Investors can then take their remaining capital and again choose projects in which to invest. All agents are able to costlessly observe the actual success of a project once an investment has been made and the entrepreneur attempts to organize the production unit.

While the probability density function surrounding the quality of an entrepreneur's proposed investment project is universally known, we assume that individual agents must incur a cost of $\beta < \Phi$ units of the good $Q$ to determine ex ante whether or not an individual project will actually be successful. Thus, while investors know ex post what the merits of these projects are, they cannot observe with absolute certainty the future outcome of an investment opportunity before investment without incurring costs to evaluate the project. I assume that the expected loss for selecting a poor project without prior evaluation, which is $(1 - \rho)(1 - \mu)\ \Phi$, is greater than the expected costs necessary to identify a good project through evaluation. The expected cost of identifying a good project is derived by noting that, in reviewing Z projects, we can expect $\rho Z$ of these projects to be "good" ones. We expect to review $Z = (1/\rho)$ projects to find one good project. The expected evaluation cost therefore is $\beta Z_l = \beta/\rho$. Given the condition $(1 - \rho)(1 - \mu)\ \Phi > \beta$ and the additional assumption of risk averse investors, equilibria emerge in which all investment is carried out through intermediaries who screen all proposed investments, each time incurring evaluation cost $\beta$ and rejecting poor projects. The expected marginal (=average) intermediation cost per unit of financial capital serviced is thus the constant per-unit-of capital project screening cost $\gamma$, where

$$\gamma = \left(\frac{\beta}{\rho\Phi}\right) \tag{2}$$

The economy is assumed to be large enough that the realized value of $\gamma$ can be treated as being effectively constant.

With competitive labor markets, the wage rate $\omega$ is determine through equation (1) and the relative supply of labor and capital:

$$\begin{aligned}\omega &= f'(L_j) \\ &= g(k) \;\; \textit{where } \partial g/\partial k > 0,\ \partial^2 g/\partial k^2 < 0\end{aligned} \tag{3}$$

For the moment, assume a steady population of size $L$. Total wage income $\Omega$ is then

$$\Omega = \omega L = L[g(k)] \tag{4}$$

Intertemporal preferences are logarithmic, so that savings are then

$$S = \bar{s}\Omega = \bar{s}L[g(k)] \tag{5}$$

where $\bar{s}$ is the savings rate.

*The Dynamics of the Capital Stock*

By assumption, retirees sell their existing portfolios to the younger generation, consuming the proceeds. The market value of these portfolios, and hence the amount of new savings devoted to consumption by retirees, depends on which of two states we are in. In the first, the supply of existing equity capital available for sale is less than the value of worker savings discounted by the cost of intermediation (i.e. we are below the steady- state level of capital). In this case, workers use their savings to purchase a mix of new and existing capital. The rate of capital accumulation will be



intermediated savings, net depreciation and the value of assets sold from the older to the younger generation. In this state, a unit of capital in a functioning production unit is worth $\alpha$ units of unprocessed financial savings, where

$$\alpha = (1-\gamma)^{-1} \tag{6}$$

Retirees are thus able to sell each unit of capital to the younger generation for $\alpha$ units of the consumption good. In the second state, where we are above the steady-state level of $K$, the supply of existing capital available from retirees exceeds the amount that could be produced if all savings were devoted to new capital formation. In this case, new savings go strictly to the purchase of existing capital, and the rate of capital accumulation is the rate of depreciation $\delta$. Formally, the rate of change in the capital stock will thus be

$$\begin{aligned}\dot{K} &= (1-\gamma)\,[\bar{s}Lg(k) - \alpha(1-\delta)K] - \delta K \\ &= (1-\gamma)\,\bar{s}Lg(k) - K, \textit{ if } K < K*\end{aligned} \tag{7a}$$

$$\dot{K} = -\delta K, \textit{ if } K > K* \tag{7b}$$

where $\dot{j}$ denotes the time rate of change in parameter J and * denotes a steady-state value. We know that $K = kL$ so that $\dot{K} = \dot{k}L$. Making this substitution, we thus have

$$\dot{k} = (1-\gamma)\,\bar{s}g(k) - k, \textit{ when } k < k* \tag{8a}$$

$$\dot{k} = -\delta k, \textit{ when } k > k* \tag{8b}$$

Equations (8) define the rate of change in the capital-labor ration over time, and hence implicitly define the time path of wage rates and income as well. We can map the two terms of equation (8a) as in the upper panel of Figure 1, where

$$Z_1 = (1-\gamma)\,\bar{s}g(k) \tag{9a}$$

$$Z_2 = k \tag{9b}$$

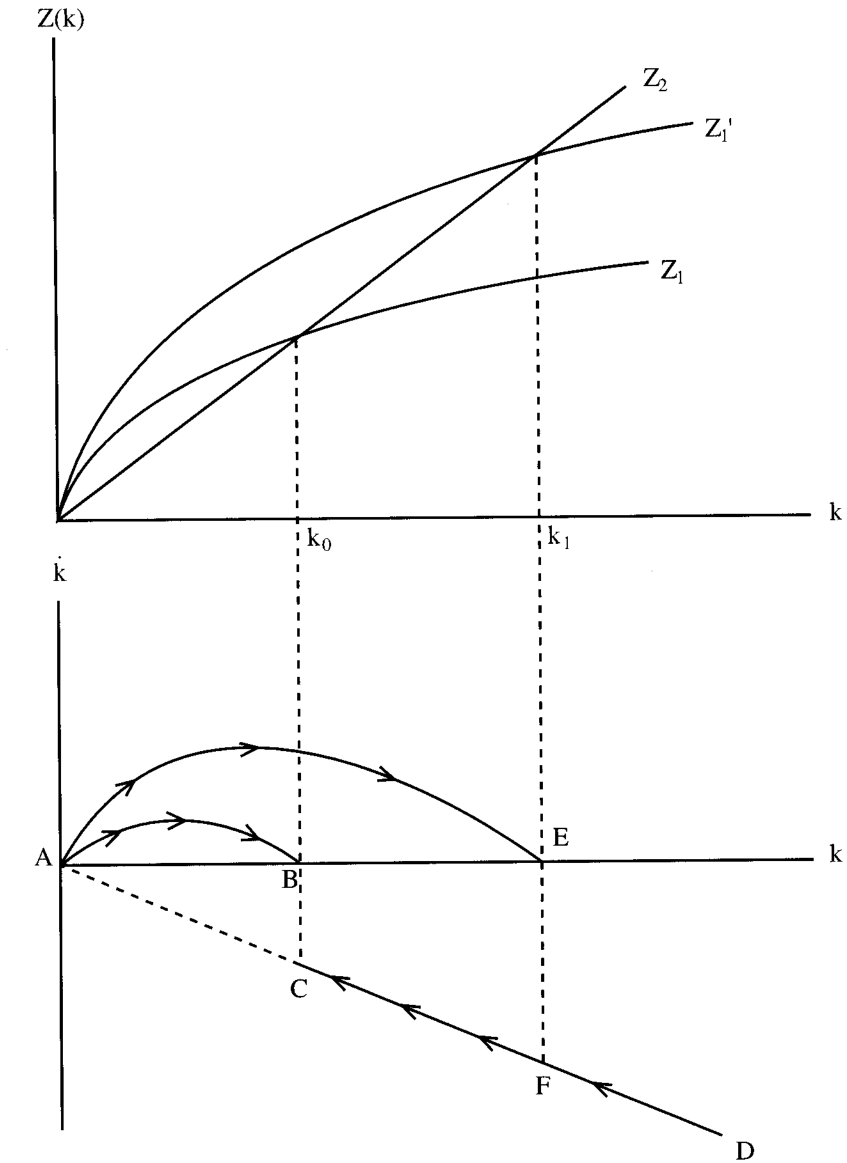


**Figure 1**



Measuring $\dot{k}$ as the the vertical distance between these two curves, and mapping (8b) as the line $-\delta k$, we can then plot the phase line ABCD presented in the lower panel of Figure 1. There is one unique, stable equilibrium where $\dot{k}$ equals zero.

## 3. TRADE IN THE STEADY-STATE

Consider a change in the cost of intermediation. For any decrease in the coefficient $\gamma$, the curve $Z_1$ shifts up to $Z_1$' in the upper panel of Figure 1. As a result, the phase line shifts to *AEFD* and the steady-state value of $k$ shifts from $k_0$ to $k_1$. Any exogenous change in the price of financial services, as will result following trade liberalization, generally leads to changes in the steady-state capital-labor ratio and thus to changes in the steady-state levels of income, consumption, and investment.

### *Trade in the Basic Model*

For importers, the opportunity to trade for services reduces the opportunity cost parameter $\gamma$ in Ricardian fashion, and as a result the curve $Z_1$ effectively moves to $Z_1$'. The steady-state level of $k$ increases to $k_1$. By importing services, a small country thus is able to achieve a bundle of consumption and investment goods beyond its autarky production possibility frontier.[2] For potential service exporters, the change in the steady-state level of capital that results from the introduction of trade is, in theory, ambiguous. However, under those scenarios that qualify as plausible, the introduction of trade also results in an increase in the steady-state level of capital for financial service exporters as well, and hence to an increase in the steady-state levels of income, consumption, and investment.[3]

[2]However, when we start below the autarky steady-state, these gains come at the expense of the generation that is retired when trade is introduced. Note from equation [6] that the sales value of existing capital depends, in part, on the opportunity cost of investing in new projects rather than purchasing equity in a functioning production unit. In other words, with a decline in the cost of intermediation, the sales price of equity capital must fall if it is to compete with the now relatively less expensive cost of funding venture projects. The effect is to reduce the market value of the equity stock held by retirees, which in turn reduces their consumption in retirement. This result obviously depends on the constraints in existing assest as well, the inter-generational redistribution effect should be diminished.

[3]For an exporter, we have $\gamma^* > \gamma$, such that the wage rate with the introduction of trade increases to $\omega = (\gamma^* / \gamma)\ g(k)$. By substituting into [9a] and recognizing that we need to replace $\gamma$ by $\gamma^*$ in the left hand side of equation [9a], it can be shown that an increase in the steady-state level of capital requires that

*Population Dynamics*

Next, consider the case of population growth. Assume population grows at a steady-rate $\lambda$, such that the current generation of workers also grows at the rate $\lambda$, Equation [5] then becomes

$$S = \bar{s}\Omega = \bar{s}L_0^{\lambda t}\,[g(k)] \tag{10}$$

where $L_0$ represents population in some base period. If we are below the steady-state level $k$, workers again purchase a mix of new and existing capital, and the rate of capital accumulation is intermediated savings, net depreciation and assets sold from the older to the younger generation. Noting that $K = kL + kL$, we thus have a condition analogous to equation [8a]:

$$\dot{k} = (1 - \gamma)\,\bar{s}g(k) - (1 + \lambda)k, \text{ when } k < k^* \tag{11a}$$

In addition, when we are above the steady-state level of $k$, new savings still go strictly to the purchase of existing capital, as reflected in [8b]. However, the decline in the level of $k$ is now driven by both the rate of depreciation and the growth in the population base. In particular, substituting $\dot{K} = \dot{k}L + \lambda k\dot{L}$ into equation [7b], we arrive at a modified version of equation [8b]:

$$\dot{k} = -(\delta + \lambda)k, \text{ when } k > k^* \tag{11b}$$

Qualitatively, the system defined by equations [11a] and [11b] is identical to that presented in Figure 1. Hence, as before, introducing or liberalizing trade in financial services leads to changes in the steady-state paths of capital, income,

$$X(\gamma^*) > X(\gamma), \text{ where } X(\gamma) = (\gamma - \gamma^2)$$

This condition holds as long as $\partial X/\partial\gamma = [1 - 2\gamma] > 0$, which is generally true as long as the net resource costs implied in the price of financial intermediation services amount to less that 50 percent of the resources channeled from savings into capital formation.



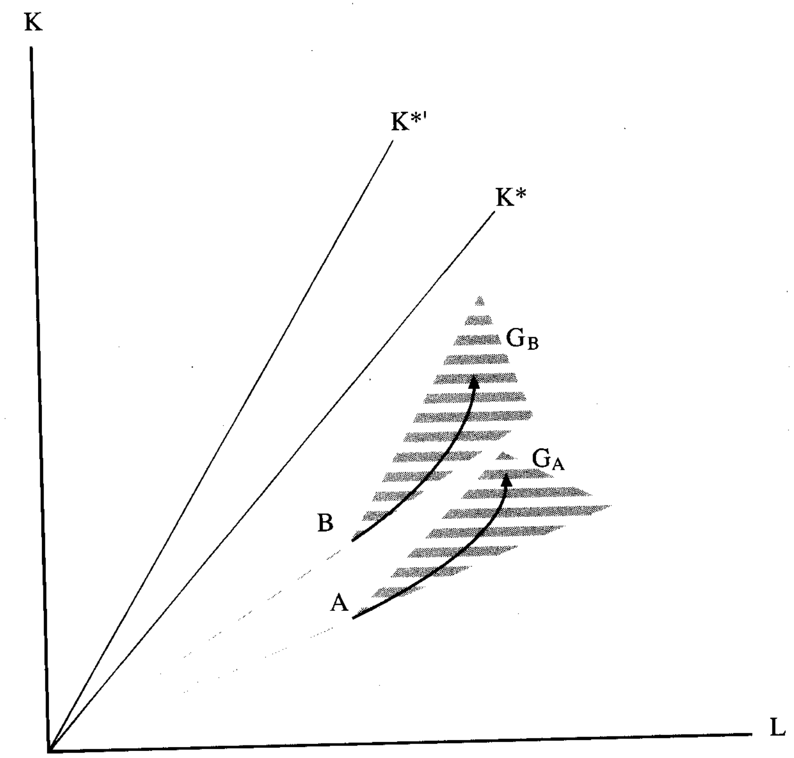


**Figure** 2

savings, and investment for the countries involved as described above. In addition, liberalization of trade in financial services again implies a transfer of wealth during the period of liberalization between the retired and working generations.

## 4. GROWTH

### Growth Paths

Given the dynamic characteristics of the model, an economy only converges asymptotically to the steady-state values discussed above. As a result, while the steady-state is, conceptually, a useful frame of reference, the growth path itself is of more immediate concern. In this regard, trade and trade liberalization imply higher growth paths. To demonstrate this point, consider Figure 2. In the figure, the line $K^*$

defines the steady-state capital-labor ratio. In autarky, over time, the economy will follow a path from point *A* (which defines autarky endowments at a point in time) that remains within the shaded region defined by Ray $R_1$, through point A and the origin, and Ray $R_2$,which is parallel to the equilibrium capital-labor ratio. (See Deardorff 1971). The introduction of trade means a level effect (a change in the starting level of capital for period *t*), moving the economy to some point like *B* rather than *A*. Since point *B* is above *A*, the set of growth paths in the shaded region around *B* is everywhere above the set around *A*. Since the shaded set of possible growth paths is redefined as the new endowment points evolve through time, the relevant set of endowments along growth path $G_B$ will always be above those associated with the autarky growth path $G_A$. The capital-labor ratio follows path $G_B$ instead of path $G_A$. This implies higher paths for incomes and consumption as well.

## The Geometry of Trade Equilibria

The evolution of equilibria in the steady state is represented in Figure 3 for the case of a Cobb-Douglas GDP function. In the upper panel of the Figure, ($Q_N$ /Q) is defined as the portion of output Q not allocated to financial intermediation. Financial services are scaled so that one unit of new financial capital requires one unit of intermediation *F*. The slope of the line from *A* (where $Q_N$ /Q = 1), to *B* (where $F = Q/\alpha$) is therefore $-\gamma$. The slope of ray *S* is defined by the share of total income allocated to savings. In particular, given $S = \bar{s}\theta Q$, we know that $F = \bar{s}\theta Q - K(1-\delta)\alpha$ (where $\theta$ is the labor share of income) and $Q_N = (1-\bar{s}\theta)Q + (1-\gamma)\bar{s}\theta Q + K(1-\delta)(\alpha-1)$. By simple manipulation, the slope of ray *S* is thus

$$dQ_N / dF = \left[\frac{(1-\bar{s}\theta) + (1-\gamma)\bar{s}\theta}{\bar{s}\theta}\right]. \qquad (12)$$

Finally, the ray *I* is determined by $\gamma$ and the rate of depreciation. Any particular set of equilibrium in the steady-state is represented by the intersection of the ray *S* and the line *AB*. Over time, the frontier *AB* shifts out with expansion of the economy, as measured by Q, with the path of equilibria defined along ray S by the intersection with the frontier at any given period. Finally, the capital stock evolves along ray *I*.

By simple manipulation, the dynamic picture in Figure 3 can be also reduced to a static representation of the general equilibrium conditions in any period of time. In particular, $Q_N$ and *I* can be scaled by total autarky output in the period, *Q*, as defined by current period resource endowments. Similarly, *K* can be scaled on the same basis. The result, presented in both panels of Figure 3, is a representation of the typical equilibrium. Panels 3a and 3b can then be interpreted as comparing autarky and trade equilibria for service importers and exporters. Consider the introduction of trade for a



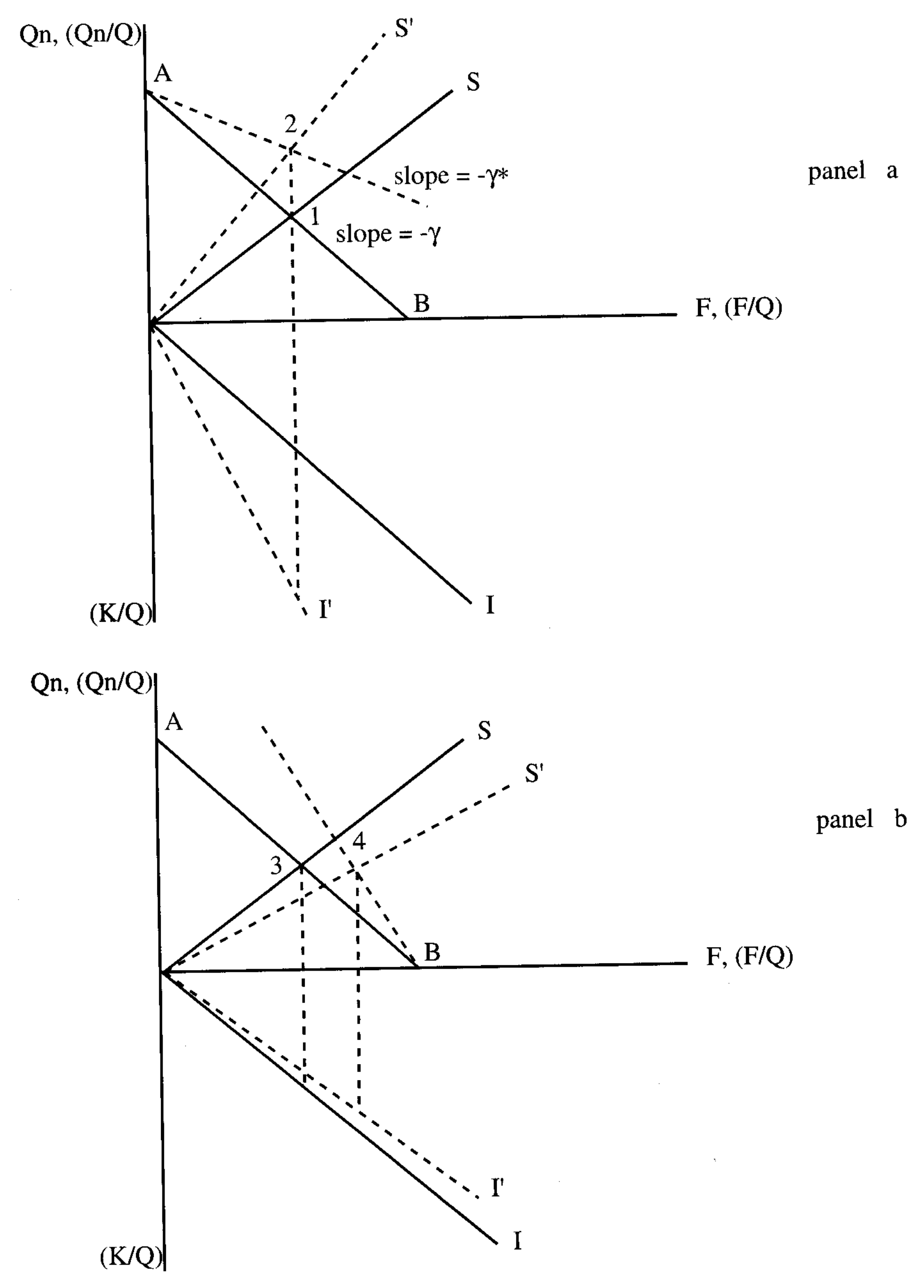


**Figure 3**

potential importer (where $\gamma > \gamma^*$). The positive implications are as follows. The financial service importer is able to trade along the price line $-\gamma^*$, rather than along line $AB$. At the same time, the shift from $\gamma$ to $\gamma^*$ causes a shift of ray $S$ to $S'$. Also, ray $I$ shifts to $I'$. The result is a shift in the set of steady-state equilibria from point 1 to point 2. At both equilibria, $(F/Q)$ is fixed by $\bar{s}$. Incomes and the capital/labor ratio rise as well. A similar story applies to panel 3b. A financial service exporter is also able to trade along the price line $-\gamma^*$. From [12], S shifts down. With the increase in income realized through trade, both $Q_N$ and $F$ increase relative to the autarky value of $Q$. The result is a shift from equilibria at point 3 to point 4.

## 5. SUMMARY

The efficiency and structure of financial sectors are important to the maintenance and augmentation of the capital stock, general economic activity, and economic growth. For this reason, the extension of liberal trading rules, such as those embodied in the GATT, to cover trade in financial services has significant and potentially far-reaching implications for the pattern of investment, the structure of financial markets, the working of payment mechanisms, and the transmission of economic disturbances across borders. However, there has been little formal analysis of trade in financial services, in this sense, in the theoretical trade literature. In this paper I have examined some of these issues, emphasizing the positive implications of trade in financial services for the evolution of the capital stock in the context of an overlapping generations model that explicitly incorporates a role for the financial sector. The results provide some formal support for the argument that liberalizing trade in services may imply dynamic gains grounded in the basic sources of comparative advantage.

There are of course numerous related issues that merit formal attention, but that at the same time are beyond the scope of the present paper. These include financial market structure (in an industrial organization rather than financial instrument sense) and financial market stability. Trade liberalization may create pressure for consolidation and closure of financial institutions as part of the rationalization process. As recent U.S. experience has demonstrated, imperfect deposit insurance schemes may imply adjustment costs that are borne by national treasuries, and hence ultimately by taxpayers. Such costs must be balanced against gains like those emphasized in this paper. Other matters related to trade in financial services worth formal exploration include trade in financial services with industries subject to increasing returns, the effect of trade in financial services on the evolution of comparative advantage and the pattern of trade, and the implications of scale economies within the financial sector itself. The transmission of real shocks through financial intermediaries linked through trade is also potentially important. This latter point goes beyond macro issues of gross capital flows, relating as well to the micro-foundations aspects of interantional finance.



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