Research Division Working Papers
U.S. International Trade Commission

Paper 92-08-A

Imperfectly Competitive Financial Markets and Financial Market Integration

Joseph F. Francois

April 1993
(revised)

The author is with the Research Division of the U.S. International Trade Commission. The views presented herein are stricity those of the author, and are not meant to represent those of the Commission or of and individual Commissioner.

Imperfectly Competitive Financial Markets
and Financial Market Integration

Joseph F. Francois
Office of Economics
U.S. International Trade Commission

April, 1993
(revised)

Abstract

This paper examines liberalization of trade in financial services and related implications of financial market integration under scale economies and imperfect competition. While risk-aversion yields preference for a variety of intermediaries, scale economies limit diversification. The model developed here allows for explicit analysis of deposit guarantees and other issues related to market uncertainty. Liberalization of trade, accompanied by liberalization of capital flows, may lead to long-run consolidation and restructuring among banks. Imperfect deposit insurance schemes imply associated adjustment costs that should be balanced against the benefits of liberalization. Phased liberalization does not necessarily smooth the adjustment process.

JEL Classifications:
F12 (Models of Trade with Imperfect Competition and Scale Economies)
F36 (Financial Aspects of Economic Integration)
G15 (International Financial Markets)

This paper represents my own opinions. It is not meant to represent, in any way, the opinions of the International Trade Commission or of any individual Commissioner. Thanks are due to Richard Boltuck, Keith Hall, Doug Nelson, Clint Shiells, Steve Suranovic, and the participants in an International Trade Commission workshop. All remaining errors are of course my own.

Address corrspondence to: Joseph F. Francois; Office of Economics; U.S. International Trade Commission; 500 E Street S.W.; Washington DC 20436; USA

Imperfectly Competitive Financial Markets and Financial Market Integration

Abstract: This paper examines liberalization of trade in financial services and related implications of financial market integration under scale economies and imperfect competition. While risk-aversion yields preference for a variety of intermediaries, scale economies limit diversification. The model developed here allows for explicit analysis of deposit guarantees and other issues related to market uncertainty. Liberalization of trade, accompanied by liberalization of capital flows, may lead to long-run consolidation and restructuring among banks. Imperfect deposit insurance schemes imply associated adjustment costs that should be balanced against the benefits of liberalization. Phased liberalization does not necessarily smooth the adjustment process.

1. Introduction

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 the functioning of payment mechanisms. In a sense, these sectors are at the core of modern, market-based economies. The rules governing trade in financial services, therefore, can have very real implications for the structure and stability of financial markets and for the related performance of market-based economies. However, while there has been a great deal of recent interest in trade in services, little attention has been paid in the formal trade literature to trade in financial services.[1] The literature has instead been focused on three issues: the pattern of trade in services broadly defined (Bhagwati 1984a; Deardorff 1985; Francois 1990a,1993; Melvin 1989; 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 1988,1992); and the correlation between service prices and per-capita income levels (Bhagwati 1984b; Clague 1985; Falvey and Gemmell 1991; and Panagariya 1988).

In this paper I examine the implications of financial market integration and the liberalization of trade in financial services. While the emphasis is placed on the integration of national markets, the framework developed can also be applied to regional market integration. A model is developed of an imperfectly competitive financial services sector. The model is similar, in reduced form, to the monopolistic competition models that have become standard in the trade literature, and most closely resembles the Chamberlinian monopolistic competition models characterized by Lancaster preferences. (See Lancaster 1980; and Helpman and Krugman 1985). While the reduced-form structure should thus be familiar to students of the new trade theories, this paper presents several innovations. First, preference for a variety of intermediaries is derived explicitly from the assumption that investors are risk averse and hence tend to diversify their holdings. The motivation of investor preference for variety thus differs in important ways from the Lancaster and Spence-Dixit-Stiglitz specifications of consumer preferences, being firmly grounded in the literature on risk-aversion. This allows for the explicit analysis of deposit guarantees, the probable failure of financial institutions, and other issues related to financial market uncertainty. It is also demonstrated in this paper that, given an aggregate preference for variety, the combination of scale economies in financial intermediaries and institution-specific uncertainty is enough to endogenously determine the structure of the financial sector, including the size and number of intermediaries in the sector.

One characteristic of current models of financial intermediation is that, in the presence of scale economies, the optimal size of intermediaries frequently tends to be infinite. At the same time, risk aversion and intermediary-specific uncertainty imply an incentive to diversify, and hence provide market incentive for a large (potentially infinite) number of intermediaries. However, the presence of scale economies effectively places a limit on the mechanism driving the number if intermediaries. One point of this paper is therefore that combining scale economies with an explicit specification of institution-

1. The exceptions include Cho (1988) and Francois (1992). Cho does discuss some of the related implications of liberalizing trade in insurance services in the context of imperfectly competitive domestic insurance markets, while Francois examines the dynamic relationship between trade in financial services and the growth of the capital stock. In response to GATT-based initiatives regarding services, there has also been a considerable amount of attention focused on these issues in the trade policy community. See Walter (1988), Hindley (1988), and Hoekman (1992a,b).

specific uncertainty balances these tendencies, yielding richer and more realistic results.[2] For the sake of tractability, this paper is focused on symmetric equilibria, characterized by identical cost structures and firm characteristics across intermediaries.

The remainder of the paper is organized as follows. In Section 2, I develop the basic model. Within the model, the size of individual intermediation firms, the number of intermediaries, the net return these firms pay to investors, and the variance on the return received by investors are all determined endogenously. I then discusses trade liberalization and deposit guarantees in Sections 3, 4, and 5. Results are summarized and conclusions are made in Section 6.

2. The Basic Model

Numerous theoretical explanations have been offered for the phenomenon of financial intermediation, and the exact justification for the existence of intermediaries is not critical to this paper. For example, intermediation may result because of monitoring costs due to informational asymmetries, as in Diamond (1984; 1991), Williamson (1987a,b), and Leland and Pyle (1977). Alternatively, intermediation may simply be due to scale economies. This may be because investment projects involve high fixed costs or otherwise require large minimum amounts of financial capital, as in Freeman (1986).

What is important for this paper is that intermediaries are subject to scale economies, and that there is some component of uncertainty that is intermediary-specific. With uncertainty that is associated with individual financial intermediaries, agents have an incentive to diversify over intermediaries. This incentive is constrained by scale economies within intermediaries. The recent evidence on scale economies includes Gropper (1991). For the United States, Gropper finds that the degree of scale economies increased over the

2. While it is well known that scale economies play an important role in financial markets, the theoretical literature on trade under imperfect competition has not focused attention on international banking and related cross-border financial transactions. For a discussion of the empirical literature on bank market structure, see Gilbert (1984) and Gropper (1991). Also see Hannan (1991).

1979-86 period of his sample. Deregulation and the technological developments which occurred in the 1970s and 1980s have made scale economies increasingly evident. His findings also suggest that recent regulatory changes may have given larger banks a distinct cost advantage, such that as a result "there may be increased cost pressures for smaller banks to become larger, either through mergers and acquisitions or through internal growth. This may lead to further consolidation pressures within the industry, and reductions in the overall number of banking firms." The theory-based results presented in this paper are consistent with the empirically-based observations of Gropper.

Assume a class of investors that are risk averse and are endowed with ξ_i units of financial capital ξ. They invest in the real economy through financial intermediaries. Also assume that investors are faced with institution-specific uncertainty about the performance of individual intermediaries. The rate of return on assets invested in the real economy is r^*, so that, in the event that there is no institution-specific shock, an intermediary pays a return of r^* less intermediation costs. However, there is also a known probability that a financial intermediary will be subjected to an institution-specific shock, at which point the investor will incur the cost γ per unit of financial capital invested, where $0<\gamma<1$. In cases where intermediaries concentrate their lending among certain regions, industries, or firms, such shocks may be due to underlying uncertainty regarding the economic health of the region or industry. Such a shock could also be due to underlying uncertainty in cases where intermediaries exist to pool assets and reduce risk associated with individual investments. Finally, as the recent Bank of Credit and Commerce International scandal and the ongoing U.S. deposit insurance crisis have reminded us, this may also be due to fraud and corruption within the institution itself. Whatever the specific reason, what matters for the present exposition is that there be some uncertainty associated with the performance of any intermediary.

One can interpret γ as the portion of financial assets (including earnings) allocated to cover the liquidation costs that must be borne by the investor if a failed intermediary is liquidated. Alternatively, the residual $(1+r^*-\gamma)$ can be interpreted as a guaranteed insurance level on deposits provided free by the government.

The Cost Structure of Intermediaries

Financial service firms are subject to increasing returns to scale. The cost C to intermediary j of providing financial services, is given by the equation

$$C = C(\xi_j)\ ,\ C'>0,\ C''<0. \qquad [1]$$

where ξ_j is the stock of financial capital serviced by intermediary j. The average cost of providing financial services is thus defined by the equation

$$\theta = C(\xi_j)/\xi_j = \theta(\xi_j),\ \theta'<0,\ \theta''>0. \qquad [2]$$

The ratio of average cost to marginal cost, which measures the degree of economies of scale is

$$\Phi = \theta(\xi_j)/C'(\xi_j) = \Phi(\xi_j),\ \Phi'<0,\ \Phi>1. \qquad [3]$$

Formally, the institution-specific risk of financial intermediaries is captured by the state of nature variable η_j. The variable η_j is defined as

$$\eta_j = \gamma\delta_j \qquad [4]$$

where γ is defined above, and δ_j is a random variable distributed as a point binomial which assumes the value 0 and 1 and has mean ρ_f and variance σ_f^2. The variable ρ_f thus represents the probability an intermediary "fails". The variable η_j enters into the expected rate of return on financial capital, and together with the resource cost of intermediation determines the actual rate of return on deposits. For the present analysis, shocks across institutions are assumed to be uncorrelated.

The rate of return to intermediaries on financial capital for a given project financed by a representative intermediary is assumed to be fixed at r*. The expected rate of return on deposits at a financial institution j is then a function of the random term η_j and of intermediation costs, and can thus be specified as

$$E[r_j] = r^* - E[\eta_j] - P_j = r^* - \gamma\rho_f - P_j\ , \qquad [5]$$

where P_j is the per-unit price of intermediation. With free entry and average cost pricing, P_j will equal $\theta(\xi_j)$.

The variance on the return on deposits at institution j is then given by

$$\sigma_j^2 = \sigma_f^2\gamma^2 \qquad [6]$$

The Elasticity of Demand for Financial Services

For the sake of tractability, the analysis is restricted to symmetric equilibria, where complete symmetry across financial intermediaries is assumed regarding institution specific risk and the cost of intermediation as measured by the function θ. In addition, investor preferences are specified in a mean-variance rather than expected utility framework. However the results are valid for a range of expected utility-based specifications as well. [3]

Given symmetry, in aggregate, the minimum variance achievable by investor i on his portfolio is defined by

$$VAR_i = \sum_{j=1}^{n}[\xi_{ji}/\xi_i]^2\ \sigma_j^2 = (1/n)\ \sigma^2, \qquad [7]$$

where the variance term defined by equation [6] is identical across firms.

Because investors are risk averse, they exhibit preference for a variety of intermediaries. This means that, if there were n intermediaries that offered an identical return, investors would prefer to spread their assets across all n institutions. This aggregate investor preference for variety gives individual intermediaries some market power, so that they are able to act as monopolists, even under free-entry conditions.[4]

3. In particular, under location and scale parameter conditions which hold in a broad set of circumstances, expected utility and moment-based specifications lead to consistent outcome rankings. (See Meyer 1987).

4. While intermediaries are able to exercise market power in setting returns, their ability to do so is limited by the threat of entry. In particular, the threat of entry (as is assumed in this paper), ensures that firms are unable to pay excessively low returns.

Consider an individual investor. When allocating funds ξ_i across j intermediaries, an investor seeks to optimize the objective function $I(E(R), \sigma_R^2)$, which is the investor welfare function defined in terms of mean return and the variance on that return. Formally, we have investors maximizing

$$I(E(R), \sigma_R^2) \text{ where } \partial I/\partial E(R)>0,\ \partial I/\partial \sigma_R^2<0 \qquad [8]$$

subject to the constraint $\sum_j \xi_{ji} = \xi_i$.

With symmetry, the portfolio characteristics, in turn, can be specified as

$$E(R) = [\xi_{1i}/\xi_i](\psi-P_1) + [\xi_{2i}/\xi_i](\psi-P_2) \qquad [9]$$

$$\sigma_R^2 = [\xi_{1i}/\xi_i]^2\sigma^2 + (n-1)[\xi_{2i}/\xi_i(n-1)]^2\sigma^2 \qquad [10]$$

where $\psi=(r^*-\gamma p_f)$ is the return earned prior to intermediation costs, ξ_{1i} is the financial capital invested by investor i in intermediary 1, ξ_{2i} is the financial capital invested by investor i in all other (identical) financial intermediaries, P_1 is the equilibrium price charged by intermediary 1, P_2 is the equilibrium price charged by all other intermediaries, and n is the total number of financial institutions.

The maximization problem for individual i is then described by the Lagrangian

$$\mathcal{L} = I(E(R), \sigma_R^2) - \lambda[\xi_{1i} + \xi_{2i} - \xi_i]. \qquad [11]$$

from equations [9], [10] and the first order conditions of [11], we can derive the the elasticity of demand for financial intermediation services, ε.

$$\varepsilon = |\,[(\partial I/\partial E(R))/(\partial I/\partial VAR)]((n-1)/2)(\sigma^2)^{-1}\theta(k)\,|. \qquad [12]$$

In equation [12], k is the (identical) amount of financial capital invested in each intermediary. The derivation of this term is discussed in the appendix. With identical investors, ε is the aggregate demand elasticity faced by an individual firm j in a symmetric equilibrium.

Note that, as n increases and k is held constant, the value of ε rises as well. In particular, given standard assumptions about I (i.e. standard convexity assumptions about the shape of indifference curves), the first term in brackets rises in absolute value as n increases. In addition, the term (n-1) obviously increases as n rises. Also note that as k

rises and n is held constant, ε falls. We thus have

$$\varepsilon = \varepsilon(n,k) \quad \partial\varepsilon/\partial n>0,\ \partial\varepsilon/\partial k<0. \qquad [13]$$

The Benchmark Equilibrium: Monopolistic Competition

As a reference or benchmark equilibrium, I first assume that financial markets are subject to free entry. This means that actual or potential entry forces intermediaries to price at average cost. However, for reasons noted above, they are also able to behave as monopolists and exercise some market power. With free entry and average cost pricing, the price of financial services is defined by equation [14], while the assumption that intermediaries set marginal revenue equal to marginal cost means that they price according to equation [15].

$$P = \theta(\xi/n)=\theta(k). \qquad [14]$$

$$P[1-(1/\varepsilon(n,k))] = C'. \qquad [15]$$

Finally, I assume that all financial capital is invested.[5] This means that

$$nk = \xi, \qquad [16]$$

Together, equations [14], [15], and [16] define the equilibrium conditions for financial markets. These conditions are presented graphically in Figure 1. In Figure 1, equation [16] defines the curve ξξ. The curve ZZ is defined by

$$[1-(1/\varepsilon(n,k))] = \Phi^{-1}, \qquad [17]$$

which is derived by substituting the zero profit condition (equation [14]) into equation [15]. Note that, as k increases, the left side of [17] falls while the right side rises. To maintain the equilibrium conditions implied by [17], n must increase by enough that the left side of equation [17] rises with Φ^{-1}. Thus, equation [17] defines a positive relationship between n and k. The ZZ curve is therefore drawn with a positive slope.

5. While beyond the scope of this paper, the framework developed here does offer the opportunity to examine the relationship of financial market structure and stability to money demand and the shifting of assets into and out of the real economy.

The intuition behind the positive slope of the ZZ curve is as follows. Points along the ZZ curve represent financial market equilibria for various total levels of financial capital. From any point on the ZZ curve, if we increase the amount of financial capital invested in financial institutions while holding the number of such institutions constant, the increase in scale leads to a decline in the price of financial services, because of scale economies. As a group, depositors are willing to "spend" some of this price savings on reduced risk, which is ultimately reflected in an increase in the number of financial institutions, and hence in the slope of the ZZ schedule.

The intersection of the two curves determines the size of individual financial intermediaries k and the number of financial institutions n. The rate of return to investors and the variance of this return are then determined through equations [9] and [10]. In general, as financial markets expand (as measured by the total stock of financial assets), there is an increase in both the size and number of institutions.

The Adjustment Process

The ZZ curve in Figure 1 defines two broad regions. Above the ZZ curves, financial intermediaries are incurring economic losses, while below the ZZ curve, financial intermediaries are earning economic profits. In particular, an intermediary's profit rate (as a share of deposits) will be

$$\pi = P - \theta(k). \qquad [18]$$

Combining this definition of profit rates with equation [15], and dividing by θ yields

$$\zeta = (\pi/\theta) = \{[1-(1/\varepsilon(n,k))]\ \Phi(k)\}^{-1} - 1, \qquad [19]$$

With zero economic profits, ζ is zero as well, and equation [19] collapses to the ZZ schedule, as defined by equation [17]. Otherwise, above/below the ZZ schedule, economic profits as defined by equation [19] will be positive/negative.

Since an economy is constrained to movements along the $\xi\xi$ schedule, the profit conditions defined by equation [19] ensure financial market stability under conditions

allowing entry and exit. In regions below the ZZ curve, economic profits induce entry, moving financial markets to equilibrium. Similarly, above the ZZ curve, losses serve as an incentive for mergers and exit. In cases where government restricts entry, the effect is to ensure some level of positive economic profits for financial intermediaries.

3. Financial Market Integration

The Large Group/Free Entry Case

This section examines the process of financial market integration, focusing on the integration of national financial markets. However, the analysis also applies to regional market integration such as that which would follow deregulation. Consider two economies, designated home and foreign. These economies have financial markets represented by the system of equations depicted in Figure 2. The integration of these two financial capital markets is assumed to involve the free participation of both financial institutions and investors in both economies. With free entry, as we integrate financial markets, the total number of financial intermediaries in the combined market is less than the sum of institutions in each individual market prior to integration. In terms of Figure 2, the national $\xi\xi$ curves, $\xi_h\xi_h$ and $\xi_f\xi_f$, are replaced by the combined curve $\xi'\xi'$. There is a corresponding increase in the scale variable k. As a result, investors gain through an increased return on their portfolios and reduced risk exposure. Note that, from a depositor's perspective, there is an increase in both the scale and number of financial institutions. The price of financial services falls, and depositors find that the value of their assets is now more stable. The increased choice only occurs because depositors can choose from institutions that call either country home.

While the long-run equilibrium results presented here suggest that investors gain in the long-run from liberalization, they also suggest a short- and intermediate-term adjustment process that may eliminate a number of existing financial institutions. In the long-run, allowing investors and intermediaries to have free access in both markets results in a consolidation among existing firms. While the financial firms that emerge ultimately from this process will be larger and relatively more efficient, there must presumably be a process of mergers, bankruptcies, and closures in the short- and intermediate-run. Given the recent U.S. experience with deposit insurance programs, this has obvious implications for the cost of administering such funds, and should be a consideration in evaluating the benefits of any liberalization process involving trade in financial services.

The Small Group/Limited Entry Case

Next, consider a small group or limited entry case. In such an equilibrium, there are significant positive economic profits in equilibrium. This may be because the integer constraint on intermediaries precludes entry of an additional firm without immediate significant economic losses. Alternatively, the regulatory environment may require a minimum bank size above free market levels, such as represented by k_M in Figure 3. As drawn in Figure 3, such a capitalization requirement, combined with restrictions on entry, imply continued economic profits even after economic integration (though there would be downward pressure on the level of such profits.) Thus, in contrast to the large group case, with a limited or small number of intermediaries, financial market integration does not necessarily imply consolidation and economic losses in the financial sector. However, in the equilibria drawn, it will force banks closer to average cost pricing. In more general terms, the process of adjustment, and its implications for profit margins, will depend on underlying constraints on entry and capitalization levels.

4. Deposit Guarantees

The implications of changes in deposit insurance schemes can be tracked as well within the analytic framework developed here. Consider, for example, an increase in the level of deposit guarantees provided by the government. A very real example of such a policy

change occurred in the early 1980s in the United States, when the U.S. raised its deposit insurance cap from $40,000 to $100,000.[6] In addition, in September 1984 the Comptroller of the Currency stated, in testimony before Congress, that some U.S. financial institutions were simply "too big to fail," and that there was no implicit deposit insurance cap at such institutions. This policy was reiterated a number of times through the 1980s. A similar set of events may now be unfolding in Japanese financial markets. Following the 1991 plunge in Japanese stock and real estate prices, Japanese government officials now find themselves making similar promises and ministrations.[7]

Such policy changes reduce the risks associated with the concentration of assets in a small number of institutions. With reference to equation [12], government guarantees on deposits imply an increase in the elasticity of demand for financial services, as depositors become relatively less concerned about risk, and show a greater willingness to move deposits in search of better returns.[8] As a result, such a policy change leads to a further reduction in service prices through concentration of assets in larger institutions. In terms of the ZZ-$\xi\xi$ system, the result is a shift in the ZZ curve in Figure 4 from ZZ to Z'Z', and a shift in market equilibrium from point A to point B as in the figure. In markets with relatively easy entry, (as the U.S. S&L markets arguably were in the early 1980s), the increase in deposit guarantee levels results in a process of bank closures and mergers that, ultimately, leads to a financial market equilibrium characterized by larger institutions and a greater concentration of financial assets, as at point B in the figure. As discussed in

6. The Congressional Budget Office has reported that, from 1934 through 1980, the real cap fluctuated in a range of between $40,000 and $60,000, measured in 1982 dollars. See Congressional Budget Office, Federal Deposit Insurance, (September 1990).

7. See Blustein (1992). Japanese regulatory practices virtually guarantee that there will be no failures. There has not been a Japanese bank failure since the mid-1930s.

8. If the guarantee increase is accompanied involves an increase in $\theta(k)$ to cover guarantee costs, the effects are somewhat ambiguous.

Section II, the adjustment process itself involves economic losses in the financial sector. Depending on the size of government guarantees, a share of such losses would ultimately be paid by the taxpayer.[9] Even if government restrictions on entry initially meant positive economic profits, if the initial equilibrium is along the shaded portion of $\xi\xi$ in Figure 4, the process of closure will still involve losses, and government guarantee payments will still occur.

As a final note on deposit guarantees, the guarantee level is a potential policy lever for manipulation of any pressure for adjustment following liberalization. In particular, while market integration generates pressure for consolidation, this can be moderated by a simultaneous *reduction* in deposit guarantees. The consequent shift in aggregate investor preferences, as represented by the shift in the ZZ schedule in Figure 2 to Z''Z'', would tend to counter the pressure for consolidation, as represented by the shift of the $\xi\xi$ schedule in the Figure.

5. Phased or Gradual Liberalization

It has been shown that financial market liberalization may lead to reduced bank profit rates and pressure for consolidation or exit of financial institutions. To deal with these pressures, agreements to integrate financial markets, like most trade liberalization agreements, usually involve a process of phased reduction of trade barriers, taxes on foreign institutions, and related restrictions. This section considers such a process of phased liberalization, involving free-flowing financial capital but taxes on the activities of foreign intermediaries in domestic markets. The effect of a phase-out of such taxes is examined. I assume that investor participation in the foreign economy is through foreign

9. It is worth noting that the resulting concentration also increases the variance of expected government payments to cover deposit guarantees. The analysis presented here illustrates graphically some of the forces behind the financial restructuring that actually took place in the Reagan years, and may highlight some of the origins of accompanying costs to the U.S. treasury. Related forces include the integration of regional financial markets in the United States in the 1980s.

intermediaries, and is thus subject to the trade taxes imposed on non-domestic intermediaries. For tractability, I adopt additional the assumption of two identical economies. Beginning from an integrated economy equilibrium like that depicted in Figure 1, assume a tax is in place on the fees of non-national intermediaries, such that the price perceived by home country investors for the services of foreign intermediaries is θ^*, where $\theta^* = (1+t)\,\theta$. Investors in the foreign country perceive the same mark-up for the services of home country intermediaries. The tax makes it relatively more expensive for investors to reduce the variance of their portfolios by investing through foreign intermediaries. As a result, assets are shifted (relative to the integrated equilibrium) toward domestic intermediaries in both countries. Even with full financial capital mobility, investors will exhibit habitat preference as long as trade in financial services is restricted by preferential taxes or other restrictions that result in relative cost differences.

While it is intuitively clear that such a tax scheme induces investors to exhibit a preference for domestic institutions, the effect of phasing out such restrictions on the actual structure of the financial sector itself is less obvious. In fact, at any given tax level, it proves to be ambiguous. Given a tax/tariff, the tariff-ridden elasticity condition is defined by the equation

$$\varepsilon = |((2+t)/2)[(\partial I/\partial E(R))/(\partial I/\partial VAR)]((n-1)/2)(\sigma^2)^{-1}\theta(k)\ |. \qquad [20]$$

This term is derived in the appendix. Note that, when t is eliminated, this collapses to equation [12]. However, in general, when the tariff rate is changed from some positive value t, the effect of this change on the elasticity of demand is ambiguous. This is because, while the first term $((2+t)/2)$ will obviously rise as t increases, the term $(\partial I/\partial E(R))/(\partial I/\partial VAR)$ rises or falls in absolute value at the same time.

To demonstrate the ambiguity in the change in $(\partial I/\partial E(R))/(\partial I/\partial VAR)$, consider Figure 5. In the figure, the opportunity locus for an investor is defined by the curve FD. Equilibrium is defined by a tangency with the iso-indifference curve I. This is a geometric representation of equation [8]. For a home country investor, the curve FD is defined by the equation

$$dE^*(R)/dVAR^* = [P^* t]/[2X_h - 1]2\sigma^{2*} \qquad [21]$$

where X_h represents the share of his portfolio allocated to domestic banks, P^* is the price charged identically by all banks domestic and foreign, and σ^{2*} is the composite variance on the return earned by investing either completely in domestic banks or completely in foreign banks. Equation [21] is derived from the two identities

$$E(R) = X_h(\psi - P^*) + (1-X_h)(\psi-(1+t)P^*) \qquad [22]$$

$$VAR = [X_h^2 + (1-X_h)^2]\sigma^{2*}, \qquad [23]$$

after taking derivatives with respect to X_h. With an increase in the tariff rate t, the opportunity locus shifts from DF to DF'. The new tangency of the opportunity locus with an iso-indifference (I) curve may occur on a steeper portion of an I curve, as drawn in the figure. The increased steepness of the tangency with the I curve implies a decrease in the absolute value of the ratio $(\partial I/\partial E(R))/(\partial I/\partial VAR)$, which equals $\partial VAR/\partial E(R)$ at the point of tangency. Thus, with an increase in the tariff rate, the first term in brackets in equation [A.13], $((2+t)/2)$ rises, while the second term, $(\partial I/\partial E(R))/(\partial I/\partial VAR)$ falls in absolute value when holding n constant. Hence the ambiguity.

In terms of the geometry of Figure 1, the ξξ curve remains stationary, while the ZZ curve may move up or down as the tax rate on non-national intermediaries is increased. This implies that a smooth phase-down of taxes on cross-border intermediation will not necessarily lead to a correspondingly smooth adjustment in the size or number of intermediaries as markets are integrated. This ambiguity results from the effect of tariff or tax rate changes on the elasticity of demand. Thus, while full financial capital market integration may result in pressure for bank closure and consolidation, this process will not necessarily be eased by a gradual phase-out of taxes on the foreign constituents of the financial services sector.[10.]

10. Presumably, this also implies that changes in discriminatory taxes or related restrictions on various classes of intermediaries will not necessarily result in predictable changes in the structure of the sector.

6. Summary and Final Comments

The extension of the General Agreement of Trade and Tariffs (GATT) to cover trade in financial services has been one of the more controversial and difficult elements of the Uruguay Round of GATT negotiations. Financial services have also been a prominent feature of the North American Free Trade Agreement (NAFTA) negotiations. Such efforts to extend international trade regimes to cover financial institutions highlight a number of important conceptual issues regarding the micro-foundations of international finance and the interrelationships between trade, capital flows, competitive financial market structure, and the international integration of financial markets. Cases like the NAFTA also highlight questions regarding the integration of financial markets with disparate structural characteristics. The issues raised straddle several camps of the economic literature, while resting squarely in none. At a minimum, these include the international trade and industrial organization literatures, with their emphasis on microeconomic analysis of trade and market structure, as well as the economic development and growth, international finance, and financial intermediation literatures. In this paper I have set out to examine some of these issues.

In this paper, I have examined financial market integration and trade in financial services under imperfect competition. With a financial market characterized by scale economies, risk-averse depositors, and intermediary specific uncertainty, the liberalization of financial services trade, including both liberalized financial capital flows and international banking, can result in a process of long-run consolidation and restructuring among intermediaries, under free entry conditions. When entry is regulated prior to integration, consolidation and exit may or may not occur. When pressure for consolidation and exit is generated, downward pressure is placed on bank profits as well. In the presence of imperfect deposit insurance schemes, any process of consolidation and closure implies short- and medium-run losses that should be weighed against the long-run benefits of trade liberalization. Changes in deposit guarantee regimes can themselves induce real changes in the structure of financial institutions, with associated guarantee costs for the governments involved. In addition, while complete financial integration implies consolidation and closure of financial institutions, this process will not necessarily be moderated by a tariff/tax scheme on financial capital flows or cross-border intermediation that involves a gradual reduction in taxes on foreign intermediaries. It is possible, given free financial capital flows, for such a scheme to actually increase volatility over some portions of the adjustment path associated with restructuring. With restrictions on the activities of foreign banks, the model also provides a formal explanation for habitat behavior on the part of investors.

The framework developed here can be extended in a number of directions, all beyond the scope of the present paper. Given the graphic example provided by the current condition of the various U.S. deposit insurance funds, (with a possible half-trillion dollar tax-payer bailout in progress), as well as ongoing EC concerns about the implications of financial market integration, a worthwhile and interesting extension of the present analysis would involve more formal examination of the implications of imperfect partial and full deposit insurance schemes for the adjustment process that follows the integration of regional or national financial markets. The possible integration of Mexican and U.S. financial markets under a NAFTA also begs an assessment of integration given very different sets of government regulations affecting the initial structure of the national financial sectors. Finally, because the rate of return and volatility of returns on real assets, as perceived by depositors, depends on the competitive structure of financial markets, another interesting application of the model developed here would be examination of the interaction of financial market structure, regulation, and exposure to institutional risk for the ultimate allocation of wealth between productive and nonproductive assets. Such an analysis would, most likely, highlight direct linkages between competitive financial market structures, financial market stability, and the stability of the real economy.

Appendix: The elasticity of demand for financial services

This appendix derives the elasticity of demand for financial services represented in the text by equation [12]. I focus on symmetric equilibria. Demand for the services of a given intermediary is measured by the amount of financial capital that is serviced by that intermediary. Formally,

$$F_j = \xi_j. \qquad [A.1]$$

where ξ_{ji} represents financial capital placed by investor i in intermediary j.

Now, consider an individual investor. I assume that, when allocating funds ξ_i across j intermediaries, an investor seeks to optimize the objective function

$$I(E(R), \sigma_R^2) \text{ where } \partial I/\partial E(R)>0,\ \partial I/\partial\sigma_R^2<0 \qquad [A.2]$$

subject to the constraint $\sum_j \xi_{ji} = \xi_i$.

The portfolio characteristics, in turn, are defined as

$$E(R) = \sum_{j=1}^{n} [\xi_{ji}/\xi_i][\psi - P_j] \qquad [A.3]$$

$$\sigma_R^2 = \sum_{j=1}^{n} [\xi_{ji}/\xi_i]^2\,\sigma^2, \qquad [A.4]$$

where ψ equals the expected rate of return paid (identically) by individual intermediaries, and P_j is the per-unit price of financial services. The term σ^2 is defined as the variance that applies (identically) to the return paid by each intermediary. With symmetry, these can be re-written as

$$E(R) = [\xi_{1i}/\xi_i](\psi - P_1) + [\xi_{2i}/\xi_i](\psi - P_2) \qquad [A.5]$$

$$\sigma_R^2 = [\xi_{1i}/\xi_i]^2\sigma^2 + (n-1)[\xi_{2i}/\xi_i(n-1)]^2\sigma^2 \qquad [A.6]$$

where ξ_{2i} is the financial capital invested by investor i in all other (identical) financial intermediaries. P_2 is the equilibrium price charged by all other intermediaries, and n is the total number of financial institutions.

The maximization problem for individual i is then described by the Lagrangian

$$\mathcal{L} = I(E(R), \sigma_R^2) - \lambda[\xi_{1i} + \xi_{2i} - \xi_i]. \qquad [A.7]$$

The first order conditions are

$$\partial\mathcal{L}/\partial\xi_{1i} = [\partial I/\partial E(R)][\partial E(R)/\partial\xi_{1i}] + [\partial I/\partial\sigma_R^2][\partial\sigma_R^2/\partial\xi_{1i}] - \lambda = 0 \qquad [A.8]$$

$$\partial \mathcal{L}/\partial \xi_{2i} = [\partial I/\partial E(R)][\partial E(R)/\partial \xi_{2i}] + [\partial I/\partial \sigma_R^2][\partial \sigma_R^2/\partial \xi_{2i}] - \lambda = 0 \qquad [A.9]$$

$$\xi_{1i} + \xi_{2i} - \xi_i = 0 \qquad [A.10]$$

From equations [A.5] and [A.6] we also know that

$$\partial E(R)/\partial \xi_{1i} = (\psi - P_1)(1/\xi_i) \qquad [A.5.1]$$

$$\partial E(R)/\partial \xi_{2i} = (\psi - P_2)(1/\xi_i) \qquad [A.5.2]$$

$$\partial \sigma_R^2/\partial \xi_{1i} = (2\xi_{1i}/\xi_i^2)\ \sigma^2 \qquad [A.6.1]$$

$$\partial \sigma_R^2/\partial \xi_{2i} = (2\xi_{2i}/\xi_i^2)\ (\sigma^2/(n-1)) \qquad [A.6.2]$$

By setting [A.8] equal to [A.9], we can derive the term

$$[\partial I/\partial E(R)][\partial E(R)/\partial \xi_{1i}]-[\partial I/\partial E(R)][\partial E(R)/\partial \xi_{2i}]$$

$$= [\partial I/\partial \sigma_R^2][\partial \sigma_R^2/\partial \xi_{2i}] - [\partial I/\partial \sigma_R^2][\partial \sigma_R^2/\partial \xi_{1i}] \qquad [A.11]$$

Rearranging this term, we get

$$[\partial I/\partial E(R)][\partial E(R)/\partial \xi_{1i}-\partial E(R)/\partial \xi_{2i}]=[\partial I/\partial \sigma_R^2][\partial \sigma_R^2/\partial \xi_{2i}-\partial \sigma_R^2/\partial \xi_{1i}] \qquad [A.12]$$

By substituting equations [A.5.1], [A.5.2], [A.6.1], and [A.6.2], we then have

$$[\partial I/\partial E(R)][(P_2-P_1)/\xi_i] = [\partial I/\partial \sigma_R^2][(2\sigma^2/\xi_i^2)][(\xi_{2i}/n-1)-\xi_{1i}) \qquad [A.13]$$

or identically,

$$\{[\partial I/\partial E(R)]/[\partial I/\partial \sigma_R^2]\}(P_1-P_2)](\xi_i/2\sigma^2)=\xi_{1i}-(\xi_{2i}/(n-1)) \qquad [A.14]$$

Note from equation [A.10] that

$$\xi_{2i}/(n-1) = (\xi_i-\xi_{1i})/(n-1).$$

Substitution of this term into equation [A.14] yields

$$\{[\partial I/\partial E(R)]/[\partial I/\partial \sigma_R^2]\}(P_1-P_2)](\xi_i/2\sigma^2)=\xi_{1i}(n/(n-1))-(\xi_i/(n-1))$$

Rearranging this term yields

$$\xi_{1i}=((n-1)/2n)(P_1-P_2)(\xi_i/\sigma^2)[(\partial I/\partial E(R))/(\partial I/\partial VAR)]]+(\xi_i/n). \qquad [A.15]$$

Taking the derivative of [A.15] with respect to P_1, we have

$$d\xi_{1i}/dP_1 = ((n-1)/2n)[(\partial I/\partial E(R))/(\partial I/\partial VAR)](\xi_i/\sigma^2). \qquad [A.16]$$

In deriving equation [A.16], several simplifications have been made by recognizing that, in a symmetric equilibrium, all derivatives with respect to P_1 in equation [A.8] except one are multiplied by $(P_1-P_2)=0$, and hence can be dropped from the expression.

To derive the symmetric equilibrium value of the elasticity of demand ε, multiply equation [A.15] by the term $(P_1/\xi_{1i}) = \theta(k)/(\xi_i/n)$. This yields

$$\varepsilon = |\,[(\partial I/\partial E(R))/(\partial I/\partial VAR)]((n-1)/2)(\sigma^2)^{-1}\theta(k)\ |. \qquad [A.17]$$

With identical investors, ε represents both an individual's elasticity of demand for the services of firm j and the aggregate demand elasticity faced by an individual firm j in a symmetric equilibrium.

With symmetric equilibria characterized by a tariff/tax by identical countries on the commercial activities of non-domestic or non-local intermediaries, equation [A.15] is then replaced by

$$\xi^*_{1i}=(1/2)((n-1)/2n)((1+t)P_1-P_2)(\xi_i/\sigma^2)[(\partial I/\partial E(R))/(\partial I/\partial VAR)]]+ \qquad [A.18]$$
$$(1/2)((n-1)/2n)(P_1-(1+t)P_2)(\xi_i/\sigma^2)[(\partial I/\partial E(R))/(\partial I/\partial VAR)]]+ (\xi_i/n).$$

where ξ^*_{1i} represents the average financial capital holding in bank 1 of one domestic and foreign investor in a symmetric equilibrium. Given equation [A.18], the tariff-ridden elasticity condition is defined by the equation

$$\varepsilon = |((2+t)/2)[(\partial I/\partial E(R))/(\partial I/\partial VAR)]((n-1)/2)(\sigma^2)^{-1}\theta(k)\ |. \qquad [A.19]$$

Note that, when t is eliminated, this collapses to equation [A.17]. However, in general, when the tariff rate is changed from some positive value t, the effect of this change on the elasticity of demand is ambiguous. This is because, while the first term ((2+t)/2) will obviously rise as t increases, the term $(\partial I/\partial E(R))/(\partial I/\partial VAR)$ rises or falls in absolute value at the same time.

References

Bhagwati, Jagdish N. "Splintering and Disembodiment of Services and Developing Nations." *The World Economy* 7, (1984a): 133-144.

_______. "Why are Services Cheaper in the Developing Countries?" *The Economic Journal* 94, (1984b): 279-286.

Blustein, Paul. "Proposal to Bail Out Japanese Banks Raises Public Furor." *The Washington Post*, (September 29, 1992), D1,D5.

Cho, Yoon Je. "Some Policy Lessons from the Opening of the Korean Insurance Market." *The World Bank Economic Review* 2, (1988): 241-254.

Clague, C.K. "A Model of Real National Price Levels." *Southern Economic Journal* 51, (1985): 998-1017.

Deardorff, Alan V. "Comparative Advantage and International Trade and Investment in Services." In Robert M. Stern, editor, *Trade and Investment in Services: Canada/U.S. Perspectives*, Toronto: Ontario Economic Council, (1985).

Diamond, Douglas W. "Financial Intermediaries and Delegated Monitoring." *Review of Economic Studies* LI, (1984): 393-414.

_______. "Monitoring and Reputation: the Choice Between Bank Loans and Directly Placed Debt." *Journal of Political Economy* 99, (1991): 689-721.

Falvey. Rodney E. and Gemmel, Norman "Explaining Service-Price Differences in International Comparisons." *The American Economic Review* 81, (1991): 1295-1309.

Francois, Joseph F. "Trade in Nontradables: Proximity Requirements and the Pattern of Trade in Services." *Journal of International Economic Integration* 5 (1990a): 31-46.

_______. "Trade in Producer Services and Returns due to Specialization under Monopolistic Competition." *Canadian Journal of Economics* XXIII, (1990b): 109-124.

_______. "Producer Services, Scale and the Division of labor." *Oxford Economic Papers* 42, (1990c): 715-729.

_______. "Dynamic Implications of International Trade in Financial Services." U.S. International Trade Commission Research Division Working Paper 92-08-A, (1992).

_______. "Explaining the Pattern of Trade in Producer Services." *International Economic Journal*, 7(3) (1993), 23-21

Freeman, Scott "Inside Money, Monetary Contractions, and Welfare." *Canadian Journal of Economics* 19, (1986): 87-98.

Gilbert, R. Alton "Studies of Bank Market Structure and Competition: A Review and Evaluation." *Journal of Money, Credit, and Banking* 3, (1984): 617-44.

Gropper, Daniel M. "An Empirical Investigation of Changes in Scale Economies for the Commercial Banking Firm, 1979-86." *Journal of Money, Credit, and Banking* 23, (1991): 718-727.

Hannan, Timothy H. "Foundations of the Structure-Conduct-Performance Paradigm in Banking." *Journal of Money, Credit, and Banking* 23, (1991): 68-84.

Helpman, Elhanan and Krugman, Paul R. *Market Structure and Foreign Trade.* MIT Press: Cambridge, 1985

Hindley, Brian "Service Sector Protection: Considerations for Developing Countries." *The World Bank Economic Review* 2, (1988): 205-224.

Hoekman, Bernard M., "Conceptual and Political Economy Issues in Liberalizing International Transactions in Services." in Alan V. Deardorff and Robert M. Stern (eds)., *Analytical and Negotiating Issues in the Global Trading System.* Ann Arbor: University of Michigan Press, (1992a), forthcoming.

_______., "Policies Affecting Trade in Services; A Review and Assessment of Principal Instruments," Discussion Paper No. 303, Institute of Public Policy Studies, University of Michigan, (1992b).

Lancaster, Kelvin "Intra-Industry Trade under Perfect Monopolistic Competition." *Journal of International Economics* 10, (1980): 151-175.

Leland, H. and Pyle, D. "Informational Asymmetries, Financial Structure, and Financial Intermediation." *Journal of Finance* 32, (1977): 371-387.

Markusen, James R. "Trade in Producer Services and in Other Specialized Intermediate Inputs." *The American Economic Review* 79, (1989): 85-95.

Melvin, James R. "Trade in Producer Services: A Heckscher-Ohlin Approach." *Journal of Political Economy* 97, (1989): 1180-1197.

Meyer, Jack "Two-Moment Decision Models and Expected Utility Maximization." *American Economic Review* 77, (1987): 421-430.

Panagariya, Arvind "A Theoretical Explanation of Some Stylized Facts of Growth." *Quarterly Journal of Economics* 103, (1988): 509-526.

Rivera-Batiz, Francisco.L. and Rivera-Batiz, Luis A. "Europe 1992 and the Liberalization of Direct Investment Flows: Services Versus Manufacturing. *International Economic Journal* 6, (1992): 45-58.

_______. "The Effects of Direct Foreign Investment in the Presence of Increasing Returns due to Specialization." paper presented at the Spring 1988 Meetings of the Midwest International Economics Conference, University of Minnesota-Minneapolis, 1988.

Sampson, Gary P. and Snape, Richard H. "Identifying the Issues in Trade in Services." *The World Economy* 8, (1985): 171-181.

United States Congressional Budget Office, *Federal Deposit Insurance*, Washington DC, (September) 1990.

Walter, Ingo *Global Competition in Financial Services*, AEI/Ballinger, 1988.

Williamson, Stephen D. "Costly Monitoring, Loan Contracts, and Equilibrium Credit Rationing." *The Quarterly Journal of Economics*, (February, 1987a): 135-145.

_______. "Financial Intermediation, Business Failures, and Real Business Cycles." *Journal of Political Economy* 95, (1987b): 1196-1216.

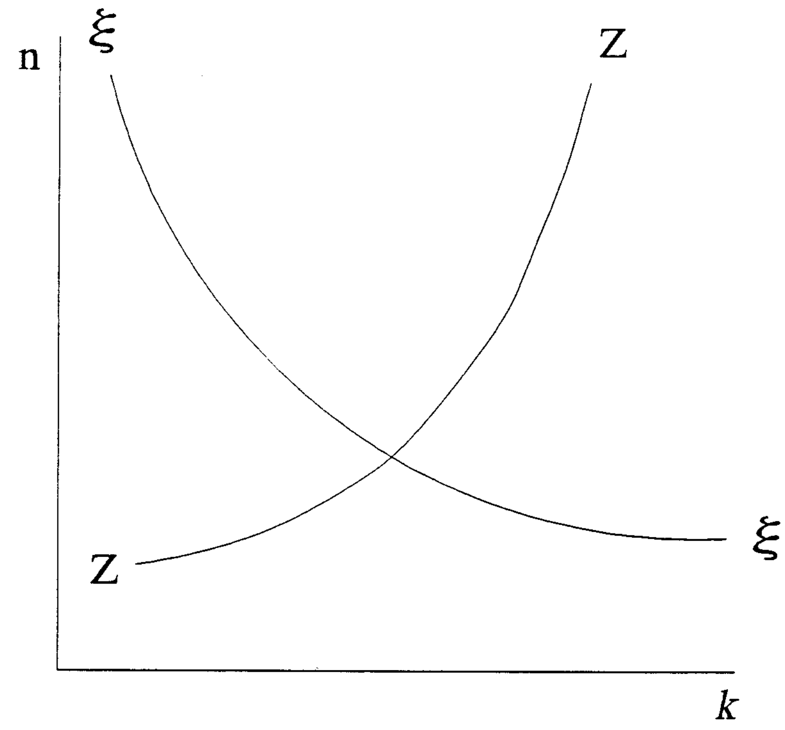

Figure 1

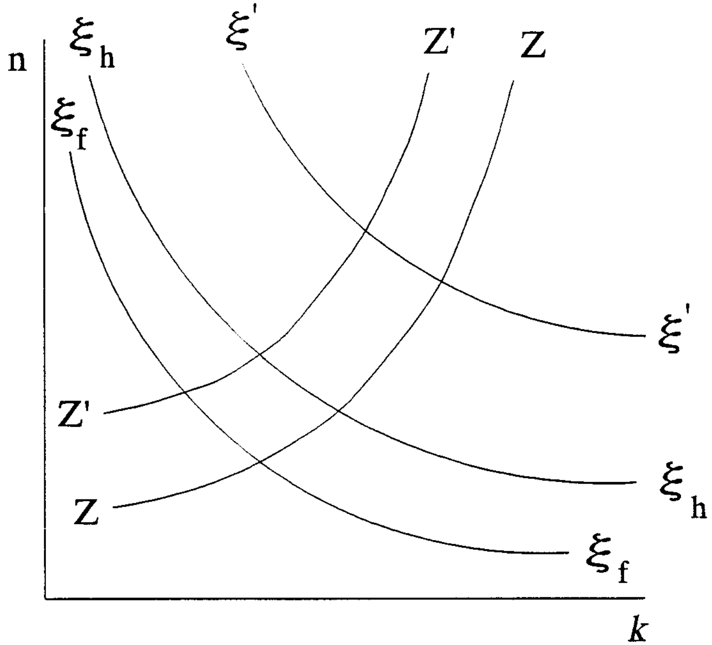

Figure 2

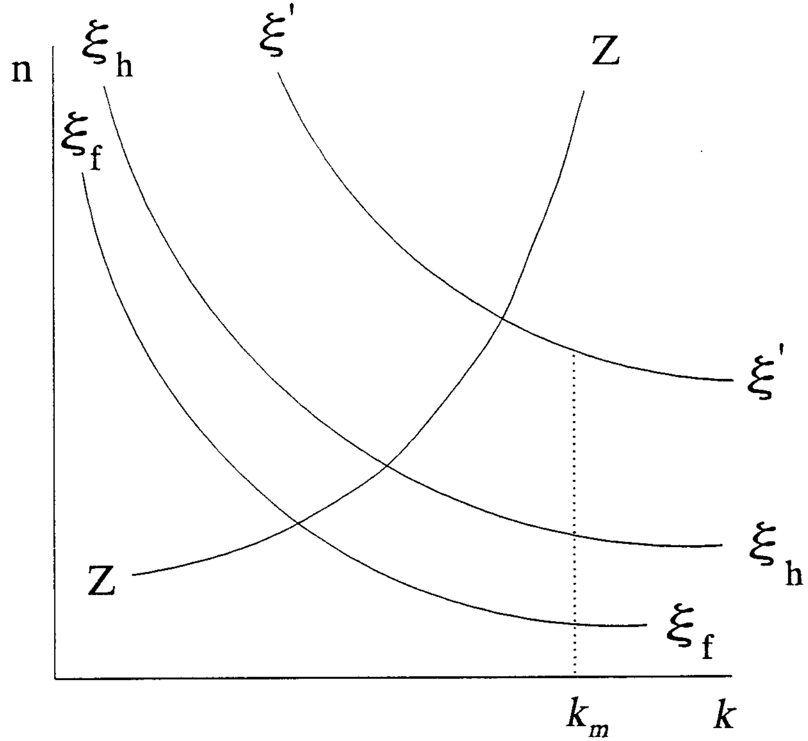

Figure 3

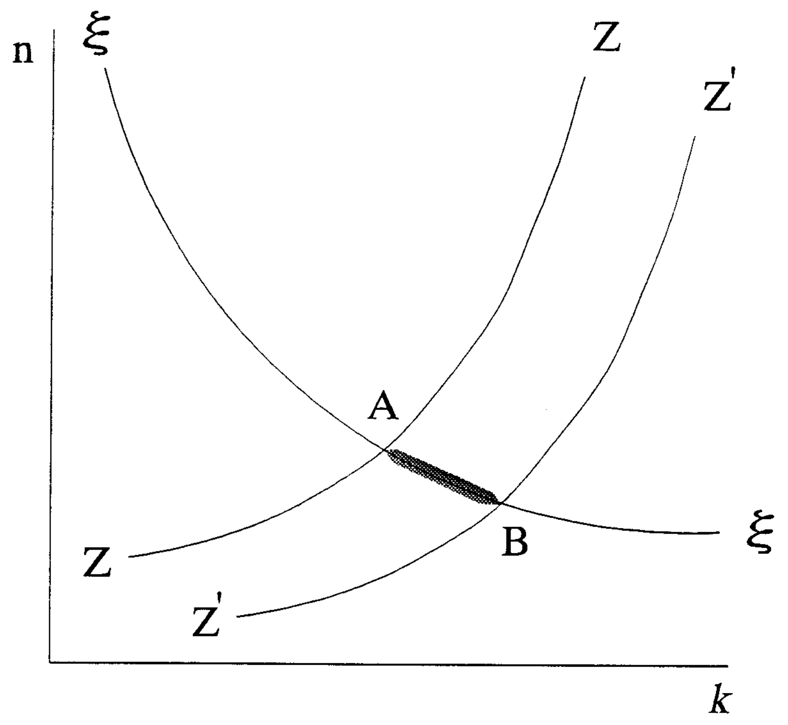

Figure 4

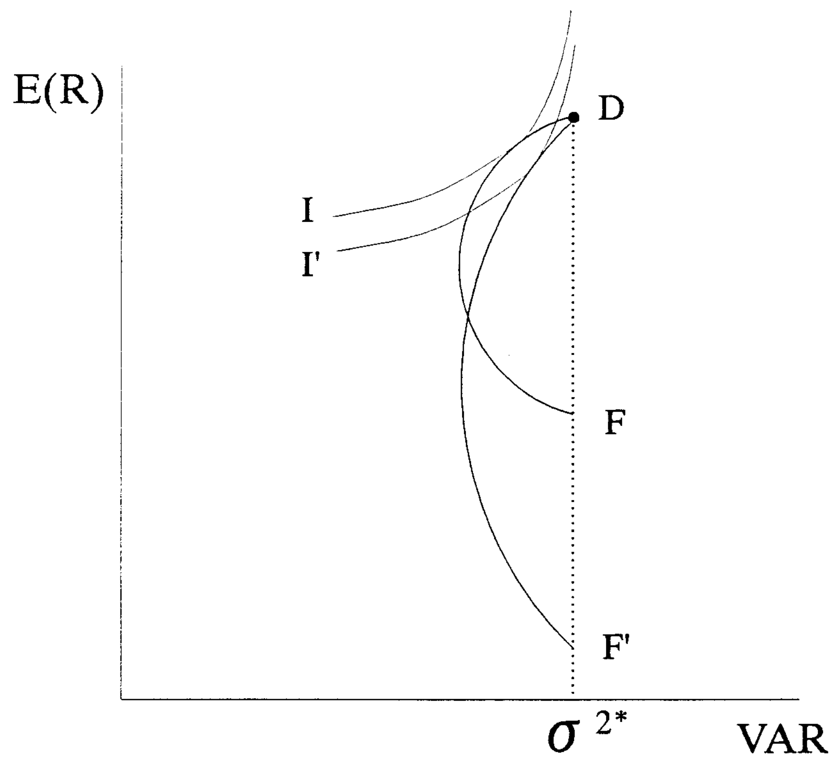

Figure 5