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FINANCIAL INNOVATIONS IN INTERNATIONAL FINANCIAL MARKETS

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ABSTRACT

The central theme of this paper is that financial innovation has become a major force effecting the United States and other developed economies. The common features of the process include product innovation, securitization, liberalization of domestic financial market practices, globalization of markets, and increased competition among financial institutions. The paper offers a review of the product and process changes that have occurred in international financial markets, an analysis of the factors leading to these changes, and an examination of the implications for both financial market participants and macroeconomic policy makers.

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I. Introduction

A wave of financial innovation begun in the early 1960s is now sweeping throughout the United States and other developed economies, producing major changes in the financial landscape. While the details of the process differ country by country, there are several common features including (i) Innovation -- the development of new financial products and markets, (ii) Securitization -- a greater tendency toward market-determined interest rates and marketable financial instruments rather than bank loans (iii) Liberalization -- of domestic financial market practices either through explicit deregulation or a breaking down of conventions, (iv) Globalization -- as national barriers erode and financial markets grow more integrated and (v) Increased competition among financial institutions with many of the traditional distinctions between commercial banks, investment banks and securities firms becoming blurred in the process.[1]

A major feature of this process has been the introduction of a wide variety of new products that trade in new market settings, thereby reducing the reliance upon banks for traditional credit instruments and credit evaluations. Many of these new products (e.g. currency and interest rate swaps, currency and interest rate options) are of obvious assistance for risk management purposes -- to enable the individual or firm to tailor the various dimensions of risk (e.g. currency, maturity, credit, interest rate, default, and so forth) more precisely than before. Other products (e.g. Note Issuance Facilities and Eurocurrency Commercial Paper) appear to directly reduce the cost of funding a desired financial position. The basic principles

underlying today's new financial products are being extended and re-applied to yield still more products.[2]

It is not an exaggeration to claim that these developments are having a profound impact on all aspects of the financial services industry. For individual employees, innovation has affected the job description of the typical bank "lending" officer at major money-center banks, the human capital needed to perform well and even the definition of normal business hours. At the level of the financial services firm, innovation has affected the geographic location of activities, the financial product line, the risks that are being traded or carried, the identity of the major players and the intensity of competition. Non-financial firms are faced with a vast array of financial choices -- new financial markets and products, each with their own risk and return properties -- that require increasingly sophisticated analysis. Naturally, all of these factors feed into macroeconomic performance. Policymakers and regulatory agencies are keen to understand the potential benefits (or costs) of these new products, new procedures and new players and to incorporate these new factors into macroeconomic policies and regulatory decisions.

The general theme of this paper is to provide a broad assessment of these recent developments surrounding financial innovation including their impact on financial stability and national policymaking. This theme suggests several basic questions:

i) What financial product and process changes have occurred over the last 20-25 years in U.S. and international financial markets?

ii) What factors account for these changes?

iii) What are the implications of these changes for individuals and the aggregate macro-economy from both a positive and policy perspective?

The purpose of this paper is to lay a foundation that will address these questions.

We begin in Section II by outlining the dimensions of the international financial marketplace. Data presented on the volume of activity in the Eurocurrency and Eurobond markets offer a good reflection of the general phenomenon in financial markets -- mushrooming volume, transforming markets once thought to be ancillary or for a specialized few into major centers of activity. Data on the extent of securitization and on trading in new risk management and funding vehicles (e.g. futures, options, and swaps) are also presented. Again the picture is one of securities or markets that were virtually non-existent a decade ago, but now have grown to substantial importance.

In Section III, we present an overview of the types of new financial products that are available and their functions. Several financial market innovations are described to illustrate their workings and recent evolution and to demonstrate how the products add value for market participants. These examples also illustrate how new financial products might be engineered from existing products. This is important to demonstrate that the new instruments need not add new price risk to the system, but by adding liquidity and new intermediaries, they may contribute additional credit or liquidity risks.

The causes of financial market innovation are explored in Section IV. We first consider the demand for financial market services in a "Perfect Capital Market" setting, and then argue that financial market innovations may be viewed as attempts to overcome real world market

imperfections. A distinction is made between imperfections that are man-made (e.g. taxes, regulatory barriers, and information disclosure) versus those that segment domestic markets and are naturally present (e.g. transaction costs, heterogeneous expectations, and heterogeneous consumption/investment/risk preferences). Innovations that overcome the former may directly thwart national economic policies, including useful prudential policies, while innovations that overcome the latter tend to increase economic (allocational) efficiency.

The implications of financial market innovation are discussed on two levels. First, in Section V, we examine the consequences of innovation on financial market prices, international price relationships and financing opportunities. Then in Section VI, we analyze the consequences of innovation for macro-prudential policy and broader macroeconomic policy.

On the markets side, innovations act to reduce the impact of market imperfections, whether man-made or natural. As a result, we should expect to observe greater capital mobility, greater similarity in the cost of funds in alternative capital markets, greater integration of international capital markets and greater substitutability among assets as a result of improved hedging opportunities.

On the policy side, there are two major concerns. One is whether recent innovations have the capacity to impose negative externalities on society. As stated above, innovations act to reduce the impact of markets imperfections, including those macro-prudential policies designed to improve welfare by safeguarding the financial system. One specific concern is that the innovative process has led to a kind of "regulatory arbitrage" with financial institutions attempting to lower

their costs and expand their activities by seeking out the least regulated environment. These shifts in activity have raised fears that innovation may increase the risk burden on financial institutions and adversely affect the safety and soundness of the financial system. These fears are compounded by the prospect of nations competing for financial services activity by further reductions in the regulatory burden.

Securitization poses another specific example of potential welfare losses associated with financial innovation. Securitization and the increased use of financial intermediaries place the burden of credit evaluation on a larger pool of participants; the increase in market linkages may itself be seen as a source of added risk. To some extent, this may be because the new instruments lack transparency (i.e. they are not well understood) and they have not stood the test of two or three business cycles. Increased reliance on the market system (i.e. adequate information disclosure of off-balance sheet items, marking-to-market of financial positions, and so forth) may provide an adequate remedy for some of these fears.

The second major policy concern is the impact of financial innovation on macroeconomic policies in general and monetary policy in particular. At one level, these concerns are operational. The availability of variable rate financing and hedging techniques makes the timing and incidence of monetary policy more uncertain. And related to this, the increasing ease of substitutability between assets and new techniques of obtaining credit may reduce the meaning and usefulness of traditional monetary and credit aggregates as indicators of monetary policy.

A more fundamental concern is that greater international mobility of capital and tighter integration of financial markets has altered the channels through which monetary policy works, ultimately threatening the welfare gains associated with international trade. Innovation appears to have reduced (to various degrees in different countries) the ability of authorities to adopt direct quantitative controls over credit or interest rate ceilings. With the effectiveness of the credit and controls channels reduced, it appears that monetary policy now has a greater impact on exchange rates, directly effecting the real competitiveness of domestic manufacturing. A country following a comparatively tight domestic monetary policy is therefore likely to lose international competitiveness, possibly setting off demands for trade protection. To the extent that countries seek to reduce the variability of exchange rate movements, the new financial environment limits the scope for effective and independent domestic monetary policies.

Viewed in isolation, the recent wave of financial innovations holds the potential to produce an international allocation of capital that is more consistent with economic risk/return considerations and allocational efficiency. An erosion of the gains from trade in manufactures and commodities would represent significant potential welfare losses. The major policy question, then, is whether free trade is antithetical to capital liberalization. Dealing with this added dimension of policy coordination will be the challenge for policy makers in the years to come.

II. Dimensions of International Financial Markets

The international financial marketplace has undergone a tremendous expansion in terms of the variety of products, the volume of trading, and the capitalized value of available securities. The data presented in this section suggest that a variety of financial markets, which were in their infancy or non-existent two decades ago, have grown to become major centers of activity and influence. The growth of these markets demonstrates their significance and potential implications for investors, corporate managers, and national policymakers. We begin by reviewing the growth of three traditional international financial markets -- the foreign exchange market, the Eurocurrency market and the Eurobond market. Then data on the rise of securitization are presented, followed by measures of activity in the markets for futures, options and swaps.

A. Foreign Exchange and the Euro-markets

The foreign exchange market, the inter-bank market for the exchange of bank deposits denominated in different currencies, has existed in one form or another for centuries and could hardly be called a modern innovation. In recent times, the foreign exchange market has been organized as a dispersed, broker-dealer market with high-speed telecommunications systems linking together the various participants in this worldwide, 24-hour market. The volume and efficiency of the market is such that the spread between bid and offer prices in the spot market is often one-tenth of one percent, or less, for the major currencies.

The data in Table 1 suggest the tremendous volume of activity handled in the foreign exchange market and its recent growth. Surveys carried out within the last year indicate that London is the most

active foreign exchange trading location with transactions totalling $90 billion per day. New York is the second most active center trading $50 billion per day, and Tokyo is close behind with $48 billion per day. The total for these three centers is $188 billion per day. Adding in the contributions from other centers (e.g. Frankfurt, Zurich, Hong Kong and Singapore), worldwide foreign exchange could possibly exceed $250 billion per day, or more than $60 trillion per year.[3] With an order flow of this size, many times in excess of world GNP and world trade, it becomes easy to understand the depth and speed of the foreign exchange market.

Insert Table 1 here

For comparison, daily trading volume in New York in 1977 was estimated to be only $5 billion, one-tenth of the estimated volume in 1986. The growth of trading in New York over this period was probably greater than that in London, and therefore overstates the worldwide growth in foreign exchange trading. Nevertheless, foreign exchange trading clearly grew at a faster pace than other nominal magnitudes over this ten-year period. The figures for New York also indicate changes in the composition of trading, away from the Canadian dollar and certain European currencies and toward the Japanese yen and Deutsche mark.

The Eurocurrency market has a much shorter tenure than the foreign exchange market. The Eurocurrency market, a market for deposits denominated in a currency different from the indigenous currency of the financial center, began to take shape in the early 1960s. The Russians played an important role in the early development of the

market. They were reluctant in those Cold War days to hold their U.S. dollars (needed for international trade transactions) in U.S. accounts. Instead, they deposited their dollars in Paris with an affiliate of a state-owned, Russian bank.[4] The true stimulus to the Eurocurrency market, however, was the differential regulation between offshore and onshore banking operations. Particular U.S. banking regulations (i.e. interest rate ceilings on time deposits, mandatory reserve requirements held at zero interest, and mandatory deposit insurance) became increasingly costly throughout the 1960s, resulting in a greater share of banking activity being pushed offshore. The innovation in the Eurocurrency market is an example of "unbundling" -- in this case, taking the exchange risk of one currency (the U.S. dollar, for example) and combining it with the regulatory climate and political risk of another financial center.

Insert Table 2 here

The data in Table 2 indicate the growth of the Eurocurrency deposit market, from roughly zero in 1960 to over $3.0 trillion on a gross basis and over $1.5 trillion on a net basis (netting out all interbank deposits) in 1986. The market, once exclusively dollar-denominated, has now stabilized to become roughly 75-80% dollar based, with the currencies of other industrialized countries making up the remainder of the market. The Eurocurrency market was once small enough to be ignored; today it rivals U.S. financial markets in terms of size and importance. The short-term lending rate in the Eurocurrency market (LIBOR, or London Interbank Offer Rate) as it has been determined largely by free-market forces, has become the reference rate for many onshore loan agreements, floating rate notes and other

contracts as well as Euromarket loans.

Over the years, because of its rapid growth and apparent lack of regulation, the Euromarket has been feared by some as a source of macroeconomic instability or as a wobbly pyramid prone to crisis. Nearly all Eurocurrency banks are major players in their parent's domestic market and could be subject to regulation via this angle. In 1974, central bankers from the Group of Ten issued a general statement of responsibility (the Basle Concordant) indicating that countries would extend lender-of-last-resort facilities for the solvency of their Eurobanks.[5] The motivation here may have been to encourage national banking authorities to pay closer attention to their members Eurobanking operations and to reduce the public's fear of an international banking panic. In 1980, the BIS announced another agreement requiring banks to produce consolidated statements of their worldwide activities, including offshore assets and liabilities. This consolidation would enable bank examiners to monitor the quality of offshore lending on the same basis as domestic offices.

Eurocurrency markets and Eurobanking operations have become a commonplace feature in international finance. In 1981, the United States acknowledged the importance of these new offshore markets and authorized the establishment of International Banking Facilities within existing U.S. banking institutions. IBFs are not subject to the regulations that apply to domestic banking activity (reserve requirements and deposit insurance, in particular) and are free to engage in many offshore banking arrangements with non-residents.[6]

The Eurobond market developed at approximately the same time as the market for Eurocurrency deposits. Again, differential regulation

between offshore and onshore securities activities played a key role in stimulating the development of the market. In 1963, the United States adopted the so-called Interest Equalization Tax, effectively an excise tax on American purchases of new or outstanding foreign stocks and bonds. To no one's surprise, the IET effectively closed foreigners access to the U.S. bond market; to the surprise of some, the market simply migrated offshore to London and Luxembourg. Other costly U.S. regulations (further international capital controls and a 30% withholding tax on interest payments to foreigners) nurtured the environment for the Eurobond market.

The remarkable growth record of the Eurobond market is presented in Table 3. From the first Eurobond floated in 1957, the volume of new offerings reached $6.3 billion in 1972. Two years later, the United States abolished the IET and its capital control program. Eurobond underwritings plunged to $2.1 billion in 1974 and the financial press was anticipating the death of the market. But Eurobonds and U.S. bonds continued to differ in several important ways -- investors in Eurobonds paid no withholding tax and held bearer securities, and issuers of Eurobonds avoided costly and time consuming SEC disclosure requirements. These differences proved to be substantial and the Eurobond market expanded sixty-fold in the next eleven years.

Insert Table 3 here

New offerings in the U.S. dollar segment of the market now exceed the volume of new corporate bond issues in the United States. Treasurers of major corporations are now geared to conduct bond issues either offshore or onshore depending on market conditions. Even the U.S. Treasury has joined the parade to the Eurobond market with

several so-called "Targeted Treasury Issues," in an attempt to lower the Treasury's funding costs.

B. Measures of Securitization

The increase in securitization, the tendency for an economy to have a greater proportion of its assets in the form of marketable securities and bearing market-determined prices, can be seen from a variety of indicators. The par value of outstanding publicly traded bonds, as shown in Table 4, totaled roughly $7.8 trillion at the end of 1986, reflecting a 25% increase over 1985. Salomon Brothers (1986) estimates that about half of this increase is the result of the dollar's depreciation. But the nearly five-fold increase in the market value of bonds relative to 1975 makes the long-term trend toward securitization apparent. The ratio of the market value of bonds to GDP has risen from 50% in 1980 to 71% in 1985, showing another measure of increasing securitization.

Insert Table 4 here

Another measure of securitization and its implications is presented in Table 5. Net borrowings by U.S. non-financial corporations have traditionally relied heavily on bank loans, traditionally a non-traded asset. In 1981 and 1982, bank loans and securitized financing were roughly equal in magnitude; by 1986, more than three-quarters of net new financings were in a securitized form. One explanation for this phenomenon is that for a variety of reasons (but primarily a deterioration in the quality of bank loan portfolios) the credit ratings of banks have fallen relative to their best

customers. Corporations have observed that funding costs could be reduced by going directly to the market. As the most credit-worthy customers are removed from a bank's portfolio, this trend is reinforced. The trend toward securitization is also reinforced to the extent that investors value liquidity and are willing to purchase marketable securities at lower yields than a bank might charge on loans.

Insert Table 5 here

The trend toward securitization in preference to traditional bank lending is also visible in the international markets. As shown in Figure 1, syndicated bank loans captured nearly 60% of this market in 1982. In the years since, there has been a steady reduction in syndicated bank lending, along with a steady increase in international bond issues and Note Issuance Facilities. The preference for borrowing through marketable securities seems to be firmly established.

Insert Figure 1 here

The market value of equity capital and its annual turnover provide further evidence on the securitization of international financial markets. The market value of equity shares reached $5.3 trillion at the end of 1986, up by 25% from 1985 and nearly five-fold from 1975, as reported in Table 6. The U.S. share of the world market has fallen substantially since 1975, with Japan's share rising by a nearly offsetting amount. The extent of securitization, as measured by the ratio of market value of shares to GDP shows considerable dispersion, from 13% in France to 77% in Switzerland. The recent trend toward privitization, the sale of state-owned assets to private investors,

is helping to increase these measures of securitization. Plans to denationalize industries are in progress around the world. More than $19 billion was raised through equity sales of state-owned enterprises in 1986, roughly 25% of total new equity issues world-wide.[7]

Insert Table 6 here

The final innovative trend that enhances securitization is the transformation of formerly illiquid pools of assets into tradeable securities, using pass-through certificates or collateralized obligations as a structure. GNMA (Government National Mortgage Association) pass-through certificates representing claims on a pool of GNMA-insured mortgages are perhaps the most well-known example, but other federal and private financial institutions began to issue similar certificates in the 1970s. New issues of asset-backed securities reached $269.0 billion in 1986, as reported in Table 7. Residential mortgages remain the dominate component of this market. Securities representing commercial mortgages are now available, as well as securities backed by automobile and credit card receivables at the shorter end of the maturity spectrum.

Insert Table 7 here

C. New Risk Management and Funding Vehicles

The extent of financial innovation is perhaps best reflected in a set of new risk management and funding vehicles -- futures, options, and swaps -- that came into existence in the early 1970s and have experienced extraordinary growth, and importance beyond what the numerical entries may suggest. The aggregate open interest in

financial futures and options, a measure of the speculative capital at risk in the market, rose to $680 billion at the end of September 1986, an increase of nearly 75% over the year-end 1985 figure. Open interest, as reported in Table 8, is split roughly two-to-one between futures contracts and option contracts. Futures and options written against contracts on interest bearing securities account for by far the greatest open interest, 94% in the case of futures and 67% in the case of options.

Insert Table 8 here

Daily trading volume for futures and options contracts, reported in Table 10, mirrors the above findings. The dominate share of trading volume is in interest rate contracts, more so in the case of futures than in options. And among contracts on interest bearing securities, the 3-month Eurodollar futures contract is by far the most popular, accounting for about 75% of all activity. The 3-month Eurodollar futures contract currently trades roughly 50,000 - 75,000 contracts per day, representing an aggregate face value of $50-75 billion. The Eurodollar contract is useful for hedging LIBOR interest rate exposure, which as we noted earlier, has become the major reference rate for pricing variable rate bank lending and floating rate note (FRN) securities.

Insert Table 9 here

Another indicator of the potential impact of financial futures markets on trading behavior is illustrated in Figure 2, which graphs the daily volume of treasury bond futures trading and the volume of

trading in the underlying cash market. The data clearly show that the volume of trading in futures contracts now swamps the volume in the cash market by a factor of four. A similar ratio maintains between trading volume in stock index futures and underlying equity shares.

Insert Figure 2 here

This development has raised fears that the heightened activity in financial futures markets may be contributing to volatility in underlying cash markets. In particular "program trading," transactions executed to remove arbitrage profits between futures and cash prices, and "witching-hour effects," related to the convergence of futures and cash prices on the expiration day of the contracts, have been cited as examples of the disruptive power of the new financial futures and options markets. Careful studies need to be carried out to examine these claims. Financial futures and options markets offer investors a combination of leverage and liquidity at exceedingly low transaction costs. When news occurs and expectations change, investors may feel that it is preferable to trade first in the futures market, leaving the cash market to adjust somewhat later in response.[8] Other evidence suggests that the addition of the futures markets has raised the pool of speculative capital in the market and that bid-offer spreads are lower in the cash market when the futures market is open.[9]

Interest rate and currency swaps, the final products in this overview, may be thought of as either risk management or funding vehicles. As part of a financing plan, a swap enables the borrower to unbundle the terms (currency, fixed-rate, variable-rate, and so forth) under which he initially raises funds from the financing terms he is ultimately seeking. For example, it is not obvious that a

corporation seeking variable-rate dollar financing ought to borrow in the variable-rate dollar market.[10] If the corporation has a comparative advantage or a window of opportunity in the fixed-rate DM bond market, it might obtain a lower cost of funds by borrowing in this segment and swapping the proceeds into fixed-rate dollar funds. The new financing alternative might be presented to the corporation as a package, allowing a comparison between it and a straightforward issue of variable-rate dollar bonds. The alternatives could be identical in all respects, except that the package containing the swap carries the risk of default on the swap.

Swaps can also be used as risk management tools to alter the currency of denomination and interest rate structure of assets and liabilities. If the above corporation decides that variable-rate dollar financing is no longer in its best interest, and it prefers fixed-rate DM financing or fixed rate Canadian dollar financing, the corporation can sell its swap or purchase other swaps to alter its position. This would very likely be cheaper than redeeming its previous bond issue and incurring additional floatation costs.[11]

Insert Table 10 here

The limited information available on swap activity is reported in Table 10. Information is incomplete because swaps are carried as off-balance sheet entries and no formal reporting is now required. The volume of interest rate swaps outstanding is estimated to be $300 billion. Currency swaps associated with primary bond issues (so-called swap-driven bond issues) were estimated at $38 billion in 1986, or about 20% of new Eurobond issues. Other asset or liability based currency swaps were estimated to be as large as $76 in 1986.

III. Characteristics of Recent Financial Innovations

A. Functions of International Financial Markets and Alternative Taxonomies

Innovation takes place when it becomes profitable to better fulfill any of the major functions of the international financial sector. These functions include (i) providing appropriate instruments for making payments, (ii) facilitating monetary exchange between currencies, (iii) facilitating the flow of savings towards investments across national boundaries, and (iv) providing mechanisms for allocating, diversifying and compensating for risk. A partial list of new financial products, classified by their intermediation function is presented in Table 11. It may be useful to explore these innovation further using several alternative taxonomies.

Insert Table 11 here

Dufey and Giddy (1981) have argued that most financial innovations are aimed at either circumventing government regulations or are taken in response to perceived relative price or relative risk changes. Government policies -- in particular, regulations that are not applied uniformly across all parties or countries, and tax rates that are not uniform across different sources and uses of income -- provide a fertile ground for the innovative process. Financial theory suggests that securities can be used to transform income from higher taxed into lower taxed forms, but the transformation is costly.[12] Individuals monitor the implied burden of differential taxation and regulation, and shift their activities when the cost-benefit ratio is favorable. Dufey and Giddy argue that in the 1960s, the regulatory burden of the U.S. financial system became too costly, providing the incentive for

the development of the Eurocurrency and Eurobond markets. In the 1970s, macroeconomic volatility increased the cost of carrying exposure, leading to a dramatic increase in the demand for risk management vehicles.

Another well-known taxonomy is the distinction between "product" and "process" innovations. The modern tradition of financial product innovation might begin with the Negotiable Time Certificates of Deposit introduced in the 1960s and include exchange traded foreign currency futures contracts and equity option contracts introduced in 1972 and 1973 respectively. The innovative process has exploded since then. Exchange traded financial futures and options contracts, which were virtually non-existent in 1970, now cover dozens of securities and synthetic instruments (e.g. the S & P index) and are traded in at least nine countries on four continents. Active over-the-counter or inter-bank markets exist for other products. Some products are generic and fairly standardized (e.g. a spot DM contract or a fixed rate currency swap). Other products have taken on proprietary names (e.g. CARS, Certificates on Automobile Receivables, from Salomon Brothers) to afford some differentiated characteristics to products that can be imitated fairly easily. This kind of product differentiation may enable the innovating firm to appropriate a larger share of the returns from innovation, but it also may require the firm to invest heavily in a secondary market for its differentiated securities.

Modern examples of process innovations include the SWIFT (Society for Worldwide Interbank Financial Transfers) network for foreign exchange payments, the grey market (or pre-market) in Eurobond trading, the Euro-clear and Cedel systems for clearing Eurobonds, the MESA network for clearing ECU transactions, and the establishment of

formal linkages and dual listings between U.S. and foreign stock and commodity exchanges. The European Monetary System (EMS) might be viewed as a process innovation intended to stabilize European exchange rates and, in turn, facilitate the use of the ECU.

The Black-Scholes option pricing model and other related models might also be thought of as process innovations. This line of theoretical research (i) provided a scientific underpinning for option pricing, (ii) indicated how option writers might manage their risks by 'delta hedging,' (iii) helped to popularize a technique for pricing synthetic contracts (i.e. the replicating portfolio approach), and (iv) alerted analysts to the fact that many common financial contracts could be usefully viewed as embodying option-like features (that might be priced "scientifically") -- all of which encouraged the development of new products and market-making activity. To take one example, Dufey and Giddy (1981) noted that despite articles describing the benefits of foreign exchange options, the market appeared to be failing because the contracts were too specialized and too difficult to hedge. Since banks will generally be selling call options to corporate customers, there is no obvious place for banks to buy options to mechanically square their books. The 'delta hedging' procedure offered a reasonable alternative for risk management, which has enabled the inter-bank foreign exchange option market to develop.[13]

The theory of finance suggests another approach for understanding the recent wave of financial innovations. Investors and borrowers are typically characterized as risk-averse welfare maximizers. In this setting, we expect that individuals will desire the flexibility to hedge against any contingent risk. If the available set of financial

assets do not "span" all possible contingencies, then individuals might be better off having access to additional securities whose payoffs depend on these contingencies. The introduction of interest rate futures, heating oil and crude oil futures, and mortgage-backed securities might be seen as products that help complete the menu of financial products thus allowing individuals to reach their desired exposure to particular risks. Some of these innovations represent an "unbundling" of existing financial products.[14] Other new products, such as pass-through certificates, are simply tradeable claims collateralized by previously existing financial positions, a process of financial disintermediation that closes the gap between ultimate borrowers and lenders.

Conditional on their exposure to risk, individuals also seek to maximize their expected investment returns, taking into account taxes and the transaction costs of managing their positions. Many new financial products (e.g. money market mutual funds, stock index options and convertible bonds) represent a composition or "bundling" of more elementary financial instruments. Small investors have historically been attracted to mutual funds as a way to attain diversification and scale economies, which lower the cost of financial services, including professional management expertise. But now large, institutional investors have become attracted to composite products because they dramatically lower the cost of establishing and maintaining a leveraged position, or acting upon fast-breaking news.[15]

A single innovation could draw on many of the characteristics just enumerated. The evolution of zero-coupon securities provides a good case in point.[16] Zero-coupon securities had existed for some time (e.g. Treasury bills and U.S. Savings Bonds). In the 1970s, aggressive

reading of the Federal tax code (regulatory channel) encouraged dealers and investors to separate (unbundle) the principal and coupon components of Treasury securities as distinct products. By selling the corpus at a deep discount, the dealer might recognize a capital loss; by purchasing this instrument, an investor might delay paying taxes until the security had matured or was sold. Taxable corporations also had an incentive to issue long-term zero-coupon bonds because of the Treasury's method of computing implicit interest expense. Even after the Treasury plugged these loopholes, demand for zero-coupon instruments persisted from foreign investors, who faced more favorable capital gains tax treatment on zeros, and from domestic investors, who used zeros to match future liabilities, eliminate reinvestment risk (hedging motives) and avoid bothering with coupons (convenience motive). The securities industry responded to this demand by stripping the coupons from existing securities, creating synthetic zeros (unbundling), some with exotic (and proprietary) names. In January 1985 the U.S. Treasury responded with its own innovation by announcing that all future issues with a maturity of greater than ten years would be transferable in their component pieces. The new product, STRIPS (Separate Trading of Registered Interest and Principal Securities), has been readily accepted with more than $90 billion of securities outstanding.

B. Engineering Innovative Financial Instruments

1. Swaps and Comparative Advantage

To set the stage for our later analysis, it will be useful to point out the reciprocal nature of demand for swaps and other hedging instruments. This is clear from the typical diagrams used to illustrate the flows of funds in a swap transaction. For example,

(i) Demand for 5-year sterling <==> Supply of 5-year dollars,

(ii) Demand for fixed rate funds <==> Supply of floating rate funds,

(iii) Demand for LIBOR basis funds <==> Supply of NY Prime basis funds.

The above situations are analogous to commodity trade in the sense that one country's demand for wheat is equivalent to its supply of cloth under the presumption that trade balances. A stylized result from classical trade theory is that countries are endowed with differential supplies of (immobile) capital and labor which gives rise to production cost differentials. To take advantage of the situation, countries tend to specialize in the production of their comparative advantage goods which they then trade, capturing the gains from trade.

The principles underlying a financial swap bear a strong relationship to those of commodity trade and comparative advantage theory.[17] The feasibility of a swap (such as in cases i, ii and iii above) between parties A and B hinges on the possibility that they face different relative costs on the two pieces of the swap. The following example uses an interest rate swap but the same principle would apply to a currency swap. Suppose that company A desires to borrow fixed-rate funds while company B desires floating-rate funds. Suppose further that the companies can borrow on the following terms:

	COMPANY A	COMPANY B	DIFFERENTIAL
Fixed rate:	11 %	9 1/2 %	1 1/2 %
Floating rate:	LIBOR + 1/2 %	LIBOR + 1/4%	1/4 %
			1 1/4 %
Comparative advantage	Floating-rate funds	Fixed-rate funds	
Objective:	Fixed-rate funds	Floating-rate funds	

Company B borrows at a lower rate in either case (it has an absolute advantage in both markets), but its relative or comparative advantage lies in the fixed-rate market. (A's comparative advantage is in the floating-rate market.) It can be easily shown that if A borrows at floating-rate terms and B borrows at fixed-rate terms and the companies then swap, there will be a 1 1/4% interest rate savings to divide between the two firms and any financial intermediaries who assist them.

What is the source of B's comparative advantage? A number of reasons might explain it:

1. Certain lenders (e.g. insurance companies) are constrained to lend to companies like B. Therefore, there is an excess supply of funds chasing firms like B.
2. Fixed-rate lenders are segmented from floating-rate lenders, and they have formed different expectations regarding A and B.
3. The assets and receivables of B are predominantly in fixed-rate terms. Consequently, lenders perceive lower risk associated with fixed-rate lending to B.

It could be argued that if explanations #1 or #2 are behind B's comparative advantage, then for "small transactions," B may exploit its comparative advantage without losing it, much the same as commodity trade. In the aggregate, however, large-scale transacting would remove the segmentation barrier which is at the heart of this swap transaction. On the other hand, if explanation #3 is valid, the market may be signalling its preference to provide fixed-rate terms. If company B borrows at fixed-rate terms and swaps, the market may perceive that B is in a riskier position and turn its relative (fixed/floating) borrowing terms against it. In this case, B has traded away or reduced its comparative borrowing advantage. Explanation #3 clearly shows the need for disclosure of information on swap transactions so that the market can offer relative financing terms that are consistent with a firm's financial risks.

Several related issues can be raised by examining a currency swap. In the 1960s and 1970s, back-to-back loans and parallel loans (with cash flows essentially the same as a currency swap) were conducted to avoid the United Kingdom's investment sterling market or Latin American capital controls. Many observers point to the World Bank/IBM swap in August 1981 as the beginning of the modern currency swap market. The funding and risk management strategy of the World Bank at that time called for borrowing in DM, Swiss franc and other low interest rate currencies. In these smaller markets, repeated bond issues can cause lending terms to deteriorate as domestic buyers reach a saturation point (sometimes the result of prudential regulation) in their portfolios.

In the August 1981 deal, IBM borrowed DM and Swiss francs at preferential rates (because of IBM's credit rating and scarcity

value), the World Bank borrowed dollars (without concern over market saturation), and the two parties then swapped the proceeds and the future obligations to make payments.[18] Each company exploited its comparative borrowing advantage and shared the gains from trade to produce a lower all-in cost of funds. The World Bank has continued to use currency swaps aggressively as an integral part of its funding strategy.

2. Building Synthetic Securities

Two further examples will illustrate other aspects of the innovation process. Suppose that a market for short-term, unsecured borrowing similar to the U.S. Commercial Paper market, but denominated in DM, does not exist. Absent this market, companies can instead issue U.S. dollar commercial paper, sell the proceeds for DM, and cover by selling DM forward in exchange for dollars. The T-account in Figure 3a demonstrates how these two transactions approximate a DM commercial paper instrument. The cost of funding in DM terms would be approximately the actual U.S. dollar commercial paper rate (for a particular maturity and credit risk) plus the forward premium on foreign exchange [19]

Insert Figure 3 and Figure 4 here

The gain from "constructing" DM commercial paper in this fashion might be measured by comparing the synthetic rate with the best alternative DM rate, perhaps a short-term Euro-DM loan. Synthetic DM commercial paper appears to offer a perfect substitute for "actual" DM commercial paper. Figure 4 shows that the savings from issuing constructed DM commercial paper were in the 30-90 basis point range

during the early 1980s. An actual market for DM commercial paper will develop only if savings on transaction costs (including liquidity factors) warrant. If, in fact, a DM commercial paper market develops, actual prices must be set close to synthetic values so as to preclude arbitrage. Similarities between actual and synthetic commercial paper prices will not indicate that the gains from financial trade have vanished -- only that the gains are now embodied directly in the interest rates themselves. Using synthetic commercial paper helps to secure these gains from financial trade permanently.

A related example is the Eurobond market for DM, Swiss francs and other currencies which at times in the recent past has been subject to queuing restrictions by national officials. Queuing imposes costs on a firm by restricting their ability to access the bond market at times when terms may be particularly favorable. The T-accounts in Figure 3b demonstrate how the proceeds from a Eurodollar bond can be swapped for DM (or other currencies) to create a long-term DM obligation that approximates a Euro-DM bond. The cost of the constructed Euro-DM bond would be approximately the U.S. dollar Eurobond rate (for a particular maturity and risk class) plus the applicable forward premium on foreign exchange.[20]

The gain from constructing a Euro-DM bond in this fashion could be measured by comparing the constructed rate with the rate that might be obtained once the firm was allowed access to the actual Euro-DM bond market at some time in the future. If the synthetic Euro-DM bond approach offers a liquid market, then queuing restrictions lose their force and countries would be inclined to drop these restrictions. Arbitrage would then insure that the current actual Euro-DM bond rate approximates the synthetic Euro-DM bond rate. By forcing these two

rates toward equality, borrowers would enjoy permanent relief from queuing costs and other market access barriers.

3. Contract Innovation

A final area of financial innovation worth noting is in the design of futures contracts. Black (1986) has modeled the success and failure of futures contracts based on their commodity characteristics, their contract characteristics, and the interaction of these two variables. Commodity characteristics include the durability, storability, and homogeneity of the commodity as well as characteristics of the spot market. Contract characteristics refer to contract size, delivery dates, delivery locations, acceptable commodity grades for delivery, and so forth. Delivery conditions play a large role in contract specifications because even though most short contract positions are liquidated by offset, some physical delivery of the underlying commodity does take place.

The most important change in contract specification to effect futures trading has been to allow for cash settlement of futures contracts upon their expiration, rather than to require costly delivery of physicals. This innovation might have been adopted years ago except that a contract which could be settled only in cash was considered a wager, and specifically outlawed in those states with major futures markets. In 1974, futures trading came under federal control (via the Commodity Futures Trading Commission), where no such rules regarding gambling were in effect. By 1981, all the regulatory channels had been cleared, and financial futures contracts specifying cash settlement began trading. The vast appeal of these new contracts is evident from the data on trading volume and open interest reviewed earlier.

C. Design and Evolution of Innovative Financial Instruments

Cooper (1986) has recently argued that in most new financial instruments, the underlying financial claims embodied in the contract are largely the same as in the past; what has changed is the packaging of the instruments as well as the speed, scope and other aspects of the trading arrangements. As we have illustrated in the above examples, new financial contracts are often a transformation of existing financial instruments. This technique, the "replicating portfolio" approach, is central to the design of new financial instruments and to their pricing. Examination of many new instruments reveals that they reflect a bundling or unbundling of existing securities that allows them to replicate something which already exists at lower transaction costs.

Our examples demonstrate that new instruments may also replicate securities which do not exist, but which the market may welcome (e.g. DM commercial paper or DM bonds without queuing restrictions). In principle, a security could be indexed to any contingent outcome in order to replicate any desired financial contract, although in practice it might have to issued offshore to avoid prohibitive regulations.[21]

Once the general principle behind a financial innovation is well-known (either its transaction costs savings or its risk reducing properties), the possibility exists to move the product from a custom-design, small volume market to a standardized product with high volume and lower transaction costs. This has been the evolution in several cases, as illustrated in Table 12 for the currency and interest rate swap market.

Insert Table 12 here

It is important to point out that product innovation is not a one-way street. There are numerous examples of failure among exchange traded futures contracts which illustrates that these products, like consumer goods, must meet the market test.[22] Product innovation is costly and because financial firms value their reputations and intend to be infinite-lived, we expect that new products will offer value-added, at least in the short run. But because financial innovations are likely to incorporate increasing complexity, it is essential for non-financial firms to gain the necessary expertise in order to evaluate the new products. And for these non-financial firms (as for regulatory authorities) it is essential that the evaluation be conducted on the basis of economic, risk-return criteria rather than accounting conventions.

IV. Causes of Financial Market Innovation

A. Financial Services Under Perfect Capital Markets

To better understand the role of swaps and other new financial instruments in the real world, it will be useful to outline the nature of financial services that would exist in a "perfect" capital market. We will then argue that departures from "perfect" capital markets provide the necessary conditions for the development of new financial products such as swaps, options and so forth.

For our purposes, the essential elements of a perfect capital market are:

(i) no transaction costs
(ii) no taxes
(iii) no regulatory barriers or restraints (but enforceable contracts)
(iv) a large number of small participants.

Uncertainty regarding future economic outcomes is present, but investors view the future similarly.[23] The absence of transaction costs insures that all investors share the same information base and that they will agree on a fair valuation of securities. No transaction costs also implies that borrowers and lenders can act directly in the market without depending on agents or intermediaries. Finally, no transaction costs implies that securities are completely divisible and may be issued in arbitrarily small units.

To complete the story, we assume that investors are risk-averse and attempting to maximize their expected utility from lifetime consumption. Two questions are of interest: What financial instruments will be offered in the market and how will individuals and firms utilize these instruments?

In this stylized setting, investors will desire the flexibility to hedge against any contingent risk. It can be shown that if there are n

independent sources of risk, then n financial instruments related to these sources of risk are sufficient for agents to form any portfolio of their choosing.[24] There could be more than n financial instruments in the market, but these would represent combinations of the original n and would therefore be redundant. The financial market could be labelled "complete" in the sense that investors could hedge against any contingent risk and form a portfolio with any risk-return pattern.

In a perfect and complete market, any borrower or issuer could enter the market and directly sell financial instruments (i.e. a loan, option or some other well-defined contract) for fair value. A lender or investor, on the other hand, could expect to find financial instruments capable of hedging any risk and enabling him to achieve any desired risk-return pattern. In a perfect and complete market, the menu of financial instruments allows everyone complete flexibility to meet their desired financial objectives.

B. Financial Services with Imperfect Capital Markets

The assumptions of perfect capital markets are substantially at odds with the real world. A variety of barriers exist which potentially might lead to departures from the various arbitrage and parity conditions applicable for international capital markets under perfect capital market assumptions. The most basic such parity condition is a variant of the "Law of One Price" applied to the financial market -- similar securities (or combinations of securities) representing similar exposures to risk ought to sell for the same price regardless of the point of sale. This law predicts, for example, that an IBM seven-year straight U.S. dollar bond floated in London ought to command the same price as a similar security floated in New

York or Tokyo. A financial market law of one price is, in essence, a statement about the integration of international capital markets and that capital flows (i.e. arbitrage) will take place to equalize currency-adjusted and risk-adjusted rates of return everywhere.

Real world market imperfections can be divided into two groups: policy-related (or man-made) and behavioral (natural) barriers. Policy-related imperfections include taxes, rules regarding information disclosure or accounting conventions, and other regulatory barriers. The latter includes factors such as reserve requirements in banking, interest rate ceilings, market access rules (e.g. queuing), ownership restrictions on shares, legality of a monetary unit and other financial instruments (e.g. ECU-denominated debts and bearer securities) and rules regarding market entry and permissible activities (e.g. the Glass-Steagall Act). These national regulations are promulgated with diverse objectives in mind -- domestic monetary control, the safety and soundness of the banking system, prudential management of pension and mutual funds, and desired competitive conditions in the financial services industry. The critical point here is that the incidence of the policy-related barriers is not similar across the world's capital markets, or even within a single capital market. Consequently these barriers lead to segmentation effects both between national capital market and within individual markets.

Other capital market barriers are more a function of the natural economic environment or human behavioral patterns. Transaction costs -- of bringing a new security to market, of discovering and verifying information regarding an issuer, of enforcing contracts -- are an obvious natural barrier to complete integration of international capital markets. Perhaps as a result of different information sets,

investors in different national markets may hold different expectations, resulting in different assessments of securities prices. And investors in different countries might have different age and income profiles, leading to different consumption/investment/risk preferences and, therefore, to different prices of similar securities across countries.

All of these barriers, whether policy-related or natural, encourage the segmentation of international capital markets and the possibility that returns on similar securities (or portfolios of securities) may not equalize across countries. As a result, profit opportunities present themselves for borrowers and lenders who can circumvent barriers at low cost.[25] In addition, barriers also reduce the number and variety of securities below the level observed in perfect and complete markets. Profit opportunities also exist for agents who can create new instruments at low cost for hedging otherwise exposed risks.[26]

The above line of reasoning suggests that as long as investors are risk-averse utility maximizers, they will continue to search out arbitrage profit opportunities and to demand more complete financial markets. Demand for financial vehicles is always present, but with the existence of costly barriers, demand will be scaled by price and only a subset of of financial vehicles will exist. What Ian Cooper (1986) called the proximate causes of financial innovation (i.e. the search for lower transaction costs, funding costs, new risk transferring vehicles, and so forth) are always lurking. Why then has there been a surge in financial innovation over the last several years?

The simple answer to this question is that a set of factors (what Cooper labels as the ultimate causes of innovation) have led to a

substantial outward shift in both the demand and supply schedules for new financial products and processes. On the demand side, rising nominal and real funding costs in the late 1970s and early 1980s increased the willingness of borrowers to search out lower cost funding. Volatility of asset prices, exchange rates and inflation rates increased the price that investors and borrowers would pay for protection against these risks. Changing world-wide wealth patterns and the globalization of industrial markets increased the demand for global asset portfolios or funding strategies. Demand was also probably heightened by user education and advances such as option pricing models.

On the supply side, advances in telecommunications and computer technology, increasing competition among financial intermediaries, and regulatory changes all combined to reduce the transaction costs of creating new financial instruments and offering market-making services. The impact of regulatory change cuts in two ways: permission to begin trading in financial futures and options clearly helped these instruments to develop, but persistence of other regulatory barriers most likely encouraged the search for close substitutes or parallel markets in order to overcome these barriers. Regulatory encouragement to increase the capital adequacy of banks and their return on assets is also credited as promoting the securitization of existing bank assets and the shift into new financial products that lead to off-balance sheet exposures.

Distinguishing between demand and supply factors may be somewhat artificial because of the reciprocal nature of financial products -- one side of the transaction cannot proceed without the other. The globalization of industrial activity suggests that it should be more

common to find borrowers from around the world raising funds in diverse markets, units of account and under diverse terms. The market for financial intermediary services has been responsive to link together the demand and supply for particular products. As we noted earlier, the supply of intermediary services itself has followed an evolutionary process from specialty deals, to brokering, and finally market-making in standardized products. The financial services industry appears particularly well-suited to overcome some of the unique barriers (such as default risk, see footnote 25) that are present in international capital markets.

V. Implications of Innovation on Financial Market Prices and Market Behavior

The process of financial market innovation that we have been describing leads directly to a number of important economic consequences. In this section, we outline the major effects on financial asset prices, international price relationships and market behavior that we would expect to observe as a result of the innovative process. Then we review the empirical evidence on internationalization and integration of markets.

Given the steady financial innovation over the last two decades and the substantial amount of activity in these new markets, we should be able to observe and measure the following major economic differences:

1) Financial Market Behavior

   a. lower transactions costs, greater liquidity, greater substitutability between domestic financial products

   b. wider array of financial products giving improved opportunities for transfer of risks and risk optimization within investor portfolios

   c. securitization of assets as investors value liquidity, financial disintermediation

   d. improved opportunities for funding riskier credits

   e. greater competition for financial services business

2) International Financial Market Relationships

   a. greater international capital mobility, existing barriers removed or more easily circumvented

   b. greater integration of international capital markets, less segmentation

   c. greater similarity between cost of funds (currency and risk adjusted) in alternative capital market locations

3) Macroeconomic Effects

a. fewer opportunities for pursuing national monetary and policies using quantitative controls on credit availability or interest rate levels

b. greater impact of monetary policy on exchange rates and exchange rate variability

Central to the above hypotheses are the reduction in transaction costs because of supply side factors (e.g. technological and regulatory change) and demand factors (e.g. scale economies and the development of secondary markets for new products). Arbitrage plays a key role in the process. As both borrowers and lenders monitor the risk/return properties of their portfolios in the face of a new menu of securities, expected rates of return on securities (adjusted for currency and risk factors) should be brought into closer conformity -- i.e. market integration. Arbitrage, as well as the creation of new synthetic securities, acts to reduce the burden of market imperfections. The greater similarity of capital market products across countries and their greater integration implies reduced scope for pursuing monetary and credit policies based on quantitative restrictions on credit or interest rate ceilings. It also suggests that as monetary policies differ across countries, exchange rate volatility will increase in response to capital mobility and portfolio rebalancing by borrowers and investors.

As these financial market transactions are completely voluntary, all those who directly participate should be better off as a result. These transactions enable borrowers and lenders to hold more desirable portfolios, given that they face lower transaction costs and an expanded opportunity set of financial instruments. For these players,

capital allocations will be more in line with economic risk/return criteria. This should be a force tending to increase economic (allocational) efficiency, but other factors (discussed in the next section) may act in the opposite direction.

In his analysis of recent innovation in Japanese financial markets, Feldman (1986) suggests three approaches for measuring the degree of internationalization of a financial market. The legal approach focuses on the extent to which the law provides the right and opportunity for cross-border capital flows. The quantity approach posits that a larger volume of cross-border transactions is associated with greater internationalization. The price approach is the most exacting. It posits that the internationalization of a market is complete when its prices are brought into an international equilibrium. Feldman takes the interest rate parity relationship as his standard; when deviations from covered interest parity are small, markets are assumed to be integrated under the price approach.

What evidence is available to observe whether these financial market and macroeconomic effects listed earlier are actually taking place? The most obvious piece of evidence comes from the scope of new financial instruments and their trading activity outlined in Section II. The legal framework has been built to permit trading in a wide variety of financial futures and options contracts. The legal framework for swap transactions is still developing, but substantial progress has been made to standardize various provisions and wordings of swap arrangements.[27] And many transactions have moved offshore, where the legal impediments to contract design and market entry are less severe. Using quantity as a criteria, it is clear that these new securities play an important role in investors' portfolios.

On the international side, we also observe legal or institutional agreements that promote international linkages. Some companies have listed their securities on several exchanges around the world for years. Recent evidence suggests that this practice may be especially beneficial for firms from smaller countries who list their shares in the United States. Alexander and Eun (1985) conclude that the effect of dual-listing on share price is greater for firms from smaller countries (e.g. Australia) which were more segmented from the U.S. capital market. As these dual-listed firms experience a price effect, arbitrage pricing suggests that other non-dual-listed firms may show a sympathetic price response, further integrating the international markets.

A variation on this theme is the recent agreement linking the Chicago Mercantile Exchange (CME) and the Singapore International Monetary Exchange (SIMEX). A futures position established on one exchange may be offset and closed with transactions on the other exchange. This linkage expands the number of hours of trading per day which can be useful when prices are extremely volatile.[28]

Two kinds of evidence concern the integration of prices in international markets. The first addresses the "Law of One Price" for international securities. The dramatic growth of the Eurobond market suggests that many companies (as well as the United States Treasury) are "arbitraging" the funding differences between the offshore and onshore markets. The funding advantage of Eurobonds, which was estimated by Kidwell (et. al.) to be in the 70-140 basis point range in the 1977-81 period, declined to the 30-60 basis point range by 1983. A later study by Mahajan and Fraser (1986) examined 92 matched

pairs of offerings in the Eurobond and U.S. bond markets between 1975 and 1983. Mahajan and Fraser concluded that once they had standardized for issuer, maturity, rating and coupon, they could not reject the hypothesis that yield were similar in the two markets. This suggests an integration and harmonization of terms between the two markets.[29]

The second source of evidence on the integration of international prices comes from tests of the interest rate parity condition and the existence of covered interest arbitrage profits. It has long been understood that covered interest arbitrage integrates the short-term Eurocurrency markets.[30] But it is now becoming more apparent that longer-term Eurocurrency markets, commercial paper markets (recall Figure 4), and onshore short-term financial markets are also being integrated by actual or potential arbitrage.[31] Feldman's (1986) analysis of the Japanese market is a good example. Figure 5 shows the incentives for covered interest arbitrage between Eurodollar and Gensakis instruments over the 1977-1984 period.[32] Feldman argues that the deviation became insignificant in mid- to late-1981, suggesting a rise in internationalization. In addition, market professionals suggest that gains from interest rate and currency swaps are now relatively small, indicating that these markets provide for a high degree of integration in international capital markets.[33]

Insert Figure 5 here

VI. Policy Implications of Financial Market Innovation

The picture being painted sounds rosy, and this should not be very surprising. If we begin with a market paradigm and open up more possibilities of choice and freedom for borrowers and lenders, in a potential sense, the world economy stands to be better off. Financial innovations act to overcome many of the natural barriers that divide and segment markets, and lead to allocational inefficiencies. But innovations also overcome many of the policy-related regulatory barriers that were put in place as safeguards or for particular policy objectives.

Concern about the recent wave of financial innovation centers around two themes. First, that increased reliance on the market mechanism -- and the possibility of asset price overshooting, excessive competition among financial players, increased credit linkages between financial intermediaries and anonymous market linkages between ultimate borrowers and lenders -- may expose the financial system to additional risk in the aggregate. Second, that the greater integration of international capital markets alters the channels through which traditional policy tools work -- reducing the effectiveness of quantitative controls on credit availability and interest rates and increasing the impact of monetary policy on the external sector of the economy. At the theoretical extreme, a small, open economy subject to a high degree of capital mobility would find it difficult to follow a monetary policy independent of those being followed abroad. Innovation has made the financial markets of all countries more open and subject to greater capital mobility.

The first policy theme centers on the relationship between innovation and financial stability. Regulation of financial markets

and institutions is intended to promote the safety and soundness of this sector of the economy and thereby enhance the economy's overall allocational efficiency. Existing regulations are designed to deal with a variety of problems that may adversely effect economic performance. The key objective is to protect the integrity of the payments system, as this represents the life-blood of business activity.

Financial institutions are known to be subject to agency problems, as shareholders and depositors may find it difficult to monitor the behavior of bank managers. Consequently, regulations to constrain or rule out certain kinds of activities may be warranted. Financial institutions may also be subject to so-called insurance or moral hazard problems, whereby managers feel the incentive to take excessive risks (given that the Federal government is insuring them) or add to their off-balance sheet positions. Financial institutions might also be subject to conflict of interest problems if they increased their activities to include lending and underwriting for nonfinancial firms, as well as brokerage sales and trust advisory services.

Financial innovation could clearly fuel additional fears over these kinds of problems. Requiring financial institutions to disclose their off-balance sheet positions would be an obvious first step. Calculating insurance rates and capital adequacy requirements on the basis of risk-adjusted measures also makes sense but might present operational difficulties.

A related concern is whether financial innovation leads to an increase in aggregate financial risk. A review of the risk attributes of the new financial instruments is presented in Table 13. These

include market risk (the risk of moment-by-moment price fluctuations), credit risk (the risk of default by one counterparty in a transaction), settlement risk (the risk of default on the day of contract delivery or settlement), and liquidity risk (the risk of not being able to trade immediately). What is the overall impact of these new instruments on risk?

Insert Table 13 here

Financial instruments which transfer price risk do not create additional price risk. And to the extent that a more desirable distribution of risk is achieved (from the standpoint of each individual), the economy may be better able to withstand certain stressful periods. However, the transfer of risk through intermediaries creates additional linkages in the financial system and may raise its vulnerability to default, particularly in a period of financial stress. In addition, as more players are brought into the system, to carry individualized risks associated with unbundled securities, more players need to make credit and pricing assessments. And, there is no established track record to guide the market for making these assessments. Innovations may increase the availability of debt financing in the economy, raising the aggregate debt level, and making it more vulnerable to shocks.

Another line of argument concerns the behavior of financial markets and unbridled competitive behavior. It is often argued that asset prices move quickly and they may, in the short-run, overshoot their long-run equilibrium value. If new financial instruments are subject to this sort of price behavior, a considerable risk could be added to the economy. Related to this concern is the possibility of

excessive competition or excessive risk-taking within financial institutions, perhaps related to the belief that behavior in these institutions may be guided by perverse incentives (e.g. compensation related to the volume of new business regardless of its risk). These concerns are enhanced because many of the new financial instruments lead to off-balance sheet exposures which may or may not be adequately captured by existing accounting conventions and regulatory guidelines.

Dealing with the above concerns is possible, but obviously easier said than done. The general point to be made is that a market system, to the extent that information is made available, has many built-in checks and balances that govern the behavior of market participants. To work in a stable and orderly manner, market participants need to make effective use of market information for decision making and performance evaluation. "Market information" implies accounting systems based on a continuous revaluation or "marking-to-market" of all financial positions (whether on the balance sheet or off) and assessment of risks on a portfolio basis. It may be the case that utilization of new financial instruments (interest rate swaps, for example) have actually lowered the exposure of their portfolio positions to interest rate risk, thereby reducing their capital needs.

Concern about mis-pricing of new financial instruments seems exaggerated, since it calls into question the ability of banks to make pricing and credit assessments of "traditional" instruments. The new instruments require an assessment of liquidity risks, traditionally represented by the bid/ask spread, and default risks, which until recently were the normal task of bank lending (credit) officers.

Excessive competition may be a concern associated with a new set

of financial products, a scramble for an early dominant market position, and the inevitable shake-out. However, some observers have argued that regulatory groundrules (e.g. constant premium deposit insurance and historical cost accounting systems) build in incentives for managers to engage in excessive risk-taking. A market-based regulatory system incorporating risk-adjusted insurance premia and risk-adjusted capital adequacy requirements could put a natural brake on excessive behavior.

Given the mobility of capital, any regulatory response to financial innovation would need to be coordinated among national regulatory bodies. Otherwise, the markets will continue to engage in a kind of "regulatory arbitrage," seeking the lowest level of constraints in which to operate. National regulatory bodies may add to this problem if they compete with each other in terms of regulatory laxity in order to protect the market share of their domestic financial institutions. The recent accord between U.S. and British bank regulatory authorities announcing risk-based capital adequacy standards within a highly similar set of rules is a welcome first step toward international coordination.[34]

The second, and final, policy theme concerns the impact of financial innovation on domestic monetary policy. Financial innovation has lowered transaction costs, increased the menu of available assets, and increased the ease of substitution among assets. As a result, the ability of authorities to measure and control the money supply has been reduced. Individuals and firms also have increased their access to variable rate financing and numerous risk hedging instruments. The availability of variable rate financing may reduce the sting of contractionary monetary policy as borrowers still have access to

funds, for which they may be willing temporarily to pay a higher rate. Lenders receive higher interest income during these periods which tends to increase aggregate spending.

The greater concern is that because of the increasing international mobility of capital, the dominant channel through which monetary policy is now felt may be the exchange rate. If countries are unable to coordinate their monetary policies effectively, then large exchange rate swings are more likely to develop. Countries then run the danger that protectionist pressures will mount, producing a contraction in international trade and reducing the gains from trade.

VII. Summary and Conclusions

This paper has offered an overview of some of the financial market innovations we have seen over the last few years, the causes of innovation, and the implications of both in terms of economic effects and policy responses. The incentives for financial innovation are strong and at the foundation of a market system. Self-interest, profit-maximization, risk optimization and technological change are guiding the process. Benefits clearly accrue to those directly involved in the innovating and trading process. Natural barriers that segment world capital markets are under pressure resulting in a tendency toward greater economic efficiency.

The transition from a segmented international capital market to one that is more integrated will also impose some costs. There will be greater demands for information and measures of the risk and return of the new financial instruments. Policy-related barriers (taxes, regulations, and so forth) will also lose some of their force, and to the extent that these were used for prudential control, other policies will have to take their place. The need to coordinate regulatory policies will increase. Monetary policy is more likely to effect the external sector of the economy via exchange rates, potentially raising the demand for trade protection. This prospect heightens the need for macroeconomic policy coordination.

In a potential sense, the world economy stands to benefit from the financial innovative process. But the process is not without its risks and not without increasing demands for policy coordination.

FOOTNOTES

1. Assessments of the recent experience have been prepared by the Bank of England (1983), the OECD (1984) and Germany and Morton (1985). By far the most comprehensive report describing recent innovations and their possible welfare and policy implications is that of the Study Group of the Group of Ten Countries (referred to in this paper as the G-10 report) published by the Bank for International Settlements in April 1986.

2. An interesting and potentially highly important area of financial innovation is that dealing with the European Currency Unit (ECU). Since the introduction of the European Monetary System in March 1979, the the ECU has been propelled to greater importance as a legal parallel currency for transactions throughout most of Europe. An array of innovative ECU products (e.g. ECU-denominated deposits, loans, swaps, bonds, futures, options and numerous variations on these themes), applications (e.g. ECU invoicing) and institutions (e.g. the Mutual ECU Settlement Association for clearing transactions) have quickly developed. It is beyond the scope of this paper to discuss these developments in detail. The reader is referred to Levich (1987a, 1987b), Levich and Sommariva (1987) and the references cited therein for further discussion.

3. Informal estimates of the volume of foreign exchange trading in various centers are reported in Group of Thirty (1985, p.11).

4. The bank, Banque Commerciale pour l'Europe du Nord, carried the cable address EUROBANK, which latter became synonymous with the general activity of accepting deposits offshore. See Kvasnicka (1969).

5. See Dam (1982, pp. 322-6).

6. For a further description of International Banking Facilities, see Chrystal (1984).

7. Salomon Brothers (1986, p. 24).

8. When asked whether the impact of Chicago's futures markets on the underlying asset markets wasn't an example of "the tail wagging the dog," Richard Sandor replied that the questioner was mistaken -- "the dog had moved to Chicago." Proceedings of the Conference on Hedging with Financial Futures for Institutional Investors, Salomon Brothers Center, New York University.

9. Miller (1986, p.15).

10. More complex strategies are possible. For example, a corporation seeking 5-year funds might borrow for 10-years, and sell the final years proceeds forward.

11. Gaz de France represents an interesting case study. Between 1983 and 1985 the company entered into 102 swap transactions totalling $7.4 billion to completely transform the currency profile of their financing away from U.S. dollars and toward European currencies including the ECU. See Reboul (1987) for details.

12. See Miller (1977) for a discussion of the use of securities markets for tax shifting.

13. A thorough discussion of foreign exchange option pricing and market characteristics is presented in Grabbe (1986, Chapter 6).

14. For example, a forward contract might be split into the combination of a put and call option. A U.S. Treasury security might be split into its principal and interest components.

15. Figlewski (1986) presents a thorough analysis of the use of financial futures for hedging portfolios of money market instruments.
16. For further details, see First Boston (1986, pp. 218-22).
17. See Giddy and Hekman (1984) for a formal demonstration.
18. For further details, see Bock (1983).
19. The cost is approximate because we ignore (i) interest compounding, (ii) U.S. commercial paper is sold for same day delivery while foreign exchange quotations are for two day delivery, and (iii) transactions costs in the commercial paper program and forward contracts. See Kreiner (1986) for a thorough analysis of these costs.
20. Alternative approaches for computing the cost of a long-term forward contract are reviewed in Antl (1983).
21. A good example are the so-called "bull and bear" bonds, which are Eurobonds with payoffs index-linked to the performance of the West German or Japanese stock markets. These instruments are a close substitute for actual stock index options on these markets that are currently outlawed. National regulators could attempt to impose sanctions on buyers or sellers of these offshore securities, but this form of control is untested.
22. Futures contracts were traded on over 128 products during the last century. Recently, only 45 commodities were actively traded on futures markets, including just 8 of the 23 commodities traded in 1929. See, Deborah Black (1986) for a model of success and failure of futures contracts based on commodity and contract characteristics.

23. Classic definitions of perfect capital markets (for example, Fama and Miller [1972, pp. 20-22]) often begin with the case of certainty. In the certainty case, all individuals necessarily share the same information and expectations. Individuals still require financial markets under certainty to smooth their lifetime consumption to its desired path.

24. For a formal proof, see Cox and Rubinstein (1985, Chapter 8) and the references cited therein.

25. A barrier that applies more in the case of international capital markets is the absence of a clear mechanism for enforcing legal contracts across borders. The possibility of debt repudiation may be a significant factor leading to reduced international capital flows and the existence of apparent arbitrage profits. Dumas (1986) argues that financial service firms may be in a position to bridge this gap. Unlike the occasional borrower, the penalty for repudiation would be high; a major financial firm cannot afford to lose its reputation and so the chance of repudiation on their part is slim. In this way, financial services firm substitute for the non-existence of a contract enforcement mechanism.

26. Black's (1986) model incorporates this result, predicting that futures contract are more likely to be successful in the marketplace if they increase the ability of people to hedge their risks (i.e. if the increase the hedging effectiveness offered in the market). The presence of transaction costs might increase the number of useful hedging vehicles. For example, even if options contracts were traded on all 500 securities of the Standard and Poor's 500 index, an S & P 500 index option would still be a cheaper way to take a position on all securities simultaneously.

27. The International Swap Dealers Association (1986) has promulgated a Code intended to standardize and simplify swap documentation. Parties to a swap agreement may adopt the Code in its entirety or selectively. Express provisions in a swap contract always override anything to tht contrary in the Code.

28. Other formal linkages exist between the New York Commodities Exchange (COMEX) and the Sydney Futures Exchange (SFE), the Chicago Board of Trade (CBT) and the London International Financial Futures Exchange (LIFFE), and the SFE and LIFFE. The National Association of Security Dealers and the London Stock Exchange are conducting a pilot project for the exchange of stock price quotations, also aimed at expanding international trading opportunities.

29. Somewhat contrary evidence comes from the United State Treasury issues targeted to the Eurobond market. These data suggest that targetted Euro-U.S. Treasuries yield about 30 basis points less than comparable Treasury issues in the United States. By implication, the Treasury could increase the supply of offerings in the Eurobond market before interest rates would equalize with onshore Treasury issues.

30. See, for example, Aliber (1973) and Frenkel and Levich (1975).

31. See Dooley and Isard (1980) and Frenkel and Levich (1981).

32. Feldman's analysis on this point leaves some ambiguity. He discusses the interest rate parity relationship as the criteria for market integration, but then uses the expected rate of exchange rate change rather than the forward premium in his formulation.

33. See Morgan Guaranty Trust (1986, p. 3)

34. See Nash, "Similar Standards for Banks are Set by U.S. and Britain," New York Times, January 9, 1987, Section A, page 1.

TABLE 1.

Average Daily Foreign Exchange Trading Volume
by Location and Currency

	Tokyo	London	New York	New York(1977)
Daily Volume, March 1986 (Billions of US $)	$48	$90	$50	$ 5
Percentage Share				
Sterling	-	30	19	17
DM	-	28	34	27
Yen	82	14	23	5
Swiss franc	-	9	10	14
French franc	-	4	4	6
Italian lire	-	2	-	1
Canadian dollar	-	2	6	19
Cross-currency and ECU	-	4	-	-
Dutch Guilder	-	-	1	6
Other	18	7	3	5
Total	100	100	100	100

Sources: Press releases of the Bank of Tokyo, Bank of England, and the Federal Reserve Bank of New York.

Table 2.

Dimensions of the Eurocurrency Deposit Market
(Billions of U.S. Dollars)

Year	Gross Size	Net Size	Eurodollars as % of Gross	U.S. Money Stock (M2)
1973	315	160	74%	861
1974	395	220	76	908
1975	485	255	78	1023
1976	595	320	80	1164
1977	740	390	76	1287
1978	950	495	74	1389
1979	1235	590	72	1498
1980	1525	730	75	1631
1981	1954	1018	79	1794
1982	2168	1152	80	1955
1983	2278	1237	81	2189
1984	2386	1277	82	2372
1985	2846	1480	75	2564
1986(June)	3059	1584	72	N.A.
Compound Growth	19.9%	20.1%	___	9.5%

Sources: Morgan Guaranty Trust Co., World Financial Markets, various issues.
Economic Report of the President, 1986, Table B-64.

TABLE 3.

Dimensions of the Eurobond Market
(Billions of U.S. Dollars)

Year	Eurobonds		Foreign Bonds	Total International Bond Issues	US Corporate Bond Issues
	Total	$-denominated			
1970	3.0	-	1.6	4.6	29.0
1971	3.6	-	2.6	6.3	30.1
1972	6.3	3.9	3.4	9.7	25.6
1973	4.2	2.4	3.6	7.8	20.7
1974	2.1	1.0	4.7	6.9	31.5
1975	8.6	3.7	11.3	19.9	42.8
1976	14.3	9.1	18.2	32.5	42.2
1977	17.7	11.6	14.5	32.2	42.3
1978	14.1	7.3	20.2	34.3	20.5
1979	18.7	12.6	22.3	41.0	26.5
1980	24.0	16.4	17.9	41.9	44.6
1981	31.6	26.8	21.4	53.0	38.2
1982	51.6	44.0	26.4	78.0	45.4
1983	48.5	38.4	27.8	76.3	50.2
1984	79.5	63.6	28.0	107.4	59.6
1985	136.7	97.8	31.0	167.8	71.3[a]
1986(Oct)[b]	163.4	102.7	30.7	194.1	N.A.
Compound growth[c]	29.0%	28.1%	21.9%	27.1%	

Note: a - first three quarters at annual rate
b - through end of October, not annualized
c - through end of 1985

Sources: Morgan Guaranty Trust, World Financial Markets, various issues.
Economic Report of the President, 1986, Table B-90.

TABLE 4.

Par Value of Outstanding Publicly Issued Bonds
(Billions of U.S. Dollars)

	Year-End				Annual Growth Rate	% of Total		Ratio to
	1975	1980	1985	1986[a]	1975-85	1975	1985	1985 GDP
U.S. Dollar	$786	$1,473	$3,119	$3,660	14.8%	48.1%	50.4%	79%
Japanese Yen	130	577	1,081	1,530	23.6	7.9	17.5	68
Deutschemark	212	505	639	849	11.6	13.0	10.3	86
Italian Lira	106	166	275	382	10.0	6.5	4.4	76
French Franc	51	110	173	245	13.0	3.1	2.8	28
U.K. Sterling	85	212	211	232	9.5	5.2	3.4	42
Dutch Guilder	41	86	123	161	11.6	2.5	2.0	83
Belgian Franc	46	105	111	150	9.2	2.8	1.8	117
Canadian Dollar	57	91	131	146	8.6	3.5	2.1	39
Danish Krone	32	71	102	135	12.2	2.0	1.6	151
Swedish Krona	38	77	101	126	10.3	2.3	1.6	89
Swiss Franc	25	54	77	106	12.0	1.5	1.2	70
Australian Dollar	27	41	50	55	6.6	1.6	0.8	33
Total	$1,636	$3,566	$6,192	$7,776	14.2%			71%

Source: Salomon Brothers, Inc. (1986)

Notes: a - Estimate as of September 30, 1986

TABLE 5.

Net Borrowing by U.S. Nonfinancial Corporations
(Billions of U.S. Dollars)

	1981	1982	1983	1984	1985	1986
Securitized Financing	45.0	37.7	27.2	78.4	90.5	98.6
Corporate Bonds	28.1	44.2	24.6	55.3	77.0	90.5
Open Market Paper	16.9	-6.5	2.6	23.1	13.5	8.1
Bank Loans	43.5	39.7	18.0	77.0	35.5	27.1
Ratio of Securitized Financing to Bank Loans	1.03	0.95	1.51	1.02	2.55	3.64

Source: Salomon Brothers, Inc. (1986, p.55)

TABLE 6.

Stock Market Value of Exchange-Listed Domestic Companies
(Billions of U.S. Dollars)

	Year-End				Annual Growth Rate	% of Total		Ratio to
	1975	1980	1985	1986[a]	1975-85	1975	1985	1985 GDP
U.S. Dollar	$704	$1,237	$2,014	$2,202	11.1%	61.2%	49.5%	51%
Japanese Yen	142	380	948	1,783	20.9	12.3	23.3	60
U.K. Sterling	86	205	354	384	15.2	7.5	8.7	70
Deutschemark	51	72	178	217	13.2	4.5	4.4	24
Canadian Dollar	51	117	157	163	12.0	4.4	3.9	47
French Franc	35	55	79	128	8.4	3.1	1.9	13
Italian Lira	11	25	58	112	18.3	0.9	1.4	15
Swiss Franc	17	43	84	97	17.7	1.4	2.1	77
Dutch Guilder	18	29	59	77	12.5	1.6	1.5	40
Australian Dollar	20	60	60	69	11.6	1.7	1.5	39
Swedish Krona	2	13	37	57	32.7	0.2	0.9	33
Belgian Franc	9	10	21	32	8.8	0.8	0.5	22
Danish Krone	4	6	15	15	13.9	0.4	0.4	22
Total	$1,150	$2,251	$4,065	$5,335	13.5%	100.0	100.0	46%

Source: Salomon Brothers, Inc. (1986)

Notes: a - Estimate as of September 30, 1986

TABLE 7.

Gross New Issues of Asset-Backed Securities
(Billions of U.S. Dollars)

	1980	1982	1984	1985	1986[a]	1987[a]
Residential Mortgage	22.0	55.0	66.7	114.0	253.3	217.0
Commercial Mortgage	—	—	1.3	6.0	5.6	7.0
Automobile Receivables	—	—	—	—	10.0	15.0
Credit Card Receivables	—	—	—	—	.05	1.0
Total	22.0	55.0	67.0	120.0	269.0	240.0

Notes: a - Estimate
b - Forecast

Source: Salomon Brothers, Inc. (1986)

TABLE 8.

Aggregate Open Interest
in Major World Financial Futures and Options Contracts
(Billions of U.S. Dollars)

	1975	1980	1984	1985	1986:3
Futures	0.2	81.0	190.7	253.7	439.9
Interest Rate Contracts	0.0	78.8	182.1	236.0	412.4
Bonds	0.0	35.9	25.0	49.5	104.3
Money Market	0.0	42.9	157.1	186.5	308.1
Stock Index Contracts	0.0	0.0	4.6	9.7	18.1
Currencies	0.2	2.2	4.0	8.0	9.4
Options	0.0	0.0	40.3	138.2	239.6
Interest Rate Contracts	0.0	0.0	21.5	88.8	161.9
Bonds	0.0	0.0	21.5	41.4	45.8
Money Market	0.0	0.0	0.0	47.4	116.1
Stock Index Contracts	0.0	0.0	14.7	37.1	38.9
Currencies	0.0	0.0	4.1	12.3	38.8
Aggregate Open Interest[a]	0.2	81.0	231.0	391.9	679.5

Notes: a - Measured by dollar par or index value of outstanding positions on the last day of the period.

Source: Salomon Brothers, Inc. (1986, p. 23)

TABLE 9.

Aggregate Daily Trading Volume
in Major World Financial Futures and Options Contracts
(Billions of U.S. Dollars)

	1975	1980	1984	1985	1986:3
Futures	0.0	25.3	55.1	86.0	134.6
Interest Rate Contracts	0.0	24.2	46.7	73.4	115.9
Bonds	0.0	6.0	11.9	25.7	57.9
Money Market	0.0	18.2	34.8	47.7	58.0
Stock Index Contracts	0.0	0.0	5.5	8.9	14.4
Currencies	0.0	1.1	2.9	3.7	4.3
Options	0.0	0.0	8.2	24.5	34.4
Interest Rate Contracts	0.0	0.0	1.9	11.5	16.3
Bonds	0.0	0.0	1.9	6.5	6.7
Money Market	0.0	0.0	0.0	5.0	9.6
Stock Index Contracts	0.0	0.0	6.0	12.3	15.6
Currencies	0.0	0.0	0.3	0.7	2.5
Aggregate Trading Volume[a]	0.0	25.4	63.2	110.5	169.0

Notes: a - Daily average of the dollar par or index value of transactions

Source: Salomon Brothers, Inc. (1986, p. 23)

TABLE 10.

Interest Rate and Currency Swap Activity

Period	Interest Rate Swaps		Currency Swaps[a]	
	Amount[a]	No. of Contracts[b]	Primary Bond Related	Other
1982	—	—	2.3	—
1983	—	—	5.0	—
1984	—	—	11.0	—
1985:1	—	—	—	—
1985:2	109.9	—	—	—
1985:3	134.7	1055	—	—
1985:4	170.2	1621	18.0	—
1986:1	—	1744	—	—
1986:2	—	2209	—	—
1986:3	—	—	—	—
1986:4	300.0[c]	—	38.0	38-76[c]

Notes: a - total amount outstanding at end of period in billions of U.S. dollars.
b - Number of contracts concluded during period
c - Estimated

Sources: Morgan Guaranty Trust Co., World Financial Markets, December 1986.
Salomon Brothers, Inc. (1986, p. 23)

Table 11.

A Classification of Innovations By Financial Intermediation Function

Innovation	Function				
	Price-risk-transferring	Credit-risk-transferring	Liquidity-enhancing	Credit-generating	Equity generating
A. On-balance-sheet					
Adjustable rate mortgages	X				
Floating rate loans	X				
Back-to-back loans	X				
Asset sales without recourse		X			
Loan swaps		X			
Securitised assets		X	X		
Transferable loan contracts		X	X		
Sweep accounts and other cash management techniques			X		
Negotiable money-market instruments			X		
Money-market mutual funds			X		
Zero coupon bonds				X	
"Junk" bonds				X	
Equity participation financing				X	
Mandatory convertible debentures					X
B. Off-balance-sheet					
Futures	X				
Options and loan caps	X				
Swaps	X			X	
Forward rate agreements	X				
Letters of credit		X			
Note issuance facilities	X	X	X		
Credit-enhancing guarantees on securities		X	X		

Source: Bank for International Settlements, Recent Innovations in International Banking, 1986.

TABLE 12.

Evolution of the Currency and Interest Rate Swap Market

Date	Phase	Trading Arrangement	Volume
1970's	Arbitrage of regulation	Parallel loans	Small
1980-81	Arbitrage of market anomalies (1)	Intermediated agreements	Small
1982-83	Arbitrage of market anomalies (2)	Intermediated with bank inventories	$20 Billion
1984	Standardized traded swaps	Market making on standard contracts	$100 Billion
1985-	Derivative agreements on swaps (forward swaps, swap options)	Market-making on standard contracts	$200-300 Billion

Source: Adapted from Ian Cooper (1986).

Table 13.

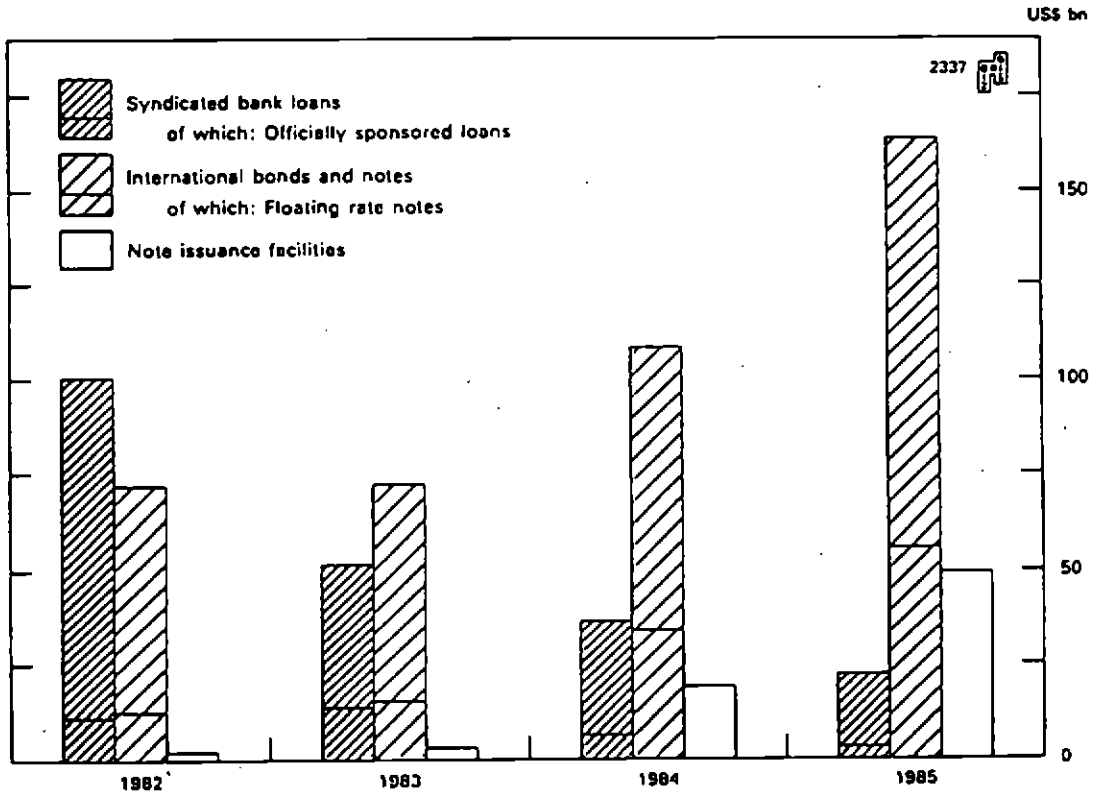
Comparative Risks of New Financial Market Instruments

Instrument	Credit risk	Market risk	Settlement risk	Market liquidity risk
Currency options	Writer for premium amount until paid, buyer for cost of replacement until exercised.	Limited for buyer, unlimited for writer.	Premium amount on payment date, principal amount for both parties if exercised. (One party pays currency A, one pays currency B.)	Exchange and OTC options new, liquidity of markets untested under stress. Liquidity of exchanges superior to OTC markets, also partially dependent on liquidity of market for underlying.
Interest rate options	Same as above.	Same as above.	Same as above except one party delivers cash, the other securities, if exercised. (Could be net amount if cash settled.)	Same as above.
Currency swaps	Default cancels future obligations. Risk limited to replacement cost. May be principal risk if agreed in original contract.	Equal to rate change on principal and interest amount.	Contractual amount on successive payment dates.	All OTC contracts: limited liquidity.
Interest rate swaps	Default cancels future obligations, risk limited to replacement cost. No principal risk.	Complex: equivalent to bond of equal maturity on fixed side. Risk to fixed payer in swap if rates have fallen, to fixed receiver if rates rise. Small on basis swap. No market risk on principal amount.	Interest payment amount only on successive payment dates.	All OTC contracts: limited liquidity.
NIFs/RUFs	Principal amount for holders of paper, same as other guarantees for writers of standbys.	Writers of standbys face risk they will be called on to lend at below-market spreads if market conditions change.	Principal amount on payment date for borrower.	Liquidity of paper largely untested.
Forward rate agreements	Mostly cash settled, credit risk limited to amount of market risk.	Equal to market risk on deposit.	Limited to amount of market risk if cash settled.	Small market, limited liquidity.
Euro-bonds	Same as onshore bond.	Same as onshore fixed rate bond.	Largely same as onshore market.	Markets well developed, but secondary market less developed than major onshore markets.
FRNs	Same as bond.	Same as on short-term paper.	Largely same as onshore market.	Relatively new market, liquidity untested, thin secondary market.
Securitised credits	Derivative from credit risk of underlying asset, sometimes with explicit insurance back-up.	Same as conventional instrument of similar maturity.	Generally equal to similar conventional instruments, although some have payment date concentrations.	Markets well developed for long-standing instruments, less clear for new instruments. Thin secondary markets.
Asset sales (with recourse)	Equal to credit risk of selling institution.	Fixed by terms of sale.	Limited.	Limited liquidity.
Asset sales (without recourse)	Buyer takes credit risk of underlying debtor.	Set by terms of underlying credit.	Limited.	Limited liquidity.

Source: Bank for International Settlements, Recent Innovations in International Banking, 1986.

FIGURE 1

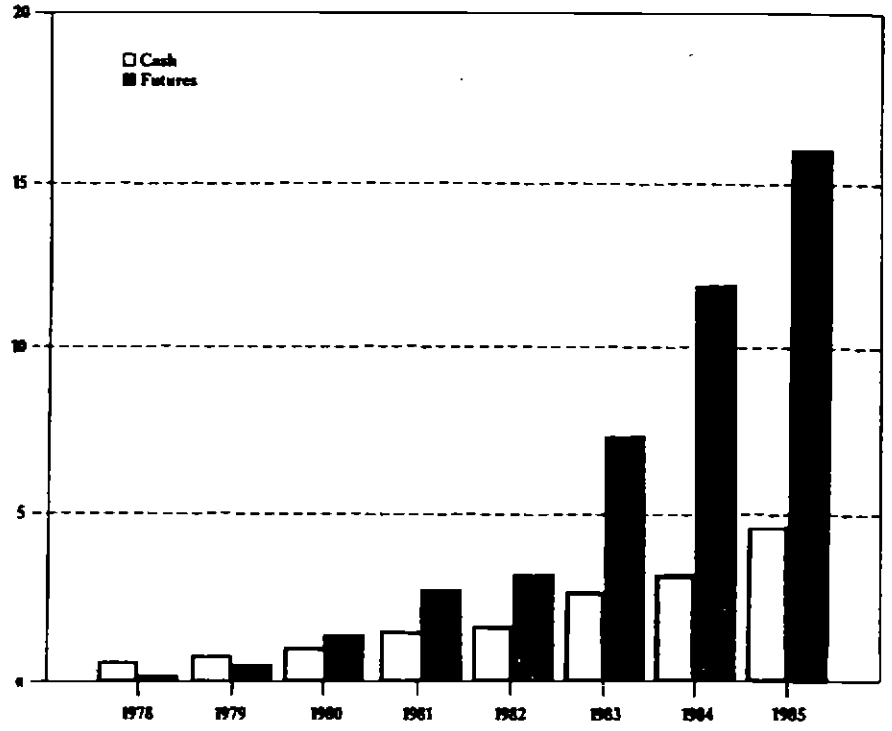
International Borrowing Through Syndicated Bank Loans Versus Tradeable Bonds and Notes



Source: Bank for International Settlements, Annual Report, 1986.

FIGURE 2

Average Daily Trading Volume in Treasury Bond Futures
and Underlying Cash Bonds
(Billions of U.S. Dollars)



Source: First Boston Corporation, Handbook of Securities of the United States Government and Federal Agencies, 1986, p. 225.

FIGURE 3

Construction of Synthetic Securities:
Euro-DM Commercial Paper and Euro-DM Bonds

3A. Euro-DM Commercial Paper

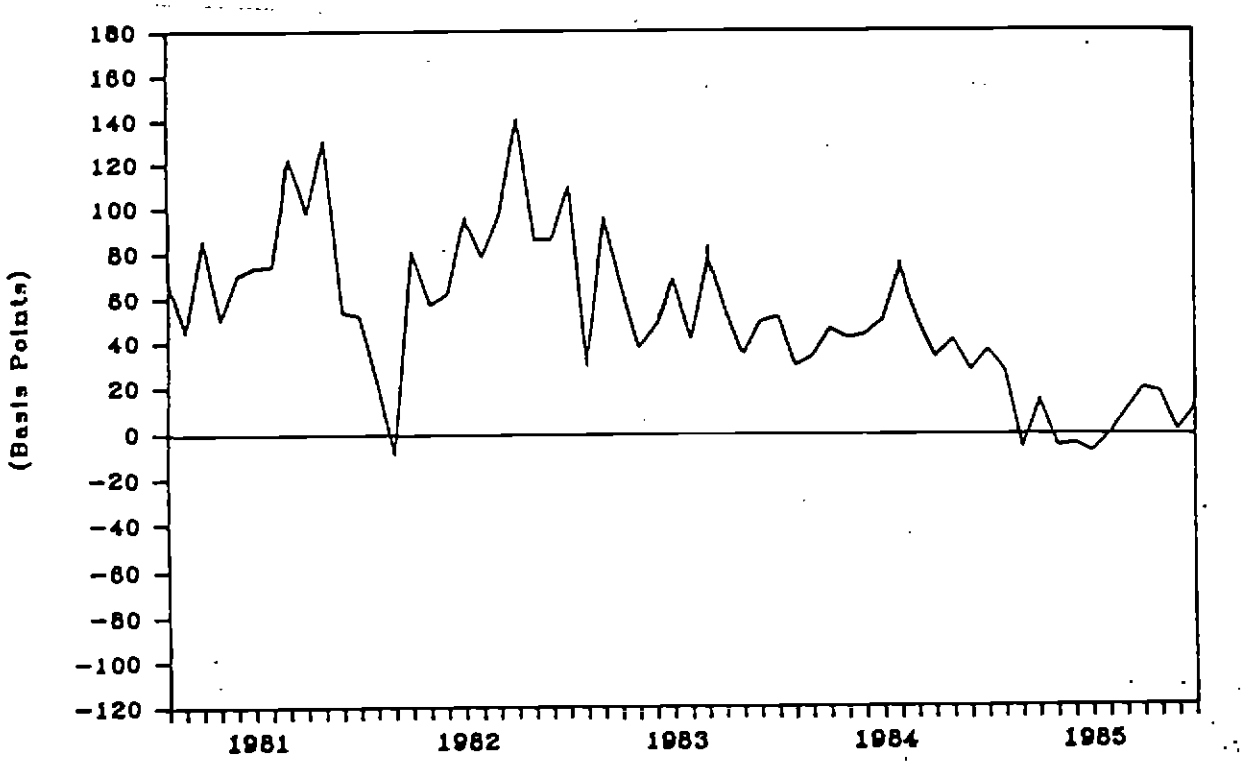
Assets	Liabilities
{$ Cash} DM Cash	A/P: $ Commercial Paper
A/R: $ forward purchase	A/P: DM forward sale

3B. Euro-DM Bonds

Assets	Liabilities
A/R: $ long-term forward purchase	A/P: Euro-$ Bond
	A/P: DM long-term forward sale

FIGURE 4

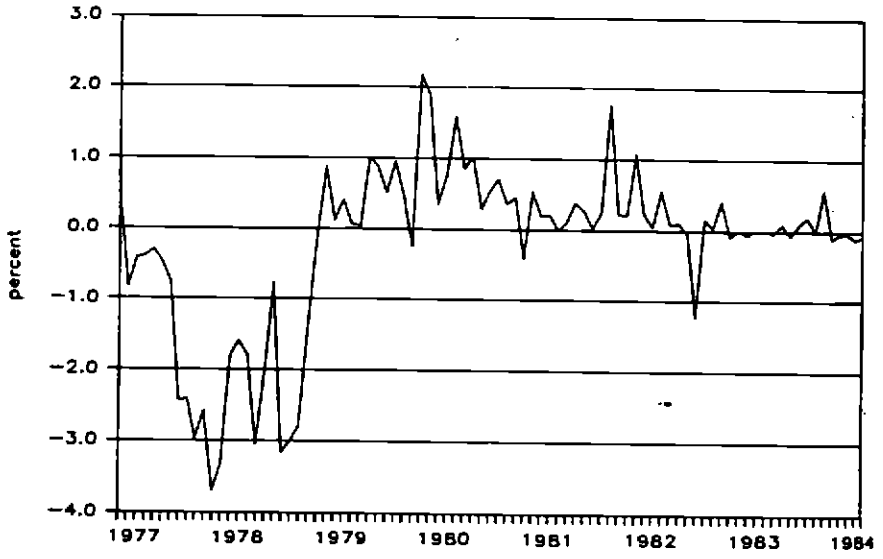
Comparative Spread Relationship:
Euro-DM Rate minus Constructed DM Commercial Paper Rate
(90-day term at percentage per annum)



Source: Irene Kreiner, "Short-Term Multicurrency Funding Via the U.S. Commercial Paper Market," 1986.

FIGURE 5

Deviations from Covered Interest Parity:
Eurodollar versus Japanese Gensakis, 3-month rates.



Source: Robert Feldman, Japanese Financial Markets, 1986, p. 182.

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