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4 Financial Innovations in International Financial Markets

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1. Richard M. Levich

4.1 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 com-

mercial 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 reapplied 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. Nonfinancial 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.

This paper provides a broad assessment of these recent developments surrounding financial innovation, including their impact on financial stability and national policy-making. This theme suggests several basic questions: (i) What financial product and process changes have occurred over the last twenty to twenty-five 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 macroeconomy from both a positive and policy perspective? This paper lays a foundation that will address these questions.

Section 4.2 outlines 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 nonexistent a decade ago, but now have grown to substantial importance.

Section 4.3 presents 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 demonstrates 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 4.4. I 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 4.5, I examine the consequences of innovation on financial market prices, international price relationships, and financing opportunities. Then in section 4.6 I analyze the consequences of innovation for macroprudential 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 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 market imperfections, including those macroprudential 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 affecting 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.

4.2 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 nonexistent 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.

4.2.1 Foreign Exchange and the Euromarkets

The foreign exchange market, the interbank 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, twenty-four-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 4.1 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

Table 4.1 **Average Daily Foreign Exchange Trading Volume by Location and Currency**

	Tokyo	London	New York	New York (1977)
Daily volume, March 1986 (billions of U.S. $)	$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.

foreign exchange trading location, with transactions totaling $90 billion per day. New York is the second most active center trading with $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 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.

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 the 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.

The data in table 4.2 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 percent dollar based, with the

Table 4.2 **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	1,023
1976	595	320	80	1,164
1977	740	390	76	1,287
1978	950	495	74	1,389
1979	1,235	590	72	1,498
1980	1,525	730	75	1,631
1981	1,954	1,018	79	1,794
1982	2,168	1,152	80	1,955
1983	2,278	1,237	81	2,189
1984	2,386	1,277	82	2,372
1985	2,846	1,480	75	2,564
1986 (June)	3,059	1,584	72	n.a.
Compound growth	19.9%	20.1%	—	9.5%

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

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 parents' 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 (see Dam 1982, 322–26). 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 con-

solidation 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.[5]

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 percent 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 4.3. 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 substantial, and the Eurobond market expanded sixtyfold in the next eleven years.

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.

4.2.2 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

Table 4.3 Dimensions of the Eurobond Market (billions of U.S. dollars)

Year	Eurobonds		Foreign Bonds	Total International Bond Issues	U.S. 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%	

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

[a]First three quarters at annual rate.

[b]Through end of October, not annualized.

[c]Through end of 1985.

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 4.4, totaled roughly $7.8 trillion at the end of 1986, reflecting a 25 percent increase over 1985. Salomon Brothers (1986) estimates that about half of this increase is the result of the dollar's depreciation. But the nearly fivefold 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 percent in 1980 to 71 percent in 1985, showing another measure of increasing securitization.

Another measure of securitization and its implications is presented in table 4.5. Net borrowings by U.S. nonfinancial corporations have traditionally relied heavily on bank loans, traditionally a nontraded 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 deterio-

Table 4.4 **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	557	1,081	1,530	23.6	7.9	17.5	68
Deutsche mark	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 1986.

[a]Estimate as of September 30, 1986.

Table 4.5 **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 1986, 55.

ration 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 creditworthy 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.

The trend toward securitization in preference to traditional bank lending is also visible in the international markets. As shown in figure 4.1, syndicated bank loans captured nearly 60 percent 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

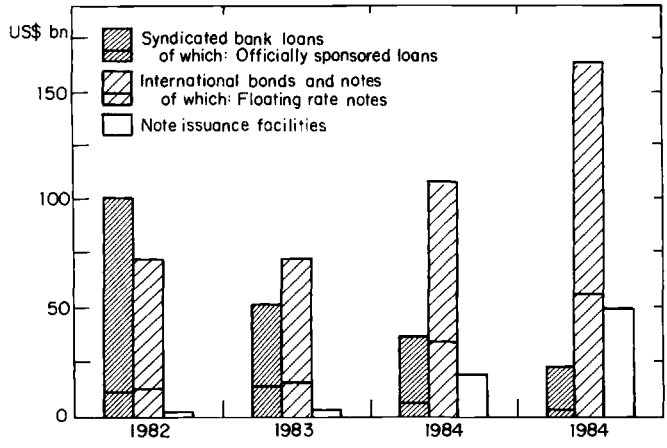

Fig. 4.1 International borrowing through syndicated bank loans versus tradable bonds and notes. *Source:* Bank for International Settlements, *Annual Report,* 1986.

issues and note issuance facilities. The preference for borrowing through marketable securities seems to be firmly established.

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 percent from 1985 and nearly fivefold from 1975, as reported in table 4.6. 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 percent in France to 77 percent 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 percent of total new equity issues worldwide (Salomon Brothers 1986, 24).

The final innovative trend that enhances securitization is the transformation of formerly illiquid pools of assets into tradable 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 4.7. Residential mortgages remain the dominant 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.

4.2.3 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 entities 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 percent over the year-end 1985 figure. Open interest, as reported in table 4.8, 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 percent in the case of futures and 67 percent in the case of options.

Table 4.6 **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
Deutsche mark	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 1986.

[a]Estimate as of September 30, 1986.

Table 4.7 **Gross New Issues of Asset-Backed Securities (billions of U.S. dollars)**

	1980	1982	1984	1985	1986[a]	1987[b]
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

Source: Salomon Brothers 1986.

[a]Estimate.

[b]Forecast.

Table 4.8 **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

Source: Salomon Brothers 1986, 23.

[a]Measured by dollar par or index value of outstanding positions on the last day of the period.

Daily trading volume for futures and options contracts, reported in table 4.9, 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 three-month Eurodollar futures contract is by far the most popular, accounting for about 75 percent of all activity. The three-month Eurodollar futures contract currently trades roughly fifty thousand to seventy-five thousand 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 noted earlier, has become the major reference rate for pricing variable-rate bank lending and floating-rate note (FRN) securities.

Table 4.9 **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

Source: Salomon Brothers 1986, 23.

[a]Daily average of the dollar par of index value of transactions.

Another indicator of the potential impact of financial futures markets on trading behavior is illustrated in figure 4.2, 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.

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

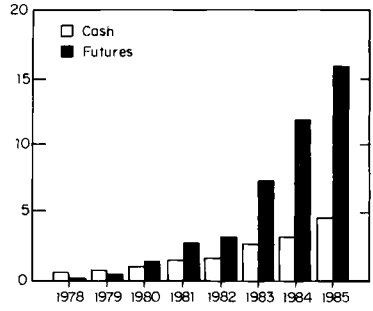

Fig. 4.2 Average daily trading volume in Treasury bond futures and underlying cash bonds (billions of U.S. dollars). *Source:* First Boston Corporation 1986, 225.

"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 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 later in response.[6] 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 (Miller 1986, 15).

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.[7] 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 variable-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 likely be cheaper than redeeming its previous bond issue and incurring additional floatation costs.[8]

The limited information available on swap activity is reported in table 4.10. 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 percent of new Eurobond issues. Other asset- or liability-based currency swaps were estimated to be as large as $76 billion in 1986.

Table 4.10 **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	1,055	—	—
1985:4	170.2	1,621	18.0	—
1986:1	—	1,744	—	—
1986:2	—	2,209	—	—
1986:3	—	—	—	—
1986:4	300.0[c]	—	38.0	38–76[c]

Sources: Morgan Guaranty Trust, *World Financial Markets*, December 1986; Salomon Brothers 1986, 23.

[a]Total amount outstanding at end of period in billions of U.S. dollars.

[b]Number of contracts concluded during period.

[c]Estimated.

4.3 Characteristics of Recent Financial Innovations

4.3.1 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 toward 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 4.11. It may be useful to explore these innovations further using several alternative taxonomies.

Dufey and Giddy (1981) have argued that most financial innovations are either aimed at circumventing government regulations or 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.[9] Individuals monitor the implied bur-

Table 4.11 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			
Securitized 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 arrangements	X				
Letters of credit		X			
Note issuance facilities	X	X	X		
Credit-enhancing guarantees on securities		X	X		

den 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 nonexistent 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 interbank 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 premarket) 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 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 prod-

ucts 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 interbank foreign exchange option market to develop.[10]

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 does 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.[11] Other new products, such as pass-through certificates, are simply tradable 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.[12]

A single innovation could draw on many of the characteristics just enumerated. The evolution of zero-coupon securities provides a good case in point.[13] 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.

4.3.2 Engineering Innovative Financial Instruments

Swaps and Comparative Advantages

To set the stage for our later analysis, it is 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 five-year sterling ↔ supply of five-year dollars;
(ii) demand for fixed-rate funds ↔ supply of floating-rate funds; and
(iii) demand for LIBOR-basis funds ↔ supply of N.Y. 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.[14] The feasibility of a swap (such as in cases i, ii, and iii) 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 com-

pany *B* desires floating-rate funds. Suppose further that the companies can borrow on the following terms:

	Company A	Company B	Differential
Fixed rate	11%	9.5%	1.5%
Floating rate	LIBOR + 0.5%	LIBOR + 0.25%	0.25%
			1.25%
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 1.25 percent 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*. 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 at the heart of this swap transaction. On the other hand, if explanation (3) is valid, the market may be signaling 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 francs, 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.[15] 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.

Building Synthetic Securities

Two further examples 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 the first half of figure 4.3 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

Euro-DM Commercial Paper

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

Euro-DM Bonds

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

Fig. 4.3 Construction of synthetic securities: Euro-DM commercial paper and Euro-DM bonds

particular maturity and credit risk) plus the forward premium on foreign exchange.[16]

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 4.4 shows that the savings from issuing constructed DM commercial paper were in the 30–90 basis pont rate 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 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 its ability to access the bond market at times when terms may be particularly favorable. The T-accounts in the bottom half of figure 4.3 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.[17]

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

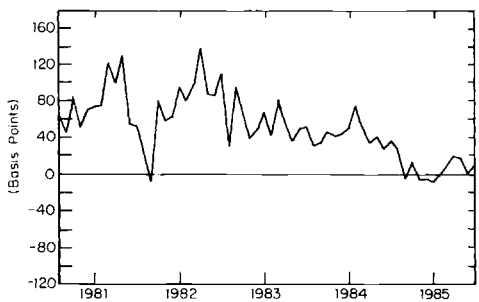

Fig. 4.4 Comparative spread relationship: Euro-DM rate minus constructed DM commercial paper rate (ninety-day term at percentage per annum). *Source:* Kreiner 1986.

bond market at sometime 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.

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 affect 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 that 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.

4.3.3 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 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 which allows them to replicate something that already exists at lower transaction costs.

Our examples demonstrate that new instruments may also replicate securities that *do not* exist but that 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 be issued offshore to avoid prohibitive regulations.[18]

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 4.12, for the currency and interest-rate swap market.

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.[19] 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 *nonfinancial firms* to gain the necessary expertise to evaluate the new products. And for these nonfinancial 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.

4.4 Causes of Financial Market Innovation

4.4.1 Financial Services under Perfect Capital Markets

To better understand the role of swaps and other new financial instruments in the real world, it is useful to outline the nature of financial

Table 4.12 **Evolution of the Currency and Interest Rate Swap Market**

Date	Phase	Trading Arrangement	Volume
1970s	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 Cooper 1986.

services that would exist in a "perfect" capital market. I 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); and (iv) a large number of small participants. Uncertainty regarding future economic outcomes is present, but investors view the future similarly.[20] 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.[21] 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 labeled "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.

4.4.2 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 that 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 markets 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.[22] 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.[23]

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 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 the ultimate causes of innovation) has 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 worldwide 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 mar-

kets, 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 noted earlier, the supply of intermediary services itself has followed an evolutionary process from specialty deals, to brokering, and finally to 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 n. 22) present in international capital markets.

4.5 Implications of Innovation on Financial Market Prices and Market Behavior

The process of financial market innovation that I have been describing leads directly to a number of important economic consequences. In this section, I 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 I 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 transaction 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—that is, 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 imply reduced scope for pursuing monetary and credit policies based on quantitative restrictions on credit or interest rate ceilings. They also suggest 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 4.2. The legal framework has been built to permit trading in a wide variety of financial futures and options contracts. The legal framework for swap transactionsis still developing, but substantial progress has been made to stan-

dardize various provisions and wordings of swap arrangements.[24] And many transactions have moved offshore, where the legal impediments to contract design and market entry are less severe. If we use 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 which 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) that 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.[25]

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, Marr, and Trimble (1986) 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 ninety-two 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 yields were similar in the two markets. This suggests an integration and harmonization of terms between the two markets.[26] 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,[27] but it is now becoming more apparent that longer-term Eurocurrency markets, commercial paper markets (recall fig. 4.4), and onshore short-term financial markets are also being integrated by actual or potential arbitrage.[28] Feldman's (1986) analysis of the Japanese market is a good example. Figure 4.5 shows

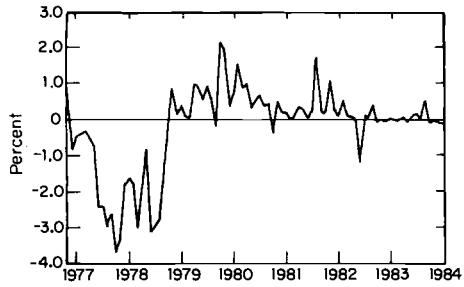

Fig. 4.5 Deviations from covered interest parity: Eurodollar versus Japanese gensakis, three-month rates. *Source:* Feldman 1986, 182.

the incentives for covered interest arbitrage between Eurodollar and gensaki instruments over the 1977–84 period.[29] 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 (Morgan Guaranty Trust 1986, 3).

4.6 Policy Implications of Financial Market Innovation

The picture being painted sounds rosy, which 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 mo-

bility 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 affect economic performance. The key objective is to protect the integrity of the payments system because this represents the lifeblood 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 attribute of the new financial instruments is presented in table 4.13. 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?

Financial instruments that 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

Table 4.13 **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.

Table 4.13 (continued)

Instrument	Credit Risk	Market Risk	Settlement Risk	Market Liquidity Risk
Note issuance facilities/ revolving underwriting facilities	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.
Eurobonds	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.
Floating rate notes	Same as bond.	Same as on short-term paper.	Largely same as onshore market.	Relatively new market, liquidity untested, thin secondary market.
Securitized credits	Derivative from credit risk of underlying asset, sometimes with explicit insurance backup.	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.

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 that 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 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 that utilization of new financial instruments (interest rate swaps, for example) has actually lowered the exposure of their *portfolio positions* to interest rate risk, thereby reducing their capital needs.

Concern about mispricing 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 shakeout. However, some observers have argued that regulatory ground rules (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 premiums and risk-adjusted cap-

ital 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 (see Nash 1987, 1).

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 because 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.

4.7 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.

Notes

The author is grateful to participants in the conference Capital Market Developments and Financial Stability, organized by the Ditchley Foundation and the Graduate School of Business of the University of Chicago and held at Ditchley Park, England, for comments on a related paper, and to Michael Dooley and Martin Feldstein for helpful comments on an earlier draft of this paper. Julapa Rungkasiri provided efficient research assistance. The author retains responsibility for all errors.

1. Assessments of the recent experience have been prepared by Bank of England 1983; 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 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 and 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, 11.

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

5. For a further description of International Banking Facilities, see Chrystal 1984.

6. When asked whether the impact of Chicago's futures markets on the underlying asset markets was not 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).

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

8. Gaz de France represents an interesting case study. Between 1983 and 1985 the company entered into 102 swap transactions totaling $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.

9. See Miller 1977 for a discussion of the use of securities markets for tax shifting.

10. A thorough discussion of foreign exchange option pricing and market characteristics is presented in Grabbe 1986, chap. 6.

11. 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.

12. Figlewski 1986 presents a thorough analysis of the use of financial futures for hedging portfolios of money market instruments.

13. For further details, see First Boston 1986, 218–22.

14. See Giddy and Hekman 1984 for a formal demonstration.

15. For further details, see Bock 1983.

16. The cost is approximate because we ignore (i) interest compounding, (ii) selling U.S. commercial paper for same-day delivery while foreign exchange quotations are sold 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.

17. Alternative approaches for computing the cost of a long-term forward contract are reviewed in Antl 1983.

18. 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.

19. 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 Black 1986 for a model of success and failure of futures contracts based on commodity and contract characteristics.

20. Classic definitions of perfect capital markets (for example, Fama and Miller 1972, 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.

21. For a formal proof, see Cox and Rubinstein 1985, chap. 8, and the references cited therein.

22. 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 firms substitute for the nonexistence of a contract enforcement mechanism.

23. Black's (1986) model incorporates this result, predicting that futures contracts are more likely to be successful in the marketplace if they increase the ability of people to hedge their risks (i.e., if they 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 five hundred 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.

24. The International Swap Dealers Associations (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 the contrary in the code.

25. 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.

26. Somewhat contrary evidence comes from the United States Treasury issues targeted to the Eurobond market. These data suggest that targeted Euro-U.S. Treasuries yield about thirty 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.

27. See, for example, Aliber 1973, and Frenkel and Levich 1975.

28. See Dooley and Isard 1980, and Frenkel and Levich 1981.

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

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2. *E. Gerald Corrigan*

The Worldwide Implications of Financial Innovations

The subject of international financial innovation is obviously vast in scope, and it is only recently that we are seeing systematic efforts to categorize and analyze the many changes that are occurring in the character and operation of our international money and capital markets. Those efforts reached something of a watershed last spring with the publication by the Bank for International Settlements of the so-called Cross report, *Recent Innovations in International Banking.* But the cause of better analysis and understanding is now being advanced on many fronts.

Because so much of a descriptive nature on this subject is now available, I forgo the usually lengthy discussion of trends and developments in order to focus my remarks on some of the policy implications of the process of international financial innovation. However, as a starting point I want to briefly stress several aspects of the situation which seem to me essential to the evolution of our thinking.

First, the process of financial innovation has and will continue to provide important benefits to suppliers and users of financial services and to the larger goal of seeking to insure that the world's capital resources are allocated in the most efficient manner possible. However, even under the best of circumstances, there are bound to be some bumps along the road as new techniques, new instruments, and new systems are put to the test of the marketplace.

Second, while many of the new financial practices and instruments we are seeing gained popularity as devices to protect against unforeseen changes in credit, interest rate, or exchange rate conditions, they can, themselves, be the source of new and sometimes subtle elements of risk. At the very least, we know that none of these practices can eliminate risk; they can and do redistribute it, but even then it is unclear whether that process of redistribution works to heighten or to reduce risks to the system as a whole.

Third, many of today's financial transactions are very complex and may not always be fully understood by the principals to such transactions. Indeed, in some cases it is not so easy to distinguish principals from agents, a distinction that becomes vital in the face of adversity.

Fourth, looking at the financial system on a worldwide basis, there can be no doubt that innovation has increased the extent of operational, liquidity, and credit interdependencies among major markets and major institutions. In this sense, we should all be operating on the assumption that systemic risk probably has increased, even though some would debate that point of view.

Finally, we must be sensitive to the fact that much of what we call financial innovation has taken place in the post-1982 environment of expanding economies and declining interest rates. We all know that neither the business cycle nor the interest rate cycle is dead.

With these general observations in mind, all of us, I believe, can agree that the process of international financial innovation is raising a host of public policy questions ranging from the structure of our money and capital markets—including the structure and workings of the official "safety net" associated with those markets—to the workings of monetary policy in a much more financially integrated world. In addition, I believe we can also all agree that whatever else these forces may imply, they certainly imply that we must have a higher degree of in-

ternational policy coordination, not just in regard to macroeconomic policy but also with regard to supervisory and related policies and practices bearing on activities of financial institutions and markets.

In some circles, the call for greater international policy coordination is greeted with sentiments ranging from doubt to outright skepticism as to whether the requisite degree of coordination is achievable. While the problems are formidable, international economic and financial policy coordination is working better than is often recognized. Several examples lead me to that conclusion.

First, the G-5, G-7 process has clearly led to a much higher degree of mutual understanding of problems and prospects while at the same time yielding important steps in policy coordination. That is not to say that all of the problems have been solved; clearly, they have not. However, progress has been made, and important building blocks for the future are in place. Having said that, I should also stress that the case for greater cooperation in the policy process does not mean that necessary policy initiatives of a unilateral nature can be ignored. To the contrary, policy coordination can only be fruitful to the extent that the individual countries are following broadly sensible policies in the first instance. Indeed, absent those fundamentals and the willingness to act unilaterally when needed, there is the obvious danger that policy coordination could become the coordination of bad policies.

Second, today's evident problems notwithstanding, I would also argue that the efforts to deal with the LDC debt problem over the past five years are a truly remarkable example of international cooperation among an incredibly large group of participants, public and private. Having said that, I am obviously sensitive to the fact that the process is under renewed strain as highlighted by Brazil's current difficulties and the greater difficulties in obtaining broad-based commercial bank support for and participation in restructuring and fresh money-lending programs. Clearly, these sources of strain must be overcome or we run the risk of reversing the hard-won gains of the past—a result that can only mean greater risks, greater instability, and greater tensions for all.

Third, in the area of bank supervision, there is also clear and important evidence of cooperation and coordination. The latest and perhaps most graphic example is the joint effort by authorities in the United States and the United Kingdom to promulgate comparable risk-based capital adequacy standards for internationally active banks in our respective countries. I regard that initiative as a genuine breakthrough in international cooperation, in part because we were able to agree on such a complex and technical subject, but also because the approach—as it applies to balance sheet and off-balance-sheet activities—is the first comprehensive effort, nationally or internationally, to substantially

adapt basic supervisory standards to the wide range of the new activities and new instruments that have grown out of the process of financial innovation.

Finally, I cite another, more subtle, example of international cooperation: the monthly meeting of the central bank governors in Basle. The value of these meetings stems not merely from the fact that they provide a regular and recurring vehicle for discussion of timely issues of mutual concern but also because the central bank governors and their key staff personnel have come to know each other so well. The spirit of collegiality and trust growing out of the Basle meetings can be of considerable value in dealing with problems when they arise.

In citing these several examples of progress being made in the area of increased policy coordination, I do not want to leave the impression that any of us can be sanguine about the future. To the contrary, the agenda for the future is formidable. Therefore, I will touch on some of the areas that seem to me of particular importance, first in regard to the operation and supervision of financial institutions and markets and then in regard to monetary policy itself.

In banking and finance, the first order of business starts here at home and relates to our capacity as a nation to come up with a coherent point of view concerning what our banking and financial system should look like. That vision must take account not only of market and competitive realities here and around the world, but also of the public interest considerations associated with the stability, integrity, and public confidence in the operation of the system. Those public interest considerations, among other things, mean that the system must be strong enough to withstand the failure of those who abuse it, even when they are large in size. Indeed, the marketplace cannot live up to its promise of efficiency and order if even a few market participants believe that the public safety net will protect not just the system as a whole, but all participants, including those who have acted in an undisciplined or irresponsible fashion. We simply cannot have a system that combines the maximization of profits with the socialization of losses.

While the need to reshape the basic legislative and supervisory framework surrounding our banking and financial markets and institutions has been recognized for some time, today's international market realities make that case all the more compelling. As most of you know, I have recently suggested one longer-term view of what our banking and financial system ought to look like. In making that essay available, I hoped it would serve as a vehicle to help shape the debate—including its public policy elements—while at the same time providing, to use the comptroller of the currency's words, something of a script others can work from. Only others can judge whether it has been successful

in that regard, but one thing is clear; namely, the case for fundamental reform is overwhelming and will not go away, nor will the need for some immediate legislative initiatives along the lines that have been persistently and aggressively espoused by the Federal Reserve and others.

Coming to grips with the structure of our own banking and financial system is, among other things, an indispensable prerequisite to coming to better grips with the structure of the supervisory system both domestically and internationally. Indeed, it strikes me as sheer folly to assume that we can better rationalize the structure of the banking and financial supervisory apparatus here in the United States while the system itself is in such a state of flux. However, and without prejudging what, if anything, should be done with it, it is clear that supervisory practices must, here and abroad, adjust to the new environment. For example, building on the U.S.-U.K. initiative, I hope that other major countries—especially those with large and active markets and institutions—will quickly begin the process of bringing capital standards for internationally active banking organizations into greater conformity with emerging international standards. To put it directly, the competitive and prudential implications of major banking organizations operating around the world with distinctly different capital requirements are simply not in the best long-run interests of strong, stable, and appropriately competitive international banking markets.

While internationally harmonious bank capital standards are important, they are only part of the task that lies ahead. Let me, therefore, briefly cite four other areas that I believe will require attention in the period ahead:

First, many of these issues that arise in the context of efforts to achieve a greater degree of harmony internationally in banking markets also arise in other areas. For example, a case can be made that greater convergence in securities market regulations among countries is a necessary corollary to greater harmony on the banking side. The case for greater convergence can also be made in regard to specific markets such as foreign exchange and swaps where banks and securities companies compete directly.

Second, the international payments system requires, in my judgment, continued attention with a view toward doing all we reasonably can to ensure its reliability and stability. This may be especially true for the vast flows of payments denominated in U.S. dollars, many of which are interbank in nature and almost all of which are associated with financial transactions. These dollar-denominated payments—many of which originate in London, Tokyo, and elsewhere and flash through New York as electronic blips—aggregate to more than $1 trillion per

day. As such, they entail operational, liquidity, and credit interdependencies of very sizable proportions among virtually all the major banking organizations in the world.

Numerous efforts are underway within the Federal Reserve and within and among private banking organizations—foreign and domestic—aimed at strengthening credit and operational characteristics of these payments systems. However, these efforts take time, and as time passes the volume of transactions continues to grow very rapidly. In these circumstances, it important that parent organizations of foreign branches and affiliates with major operations in the United States, as well as their central banks, take steps to ensure they understand the risks that can be associated with international payments flows, including, but by no means limited to, dollar payments that are settled in New York.

Third, fresh questions are arising concerning the powers and privileges granted to financial institutions operating on foreign soil. We in the United States have for some years followed a policy of national treatment whereby foreign banks and securities firms operating in the United States have the same privileges and responsibilities as do our domestic institutions. Others follow that same policy, but in some countries reciprocity, or a blend of reciprocity and national treatment, is the rule. However, even where national treatment is the policy, questions arise as to whether practices are always consistent with that policy.

The policy of national treatment is coming under attack in the United States amid perceptions that U.S. firms are not always treated evenhandedly in some other countries. This situation requires our careful attention since protectionism in banking and finance is susceptible to those same insidious forces that we all fear on the trade side; in short, once unleashed, it is difficult to know where it will stop.

Fourth, there is a host of questions regarding the implications of efforts underway in a number of countries to reshape the basic legislative and regulatory framework within which banking and financial institutions operate, in the face of the changes that have been induced by market forces over the past decade or more. In addition to difficult issues of legal and regulatory philosophy, custom, and tradition, these efforts must also come to grips with differences in data reporting and consolidation requirements, tax policies, disclosure rules, and accounting standards.

As I said earlier, the agenda regarding the structure and supervision of banking and financial markets is formidable indeed, but there are also a number of important questions regarding monetary policy that grow out of the process of international financial innovation. For example, we know that at least for a transition period, financial innovation has played a role in undercutting relationships between monetary ag-

gregates and key macroeconomic variables such as the GNP or the price level. We also know that the exchange rate is now more important than it once was insofar as its role in transmitting monetary policy changes to the economy. We also know that a variety of forces associated with the process of financial innovation implies that the role of credit-rationing devices in the monetary policy process has been reduced in importance, while price variables—interest rates and the exchange rate—have become more important. Finally, while we cannot be sure, many strongly suspect that the lags in the monetary policy process have become either longer or more unpredictable, or both.

In combination, these forces imply that the monetary policy process is subject to new sources of uncertainty and new tensions. This seems to me to imply that judgment and discretion will have to continue to play a large role in the process of monetary policy formulation and execution. I say this not just because there are the obvious questions surrounding the relevance of outdated empirical analysis and related "rules of thumb" concerning the workings of monetary policy, but also because the unbundling of the credit apparatus raises important questions as to the incidence of monetary restraint, not just its ultimate impact on the economy at large.

As I said earlier, it is clear that the international side of the monetary policy equation will be more important than it once was. That, in turn, implies the need for still greater communication and coordination, but the case for greater coordination internationally must not divert our attention from pressing matters here at home. Among the clear priorities in that regard are the need to better rationalize and strengthen our banking and financial system, and the need to reduce significantly and decisively the budget deficit, thereby narrowing and ultimately eliminating the domestic savings gap and thus providing the financial room to reduce our external deficits. Finally, financial institutions and financial market practitioners are going to have to gain a renewed sense of self-discipline and prior restraint if we are to avoid running the world's credit system too close to the soft shoulder of the high-speed expressway of international finance. None of these challenges will be easy to overcome, but if we are to reap the fullest benefits of financial innovation we must find the ways. I, for one, believe we can.

3. *Charles S. Sanford, Jr., and George J. Vojta*

Deregulation, Technology, and the "Safety and Soundness" of the Financial System

Incomplete deregulation of the financial services industry and the dramatic advances in information technology are seriously damaging the safety and soundness of the commercial banking and thrift franchises in the United States, while at the same time creating a highly concentrated and protected securities industry.

The magnitude and pace of these powerful and irreversible changes are so great that the ability of adversely affected intermediaries and their responsible regulators to adapt is being severely tested. The result is progressive, increasing danger to the safety and soundness of the American financial system. The derivative consequence is that financial competition and innovation which improve service to the public are arrested because of accelerating systemic risk. Let us examine these issues one by one.

Incomplete Deregulation

During the Great Depression, interest rates on deposits were fixed by law or regulation at zero or relatively low levels, entry to banking was restricted, local banking markets were protected by limits to geographic expansion, federal insurance was provided for deposits, and banks gained exclusive access to the lender-of-last-resort window of the Federal Reserve system. At the same time, banks relinquished the right to underwrite securities. It was a package deal. The result was that commercial banks had the lowest cost of funds. Since they could charge less and yet maintain a decent profit, they had the pick of the most creditworthy and liquid assets. Banks became AAA "gilt-edged" credits, and few if any of them needed FDIC support to attract or hold deposits.

Today, the pact has been abrogated. The deregulation of the liability side of commercial banks' balance sheet, which occurred in the 1970s and 1980s, left the banks with a much higher relative cost of funds. Today the most creditworthy banks are unable to fund profitably, even on an acceptable mismatch basis, a loan to an A- or better-rated industrial company. As a result, the quality of the bank loan portfolios

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has deteriorated and bank credit ratings have degraded significantly. Many banks now must have FDIC support to keep or attract funds. This process, far from being static, continues in a downward spiral.

Such an unpromising situation would not exist if, at the time of deposit deregulation, banks had been allowed to service the better credits in the open markets. The anomalies in the present situation are astonishing. A bank is not permitted to hold a liquid credit for five minutes, but is allowed to hold the same credit as an illiquid investment for fifty years. Banks cannot underwrite commercial paper, but they can underwrite the backup line of credit that comes into play when the credit behind commercial paper deteriorates.

One alternative is to return to the 1930s arrangement, which guaranteed banks the lowest cost of funds, an option that even the most politically naïve agree is impossible. Granting that premise, elimination of Glass-Steagall is the only rational cure for the decline of the safety and soundness of the banking business which has resulted from incomplete deregulation.

Foreign banks have been more fortunate. The advance of deregulation abroad seems inexorable. The British Big Bang and the changes taking place in Canada, to cite only recent events, are not isolated developments. At the same time, we see Swiss and German banks underwriting corporate bonds and stocks in the U.S. market. All of this is part of a global movement toward free competition in the financial markets. We hope that the completion of deregulation in the United States will follow soon.

Richard Levich's paper outlines clearly, with strong documentation, the broad picture. There is no need to refine his discussion of the process by which banks have lost ground to open market alternatives and seen their creditworthiness deteriorate. There is no escaping the conclusion that half of the Glass-Steagall arrangement has been repealed but the other half remains. U.S. banks are no longer protected from competition, but their powers to compete remain restricted.

Information Technology

The costs of gathering, storing, analyzing, and globally transmitting information have fallen dramatically. No end to this trend is in sight. The existence of financial intermediaries depends upon deficiencies in the information flow between borrowers and investors.

Information is not free and is not equally distributed across the population. It takes time and effort to find a counterparty to a bargain, and a suitable counterparty with complementary financial needs may be hard to find or may be nonexistent. Bargains cost money to structure and to enforce. Crafting a deal properly to reflect real-world legal, tax, and accounting considerations takes considerable skill. No one can be

an expert on everything, so it pays to specialize—some of us build cars and some of us underwrite bonds. Some people are smarter than others; some people work harder than others; and some people are more willing to take risks than others.

Last, but certainly not least, governments may muddle up the works by supplanting the judgment of the market with the judgment of politicians. They do so sometimes in the name of high-minded goals like fairness, equality, and political stability, and sometimes in the service of special interests or entrenched mythologies, as in the case of the Glass-Steagall Act.

These shortcomings are what the economist likes to call "market imperfections," a term that may not do them justice. These imperfections cost society money by creating blockages and distortions in the flow of funds from investors to borrowers. Faulty investment decisions make society poorer than it would otherwise be.

The financial intermediary is a specialist whose job is to eliminate, circumvent, or reduce the cost of these financial market imperfections. The earnings of intermediaries depend upon the magnitude of the market imperfections that they face and their success in getting around them—whether by providing efficient information processing, by providing expert judgment, or by bearing unwanted risks. Improvements in information technology make it easier and cheaper to overcome those market imperfections that are caused by deficiencies in the flow of information between borrowers and investors. As these deficiencies are remedied by better and cheaper information technology, the demand for intermediation falls, increasing the competitive pressure on financial firms.

An important example of this phenomenon is the disappearance of the commercial banks' virtual monopoly on credit information. Years ago, banks gathered and evaluated information about the financial health of potential borrowers—a difficult and, in most cases, impossible if not prohibitively expensive task for individual investors. A bank pooled depositors' funds and lent to borrowers it determined were the best credit risks. Borrowers had few alternatives to the low-cost funds provided by banks.

Information technology has reduced the banks' comparative advantage in evaluating and taking credit risks. Computer and communication technology can quickly distribute financial news and data to the market in general. Rating agencies specialize in selling credit analysis on growing number of borrowers to a wider and wider audience. SEC disclosure requirements greatly improve the quantity and quality of available information. Banks have lost their relative monopoly in credit information; instead credit information is becoming a utility outside of the banking system.

Computer technology has also increased the efficiency of pooled investing via mutual funds, pension funds, and other institutional and individual investors. Investable funds are concentrated increasingly with these institutional and affluent individual investors, who are willing and able to do their own research and analysis. Investors now buy securities of the issuers directly, bypassing the bank loan and intermediation process. Since this disintermediation of banks begins with the better credits and works its way down, banks not only suffer a loss in business volume; they suffer a loss in the quality of the business that is left to them. As the competition for lesser credit increases, margins correspondingly decline. Thus, because of advances in information technology, and also because of incomplete deregulation, the bank loan and deposit business is under intense attack from more efficient, open markets and bank asset quality is deteriorating. But technology is transforming the nature of financial intermediaries as well.

It is hard to say whether intermediaries, as a group, will make more or less money as technology advances. What is clear is that successful financial firms will be structured and managed very differently from today. For example, as technology makes routine information cheaper and more widely available, financial professionals will have to find new ways to add value for their customers. More than a few of today's securities salespeople earn a handsome living by reciting current market prices, repeating conventional market chat, and helping customers evaluate simple trades. What happens when most of their customers have screens and expert systems to give the real-time prices and instant analysis of common trades?

As another example, artificial intelligence may make computer-to-computer trading a practical possibility. The more routine trades for the high-volume standardized instruments might be the first to be automated. Just as today's bond trader uses a programmed calculator, which is nothing more than an expert system, to do bond math and to evaluate simple trades, tomorrow's trading manager might use an automated trader to execute part of the firm's overall trading strategy. One early form of programmed trading is already achieving notoriety in the equities markets. The message is that the lower-order skills that are now the stock-in-trade of many traders, salespeople, loan officers, and other financial people are being taken over by technology and artificial intelligence of one form or another, leaving the higher-order skills to be performed by a new breed of financial professionals.

This new breed combines the talents of an artist with those of a technician and has enormous ability to craft creative solutions to customer-specific financial problems. This new person is comfortable with technology and demands "high-tech" research and analytical support

to function. Information technology is no longer a black box in the back office but a critical front office tool. As firms employ greater and greater numbers of these new financial people, they will undergo significant organizational change, since these people will have to be managed differently. There will be fewer levels of management, weaker hierarchy, and less bureaucracy. A high-performance atmosphere will require greater autonomy and collegiality among professional members of the firm.

Also, the new technology will drive geographical expansion because the market is now global and requires a presence in all the major financial centers. Once the technology has become worldwide in scope and available to everyone who wishes access to the marketplace, then its specific location becomes irrelevant. Indeed, we can expect a certain geographical contraction to occur as firms focus their technology in the country where they are headquartered.

Information Technology and the New Global Market

Aside from the more obvious effects of technology on financial markets and institutions, another important structural change is occurring. Technology is allowing the creation of a globally integrated market for distinct, unbundled financial attributes.

Any financial instrument can be thought of as a bundle of financial attributes, such as amount, term, currency, repricing interval, base rate, credit risk, tax benefits, and so on. The new technologies, caps, floors, options, futures, and so forth are used to unbundle and repackage these attributes. Traditionally, a financial instrument was priced by comparing it to other instruments of the same name and the same structure trading in the same market. Today, it is common to price an instrument by comparing it to pieces or packages of other types of instruments in many different markets, that in combination produce the same financial result, that is, the same bundle of financial attributes.

For example, a U.S. dollar floating-rate loan from a U.S. bank is not simply compared to other floating-rate loans offered by other U.S. banks. It is also compared to a fixed-rate Eurodollar bond issue coupled with an interest rate swap and to a floating-rate sterling loan from a U.K. bank coupled with a currency swap. All produce the same bundle of attributes: funding in a given currency for a given term that floats off a given base rate at a given repricing interval.

Sophisticated borrowers and investors with ready access to the global markets approach financial needs by defining their underlying requirement for financial attributes—currency, term, repricing, and so on. They compare alternative packages of these attributes assembled from many markets around the world which meet optionally their require-

ments. Financial attributes are being priced and traded on world markets. As the volume of this activity expands, a single world price for each attribute will emerge. None of this would be possible without modern information technology to gather and analyze quickly data from all over the world.

In due course, every financial instrument will become a potential competitor to every other financial instrument. The ability to disassemble and repackage attributes into optional bundles means that anomalies in prices of different instruments will be arbitraged away more quickly. Artificial intelligence will accelerate this process by allowing the rapid comparison of many complex alternatives.

Similarly, segmentation and isolation of markets by political or institutional boundaries will be much harder to sustain because of competition from efficient synthetic substitutes available in the global market. Borrowers and investors will benefit greatly from this intense competition. The middleman's profit on basic intermediation will decline as a result of these developments. More important, it will be far easier to diversify away or hedge unwanted risks to achieve a customized financial position suited to the customer's situation. Successful financial professionals will be adept at using technology to help customers achieve their desired financial position.

Access to this new global market will be extremely valuable. Since the loss of market access will be costly, perhaps fatal, everyone will be subject to increased market discipline. It will be necessary to disclose all important information and, indeed, secrets will be much harder to keep. Failure to honor agreements may be suicidal.

The impact on financial intermediaries will be dramatic. Comfortable and profitable niches that are now protected by tradition, insulation, and regulation will be under relentless attack. The successful intermediary will not make its money from passive risk bearing or milking customers who have nowhere else to go. Instead, profit will be earned from (1) the creation and professional execution of effective solutions to unique financial problems; (2) the astute trading and positioning of financial attributes; and (3) the low-cost production and distribution of standard financial attributes in high volumes.

Relatively few firms will be capable of meeting the necessary standards of excellence over a wide range of customers and products. It will be vital to focus resources on a clearly defined and sustainable business franchise that is built upon a firm's unique strengths.

The advance of information technology will not be reversed unless some calamity returns the world to the Stone Age. Politicians may cause temporary setbacks, but technology will advance inexorably. Institutions and governments that ignore or resist the imperatives of

technology will merely transfer their wealth to others who are more enlightened. Even the Kremlin cannot stop the PC from undermining its centralized monopoly on information.

How do regulators achieve safety and soundness in this new environment? They must create a financial system that responds to the challenges of technology and avoids stifling, harmful over-regulation. In these circumstances, over-regulation and restrictions on competition will create another perilous spiral. Suffocating regulation will breed evasive and desperate risk taking, which in turn will breed costly institutional failures, thus inviting further regulation, starting the cycle all over again. Reregulation in the United States runs the risk of generating such a process. We support three major changes in public policy with respect to the financial system: (1) reform of the "safety net"; (2) deposit insurance reform; and (3) removal of arbitrary restriction on product powers.

Reform of the "Safety Net"

When healthy market discipline and free competition are compromised by stifling regulation and an ambiguous "safety net," banks are denied the means and the incentives to build sound and sustainable businesses. There are many important roles for regulators to play, but it is unrealistic to pretend that they can be solely responsible for the health of individual banks *and* the system as a whole.

The erroneous assumption is that the safety of the financial system is synonymous with the safety of individual banking institutions. In this view, to protect the system, the government must restrain and protect each bank in hope of minimizing the number and severity of bank failures. A more promising approach is to return to the original purpose of the "safety net"—to protect small depositors and the system at large without protecting or guaranteeing the survival of individual institutions.

Protecting individual *institutions* is an expensive and self-defeating policy. Ultimately, it will be ineffective, for it

- breeds incompetent or reckless managers;
- places superhuman demands on regulators to prevent or salvage failures and forces them to say no to anything perceived to be "risky" or unfamiliar in terms of broadened competitive powers;
- creates excess capacity in the industry by preventing the exit of unfit and unneeded firms; and
- risks catastrophic losses to the insurance funds by encouraging insolvent firms to go for broke at the public's expense (the FSLIC has already been decimated by this process).

Gearing regulatory policy to try to prevent individual bank failures is at variance with providing a safe and sound financial system. We should focus instead on insulating the system from any serious consequences of bank failures rather than preventing individual failures themselves. It is possible to insure that the failure of one bank or group of banks will not spread to otherwise healthy banks in a contagion of failure that threatens the system as a whole.

In the absence of adequate safeguards, there is no denying that such an event could take place, given banks' illiquid assets, short liabilities, and interlocking transactions. There are safeguards in place now, however, and more could be added if necessary. Existing safeguards include banks' limits on credit extended to any one bank, daylight overdraft limits on Fedwire and CHIPS, and the ability of the Federal Reserve to lend to solvent but temporarily illiquid institutions. The deposit insurance system effectively precludes runs on retail deposits.

Technical changes in payment system procedures and policies might further reduce the risk of contagion. (Note that there is no risk of contagion on Fedwire now, since the Federal Reserve guarantees payments when made. The issue here is credit risk assumed by the Federal Reserve.) If even further safeguards are needed, and it is not obvious that they are, the payments mechanism could be transformed into a separately capitalized "exchange" that would absorb counterparty risks and establish rules for access and procedures for collateralizing transactions.

Deposit Insurance Reform

We must restore market discipline and reduce the ambiguity about which depositors are insured and under what circumstances. We offer the following program:

1. Regulators, stockholders, management, creditors, and depositors should know exactly what the rules are in advance. Ambiguity creates anxiety in the markets, undermining confidence in the banking system and increasing the potential for panic.
2. Only small depositors ($100,000 and under) should be insured. Everyone else should be at risk.
3. Insurance premiums should not be assessed on uninsured deposits, domestic or foreign.
4. Greater market discipline—the prospect of paying more for funds or not being able to raise enough funds at any price—is a powerful incentive for management to keep its house in order.
5. Effective market discipline depends upon disclosure of credible information about risks and performance of a bank.

6. If regulators intervene before a troubled bank has exhausted its capital cushion, the potential losses to insurance funds and the public are much smaller.

7. Mark-to-market accounting will inform both regulators and the market of the real value of a bank's assets so that their actions are informed and timely.

8. Risk-based capital requirements, if enforced, make it much less likely that a bank will ever approach insolvency.

9. An absolute requirement for the stability of our fractional reserve banking system is that the Federal Reserve must stand ready to act as the lender of last resort and to supply liquidity to solvent but temporarily illiquid banks.

10. Once it is determined that a bank is approaching insolvency, it must be allowed to fail. It does not follow that the bank is abruptly shut down. There can be an orderly process for reorganizing or liquidating a failed bank just as there is an orderly chapter 11 process for commercial firms.

It should be possible to construct a safety net for the *system* (but not for banks) without raising questions of subsidy or unfair advantage. If deposits are insured, fair premiums are paid and the fund is protected by risk-based capital and adequate collateral. There is no assumption that only banks (or thrifts) are entitled to insurance. If there are discount window borrowings, they are secured and at a fair market rate of interest. There is no assumption that only banks (or thrifts) are eligible to borrow.

Any other significant services provided by the government or the insurance funds are charged to their users at a fair price. Access to these services could be provided to any bank or nonbank if appropriate for system safety. Most important, the full consequences of risk taking fall on the risk takers and not on the public.

Functional Regulation

A direct route to competitive equity among suppliers of financial services is regulation according to function, rather than to types of institutions. This approach is especially important in view of the realities of the marketplace for financial attributes. The traditionally defined boundaries between different sorts of institutions and financial instruments are being obscured, even eliminated, as all institutions offer functional equivalents of one another's products.

Take, for instance, the case of transaction accounts. At one time, these were the exclusive preserve of banks. Eventually, investment banks established money funds that, because they were not in commercial banks, were free of reserve requirements, rate ceilings, and so forth. The regulators ultimately lifted interest rate ceilings and allowed

banks to create money market accounts, although banks still face numerous competitive disadvantages.

Functional regulation not only promotes competitive equity because it deals with the world as it really is. Functional regulation also involves the most efficient use of regulatory resources, since it requires only primary regulatory for one generic activity or product.

Removal of Arbitrary Restrictions on Product Powers

The pressures created by advancing information technology—new products and new competitors—make it apparent that any system of regulation that is wedded to antique forms is dangerously obsolete. Yet that is exactly what we have: a major pillar of the regulatory framework, the Glass-Steagall Act, is based on the increasingly meaningless distinction between loans and securities.

Defenders of Glass-Steagall contend that allowing banks to underwrite domestic corporate securities would endanger the "safety and soundness" of the banking system. While there is no doubt that a stable, healthy system of banking and capital markets is vital to the nation's economy, there is considerable doubt that Glass-Steagall somehow protects the stability and health of banks. In fact, the notion that Glass-Steagall somehow protects banks is the truth stood on its head: Glass-Steagall *threatens* the "safety and soundness" of the financial system by limiting banks' ability to compete on an equal footing and to manage their business prudently.

Underwriting and Risk

The myth that bank underwriting activities caused the Great Depression has been debunked by careful economic analysis and examination of the historical record. There is no evidence that underwriting losses have caused any significant bank or securities firm to fail.

It is not difficult to see why the risks of securities underwriting are low and manageable. Underwriters hold securities for only a brief period—days or weeks at most. It is not unusual for an issue to be presold before it comes to market. Any securities that must be held by the underwriter can be substantially hedged against price changes by using options, futures, or short positions. The underwriting spread provides a further buffer against losses. A study by Ian Giddy of Columbia University showed that domestic equity underwritings between 1976 and 1983 rarely lost money for the syndicate involved and that those losses seldom exceeded $500,000—hardly a scary business.

The robust profits of the major securities firms are testimony to the relatively low risk (not to mention excessive concentration) of the domestic securities business. From 1979 to 1983, the after-tax rate of return on equity for the largest investment banks averaged over 26

percent, compared to less than 15 percent for the ten largest commercial banks.

Now consider lenders who originate and hold loans to maturity. Most of these are unmarketable medium- and long-term loans to borrowers who do not have good enough credit ratings to go to the open markets. Lenders also provide backup commitments to those borrowers who currently have access to the open markets but who will come to the banks if they are shut out of those markets because of deteriorating credit standing.

Can there be any doubt that securities underwriting is less risky than traditional lending? Skeptics should examine the case of Continental Illinois and Seattle First, whose risky and poorly diversified loan portfolios caused the bank to collapse. It is no accident that many banks are trying to liquify their loan portfolios to capture the value of loan origination and distribution skills without taking such large portfolio risks. This attempt to liquify loans will erase the few remaining financial distinctions between loans and securities—leaving only the artificial and archaic legal and emotional distinctions.

Diversification, Productivity, and Underwriting

If the arbitrary legal distinctions between loans and securities and between lenders and underwriters were eliminated, a bank could properly position itself within the generalized business of originating, distributing, trading, and investing in financial attributes, without regard to the form of the investment. The ability to compete freely in this wider arena would not only give banks a fair chance to regain some of the market share that has been lost to nonbank competitors; it would also dramatically expand banks' ability to diversify their portfolio risks, increase the liquidity of their balance sheets, and make more productive use of their capital and people. These benefits are potentially enormous and could dramatically increase the "safety and soundness" of banks both large and small.

Concentration of Power

Opponents of bank underwriting have waved the flag of bank domination. It is a curious concern in this day and age: the danger of concentrated market power of U.S. commercial banks seems remote, even absurd, in a time of global financial markets and the ascendancy of securitization over bank lending. Nevertheless, any excessive market power could and should be addressed by the antitrust laws. The real danger is the concentrated market power and inflated profits of domestic *investment* banks. The obvious cure for this malady is the entry of new competition from bank underwriters.

Implementation

Once we agree that banks need new powers, an interesting procedural question arises. Should these new powers be exercised in the bank itself or in a separately incorporated and capitalized subsidiary of the parent holding company?

It is difficult to see the point in granting banks expanded powers and then compromising their ability to employ them efficiently and effectively. Insisting that banks use their new powers through separately incorporated and capitalized subsidiaries is precisely such a compromise.

The separate subsidiary approach is inefficient as well as unnecessary. Again, competing in the new global markets will require a high degree of organizational flexibility, informal and temporary networks, coordination, and cooperation. Walls erected to provide an unnecessary insulation can only make it more difficult to achieve excellent competitive performance.

If it is a question of the deposit insurance fund inappropriately subsidizing securities activities, the answer is that the safety net should not subsidize or bail out any institution, bank or nonbank, big or small. Risk-based capital, fair insurance premiums, and market discipline—the abandonment of the "too big to fail" doctrine—and the prudent use of the lender-of last-resort powers of the Federal Reserve eliminate any question of subsidy without resorting to separate subsidiaries. Another approach would be for the banks to collateralize deposits under $100,000, thus obviating the need for the insurance fund entirely.

If it is a question of conflicts of interest, self-interest in preserving a good reputation and the penalties of the securities acts should be sufficient. It would be a shame to reach the sound conclusion that banks need new powers, only to dissipate some of the benefits by requiring an inefficient and unnecessary device for exercising those powers.

Proponents of the separate subsidiary approach usually cite a need for insulating the bank from the supposed dangers of the new activities. The argument is that this insulation is easier to accomplish and to monitor if new activities are in a separate legal entity.

It should be clear from everything that has gone before that insulation from the securities business is the last thing a bank needs. It is the *banking* activities that are dangerous, not the securities activities. Securities activities will strengthen the bank, not weaken it. Indeed, it is easy enough to imagine the employees of a securities firm wishing to be insulated from the *bank*.

The world of finance is changing irreversibly. In time, we suspect that public authorities will achieve consensus on five basic principles that must govern the world that is coming into being.

First, financial services firms must function as single, integrated institutions. These institutions will be confined to finance, however, and will not engage in commerce.

Second, regulators throughout the world will have to reach a meeting of the minds. Since the financial marketplace will be global, regulation will have to be consistent worldwide.

Third, financial institutions in this country will have to be able to compete equally in all markets, all exercising the same product powers.

Fourth, these institutions will have to be organized flexibly in order to respond to rapid change; institutions that are too large or too varied will have difficulty adapting to change.

Fifth, and finally, these jurisdictions will be accepted: the public responsibility is for the health of the financial system in general, and the system only; the private responsibility is for the health of individual institutions.

At this point, we shall truly have achieved safety and soundness in our financial system.

Summary of Discussion

The first theme of the discussion was the implications of financial innovation for macroeconomic policy. Geoffrey Carliner wondered if financial deregulation contributed to the unexpected decline in velocity during 1982, which in turn contributed to an unexpected change in the effect of Fed policy and to the depth of the 1982 recession. A 2 percent of GNP loss due to lack of Fed control associated with financial innovation would wipe out a lot of efficiency gain, he pointed out. Gerald Corrigan proposed that technical/measurement problems were not an overriding problem in the 1982 recession, and the ambiguity that did exist revolved around money market mutual funds prior to the availability of bank money markets. In any case, he noted, there is no choice involved in financial innovation, which is a technically driven process.

A question that is intellectually fascinating and policy relevant, according to Corrigan, is the issue of an inherent contradiction between the speed of capital and exchange rate movements and a monetary policy process compatible with a far more stable exchange rate environment. Another recent development is the disappearance of a stable private debt to GNP ratio since 1982. While some academics say not to worry, Corrigan does. Certainly innovation alters this relationship, and the question is how monetary restraint will work through a system with such a high degree of intermediation. Martin Feldstein pointed out that a high debt-to-GNP ratio implies a large degree of leverage,

which in turn implies great interest sensitivity. Corrigan contended that the behavior of highly leveraged instruments is unknown and that the cumulative effect of financial innovation and leverage may be that a given degree of money restraint will require higher levels of interest rates.

Attention shifted to German and Japanese monetary aggregates when Jeffrey Frankel remarked that the Germans and Japanese resist American calls for more expansionary monetary policy by referring to high M1 growth in their countries. He wondered if the monetary authorities in these countries do not know about the breakdown in the M1-to-GNP relationship. Corrigan responded that little has changed in the monetary aggregates in these countries, except for a relatively minor change in the interest rate on Japanese postal savings accounts. He added that the situation in the United States is related not just to financial innovation but to the large drop in nominal interest rates over time.

Rudiger Dornbusch returned to the question of the benefits of financial innovation. He raised the possibility of an overproduction of varieties and pointed out that in manufacturing investment it would be preferable if financial analysis was done over horizons of longer than one quarter, suggesting that decisions become completely short term when financial instruments can be split up into attributes with little apparent connection to the real investment. Corrigan agreed that a series of questions existed about the costs of financial innovation, but he argued that the existence of an enormous flow of benefits is indisputable.