

Table 3.A.2

Garman-Kohlhagen model for currency options

Variables

- S = spot price
 K = strike price
 σ = exchange rate volatility
 F = foreign interest rate
 D = domestic interest rate
 T = remaining time to expiration
 N (x) = cumulative normal distribution

Call price

$$C = e^{-FT} SN(x + \sigma\sqrt{T}) - e^{-DT} KN(x)$$

where

$$x = \frac{\ln(S/K) + [D - F - \sigma^2/2]T}{\sigma\sqrt{T}}$$

Sensitivity to other variables (See Figs. 3.E.9-13)

- $\partial C / \partial S = e^{-FT} N(x + \sigma\sqrt{T}) > 0$ (the hedge ratio δ)
 $\partial C / \partial K = -e^{-DT} N(x) < 0$
 $\partial C / \partial \sigma = e^{-DT} K \sqrt{T} N'(x) > 0$
 $\partial C / \partial D = Te^{-DT} KN(x) > 0$
 $\partial C / \partial F = -Te^{-FT} SN(x + \sigma\sqrt{T}) < 0$
 $\partial C / \partial T = -Fe^{-FT} SN(x + \sigma\sqrt{T}) + De^{-DT} KN(x) + e^{-DT} \sigma KN'(x) / 2\sqrt{T} \gtrless 0$
 (>0 for an American option)

Hedge ratio sensitivity to other variables (See Figs. 3.E.14-18)

- $\partial \delta / \partial S = e^{-FT} N'(x + \sigma\sqrt{T}) / (S\sigma\sqrt{T}) > 0$
 $\partial \delta / \partial \sigma = -xe^{-FT} N'(x + \sigma\sqrt{T}) / \sigma \gtrless 0$
 $\partial \delta / \partial D = e^{-FT} N'(x + \sigma\sqrt{T}) \sqrt{T} / \sigma > 0$
 $\partial \delta / \partial F = -e^{-FT} N'(x + \sigma\sqrt{T}) \sqrt{T} / \sigma - Te^{-FT} N(x + \sigma\sqrt{T}) < 0$
 $\partial \delta / \partial T = e^{-FT} N'(x + \sigma\sqrt{T}) [-x/2T + (D-F)/\sigma\sqrt{T}] \gtrless 0$

Table 3.A.3

The Leland option-pricing model with transaction costs

Variables

S = spot price

K = strike price

r = interest rate

σ = spot price volatility

T = remaining time to expiration

k = proportional "round trip" transaction cost

Δt = revision interval

N(x) = cumulative normal distribution

Call price

$$C = SN(\hat{d}_1) - Ke^{-rT} N(\hat{d}_1 - \hat{\sigma}\sqrt{T})$$

where

$$\hat{d}_1 = \ln(S/Ke^{-rT})/\hat{\sigma}\sqrt{T} + 1/2\hat{\sigma}\sqrt{T}$$

$$\hat{\sigma} = [1 + K \sqrt{2/\pi}/\sigma \sqrt{\Delta t}]^{1/2}$$

Sensitivity to changes in k and t (See Figs. 3.E.19-20)

(all other partial derivatives are analogous to Black-Scholes)

$$\partial C / \partial k = \frac{1}{2\pi} \left[\Delta t \left(1 + \frac{k \sqrt{2}}{\sigma \sqrt{\pi \Delta t}} \right) \right]^{-1/2} \exp(-\hat{d}_1^2/2) S \sqrt{T} > 0$$

$$\partial C / \partial \Delta t = \frac{-Sk \sqrt{T} \exp(-\hat{d}_1^2/2)}{4\pi(\Delta t)^{3/2}} \left[1 + \frac{k \sqrt{2}}{\sigma \sqrt{\pi \Delta t}} \right]^{-1/2} < 0$$

Sensitivity of hedge ratio to changes in k and Δt (See Figs. 3.E.21-22)

$$\partial \delta / \partial k = N'(\hat{d}_1) \left[-\hat{d}_1 / \hat{\sigma} + \sqrt{T} \right] (\sigma / \hat{\sigma}) / \sqrt{2\pi \Delta t} \geq 0$$

(>0 unless option is deep enough in-the-money)

$$\partial \delta / \partial \Delta t = -1/2 N'(\hat{d}_1) \left[-\hat{d}_1 / \hat{\sigma} + \sqrt{T} \right] K (\Delta t)^{-3/2} / \hat{\sigma} \sqrt{2\pi \Delta t} \geq 0$$

(<0 unless option is deep enough in-the-money)

Sensitivity of bound to changes in variables (See Figs. 3.E.23-28)

$$\text{Bound} = B = 2kS \frac{N'(d_1) \sqrt{T}}{\sigma \sqrt{\Delta t}}$$

where $d_1 = \frac{\ln(S/Ke^{-rt}) + \sigma\sqrt{T}/2}{\sigma\sqrt{T}}$

$$\partial B / \partial S_0 = 2kN'(d_1) \frac{\sqrt{T}}{\sqrt{2\pi\Delta t}} \left[\frac{1}{2} - \frac{\ln(S/ke^{-rt})}{\sigma^2 T} \right] \geq 0$$

(>0 unless option is far enough out-of-the-money)

$$\partial B / \partial \sigma = \frac{d_1 k S_0 N'(d_1)}{\sqrt{2\pi\Delta t}} \left[2 \ln(S/Ke^{-rt}) / \sigma^2 - T \right] \geq 0$$

(<0 unless option is far enough out-of-the-money)

$$\partial B / \partial T = \frac{k S_0 N'(d_1) [1/\sqrt{T} - 2rd_1/\sigma + d_1 \ln(S/ke^{-rt})/T - \sigma d_1/2]}{\sqrt{2\pi\Delta t}} \geq 0$$

(<0 unless option is far enough out-of-the-money)

$$\partial B / \partial r = -2kd_1 S_0 N'(d_1) T / \sigma \sqrt{2\pi\Delta t}$$

(<0 unless option is far enough in-the-money)

$$\partial B / \partial k = 2S_0 N'(d_1) \sqrt{T/2\pi\Delta t} > 0$$

$$\partial B / \partial \Delta t = -k S_0 N'(d_1) \sqrt{T/2\pi} (\Delta t)^{-3/2} < 0$$

References

- Black, Fischer and Scholes, Myron (1973), "The Pricing of Options and Corporate Liabilities", Journal of Political Economy 81 (3), pp. 637-654.
- Cox, John C. and Rubinstein, Mark, (1985), Options Markets (Englewood Cliffs: Prentice-Hall, Inc.).
- Garman, Mark B. and Kohlhagen, Steven W., (December 1983), "Foreign Currency Option Values", Journal of International Money and Finance. 2 (3), pp. 231-238.
- Leland, Hayne E., (1984), "Option Pricing and Replication with Transactions Costs", Working Paper No. 144, Institute of Business and Economic Research, University of California, Berkeley.

Fig. 3.E.1: Call price as a function of stock price

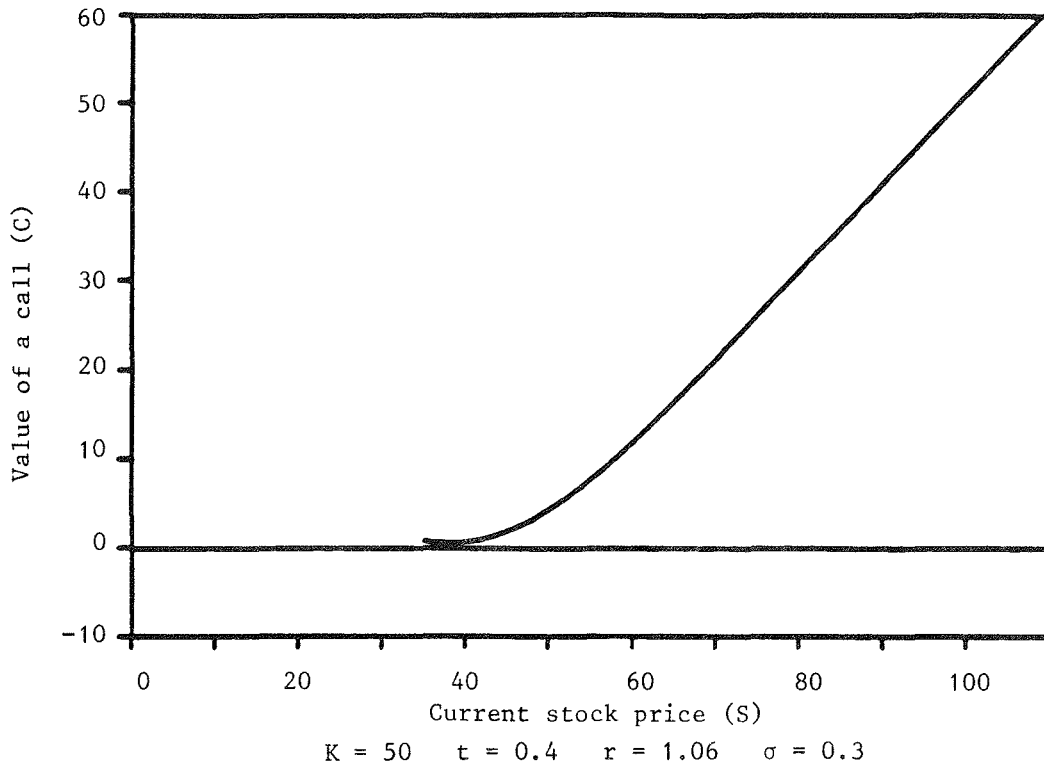


Fig. 3.E.2: Call price as a function of interest rate

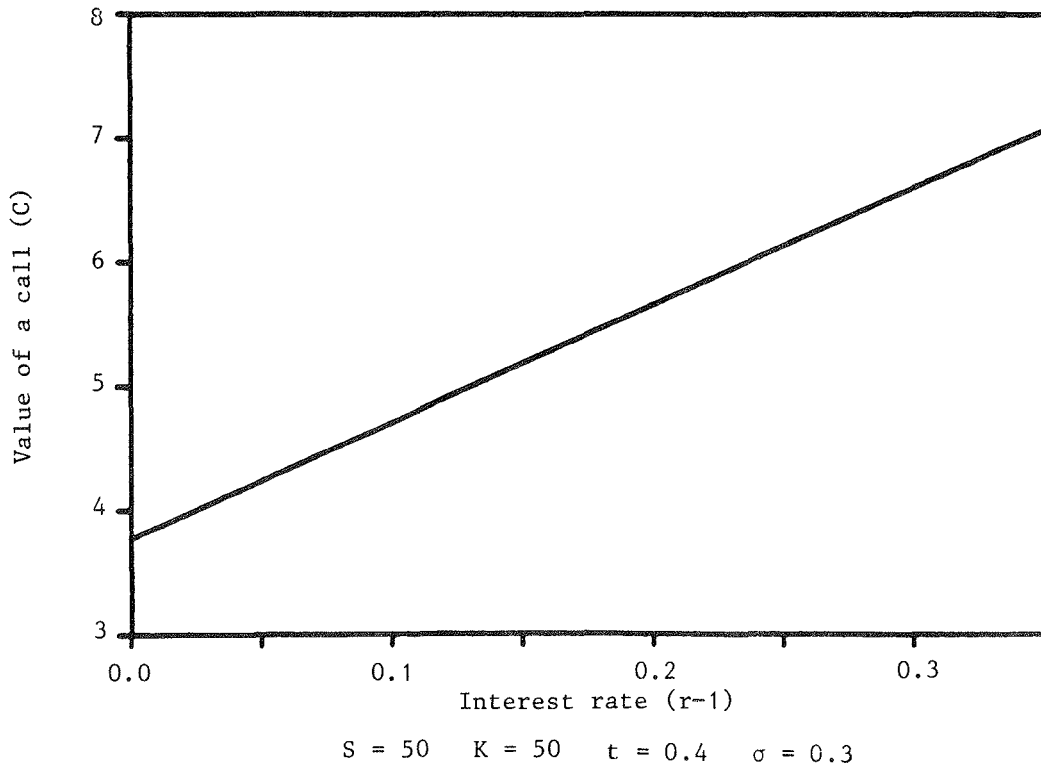


Fig. 3.E.3: Call price as a function of time to expiration

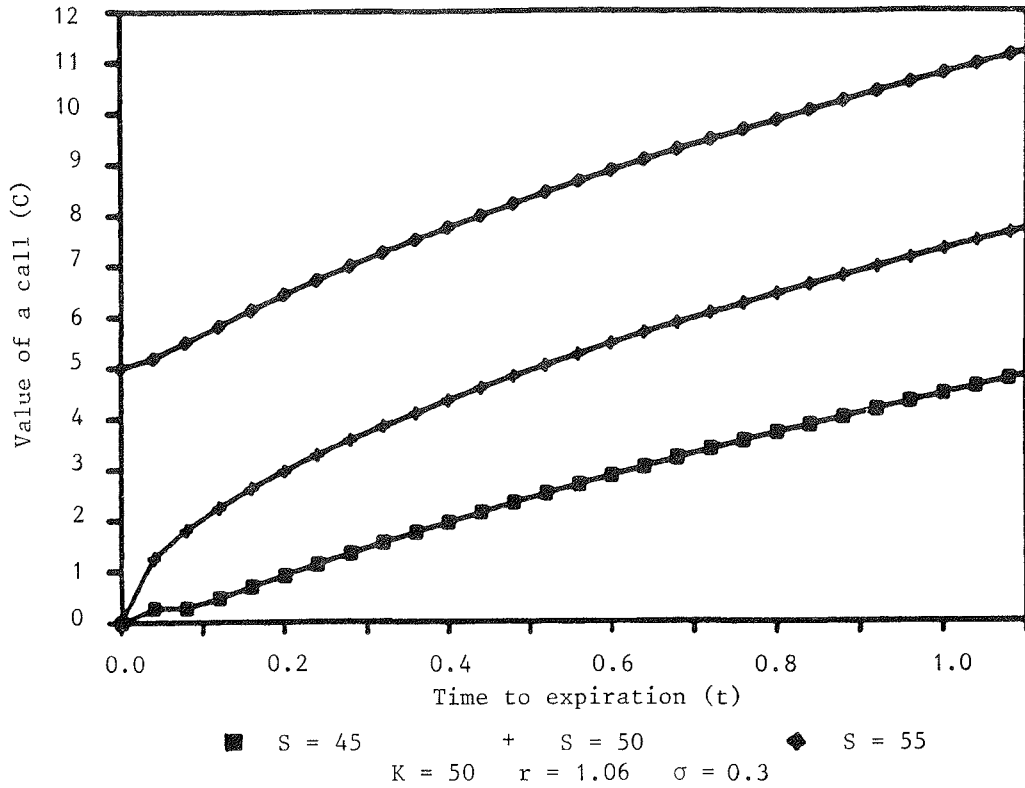


Fig. 3.E.4: Call price as a function of volatility

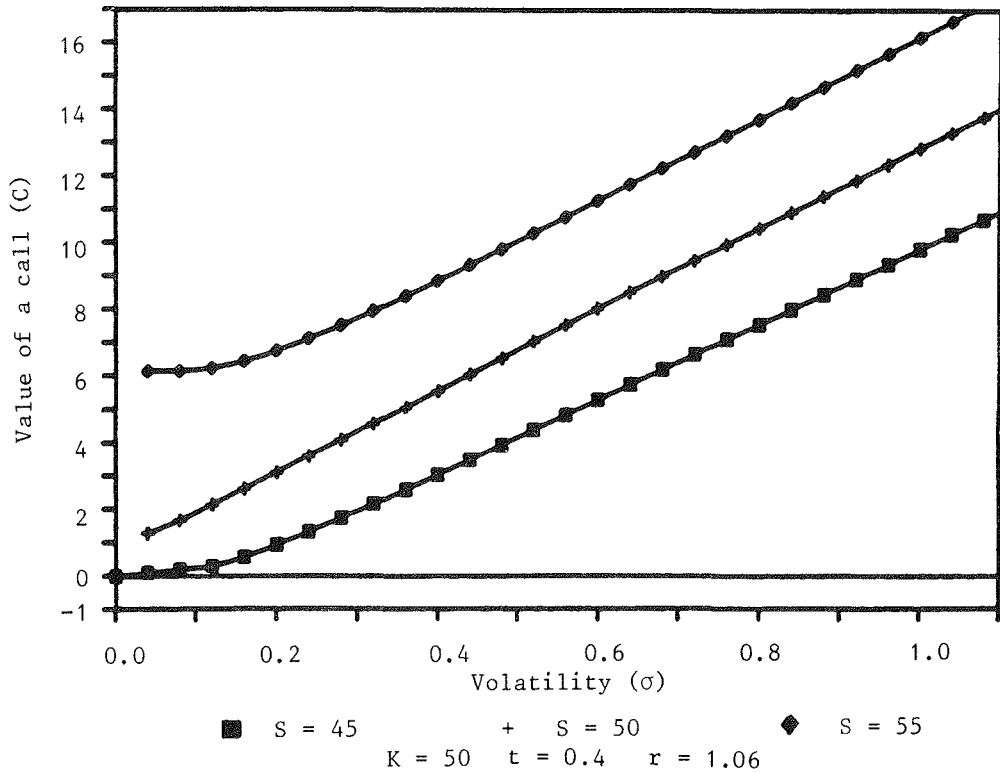


Fig. 3.E.9: Foreign currency call price as a function of exchange rate

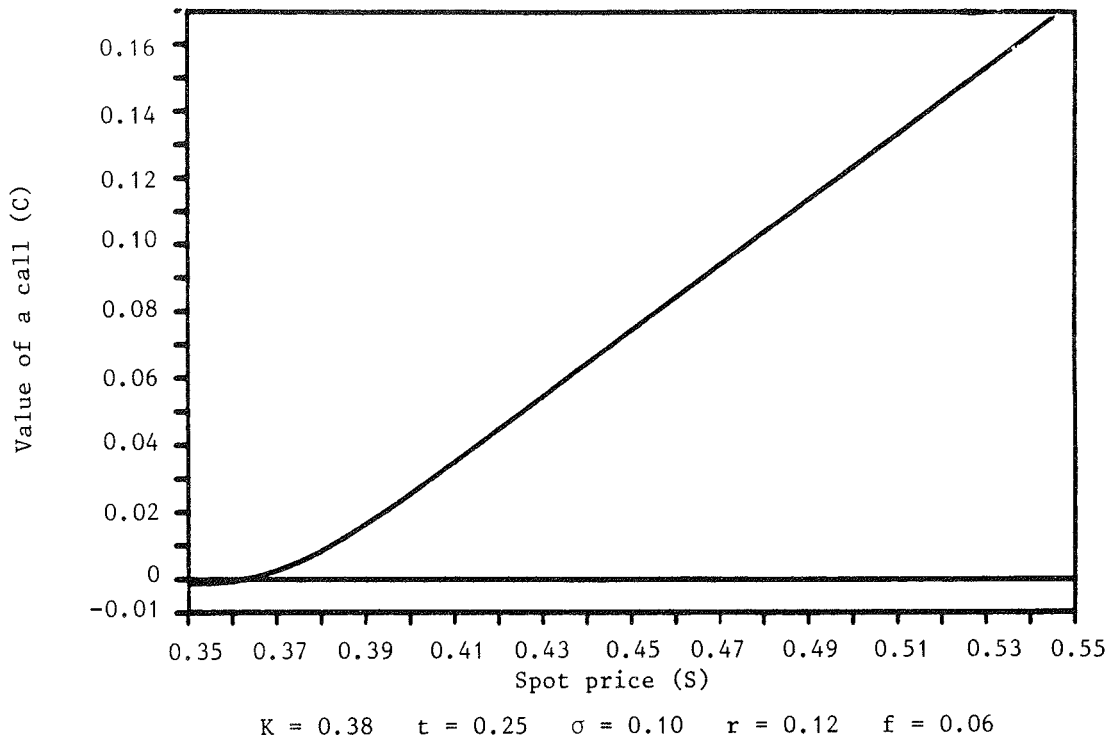


Fig. 3.E.10: Foreign currency call price as a function of foreign interest rate

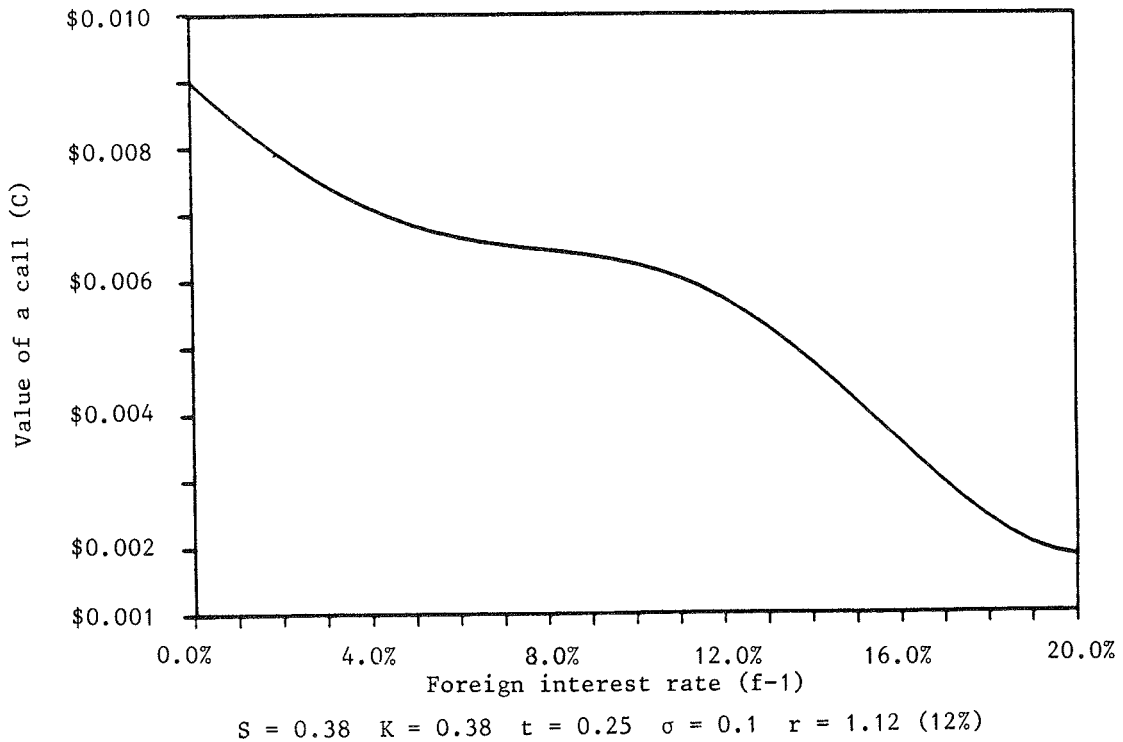


Fig. 3.E.5: Hedge ratio as a function of stock price

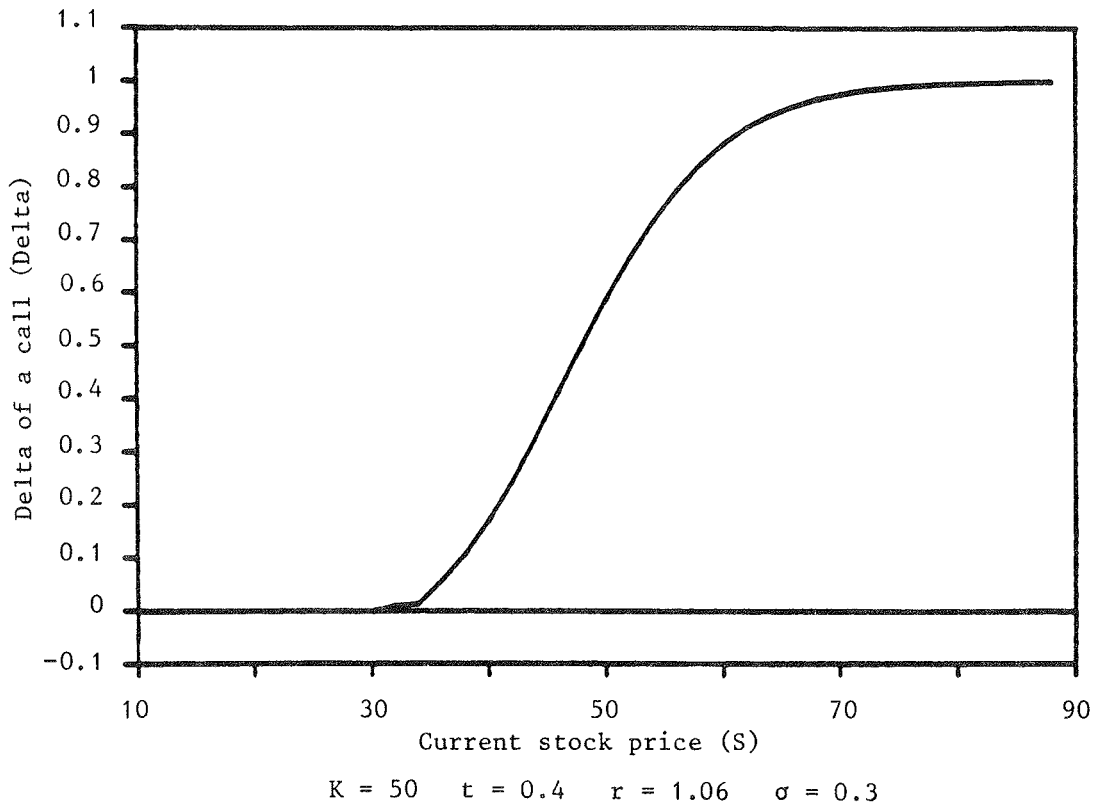


Fig. 3.E.6: Hedge ratio as a function of interest rate

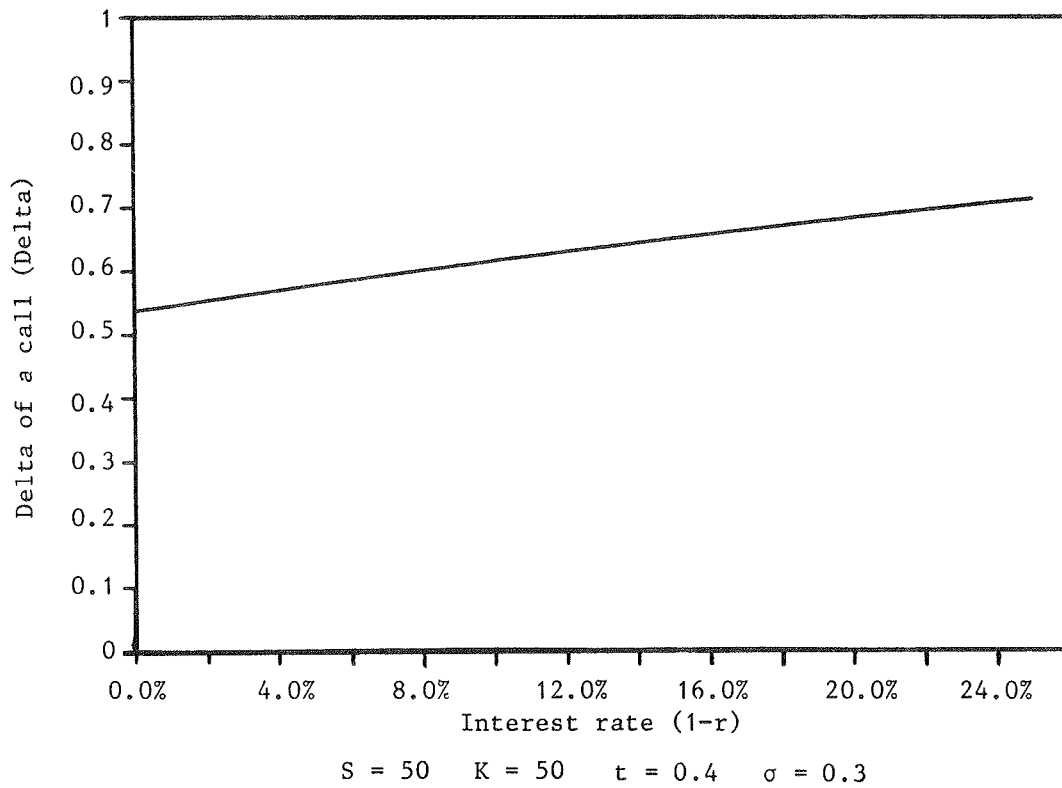


Fig. 3.E.7: Hedge ratio as a function of time to expiration

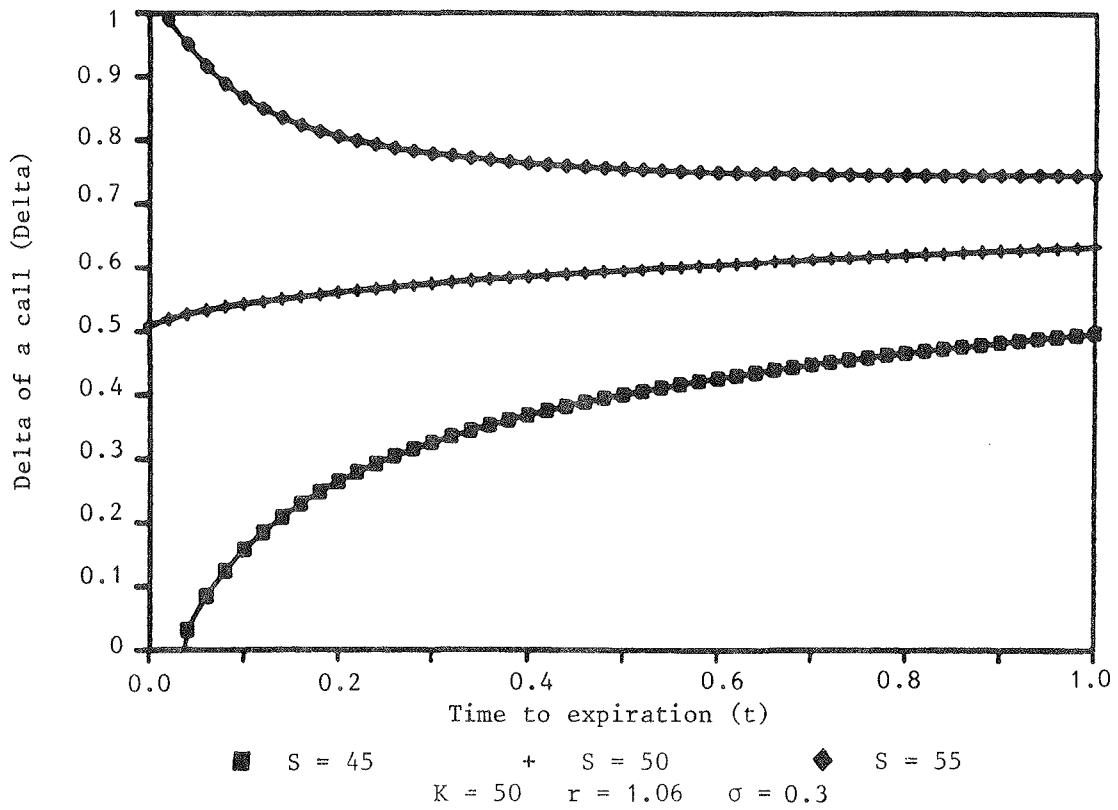


Fig. 3.E.8: Hedge ratio as a function of volatility

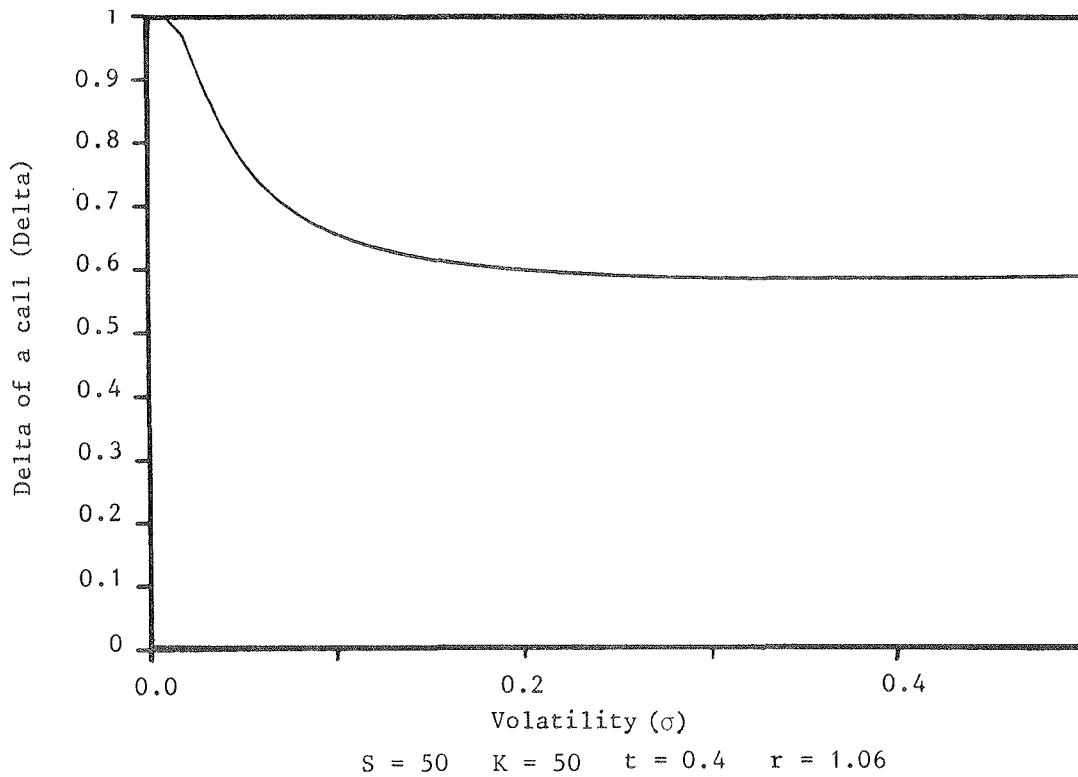
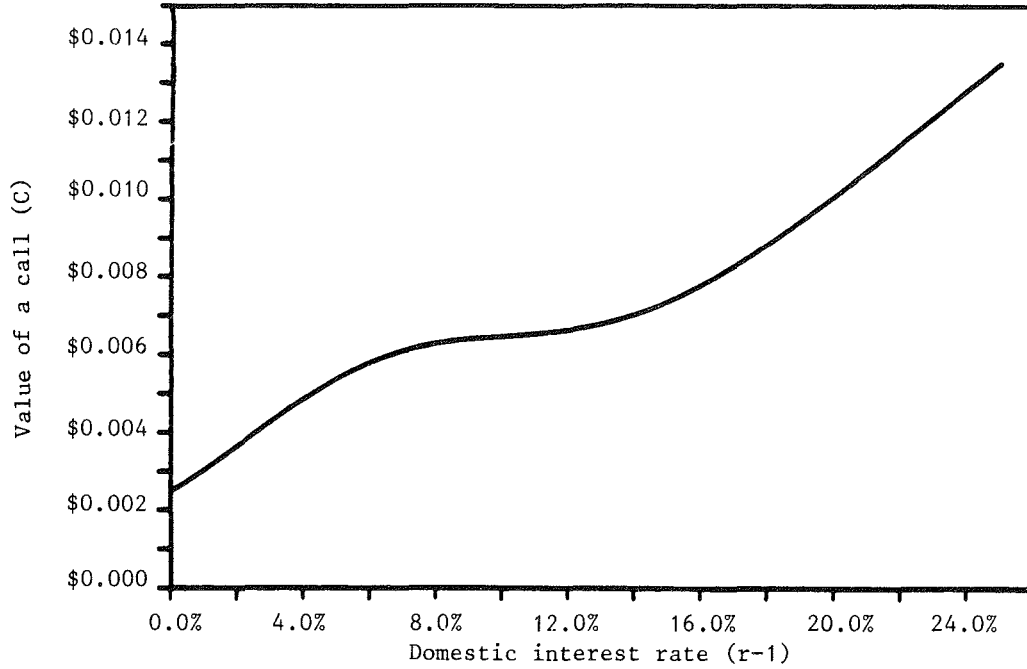
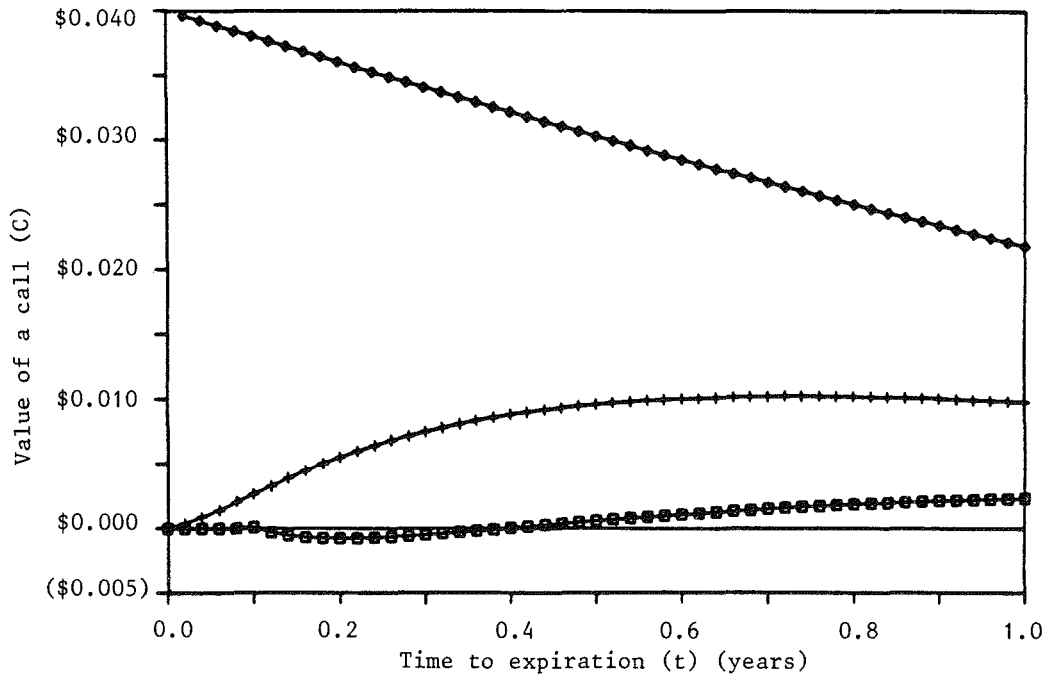


Fig. 3.E.11: Foreign currency call price as a function of domestic interest rate



$S = 0.38$ $K = 0.38$ $t = 0.25$ $\sigma = 0.1$ $f = 1.06$ (6%)

Fig. 3.E.12: Foreign currency call price as a function of time to expiration



\square $S = 0.34$ $+$ $S = 0.38$ \blacklozenge $S = 0.42$
 $K = 0.38$ $t = 0.25$ $\sigma = 0.10$ $r = 1.12$ $f = 1.06$

Fig. 3.E.13: Foreign currency call price as a function of volatility

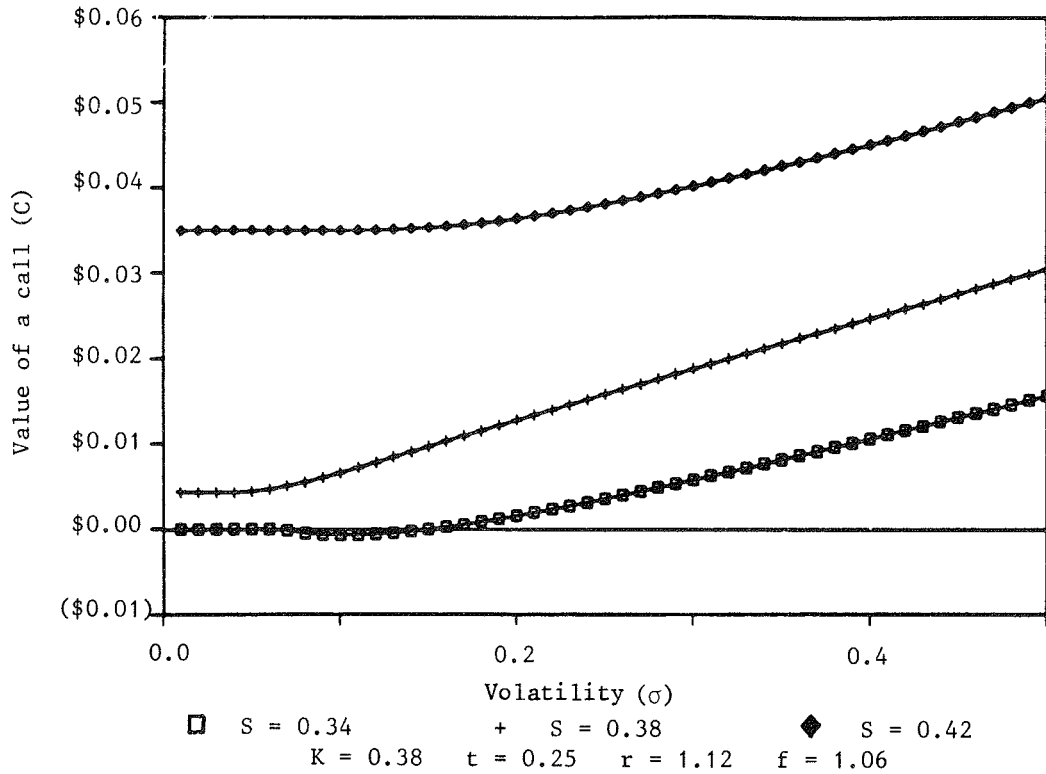


Fig. 3.E.14: Foreign currency hedge ratio as a function of exchange rate

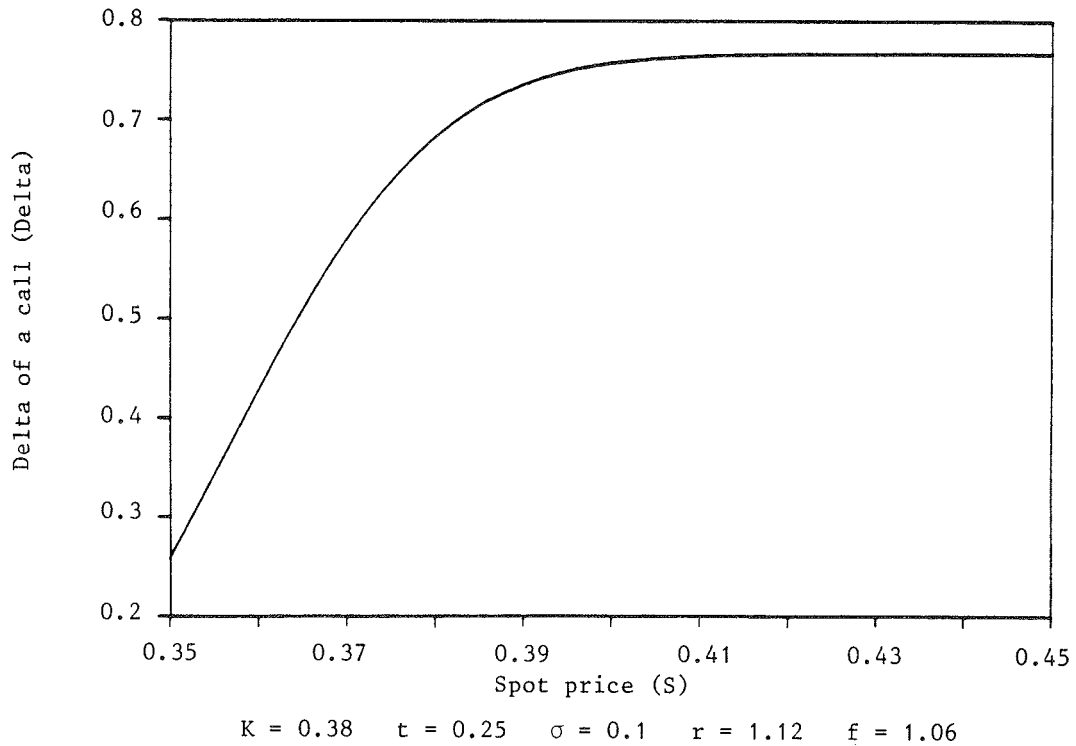
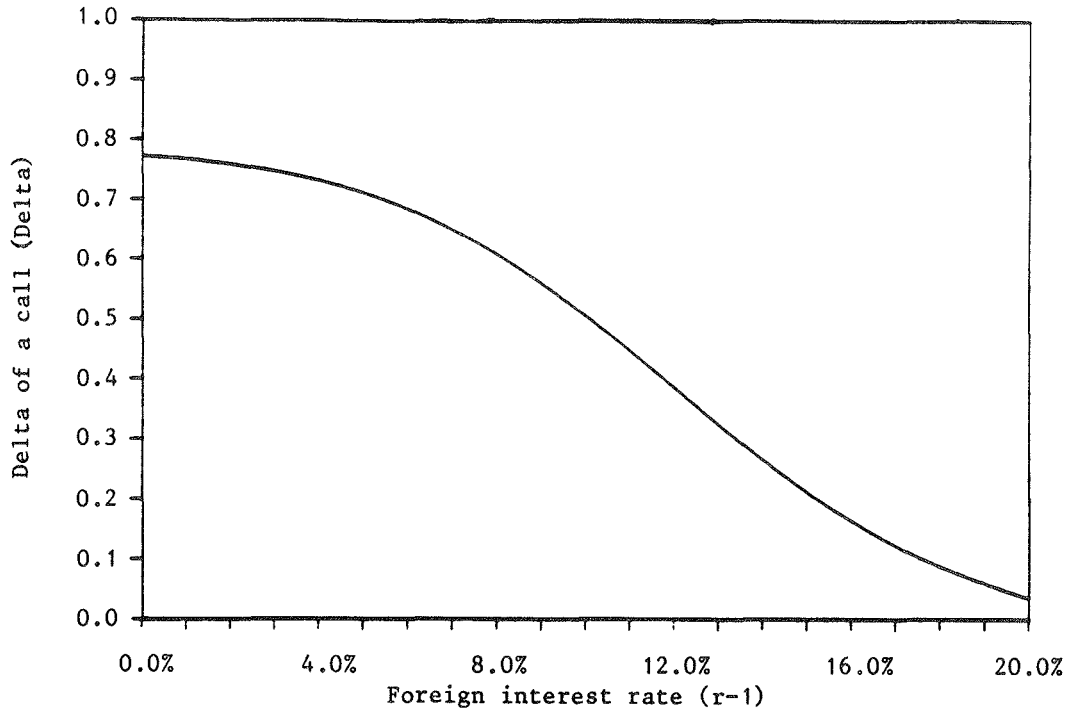
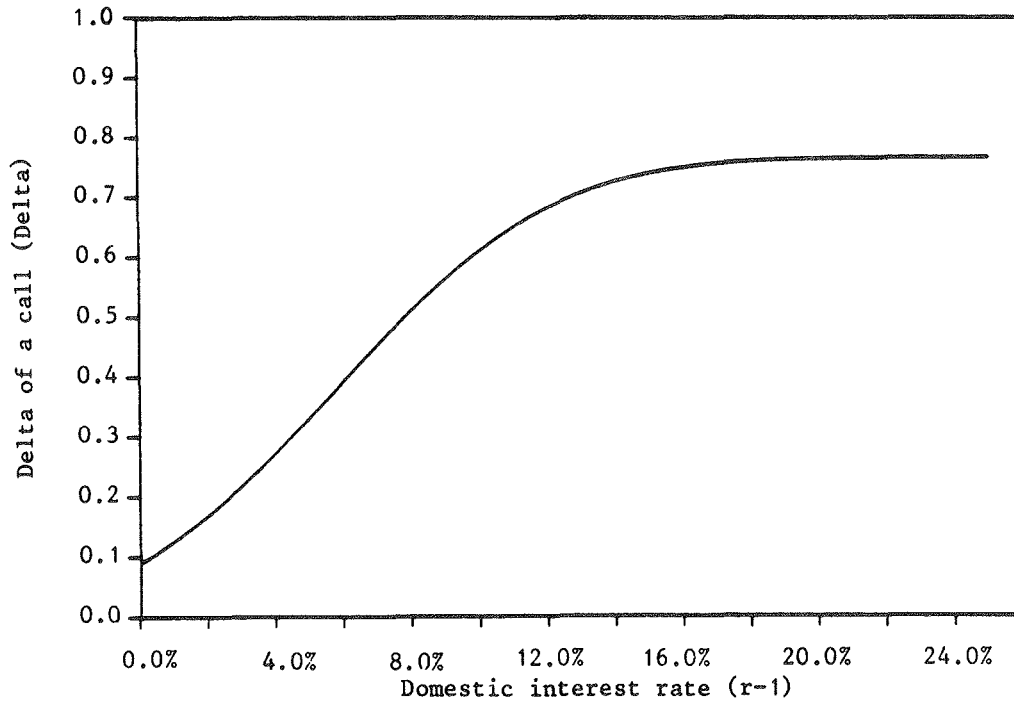


Fig. 3.E.15: Foreign currency hedge ratio as a function of foreign interest rate



$K = 0.38$ $S = 0.38$ $t = 0.25$ $\sigma = 0.1$ $r = 1.12$

Fig. 3.E.16: Foreign currency hedge ratio as a function of domestic interest rate



$K = 0.38$ $S = 0.38$ $t = 0.25$ $\sigma = 0.1$ $f = 1.06$

Fig. 3.E.17: Foreign currency hedge ratio as a function of time to expiration

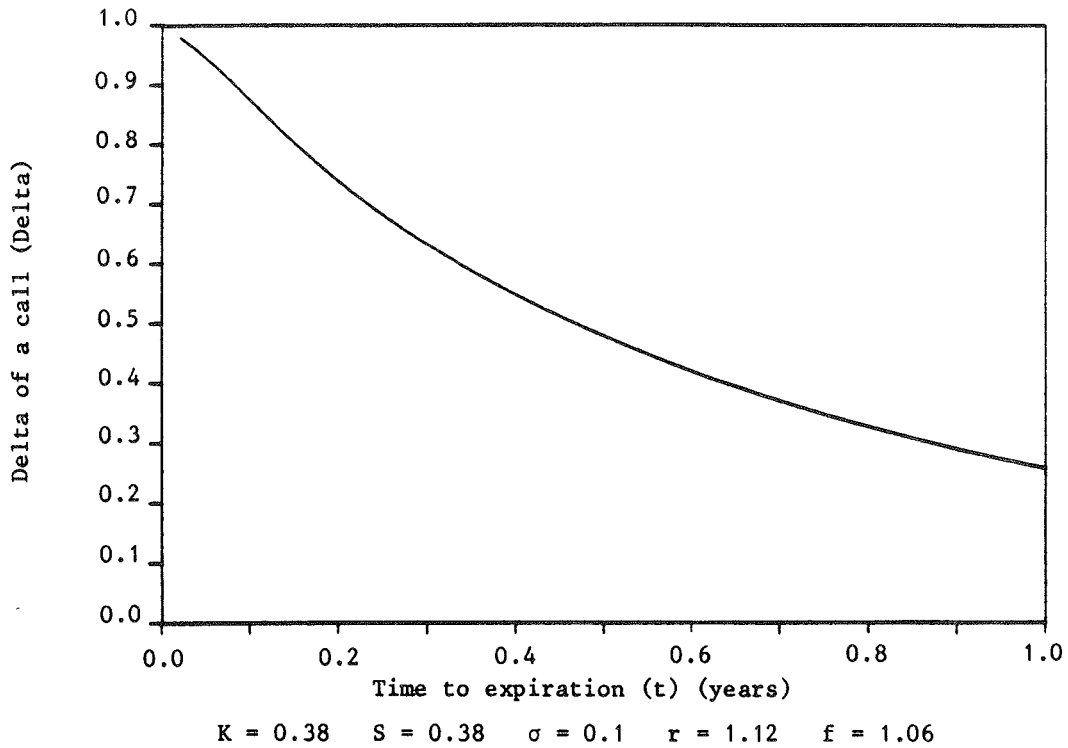


Fig. 3.E.18: Foreign currency hedge ratio as a function of volatility

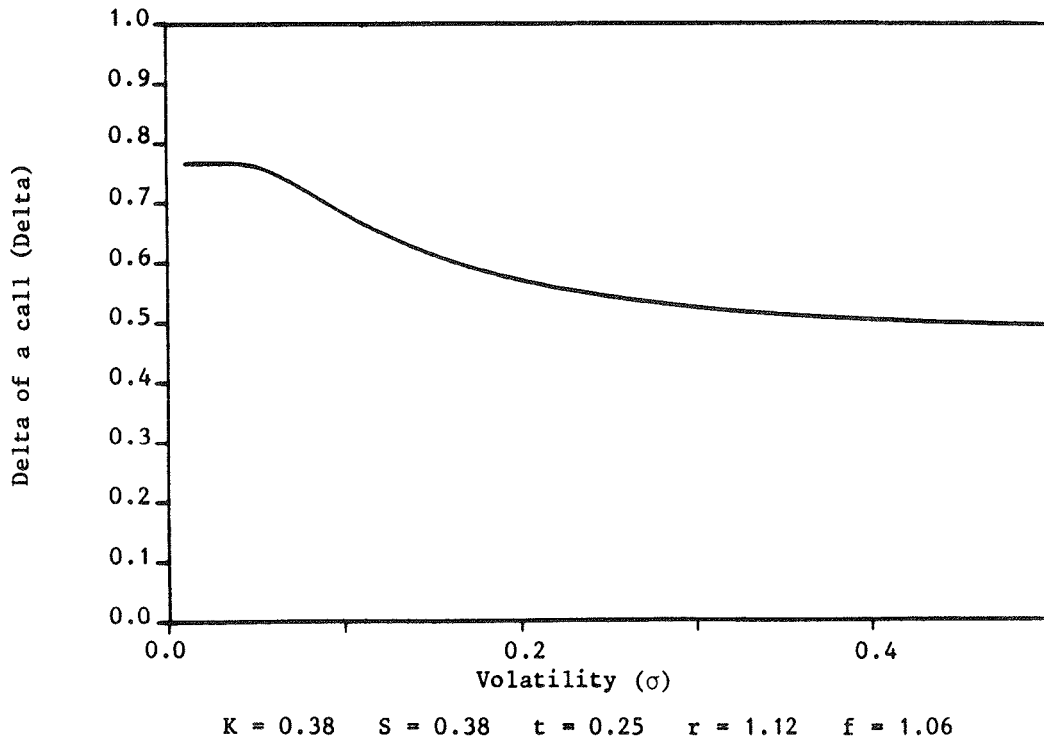


Fig. 3.E.19: Call price as a function of revision interval
(with transaction costs)

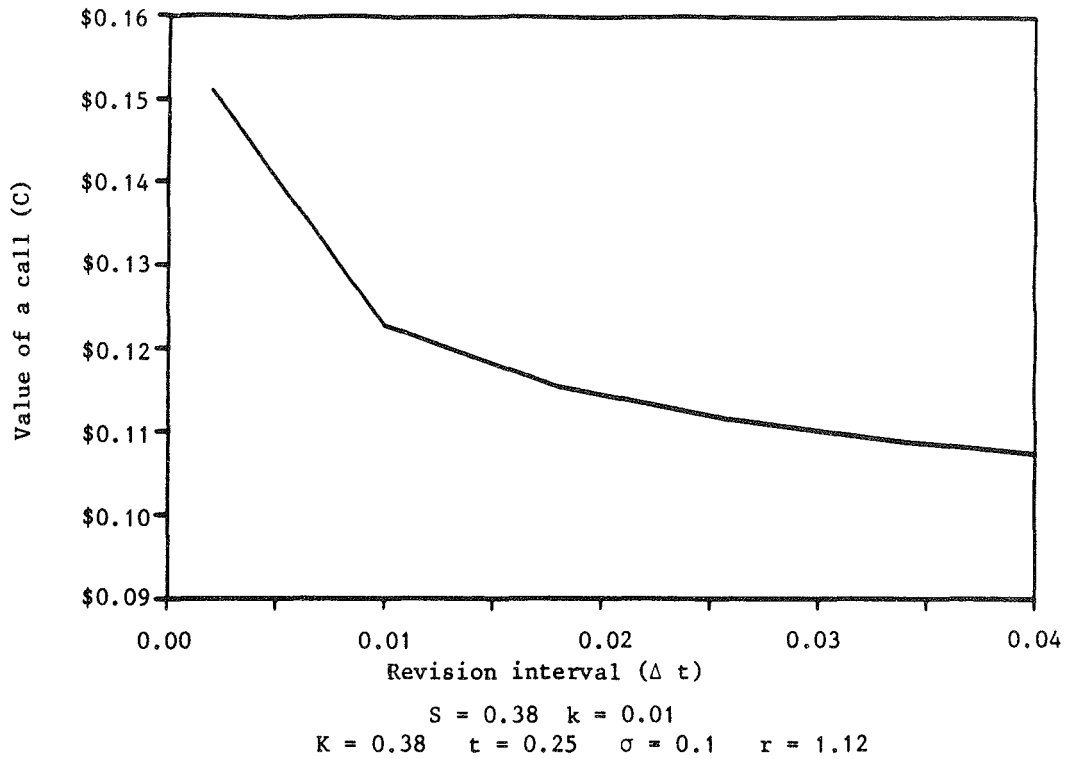


Fig. 3.E.20: Call price as a function of transaction cost

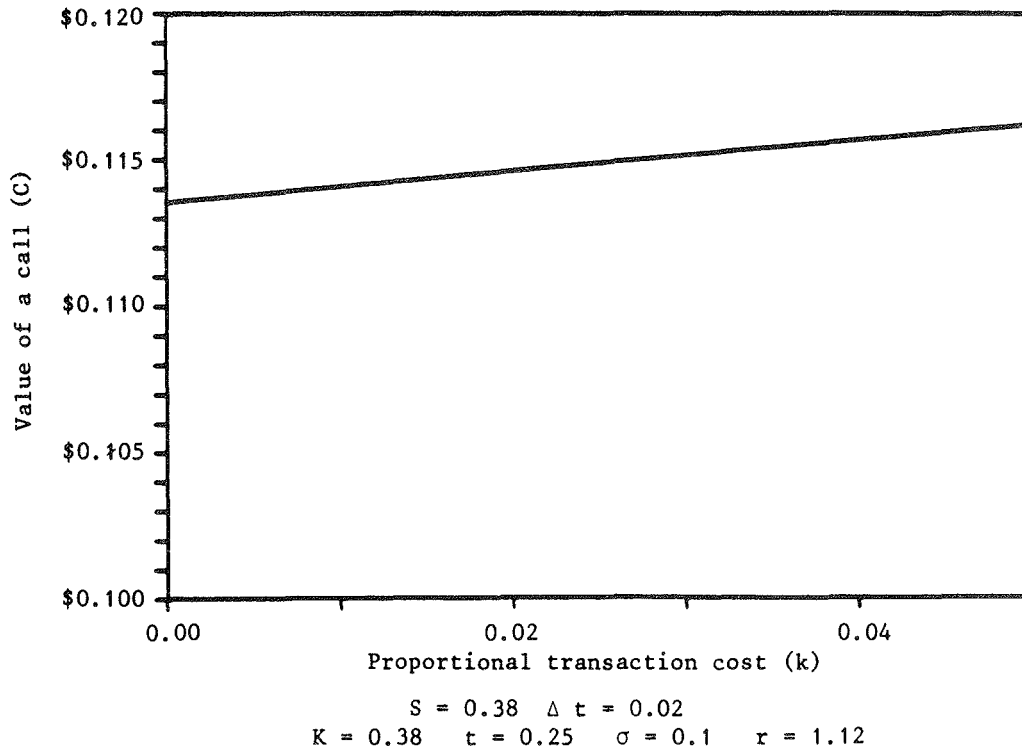


Fig. 3.E.21: Hedge ratio as a function of revision interval
(with transaction costs)

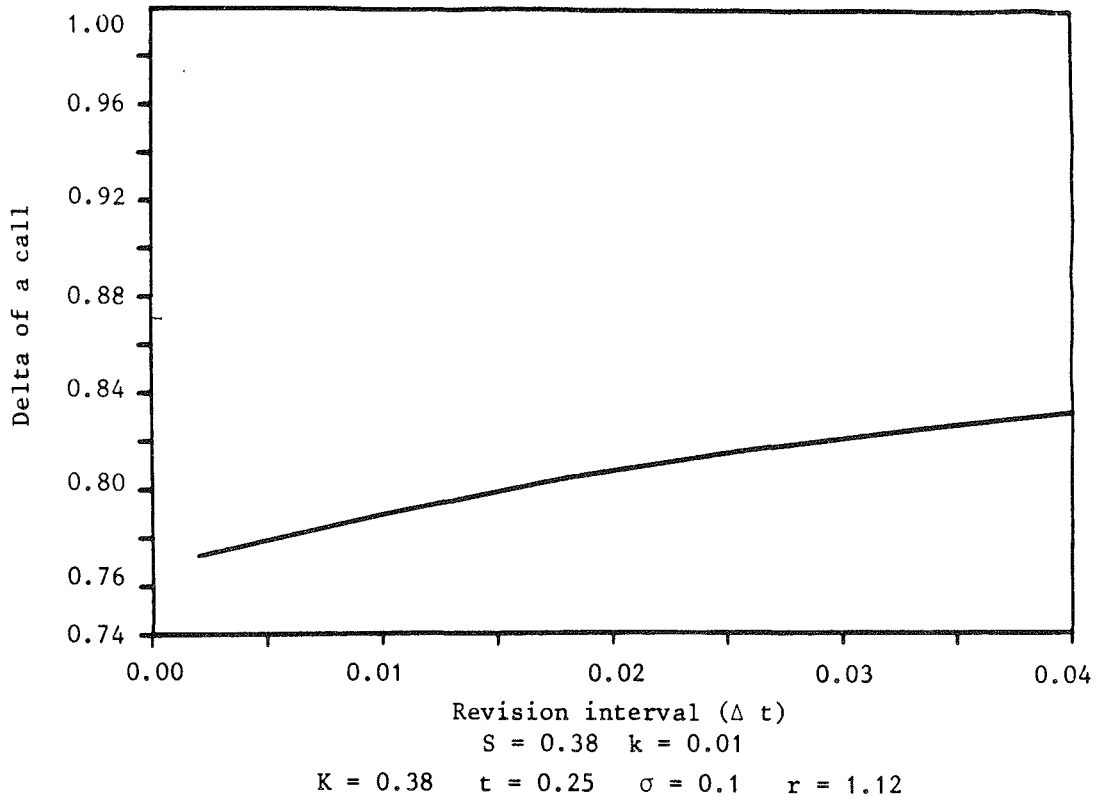


Fig. 3.E.22: Hedge ratio as a function of transaction cost

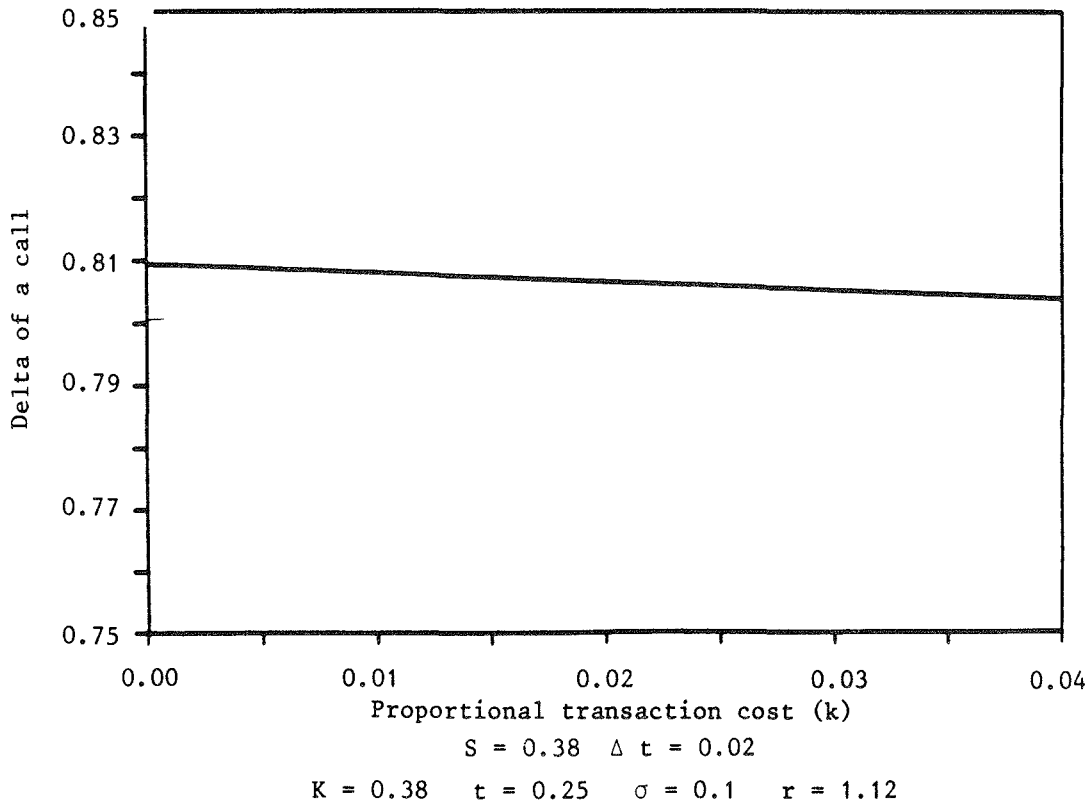


Fig. 3.E.23: Range of call prices as a function of stock price
(with transaction costs and weekly revision)

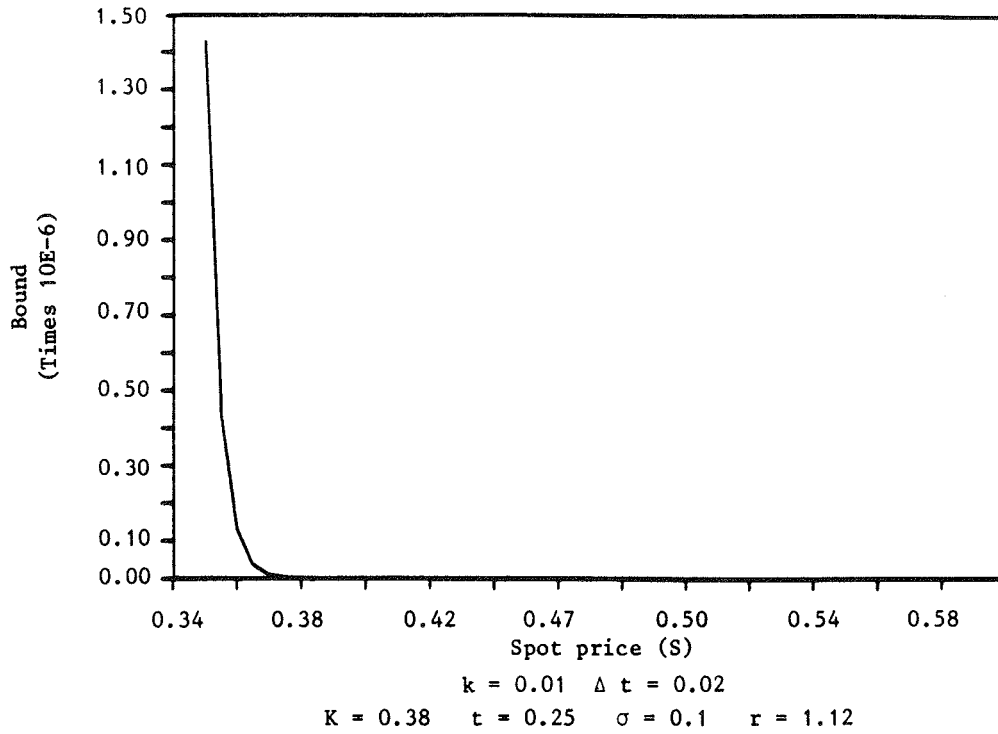


Fig. 3.E.24: Range of call prices as a function of interest rate
(with transaction costs and weekly revision)

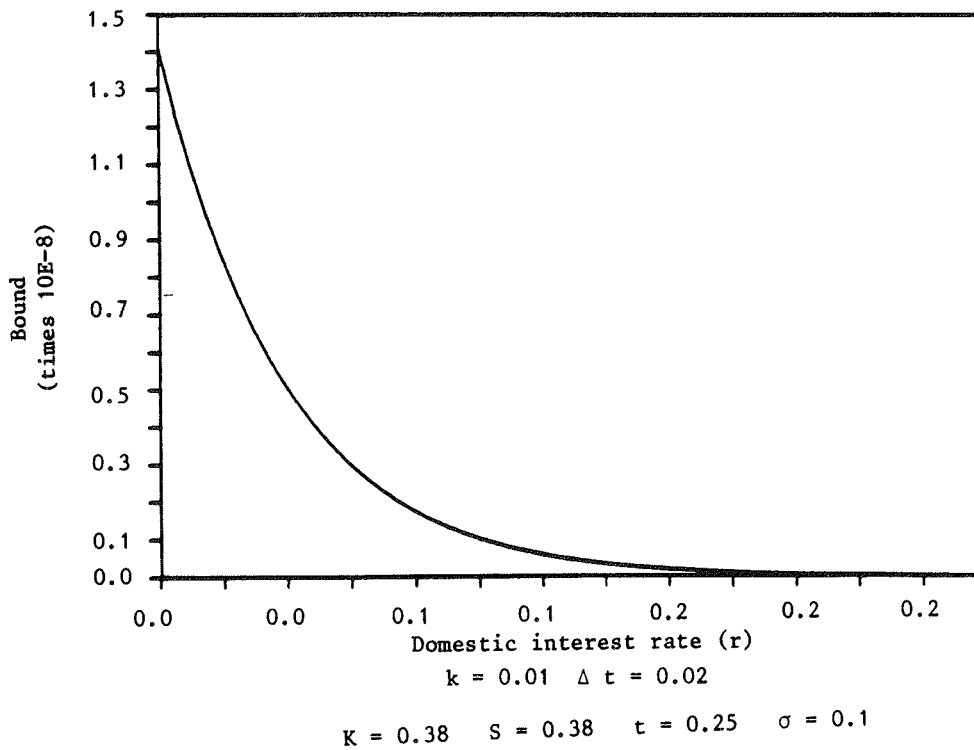


Fig. 3.E.25: Range of call prices as a function of time to expiration
(with transaction costs and weekly revision)

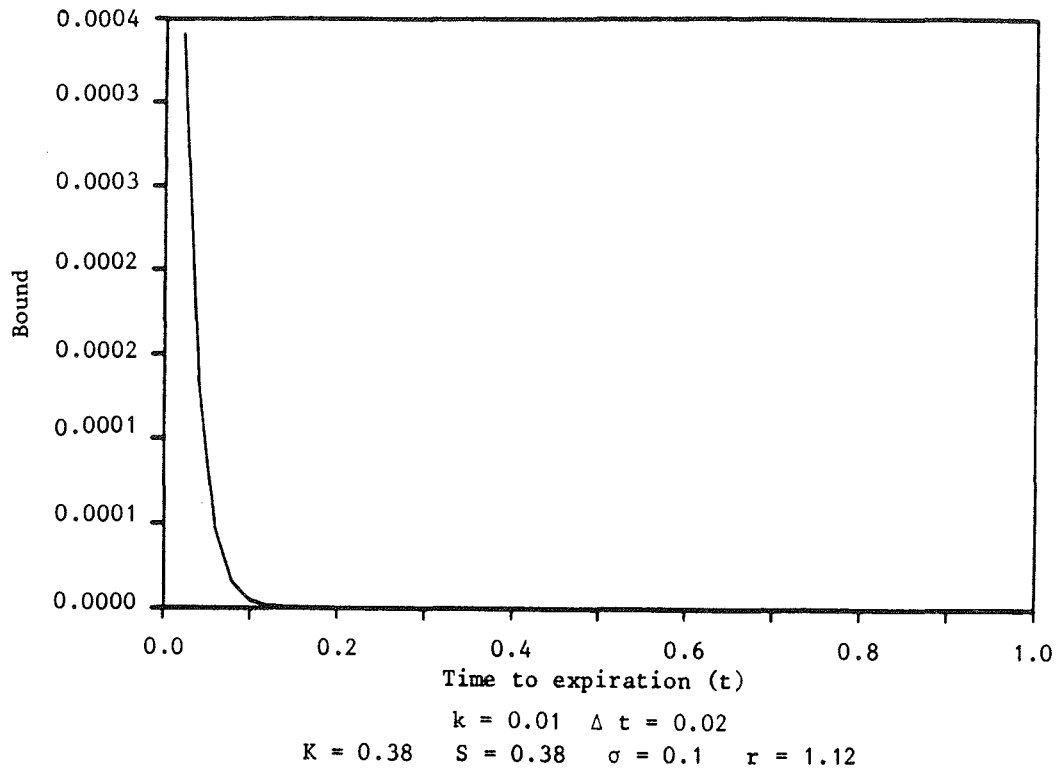


Fig. 3.E.26: Range of call prices as a function of volatility
(with transaction costs and weekly revision)

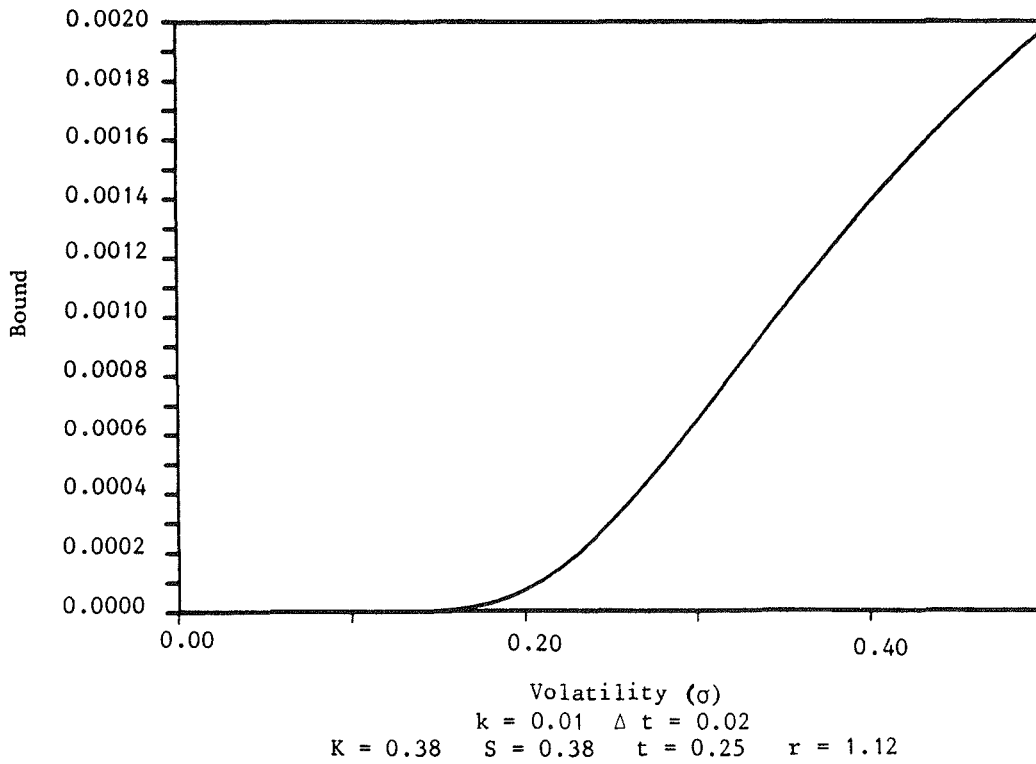


Fig. 3.E.27: Range of call prices as a function of revision interval (with transaction costs)

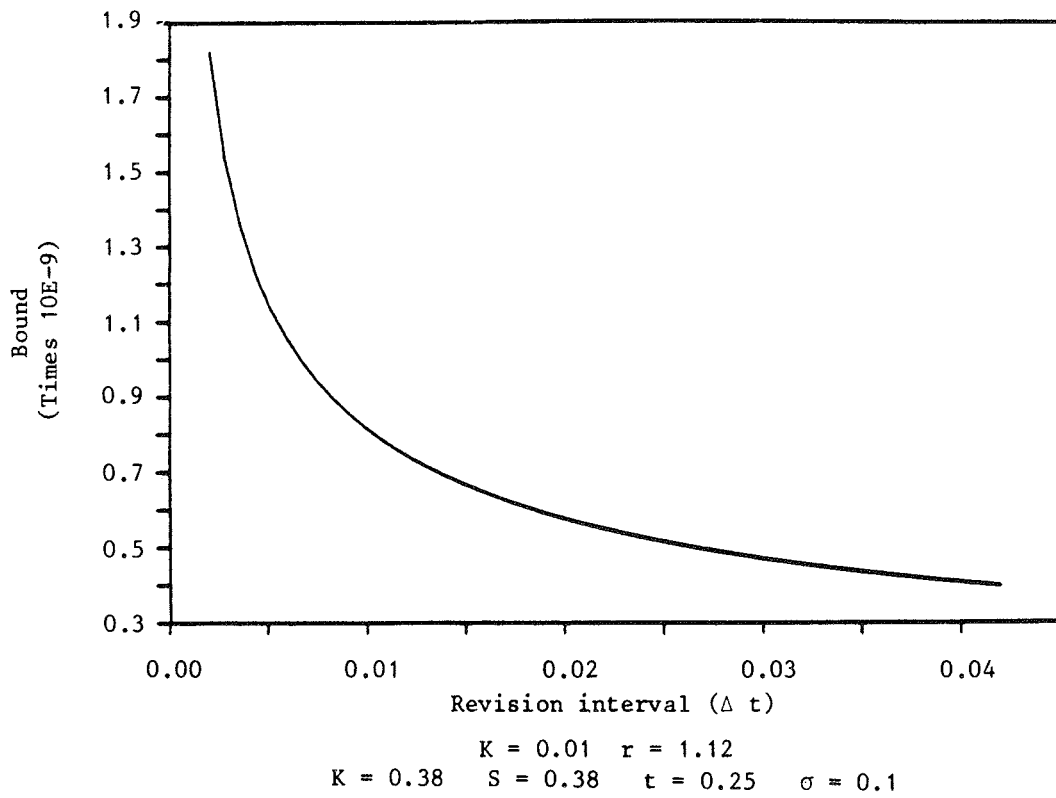
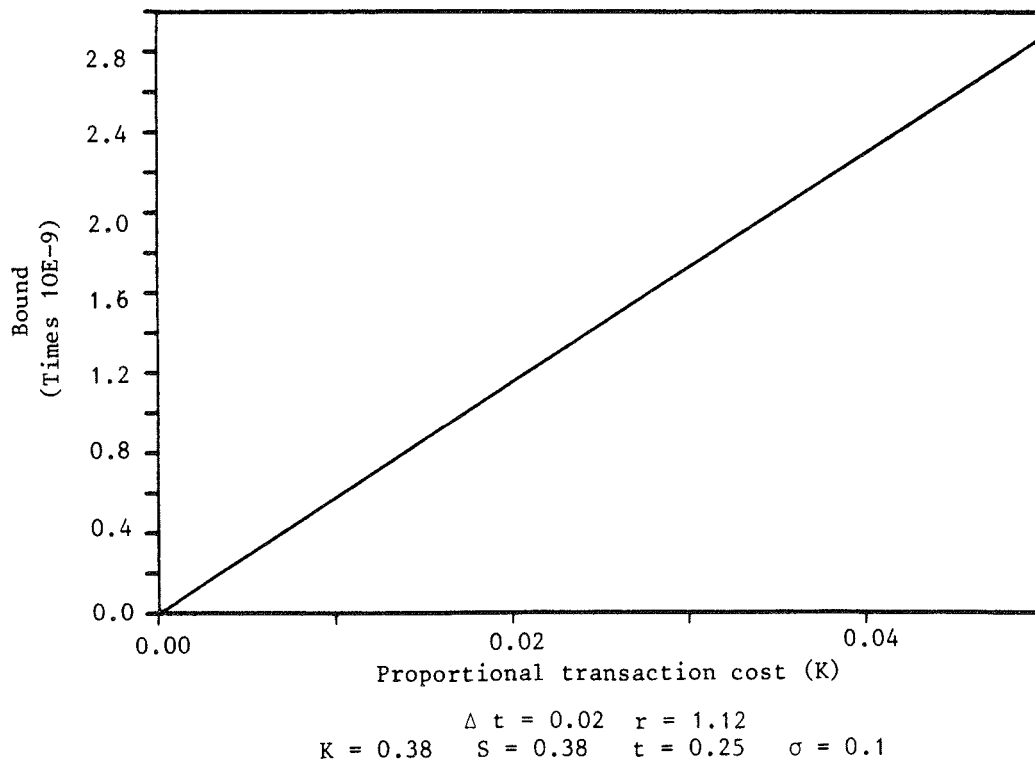


Fig. 3.E.28: Range of call prices as a function of transaction cost



Chapter 4

Forward rate agreements

A. The instrument

A forward rate agreement¹ (FRA) is closely analogous to an interest rate future. It is a contract in which two parties agree on the interest rate to be paid on a notional deposit of specified maturity at a specific future time (the settlement date). The contract period for FRAs is quoted as, for example, "six against nine months", meaning the interest rate for a three-month period commencing in six months' time. Principal amounts are agreed but never exchanged, and the contracts are settled in cash.

In common market terminology, the "buyer" of an FRA is the party wishing to protect itself against a rise in interest rates, that is, which as an alternative to an FRA would seek to set the rate today on a deposit it was to receive at a future time. Conversely, the "seller" is a party protecting itself against an interest rate decline, and its sale of an FRA is analogous to making a loan for future delivery.²

At the settlement date, the difference is calculated between the agreed interest rate on the FRA and the reference rate specified in the contract, usually LIBOR. That difference is multiplied by the agreed principal amount and the period of the deposit to determine the amount due. If LIBOR on the settlement date is higher than the agreed rate, the buyer of the FRA receives payment of the difference from the seller; if LIBOR is lower than the agreed rate, the seller receives payment.

The FRA developed out of the forward/forward deposit market, where one party contracts to make a deposit with the other party on a date in the future at a predetermined rate. FRAs have been traded for about two years, but activity has grown most rapidly since the second half of 1984. By late 1985, monthly volume amounted to at least \$7 billion (notional principal amount), compared with \$2.5 billion per month at the start of the year.

An FRA is in effect an over-the-counter financial future. Like financial futures, FRAs enable banks to adjust their interest rate exposure without altering their liquidity profile and with less impact on the size of the bank's balance sheet and credit exposures than use of the interbank market. By comparison with futures, FRAs offer the features of simplicity, flexibility, absence of margins and the possibility of an instrument tailored exactly to a bank's or a customer's interest rate mismatch. They are particularly attractive in currencies for which there are no futures contracts. Some banks, however, once they have invested in the capacity to operate on a futures exchange, find futures offer the advantage of a central market-place where instruments can be bought and sold, whereas an FRA cannot be sold, but only reversed with another FRA. Credit risk on futures is uniform and considered to be very small, whereas

1 Also known as a future rate agreement.

2 Note that the words "buyer" and "seller" have the opposite meaning to that used in the financial futures market. Thus, a bank wishing to hedge against a rise in interest rates may buy an FRA or sell an interest rate future.

on FRAs it will vary with the counterparty. Also, futures are traded at thinner spreads than FRAs.

B. Markets for FRAs

1. Structure of the market

FRAs are predominantly (over 90 per cent.) a US dollar market. Agreements denominated in pounds sterling, Swiss francs, Deutsche Mark, Dutch guilders and ECUs are less common, partly because interest rates in these currencies are thought to be less volatile than in dollars. As the market has matured the range of dates for which FRAs are quoted has broadened. Initially, round periods such as three against six months were most common. By late 1985, FRAs were frequently quoted for all three or six-month periods up to about one year, and FRAs for broken dates were becoming more common. Similarly, the size of deals has grown, FRAs of \$20 million being quite common by late 1985 and even amounting to \$50 million at times.

London is the main centre for FRAs, accounting for about 40 per cent. of the market, although this proportion is falling as activity increases elsewhere. New York is next in importance with about 25 per cent. of the total. The principal market-makers are the large US banks, British merchant banks and some British clearing banks. Italian and Dutch banks are fairly consistent participants in the market, while participation by Belgian, French, Canadian and Scandinavian banks is more scattered. Japanese banks have been slow to begin trading FRAs, although they are expected to become more active. German banks appear to have used FRAs only infrequently.

The FRA market is primarily interbank, with about half the contracts arranged through brokers. Most banks have also concluded a small number of FRAs with non-bank customers, who almost always use FRAs to cover future borrowing rather than deposit rates. Few contracts with non-banks are arranged through brokers. British, Italian and Dutch banks have offered FRAs to non-bank customers as a form of over-the-counter futures contract. The attraction to the customer is that the FRA can be tailored exactly to his requirements as far as amounts, dates and interest rate bases are concerned, and without margining requirements. In the United States, use of exchange-traded futures contracts by non-banks is well established and the FRA is, therefore, comparatively less attractive. There is apparently little sign of investment-bank involvement in FRAs, either for their own account or as market-makers. For the most part commercial banks use FRAs for their own account.

2. Standardisation of documentation

Following the publication in August 1985 of the British Bankers' Association's booklet on FRAs, the "FRABBA" terms, as they are known, have become the standard in the market. All interbank dealings in FRAs in London use these terms and conditions unless otherwise stated.

3. Reasons for the use of FRAs

The main attraction of FRAs for banks is that they offer a means of managing interest rate risk that does not inflate the balance sheet, and they can be used to reduce the gross size of a bank's interbank book. One bank was

able to reduce its interbank book by 40 per cent. The desire by banks to reduce their use of the interbank market and contain overall balance-sheet growth is mainly the result of supervisory pressure to increase capital, as well as their desire to improve their financial performance as measured by return on assets.

Some banks employ FRAs as a trading instrument, especially British banks which are active as market-makers in most international markets. Trading may take the form of arbitrage between FRAs and financial futures, short-term interest rate swaps or cash deposits. FRAs can also be used for position-taking with a view to interest rate movements. Financial futures are frequently used to hedge temporary FRA positions. Increased use of FRAs for trading has led to a larger number of FRAs for broken dates as banks close positions taken earlier.

The accounting treatment of FRAs and financial futures can alter their attractiveness for banks. In some countries (Italy, for example) financial futures must be marked to market with differences taken through the bank's profit and loss account, whereas this treatment is not required for FRAs. The result is that the hedging of a position through FRAs is better reflected in a bank's accounts than hedging through financial futures. In the latter case, even though the hedging is effective, accounting practices would require the profit on the hedge to be taken in a different accounting period from the loss on the underlying position (or vice versa), leading to wider apparent variations in the bank's performance. Differing accounting treatment would also mean that FRAs could not effectively be hedged with financial futures. In other countries (for example, Germany) accounting rules require FRAs to be marked to market prices when these are below cost, but do not allow profits to be taken until they are realised. Again, this can mean that reported profits do not reflect the effectiveness of the hedge.

In the United Kingdom, the Netherlands and Germany there are gaming or gambling laws which, it is thought, could result in FRAs being unenforceable in certain circumstances. This has not been tested in the courts.

C. Bank assessment and control of market and credit risk

1. Risks

FRAs give rise to a replacement cost risk: if the counterparty to an FRA fails, a bank is at risk to the extent that it expects to receive a payment from the counterparty, given the current level of interest rates. Thus, the risk of loss depends on both the adverse movement of interest rates and the default of the counterparty. For example, supposing a bank buys an FRA at 10 per cent. to protect itself against a rise in LIBOR. By the settlement date LIBOR has risen to 12 per cent., but the counterparty defaults. The bank therefore fails to receive anticipated compensation of 2 per cent. per annum of the agreed principal amount for the period covered by the FRA. The bank is not at risk for the entire notional principal amount.

FRAs also create interest rate positions in the future. They are generally used to hedge existing positions, but could be used to open a position if a bank wanted to take a view on interest rates.

2. Assessment and control of risk

As described above, the size of the credit exposure on an FRA depends on the extent and direction of interest movements in the period up to the settlement date. Consequently, the eventual exposure cannot be known at the outset, although it will only be a small fraction of the agreed principal amount. FRAs raise the same issues for measuring exposure as do interest rate swaps, such as estimating the volatility of interest rates (see Chapter 2). In practice, a more rough-and-ready approach is generally adopted because the periods covered by FRAs are much shorter than for swaps.

In most cases the credit exposure on FRAs is measured by setting a flat rate amount against the counterparty's credit limit, usually 5 per cent. (sometimes 10 per cent.) of the principal amount. The 5 per cent. credit exposure is a rule of thumb adopted for convenience, and represents the potential loss from counterparty default if the reference interest rate for a three-month future period moves against the bank by 20 percentage points before the settlement date. For an agreement covering a six-month future interval, the 5 per cent. charge to a counterparty's credit limit represents exposure against a 10 percentage point move in the reference interest rate.

The interest rate positions created by FRAs bought and sold are generally included within a bank's overall system for measuring and controlling interest rate exposure.

3. Method of pricing

The pricing of FRAs reflects the costs of alternative ways of constructing a similar hedge. For example, the price of a six against nine-month FRA will depend in particular on interest rates on six and nine-month deposits. The relationship of FRA rates to deposit rates is illustrated in the Appendix to this chapter.

Bid/offer spreads on FRAs narrowed from 1/4 percentage point in early 1985 to 1/8 percentage point or less by the end of the year. There is no evidence that widespread profitable arbitrage opportunities between the FRA and deposit markets exist after taking into account spreads and transaction costs. Nevertheless, the FRA rate can at times be sufficiently different from the implied forward/forward rate for one means of hedging to be preferable to the other. Arbitrage opportunities involving placing and taking of deposits do appear to exist for banks which are able to fund themselves below LIBOR, particularly on longer-term contracts such as nine against twelve months. Arbitrage involving deposits may not be attractive for banks with return-on-asset requirements, however, since the interest differential would be earned for only three months, but the balance sheet would be expanded for a full twelve months. The differential would therefore need to be four times the required return for the arbitrage to be worthwhile.

On the settlement date the difference calculated between the agreed forward rate and the rate at that time is discounted (using the current rate) to take into account the fact that the payment of the difference is made at the start of the agreed period rather than at maturity.

Appendix

Uses of FRAs: a practical example

The choices confronting a bank when it decides to fund a six-month loan illustrate the uses of an FRA. The bank could, for example:

- (i) borrow for six months at LIBOR, 8 3/8 per cent.;
- (ii) fund for the first three months using its own funds at a cost of 8 1/16 per cent.

In choosing the second option, the bank runs the risk that interest rates will rise and that the overall cost of funding the loan for six months will be above 8 3/8 per cent. To protect against that risk, the bank could enter the FRA market where three against six-month FRAs are quoted at an offer/bid spread of 8 1/2 - 8 1/4 per cent. Buying an FRA at a rate of 8 1/2 per cent. locks in a borrowing cost of 8 1/2 per cent. in three months' time. The overall cost of funding the loan in this fashion is 8.36 per cent., almost exactly the same as borrowing for six months at 8 3/8 per cent.

If three-month LIBOR is above 8 1/2 per cent. in three months, the bank's counterparty will pay the difference to the buyer of the FRA. The payment will offset any higher interest cost incurred by the bank when it enters the market to raise funds. If LIBOR is below 8 1/2 per cent. in three months, the bank will pay its counterparty the difference; however, it will be compensated by raising funds at a rate below 8 1/2 per cent.

Assuming the size of the deposit to be \$10,000,000, the costs of the two alternatives work out as follows:

- (i) Borrowing for six months at 8 3/8 per cent.

$$\$10,000,000 \times 8.375\% \times 0.5 = \$418,750.00$$

- (ii) Borrowing for three months at 8 1/16 per cent., then an FRA at 8 1/2 per cent.

$$\text{First three months} = \$10,000,000 \times 8.0625\% \times 0.25 = \$201,562.50$$

Now, suppose three-month LIBOR has risen to 10 1/2 per cent. The bank receives the difference between the actual rate and the agreed forward rate (10 1/2% - 8 1/2% = 2%) on \$10,000,000 for three months, discounted to take account of the fact that it is paid at the start rather than the end of the three-month deposit period. This comes to:

$$\frac{\$10,000,000 \times 2\% \times 0.25}{1 + (10.5\% \times 0.25)} = \$48,721.07$$

The amount to be borrowed for the second three-month period is:

The principal	\$10,000,000.00
<u>plus</u> interest paid after the first three months	201,562.50
<u>minus</u> the amount received under the FRA	(48,721.07)
	<hr/>
	\$10,152,841.43

The interest paid for the second three months is:

$$\$10,152,841.43 \times 10 \frac{1}{2}\% \times 0.25 = \$266,512.10$$

Total outlays are:	201,562.50
	266,512.10
	(48,721.07)
	<hr/>
	\$419,353.53

(This is slightly more than the outlays under alternative (i) because the FRA was only for the round amount of \$10,000,000, not the \$10,201,562.50 which actually had to be covered.)

Part III

Broad trends in international financial innovation

Financial innovation in its broadest sense may encompass two different phenomena. It may take the form of new instruments, such as those described in Part II, or it may manifest itself in far-reaching changes in the relative importance of various channels of financial intermediation. In practice, of course, these two types of structural change will tend to be closely interrelated. They may result from a common set of influences such as inflationary uncertainties, interest rate volatility and deregulation. At the same time, the development of new instruments and techniques may favour certain forms of financial intermediation, or vice versa.

It is the aim of the following three chapters to place the individual new instruments and techniques described in the preceding chapters into the much wider context of financial innovation and structural change which has been under way for some time in the international financial markets, but has accelerated particularly sharply during the past three or four years. The tenor of these three chapters will be essentially descriptive, with the emphasis on the restructuring of credit flows and on an examination of some instruments and techniques which, while not altogether new, have in recent years considerably increased in importance.

The change in the process of international financial intermediation over recent years has consisted of three broad strands:

- a trend towards securitisation;
- increasing importance of off-balance-sheet items;

and partly as a result of these developments and the particular form in which they have manifested themselves:

- increasing global integration of financial markets.

Chapter 5 outlines the main influences which have led to the trend towards securitisation and describes the two principal forms in which this securitisation has manifested itself: firstly, the expansion of the international securities markets; and, secondly, the trend towards increased marketability of banks' assets and liabilities.

Chapter 6 discusses the rôle of more traditional off-balance-sheet banking activities and it portrays in some detail the strongly increased presence of the banks in the markets for interest rates futures.

Chapter 7 examines the trend towards global integration in the field of bank credit and the security markets resulting from deregulation, technological progress, new instruments and other innovatory trends.

Chapter 5

The trend towards securitisation

A. Main influences

A major trend in the international financial markets in recent years has been the shift of credit flows from bank lending to marketable debt instruments. This "securitisation", with one significant exception, represents a return to the form of intermediation prevalent before the growth in the early 1970s of Euro-currency markets and syndicated lending. The new development is that commercial banks have become major issuers and purchasers of securities as well as arrangers and managers of new issues.

In addition to the broad forces discussed in Part IV below, several specific factors have spurred the securitisation of international credit flows. The reappearance of positive real interest rates and positively sloped yield curves has enhanced the appeal of longer-term bonds to investors, and made it more attractive for the market-makers to hold and trade inventories of such bonds. The international debt problem has emphasised the desirability of liquidity and marketability of bank assets, and also encouraged banks to strengthen their capital base by stepping up long-term debt issuance. At the same time, there have been virtually no difficulties in the bond markets in recent years, not even with paper issued by problem debtor countries. Finally, for a variety of reasons, mainly associated with pressures on bank balance sheets arising from disinflation, it has become cheaper for prime non-bank borrowers to raise funds through the securities markets than from banks.

More generally, securitisation has been fostered by the maturing and increasing efficiency of the Euro-bond markets. Initially segmented, the markets have become broad and homogeneous, with standardised trading practices. It has become common practice to issue bonds through multinational syndicates of large banks with well-developed placing power, making it possible to raise significant amounts of capital at short notice. Even though many debt instruments are tailored in many respects to the needs of specific investors or borrowers, most new issues are priced according to one of only three basic formulae - fixed rate, floating rate and "convertible" - thereby permitting price comparisons, arbitrage and a unified price structure.

The secondary market for Euro-bonds has grown so much that it now ranks second only to the US domestic bond market in terms of depth and liquidity. Major international banks are the main market-makers. The Euro-bond market is almost entirely free of official regulation, but instead is self-regulated by the Association of International Bond Dealers (AIBD). Both the primary and secondary markets operate through standard clearing mechanisms (Euro-clear and CEDEL), producing low-cost dealing and delivery.

The organisation of short-term securities markets is less clearly defined than that of the Euro-bond market, but the development of new forms of back-up facilities (discussed in detail in Chapter 1 and 6) clearly is in response to preferences of both borrowers and investors for increased flexibility. Thus the various forms of NIFs, in assuring long-term access to

funds, offer the borrower the choice of when to draw and repay, how much to draw, in which form and in what currency the drawing will be made, and what reference rate will be used (LIBOR, prime rate, LIBID, CD rate, etc.). For the investors the securities issued under these facilities combine relatively high yields with short maturities and therefore relatively limited price and credit risks.

B. The shift away from bank credit to the securities market

Over the first half of the 1980s the composition of new international credit shifted from mainly syndicated bank loans to predominately securitised assets (see Table 5.1). Note issuance facilities (NIFs) are the main form of short-term credits, while bonds and floating rate notes (FRNs) account for most of the securitised long-term credits.

Table 5.1

The international credit and capital markets

Items	1981	1982	1983	1984	1985
	in billions of US dollars				
International bonds and notes	44.0	71.7	72.1	108.1	162.8
<u>of which: floating rate notes</u>	7.8	12.6	15.3	34.1	55.4
convertible bonds ..	4.1	2.7	6.8	8.5	7.3
Syndicated Euro-bank loans ¹ ...	96.5	100.5	51.8	36.6	21.6
<u>of which: managed loans</u> ²	-	11.2	13.7	6.5	2.4
Note issuance facilities ³	1.0	2.3	3.3	18.9	49.4
Total	141.5	174.5	127.2	163.6	233.8

1 Excludes US takeover-related standbys.

2 New money element of rescue packages.

3 Includes revolving underwriting facilities, multiple-component facilities (if they include a note issuance option) and other Euro-note facilities.

Source: Bank of England.

New syndicated Euro-bank loans contracted markedly, particularly if the "non-spontaneous" lending to some large Latin American debtor countries is excluded. Over \$100 billion in new syndicated loans was raised in 1981, \$30 billion in 1984 and only \$19 billion in 1985. Moreover, these figures actually understate the extent to which net new borrowing from banks in this form has contracted, since they include loans used to replace outstanding or maturing credits, and make no allowance for the contraction of the conventional kind of bank lending in non-syndicated form.

Further refinement of the data on lending by banks in the BIS reporting area to exclude refinancings shows that net new financing ceased entirely by 1984 (see line 3 of Table 5.2a). Net new cross-border bank lending to non-bank entities within the BIS reporting area (other than the United States) shrank from nearly \$28 billion in 1980 to \$4.5 billion in 1983. In 1984 and the first nine months of 1985 there were actually net repayments of over \$2 billion and about \$1 billion respectively. Moreover, these figures include the acquisition by banks of short-term paper issued under NIFs and RUFs, and in some cases investment in long-term securities. If estimates of these latter items are subtracted, it seems clear that the total of outstanding international bank loans to non-bank entities contracted by \$5-10 billion in 1984 and continued to fall at a similar pace in the first nine months of 1985.

Lending by banks to resident non-bank borrowers in foreign currency (excluding US and Japanese borrowers), which is largely trade-related, has also fallen, but not as rapidly as cross-border lending (see Table 5.2a, line 4). In 1984, such lending totalled about \$13 billion, down by over one-third from its 1980 peak level. Foreign currency lending to residents in the first nine months of 1985 was only \$12 billion at an annual rate, but about 65 per cent. of that increase which occurred in London may have reflected in large measure lending to securities houses.

Cross-border international bank lending to non-bank entities outside the BIS reporting area also contracted quite sharply (see line 6 of Table 5.2a). Such lending totalled \$50 billion in 1981, but fell to roughly \$10.5 billion at an annual rate in the first nine months of 1985. Securitisation was only one of several factors in this change, the main cause undoubtedly being the outbreak of LDC debt problems in the summer of 1982. In addition, most LDCs do not yet have full access to the international securities markets.

One apparent exception to these general trends is that international bank lending to US residents, after remaining rather stagnant in 1982-83, increased by \$19.7 billion in 1984. However, the 1984 data for the first time include full figures on the activity of banks in several major offshore centres. In fact, over half of the 1984 increase in claims on US residents was reported by one offshore centre. Claims on US residents expanded by \$7.2 billion in the first nine months of 1985, probably partly in connection with merger activity in the United States.

The flows of deposits to international banks have also contracted in the 1980s, and their pattern has altered. But these shifts appear to reflect macro-economic shifts at least as much as trends towards securitisation. Aside from those in the United States, non-bank residents within the reporting area continued to make deposit placements at international banks (see Table 5.2b, lines 3 and 4). These flows have been erratic, but without the sharp downward trend evident in international bank lending. Such placements climbed by \$24.5 billion in 1984, just as international securities markets were accelerating sharply but slowed to \$5.9 billion in the first half of 1985.

Table 5.2a

The development of international bank credit: International lending by BIS reporting banks to non-bank entities inside and outside their own areas
(in billions of US dollars)

	Changes (excluding exchange rate effects)							Amounts outstanding at end-Sept. 1985
	1979	1980	1981	1982	1983	1984	1985 first 9 months	
1. Cross-border claims on non-bank entities within the reporting area	14.8	30.6	31.0	18.4	6.4	17.1	6.3	315.8
2. of which: on US residents	4.6	2.7	5.1	- 0.3	1.9	19.4	7.2	78.0
3. other	10.2	27.9	25.9	18.7	4.5	- 2.3	- 0.9	237.8
4. Local foreign currency lending to non-bank residents (other than in the United States and Japan)	8.7	20.7	19.4	12.1	10.1	13.1	8.8	144.8
5. Total international bank lending to non-bank entities inside the reporting area (excl. domestic foreign currency lending in the United States) (Items 1 and 4) ...	23.5	51.3	50.4	30.5	16.5	30.2	15.1	460.6
6. Claims on non-bank entities outside the BIS reporting area	40.1	38.4	50.0	37.3	27.3	10.7	4.7	403.1
7. Total cross-border claims on non-banks (Items 1 and 6)	54.9	69.0	81.0	55.7	33.7	27.8	11.0	718.9
8. Total identified international bank lending to non-bank entities (Items 4 and 7).	63.6	89.7	100.4	67.8	43.8	40.9	19.8	863.7
<i>Memorandum items:</i>								
<i>Cross-border interbank claims within the reporting area</i>	<i>126.7</i>	<i>135.6</i>	<i>160.7</i>	<i>107.7</i>	<i>67.1</i>	<i>90.0</i>	<i>77.3</i>	<i>1,378.7</i>
<i>Claims on banks outside the reporting area *</i>	<i>24.3</i>	<i>36.5</i>	<i>23.1</i>	<i>17.1</i>	<i>5.2</i>	<i>3.0</i>	<i>9.6</i>	<i>249.0</i>

Note: Up to 1983 the reporting area includes banks in the Group of Ten countries, Luxembourg, Austria, Denmark and Ireland, plus the offshore branches of US banks in the Bahamas, the Cayman Islands, Panama, Hong Kong and Singapore.

As from 1984 the reporting area includes, in addition, Finland, Norway and Spain, as well as non-US banks engaged in international business in the Bahamas, the Cayman Islands, Hong Kong and Singapore and all offshore banks in Bahrain and the Netherlands Antilles.

* Including unallocated items.

Table 5.2b

The rôle of the international banking sector as an outlet for non-bank deposits: International liabilities of BIS reporting banks to non-bank entities inside and outside their own areas
(in billions of US dollars)

	Changes (excluding exchange rate effects)							Amounts outstanding at end-Sept. 1985
	1979	1980	1981	1982	1983	1984	1985 first 9 months	
1. Cross-border liabilities to non-bank entities within the reporting area	27.6	22.3	49.8	27.9	23.4	13.6	7.9	333.0
2. <i>of which: to US residents</i>	20.0	9.8	35.3	17.7	16.7	- 5.9	- 1.7	158.3
3. <i>other</i>	7.6	12.5	14.5	10.2	6.7	18.8	2.4	159.5
4. Local foreign currency liabilities to non-bank residents (other than in the United States and Japan)	2.8	5.5	5.3	6.8	2.1	5.7	3.8	63.2
5. Total international liabilities to non-bank entities inside the reporting area (excl. domestic foreign currency in the United States) (Items 1 and 4)	30.4	27.8	55.1	34.7	25.5	19.3	11.7	396.2
6. Liabilities to non-bank entities outside the BIS reporting area*	23.4	21.2	22.2	13.7	17.2	6.3	8.8	190.4
7. Total cross-border liabilities to non-banks (Items 1 and 6)	51.0	43.5	72.0	41.5	40.6	19.9	16.7	523.4
8. Total identified international liabilities to non-bank entities (Items 4 and 7)	53.8	49.0	77.3	48.4	42.7	25.6	20.5	586.6
<i>Memorandum items:</i>								
<i>Cross-border interbank liabilities within the reporting area</i>	152.8	161.4	155.2	97.6	80.4	104.6	88.7	1,538.0
<i>Liabilities to banks outside the reporting area*</i>	49.2	37.3	10.5	- 8.5	- 10.3	21.8	- 2.8	232.0

Note: Up to 1983 the reporting area includes banks in the Group of Ten countries, Luxembourg, Austria, Denmark and Ireland, plus the offshore branches of US banks in the Bahamas, the Cayman Islands, Panama, Hong Kong and Singapore.

As from 1984 the reporting area includes, in addition, Finland, Norway and Spain, as well as non-US banks engaged in international business in the Bahamas, the Cayman Islands, Hong Kong and Singapore and all offshore banks in Bahrain and the Netherlands Antilles.

* Including unallocated items.

The main counterpart of the fall-off in international bank lending lies elsewhere, namely in the shifting behaviour of US non-bank entities, US banks and international depositors from outside the reporting area. US non-bank entities provided the bulk of Euro-currency deposits by non-banks in the reporting area in most years up to 1983. US non-bank entities withdrew nearly \$6 billion of their deposits in 1984 and about \$2 billion in the first nine months of 1985. Flows of deposits to international banks from outside the reporting area have dropped by about two-thirds from the late 1970s (see Table 5.2b, line 6). The inflow of OPEC funds to international banks in the 1970s came to a halt in the early 1980s, and by mid-decade had been partially reversed. Finally, banks in the United States shifted from being net suppliers of new funds to the international banking market to being net takers of such funds for domestic purposes.

The main counterpart of declining credit intermediation in international bank lending has been a rapid growth of new issues and the proliferation of forms of security in the international bond market. New issue activity rose by nearly 140 per cent. between 1981 and 1984, and in 1985 the issuing pace was over three and a half times that of 1981 (see Table 5.1). The most important compositional shift has been the rapid growth in the issuance of floating rate notes (FRNs), which are a close substitute for syndicated bank lending. FRNs amounted to only 12 per cent. of new issue volume in 1980, but expanded to over one-third of a much larger market by 1985.

Within the category of FRNs, there has been considerable innovation, mainly in new types of interest formulae. A number of recent issues have contained maximum interest rates (capped FRNs), either over the life of the instrument or beginning two or three years from original issuance. There have been issues of "interest mismatched" notes where the interest rate payment period is, for example, six months but the interest yield is adjusted more frequently, such as every month or every three months. A novel feature in 1985 was banks' issues of perpetual FRNs which must be converted into equity in case of solvency problems.

The fixed rate sector grew relatively slowly between 1982 and 1984, but it too expanded very strongly in 1985 and displayed an increasing use of special features. Bonds were issued with warrants, some for further issues of bonds rather than shares. Convertible bonds have been issued for years in international markets, but gained an increasing market share. Partly paid-up bonds were issued, which allowed purchasers to defer the full payment of principal for some months. This feature provides investors with temporarily increased leverage, which is particularly attractive when the exchange rate of the currency in which the bonds are denominated is expected to decline. Deep discount and zero coupon bonds, already developed in domestic markets, appeared in international markets, some apparently attempts to exploit regulatory uncertainties existing for some investors.

The trend towards floating interest rates was especially pronounced in the dollar sector of the Euro-bond market (see Table 5.3). In fact, in 1985 the volume of FRN issues for the first time will exceed that of fixed rate issues in dollars, even though fixed rate issues benefited from being used in swaps and other innovations such as zeros. The main issuers of FRNs were governments and banks, whereas industrial and commercial borrowers mainly issued fixed rate bonds. It should be noted, however, that the increase in the prominence of FRNs does not necessarily imply that more international credit is at floating rates. FRNs mainly replace syndicated loans, which are largely on a variable rate basis.

Table 5.3

Euro-dollar bond issues

Items	1981	1982	1983	1984	1985
	in billions of US dollars				
Floating rate notes	7.3	12.4	13.7	31.2	47.8
Fixed rate straight bonds	13.1	27.3	19.0	31.6	43.7
Convertible bonds	2.1	1.2	3.1	4.4	3.8
Total	22.5	40.9	35.8	67.2	95.3

Source: Bank of England.

C. Increased marketability of banks' assets

1. Banks' increased securities holdings

Direct participation by banks in the securities markets, as investors as well as agents, has been a major aspect of securitisation. Detailed statistical data are scarce, but most reports suggest that banks have bought the majority of the short-term paper (Euro-notes) issued under NIFs and RUFs, although recently a growing share of this paper has been sold to non-bank investors. Banks have also been heavy buyers of long-term securities, notably FRNs.

The available data on this subject, presented in Table 5.4, confirm market reports of strong demand by banks for marketable securities, especially in 1985. This increase has been widely distributed, though banks of some nationalities and in some centres have been more active than others.

2. Increased marketability of domestic bank assets

In addition to buying securities in the international markets, banks have sought to increase the negotiability of their conventional domestic assets. Two main developments have occurred in this field: the packaging of loans, notably mortgages, into securities; and the outright sale of loans either with or without recourse.

The securitisation of mortgage loans has developed rapidly in the United States, generally by shifting loans to specialised institutions which finance themselves through the issue of long or short-term securities, often

with some form of government backing. The share of new mortgages being securitised in the United States has climbed from about 15 per cent. of the market in 1981 to nearly one-half in 1985. These trends are so far of limited importance to the international markets, except that foreign banks might be purchasers of such mortgage-backed securities.

Table 5.4

Bank holdings of international bond and other long-term securities¹

	Outstanding amounts at end of period in billions of US dollars				
	1981	1982	1983	1984	1985
Estimated total holdings ² ..	46.7	59.2	76.7	99.5	157.7
Holdings of banks in the United Kingdom ³	16.8	22.9	32.4	41.7	64.6 ⁴
<i>of which:</i>					
FRNs	n.a.	4.2	9.9	16.7	30.8 ⁴

- 1 Securities issued by non-residents in all currencies and by residents in foreign currency with a maturity exceeding one year.
- 2 Estimates based on the holdings of international securities as reported by banks in Belgium, Canada, France, Germany, Italy, Luxembourg, the Netherlands, Sweden and the United Kingdom (see footnote 3), as well as the consolidated holdings of Japanese banks booked at head office and at all domestic and foreign branch offices plus their holdings at merchant banking subsidiaries located in London net of possible double-counting.
- 3 Including holdings of short-term CDs.
- 4 Provisional figures.

Securitisation of loans by packaging them into marketable instruments has only recently begun to have an impact on the international markets. A few packages of mortgages which originated in the United States have recently been funded through Euro-bond issues. In the United Kingdom specialised institutions have begun to issue mortgage-backed FRNs with interest rates geared to LIBOR. These securities are undoubtedly aimed at the international investor. Also, in the United Kingdom a financing vehicle has been set up to issue FRNs against bundles of officially guaranteed export credits.

Outright sales of loans by banks, not involving packaging into securities, have also expanded rapidly in the United States. The cumulative total of these amounted to about \$45 billion at the end of 1985. This market can be seen as a supplement to the existing market for loan syndications and

participations, but differs from it in some important respects: maturities are generally much shorter and many of the deals are at very low spreads.

The principal sellers of loans are banks in the large US money centres. At least eight or ten banks have devoted substantial resources to enlarging their capacity to originate loans for distribution via participations. The loans sold are generally obligations of top-quality domestic commercial borrowers. The bank earns origination fees and attempts to retain some part of the spread. Besides the desire to generate fee income on off-balance-sheet activities, many loan sales are motivated by a desire to maintain banking relationships with high-quality borrowers who are borrowing in the direct issuance markets. As a result, the profit on these transactions is often very narrow (less than ten basis points) and even zero in some cases.

Purchasers of loans were originally smaller US banks, but in the last year foreign banks have begun to acquire as much as two-thirds of the paper. Purchasing these loans is attractive for two reasons: it provides access to top-quality borrowers for institutions with little previous experience in lending to US corporations in the domestic market, such as foreign banks and thrifts. Many of the purchasers find they can generate deposits more easily than they can generate loan demand. In addition, buyers earn higher rates of return than on comparable, if more liquid, money-market instruments. Foreign banks and smaller US banks view loan purchases as an attractive substitute for other short-term investments such as commercial paper, domestic certificates of deposit, Federal funds or Euro-dollar deposits, none of which offer a yield as high as LIBOR.

These sales of domestic loans or of securitised shares in domestic loan bundles to foreign banks illustrate another important trend during recent years, namely the increasing blurring of the borderlines between the domestic and the international financial markets which is described in more detail in Chapter 7.

3. Increased marketability of banks' international assets

Banks have made only limited attempts to increase the marketability of their international assets. The two main new practices are the trading of claims on sovereign debtors and a more aggressive selling of participations in syndicated loans.

Banks have sought mainly to trade claims on problem debtor countries. It is probable that banks would prefer to sell such assets outright, but have only infrequently done so because accounting rules would require that they book the transaction at whatever discount was required to sell the asset. For this reason, banks mainly exchange claims on one country for claims on another, although there may be cash payments made to compensate for differences in the quality of the loans. Most outright loan sales appear to have been concentrated on high-quality loans, although there have been instances of outright sales at substantial discounts.

A few large US banks are active as participants or brokers in this market, but the major participants have been Latin American banks. Some US regional banks have traded or sold relatively large portions of their LDC exposure. Certain European banks were reported to have been involved in this market, as well as some private firms in developing countries and multinational

firms. In some of these latter transactions, a foreign firm may exchange the discounted loan at face value in the debtor country, using the local currency proceeds for the purchase of goods and services.

For banks, swapping of loans may be motivated by perceived differences in risk, efforts to reduce risk concentrations, and also the desire to cut administrative and monitoring costs by eliminating some exposure to small countries. Moreover, Latin American banks may use swaps to raise cash and reduce their foreign exposure, while other non-US-based banks may be interested in exchanging exposure to Latin America for regions closer to home. Systematic information regarding the quantitative importance of these loan swaps and loan sales is not available, but it seems that the market is very narrow with the turnover ranging around \$1 billion a year.

In recent years banks have increased sales of participations in syndicated loans. This practice serves somewhat different purposes for the seller and the buyer. For the selling bank it creates an opportunity to originate new loans without expanding funding, thereby yielding additional fee income. It may also permit the "repackaging" of old loans, including the selling-off of the remaining portion of a long-term loan. For the purchasing bank, it provides an opportunity to build a portfolio quickly.

The sales of participations, the "sub-participations", have not assumed great significance because of several legal ambiguities. The most important is that the sub-participant does not obtain a direct claim on the borrower for either principal or interest. For this reason a new technique has been developed which incorporates a provision for transferability when the contract is negotiated. Two legal approaches have been used: assignment and novation. Assignment is based on the creation of transferable loan instruments (which might be subject to securities regulations), whereas novation involves the replacement of one obligation and the creation of an entirely new one. Both instruments entail the setting-up of a register in which transfers of ownership are recorded.

Transferability endows the syndicated credit with many of the attributes of securities together with the flexibility and liquidity features of NIFs. Its advantages are passed on to the borrowers as well, mainly because lending banks strongly prefer to lend in this fashion and thus offer borrowers narrow margins and favourable maturities.

The first transferable loan was executed in February 1984: a \$500 million loan renegotiation for the Republic of Ireland. By the end of 1985 this technique had been employed in thirty-three loan facilities amounting to over \$5.4 billion, and about one-quarter of new loans, in value terms, contained transferability clauses. The borrowers are concentrated mainly among the OECD countries such as Ireland, Greece, Portugal and Spain, and more recently developing countries such as Barbados, Colombia, Trinidad and Tobago, South Korea, Pakistan and Thailand, as well as Hungary, have also incorporated this new technique. The largest transaction announced so far was a \$650 million transferable loan to the Korean Development Bank in May 1985.

Whether the transferable syndicated loan technique will be able to compete successfully with FRNs, NIFs and RUFs will depend in large measure on whether a well-functioning secondary market develops for the instrument. Little information is available on the amount of trading taking place in these participations.

D. Banks as borrowers in the long-term securities markets

Another prominent feature of the international financial markets in recent years has been the growing importance of banks as borrowers in the international bond markets. This has been particularly true of the FRN sector, where the issue volume in 1985 was more than ten times that in 1980 (Table 5.5). This dramatic expansion occurred at a time when the volume of syndicated bank lending was contracting sharply. In fact, taking fixed and floating rate instruments together, total issues by banks in 1985 for the first time exceeded the amount of their gross syndicated lending. In addition, banks have also been important issuers of long-term certificates of deposit, which in most cases carry floating interest rates and which by their very nature can be considered as a close substitute for FRNs.

Table 5.5

Securities issued by banks*

Items	1980	1981	1982	1983	1984	1985
	in billions of US dollars					
FRNs	2.3	3.0	4.9	3.8	14.6	29.2
Other bonds	3.1	3.6	6.1	8.1	8.5	13.8
Total	5.4	6.6	11.0	11.9	23.1	43.0

* Excluding CDs.

Source: OECD.

There are a number of reasons for this growing importance of banks as issuers of Euro-bonds. To the extent that these issues have been in the form of subordinated and/or perpetual debt, they have reflected efforts by banks to strengthen their capital base. Moreover, through bonds and long-term CD issues the banks have sought to reduce the degree of maturity transformation performed in their international lending and to achieve a better symmetry between their longer-term lending and funding. And, finally, a substantial part of banks' bond issues, particularly the fixed rate sector, seems to have occurred in connection with interest and currency swaps.

The growing importance of banks as issuers of bonds, in conjunction with their expanding rôle as investors in the bond markets and their rôle in

connection with NIFs, RUFs and interest swaps, has meant that the distinction between credit intermediation via the banks and via the capital markets has become more and more blurred. From the point of view of lenders the liquidity and solvency characteristics of FRNs issued by banks may not be very different from banks' short-term deposit liabilities, but from the point of view of macro-economic monitoring they tend to be evaluated differently because they are not usually included in monetary aggregates. To the extent that banks' bond issues are acquired and held by other banks, they do not amount in overall terms to a strengthening of the international banking sector's capital structure but share most characteristics of other forms of interbank lending.

Paper issued by non-bank entities under long-term NIFs and RUFs, despite its formally short-term character, combines in macro-economic terms features of long-term credit and capital-market paper. Banks' holdings of FRNs issued by non-banks have some of the characteristics of traditional syndicated credits, and interest swaps tend to establish a direct link between bank lending and capital-market borrowing. The implications of these various cross-currents for macro-economic developments and the stability of the international financial system will be discussed in Part V of this Report.

Chapter 6

The increasing importance of off-balance-sheet business: back-up facilities and financial futures

Part II of this Report examined four off-balance-sheet instruments which have grown in importance during recent years. Financial institutions have long engaged in a wide range of other off-balance-sheet activities, many of which have become more actively traded in recent years. The most important examples are loan commitments, bankers' acceptances, forward foreign exchange transactions, financial futures, guarantees of various types and agency and fiduciary services. Many of these activities, such as bankers' acceptances and forward foreign exchange transactions, are widely understood and require no further elaboration. The trading of financial futures and various types of guarantees is less well known, has grown quickly and thus will be discussed in more detail.

The growth of these instruments can be attributed generally to the same factors affecting the trend towards securitisation, with two additional influences. Firstly, bankers have been attracted to off-balance-sheet business because of constraints imposed on their balance sheets, notably regulatory pressure to improve capital ratios, and because they offer a way to improve the rate of return earned on assets. Secondly, for similar reasons, banks have sought ways to hedge interest rate risk without inflating balance sheets, as would occur with the use of the interbank market.

A. Back-up facilities

Banks provide a variety of products which enhance borrowers' access to funds either by improving the credit rating of the individual instrument above that otherwise available to the borrower or by providing an assurance of directly available funding. Markets for these products are particularly well developed in the United States, but increasingly transactions with these same features such as NIFs and Euro-commercial paper are appearing in the international markets. These products effectively transfer credit or liquidity risk among market participants.

1. Bank guarantees

Banks use two broad types of techniques to guarantee performance of a third party under a financial transaction: standby letters of credit and loan commitments. The amount of risk assumed by the bank and the amount of credit and/or liquidity enhancement provided to the customer varies across and within these two categories of guarantees. In the United States banks are prohibited by regulation from providing formal guarantees and instead offer these commitments as a functional equivalent of a guarantee.

(a) Standby letters of credit

The three basic types of standby letters of credit (SLC) are conventional SLCs, guarantees and irrevocable revolving credit commitments. Banks use different terminology to describe their own version of these instruments.

(i) Conventional standby letters of credit

A conventional standby letter of credit (CSLC) is an irrevocable obligation in the form of a letter of credit issued by a bank on behalf of its customer. If the bank's customer is unable to meet the terms and conditions of its contractual agreement with a third party, the issuing bank is obligated to pay the third party (as stipulated in the terms of the CSLC) on behalf of its customer. A CSLC can be primary (direct draw on the bank) or secondary (available in the event of default by the customer to pay the underlying obligation).

(ii) Guarantees

A guarantee is an obligation of the bank to pay the beneficiary if the bank's customer does not meet its obligations under an underlying agreement with the creditor-beneficiary. In general a guarantee differs from a CSLC in its dependence on the underlying contract: the guarantor's liability is secondary to the obligor's liability under the contract, whereas in a CSLC the bank has a primary obligation to honour drafts or demands in accordance with the letter of credit itself. US banks are generally prohibited from issuing guarantees in or from the United States, but may issue them from foreign branches provided such activities are in the normal course of business and permitted by local rules of the host country.

(iii) Irrevocable revolving credits

In an irrevocable revolving credit (IRC) the bank irrevocably commits itself to funding drawings by the obligor to meet contractual obligations. This is not to be confused with revolving credit lines which are conditional commitments to lend. Generally, an IRC has the same effect as a CSLC. In contrast to a CSLC, however, the bank's IRC provides liquidity to the obligor, not directly to the beneficiary. This structure imposes greater conditionality on the bank's obligation to perform than does a CSLC.

(iv) Uses of standby letters of credit

Standby letters of credit can be used to back the financial obligations or the performance of a bank's customer. The former supports direct financial obligations such as commercial paper, tax-exempt funds or other debt instruments, insurance premiums or tax indemnities, or margins/exchange requirements. The latter guarantees bid or performance bonds or provides indemnities for discrepancies or missing documents.

(v) Risk aspects of standbys

Standby letters of credit represent an extension of credit in the sense that the bank substitutes its credit for that of its customer. While the risks the bank assumes vary considerably based on the structure of the standby

and the creditworthiness of its customer, the risk spectrum is similar to that of loan assets. However, unlike a loan agreement, which allows the bank to protect its position if its customer's financial condition deteriorates, the standby (if not collateralised) provides protection for the lender-beneficiary.

Further, standbys backing financial obligations are likely to be more risky than performance-related standbys. The risk under the first type includes at least all of the credit risks involved in extending a loan because the obligation is purely monetary and the beneficiary is indifferent whether it receives the entire amount from the obligor or the issuing bank. It could be argued that a greater risk is involved with such standbys than with a direct loan since the beneficiary (lender/investor) might have little or no inclination to impose discipline upon the borrower inasmuch as repayment is guaranteed.

In contrast, in issuing a performance-related standby, the bank is assuring the ability of the account party to perform according to a specific contract. The beneficiary's primary interest is in successfully acquiring an operation, product or service from the obligor as opposed to collecting cash from a bank. The opportunity cost to the beneficiary of not having a completed contract could very well be greater than the compensation received under the standby. A strong motivation could, therefore, exist for the beneficiary to work with the obligor to complete the contract if the latter were to be in trouble. Secondly, even in a work-out situation, it may be to the benefit of all interested parties for an obligor to perform under a contract if the completion will, on a net basis, produce a positive cash flow to the company and, hence, its creditors.

In some respects loans and standbys are treated similarly for risk evaluation purposes, although standbys are not currently subject to capital requirements in most countries.

Standbys may serve to concentrate risk in the banking system. For instance, an SLC backing an issue of securities effectively transfers risk from the various security holders to the individual bank which issued the standby.

(b) Loan commitments

A loan commitment enables a customer to obtain credit from the issuing bank under prearranged terms. Unlike SLC, which commits the bank to satisfying its customer's obligation to a third party, a loan commitment involves only two parties, the bank and its customer.

One particular form of loan commitment is a revolving credit. In general this is a financial commitment (for a specified maximum amount) extended by a bank to its customer. Banks usually extend revolving credit lines to customers for working capital or seasonal/cyclical needs. These lines have specific terms and conditions which the customer must meet before receiving funds. One common feature of a revolving credit line is the restoration of the amount drawn, which the customer repays during the extension period of the line. From a regulatory viewpoint, a revolving credit line is simply an "unused commitment to lend or extend credit".

The risk inherent in a revolving credit line is similar to an actual loan in that the bank must be prepared to fund certain loan requests under the line. Banks usually protect themselves by imposing "conditions precedent" requirements (e.g. no material adverse change to the company), by subjecting the line to availability of funds by the bank, and by pricing the loan at the time of funding.

The main use of back-up facilities in the international financial markets is in connection with NIFs and associated facilities. As can be seen in Table 6.1, the volume of such facilities arranged has grown more than tenfold within the space of two years, from \$3.5 billion in 1983 to \$38.7 billion in 1985. The banks in this way have contributed to the development of a Euro-market in short-term commercial paper where the banks for fee income play a rôle as arranger and underwriter of the issue, rather than as lender.

Table 6.1

New international back-up facilities*: 1982-85

(in billions of US dollars)

	1982	1983	1984	1985
Multiple-component facilities..	-	-	8.0	18.0
Back-up for Euro-notes	2.5	0.9	6.4	17.9
Other NIF-like facilities	0.2	2.6	3.0	2.8
Total NIFs	2.7	3.5	17.4	38.7
Bankers' acceptances	2.0	1.8	5.8	2.5
of which: sterling	(1.5)	(1.3)	(1.1)	(2.1)
Commercial-paper back-ups	0.2	3.0	2.8	6.2
Other instruments	0.5	1.2	2.8	2.5
Total	5.4	9.5	28.8	49.9

* Excluding merger-related facilities.

Source: OECD.

B. Use of interest rate futures by international banks

As discussed in Chapter 4, FRAs are one of the latest off-balance-sheet instruments designed by banks to hedge interest rate risk. Standard interest rate futures contracts traded at organised exchanges have been used for this purpose for some years, and continue to grow in quantitative

importance in international banking. The following describes the growth and current status of these markets.

Interest rate futures were introduced on the Chicago commodity exchanges in the mid-1970s. The main contracts were those in US Treasury bills and bonds. Euro-dollar time deposit contracts, which are closely analogous to FRAs, were added in late 1981, and have since claimed a rapidly increasing share of a growing market. Open interest on Euro-dollar deposit contracts totalled \$121 billion (face value) at end-December 1985, accounting for nearly two-thirds of outstanding positions (see Table 6.2).

The success of the futures contracts in Chicago stimulated the opening of other exchanges, the first of which was the London International Financial Futures Exchange (LIFFE) in September 1982. On the LIFFE, too, the Euro-dollar contract is by far the largest futures instrument traded with a total face value of \$21.2 billion outstanding at end-December 1985 (see Table 6.3). Trading in interest rate futures has begun in Tokyo (1985), and in Singapore (1984), in the latter case with a linkage to the Chicago Mercantile Exchange which enables contracts opened in Chicago to be offset in Singapore and vice versa. In early 1986 there were numerous proposals for the opening of similar exchanges elsewhere.

Open interest and trading of Euro-dollar futures has grown explosively in recent years, while activity in other interest rate futures seems to have levelled off. Between mid-1983 and end-1985 outstanding positions in Euro-dollar contracts at the Chicago exchanges expanded by \$93.8 billion, or by about 350 per cent., whereas those on all other contracts taken together declined. Average monthly turnover during the same period climbed from less than 100,000 contracts to about 800,000. Euro-dollar contracts in London followed roughly similar trends: open positions rose by \$16 billion from mid-1983 to end-1985.

Bank participation in both Chicago and London futures exchanges is much larger in the Euro-dollar futures market than in the other interest rate contracts. At end-1985, for example, the banks accounted for nearly 50 per cent. of Euro-dollar contracts purchased and 29 per cent. of contracts sold in these two market centres. In the case of US Treasury bill contracts, the second most active contract in Chicago, the corresponding figures amounted to only 11 per cent. and 4 per cent. respectively.

In the Chicago futures exchanges, the Euro-dollar contracts are the only ones in which non-US-based banks have been active on a major scale. Before the introduction of the Euro-dollar contract, they were virtually absent from the futures market. Non-US banks became active in the new contract when it was introduced in mid-1983, accounting for 58 per cent. of outstanding positions at the end of the first month. Partly as a consequence of the opening of exchanges outside the United States, the non-US bank share in Chicago had fallen somewhat by end-1985.

Table 6.2

Open interest positions in some interest rate futures contracts
traded at the Chicago exchanges

Contracts	Total face value of open positions	Distribution of open positions ¹					
		futures purchases			futures sales		
		commercial banks US-based	commercial banks non-US-based	all others	commercial banks US-based	commercial banks non-US-based	all others
in billions of US dollars							
Euro-dollar deposits:							
end-1981	1.5	0.3	-	1.2	0.1	0.1	1.3
mid-1983	27.4	3.0	15.9	8.5	2.5	0.8	24.1
mid-1984	89.3	19.6	33.1	36.6	18.8	0.9	69.6
mid-1985	116.3	33.4	21.2	61.7	18.1	3.6	94.6
end-Sept. 1985	122.0	33.4	22.7	65.9	23.5	2.9	95.6
end-1985	121.2	39.5	18.9	62.8	25.9	5.5	89.8
US Treasury bills:							
end-1981	30.1	1.2	-	28.9	2.1	0.3	27.7
mid-1983	40.4	3.2	1.2	36.0	3.2	0.4	36.8
mid-1984	47.5	4.3	1.4	41.8	4.3	0.5	42.7
mid-1985	33.7	3.6	0.8	29.3	1.9	0.7	31.1
end-Sept. 1985	32.9	2.7	0.2	30.0	2.7	0.0	30.2
end-1985	33.3	3.7	-	29.6	1.3	-	32.0
US domestic CDs:							
end-1981	4.7	0.5	0.1	4.1	0.2	-	4.5
mid-1983	15.0	2.0	-	13.0	2.9	0.1	12.0
mid-1984	29.4	4.4	0.3	24.7	4.7	0.3	24.4
mid-1985	3.5	0.5	-	3.0	0.3	-	3.2
end-Sept. 1985	1.9	0.4	-	1.5	-	0.1	1.9
end-1985	0.9	-	-	0.9	0.1	-	0.8
Other instruments:²							
end-1981	29.9	0.4	-	29.5	0.9	-	29.0
mid-1983	19.9	1.0	0.4	18.5	1.1	-	18.8
mid-1984	24.7	1.1	-	23.6	1.5	-	23.2
mid-1985	25.0	1.5	-	23.5	1.2	-	28.2
end-Sept. 1985	29.6	1.1	-	28.5	1.4	-	28.2
end-1985	36.4	2.0	-	34.4	1.5	-	32.9
Total							
end-1981	66.2	2.4	0.1	63.7	3.3	0.4	62.5
mid-1983	102.7	9.2	17.5	76.0	9.7	1.3	91.7
mid-1984	190.9	29.4	34.8	126.7	29.3	1.7	159.9
mid-1985	178.5	3.9	2.2	117.5	21.5	4.3	152.7
end-Sept. 1985	186.4	37.6	22.9	125.9	27.6	3.0	155.9
end-1985	191.8	45.2	18.9	127.7	28.8	5.5	155.5
Share of Euro-dollar in total contracts:							
in percentages							
end-1981	2	13	-	2	3	25	2
mid-1983	27	33	91	11	26	62	26
mid-1984	47	67	95	29	64	53	44
end-June 1985	65	86	96	53	84	84	62
end-Sept. 1985	66	89	99	52	85	97	61
end-Dec. 1985	63	87	100	49	90	100	58

¹ Based on data from large traders for surveillance purposes by the US Commodities Futures Trading Commission.

² Contracts include 10-year Treasury notes, US Treasury bonds, GNMA.

Table 6.3

Open interest positions in interest rate futures contracts
traded at LIFFE

Contract	Total face value of open positions	Distribution of open positions					
		futures purchases			futures sales		
		commercial banks			commercial banks		
		US-based	non-US-based	all others	US-based	non-US-based	all others
in billions of US dollars							
Euro-dollar:							
mid-1983	5.20	1.00	2.80	1.40	1.10	0.60	3.50
mid-1984	13.20	2.60	7.00	3.60	3.80	3.20	6.20
mid-1985	16.60	0.60	9.20	6.80	4.00	3.50	9.10
end-1985	21.20	1.80	9.90	9.50	5.30	4.60	11.30
T-bond:							
mid-1983	n/a						
mid-1984	n/a						
mid-1985	0.25	--	0.02	0.23	0.04	0.02	0.19
end-1985	0.34	-	0.08	0.26	0.08	0.05	0.21
in billions of pounds sterling							
Short sterling:							
mid-1983	1.05	0.09	0.52	0.45	-	0.55	0.50
mid-1984	2.20	0.01	1.62	0.60	0.35	0.50	1.35
mid-1985	3.10	0.40	2.00	0.70	0.35	1.40	1.35
end-1985	3.80	0.55	2.00	1.25	0.80	2.00	1.00
Long gilt:							
mid-1983	0.20	-	0.05	0.15	-	0.05	0.15
mid-1984	0.45	-	0.05	0.40	-	1.00	0.35
mid-1985	0.10	-	0.05	0.10	-	-	0.10
end-1985	0.25	-	0.05	0.20	-	0.10	0.10

Source: LIFFE. The breakdown by type of positions has been provided by LIFFE, to whom grateful acknowledgement is made for their help.

In both the Chicago and London markets there have been distinct patterns over time in the positions taken by US and non-US-based banks, and by non-banks. In mid-1984, for example, non-US-based banks accounted for \$40.1 billion of purchases of Euro-dollar futures, but for only \$4.1 billion of sales. US-based banks' positions, by contrast, were largely offsetting, their holdings of purchase and sale contracts at that time amounting to \$22.2 and 22.6 billion respectively. The net purchases of Euro-dollar interest rate futures by non-US banks, therefore, had as a counterpart net sales by the non-bank sector. Put differently, non-US-based banks seemed to hedge against a decline in Euro-dollar interest rates, while non-bank entities appear to have used the futures markets to protect themselves against an increase in the cost of dollar borrowing. Between mid-1984, when US dollar interest rates peaked, and mid-1985, non-US banks reduced holdings of Euro-dollar interest futures by

\$9.7 to 30.4 billion, while their sales of futures contracts expanded by \$3 to 7.1 billion over this period. These differences over time and between groups of market participants, in hedging requirements and views about future interest rate trends, are powerful spurs to market growth.

Finally, it should be mentioned that the type of instrument underlying a futures contract does not provide conclusive evidence that the contract is used in domestic or international business. For example, before the advent of Euro-dollar deposit contracts, Treasury paper contracts may have been used for covering open interest positions in banks' Euro-dollar books, while Euro-dollar contracts may afterwards have been used to cover open interest positions in domestic business in the United States, although such an incongruity of the underlying instruments would give rise to basis risk. However, banks, especially non-US-based banks, were largely absent from the futures market before the advent of the Euro-dollar contract, suggesting considerable parallels between the growth of trading in Euro-dollar contracts and the use of interest futures generally as a substitute for the international interbank market.

Chapter 7

Global integration of financial markets

The roots of the present trend towards a global integration of financial markets go back to the 1960s when the development of the Euro-currency and Euro-bond markets heralded the advent of truly international financial markets. However, owing to various regulations and exchange controls, the links between these international markets and the individual domestic markets remained in most cases rather loose or partial. It was only in the course of the 1970s, and particularly during the past five years, that international and individual domestic markets have become increasingly integrated. This has occurred as a result of macro-economic developments, deregulatory measures, technological changes and financial innovations. Since these changes have been neither smooth nor uniform, the outlines of what could be called truly global financial markets often appear as a patchwork of individually integrated financial instruments and channels of intermediation.

A. Global integration in the field of banking

The trend towards increased integration between the Euro-currency market and the individual national markets received a powerful impetus from the liberalisation of capital flows following the move towards flexible exchange rates and the 1973 oil price explosion. Although these liberalisations were not restricted to banking, this sector was initially the most directly affected. The most noteworthy measures were taken in the United States, where restrictions on capital outflows were dismantled in 1974. Around the same time, some other major oil-importing countries also relaxed their controls on capital inflows.

A second important wave of deregulation came in 1979 and the early 1980s with the scrapping of the British and Japanese exchange controls on capital outflows. The Japanese liberalisation measures in the field of international capital flows adopted during 1984 and 1985 were a further important move in the direction of global integration of financial markets. Likewise in Germany the opening of financial markets was stimulated by the liberalisation of capital inflows, which resulted in 1981 in the lifting of restrictions on purchases by non-residents of domestic bonds and money-market instruments.

Other regulatory changes more directly related to banking than the general dismantling of capital controls have also contributed to bringing the domestic and international financial markets more closely together. In the United States the integration between the Euro-markets and domestic markets has been stimulated by domestic deregulation on interest rate ceilings and the opening of International Banking Facilities (IBFs). In France banks have recently been permitted to issue French franc and ECU certificates of deposit on the domestic market, and the issue of certificates of deposit denominated in foreign currency is envisaged for the near future. In the Netherlands deregulation measures taking effect in 1986 allow domestic and foreign banks to issue a wider range of financial instruments, including certificates of

deposit. The extension of banking supervision to a worldwide consolidated basis in the main industrial countries has also tended to reduce regulatory distortions in the international capital flow pattern.

Another factor contributing to the process of international financial integration is the increasing rôle of foreign banking entities in national markets. In those countries where foreign banks have been operating for many years, they have grown both in number and in relative importance (Tables 7.1 and 7.2). Moreover, recently other countries, including Australia, Canada and Sweden, have permitted or liberalised the activities of foreign banks. Foreign establishments as a rule carry out a higher proportion of their business in foreign currency with non-residents or multinational companies than do domestically-owned banks. In this respect such establishments have often played a prominent rôle in developing trade-related finance in minor market centres. Moreover, since they often cannot rely on a natural deposit base in the domestic currency of the country in which they operate, these banks are major participants in wholesale money markets. For example, the term Federal funds market in the United States is dominated by the agencies and branches of foreign banks, and similarly in many other centres foreign banks are large purchasers of funds in the local interbank market.

Foreign establishments are also likely to transfer innovations across centres. US banks, for example, have often marketed in foreign countries new instruments - such as asset sales and packaged loans - similar to those originally developed in the United States.

With respect to the integration of domestic and international markets, foreign establishments have internationalised domestic financial activity by undertaking business abroad such as the underwriting of securities which their head offices cannot carry out in their country of origin. This may, furthermore, result indirectly in the development of new market instruments, as possibly in the case of NIFs.

The closer integration of domestic and international banking transactions can also be observed in relatively new, and increasingly important, types of services being offered by banks. One such service is the global management of companies' cash flows through integrated computer networks. Banks in many countries now offer their multinational corporate clients the possibility of settling claims and liabilities, often in different currencies, from separate affiliates against one another.

B. International securities markets

The strong growth of the securities markets in recent years has been accompanied by a growing integration between domestic and international markets. Several factors account for the internationalisation and the increasing attraction of the security markets.

Firstly, regulations with regard to market participation have been liberalised. For example, in Japan the access of non-resident borrowers to the domestic issues market and the Euro-yen bond markets has been eased. Moreover, the de facto restriction of the management of Euro-yen bond issues to Japanese banks has been eliminated. In Germany foreign-owned banking entities domiciled in Germany have been allowed to manage foreign DM bond issues. The Italian Euro-lira bond market has recently been opened.

Table 7.1

Foreign banking presence in selected countries
(at end-period)

Host country	1960	1970	1980	end-June 1985
Number of institutions ¹				
Belgium	14 ²	26	51	57
Canada	0	0	0	57
Italy ³	1	4	26	36
Netherlands .....	..	23	39	40
Switzerland	8	97	99	119
United Kingdom	51 ⁴	95	214	293 ⁵
Number of banking offices ⁶				
France	33	58	122	147
Germany	24	77	213	287 ⁷
Japan ⁸	34	38	85	112
Luxembourg	3	23	96	106
United States .....	..	..⁹	579	783 ¹⁰

1 Number of foreign banking institutions ("families") operating in the country through branches or majority-owned subsidiaries unless otherwise specified.

2 1958.

3 Branches only. At end-June 1985 there were five foreign-owned subsidiaries.

4 1962.

5 At end-June 1985, 357 if joint ventures and consortium banks are included.

6 Foreign banking organisations represented by more than one entity are double-counted.

7 At end-June 1985 these offices represent 95 different banking organisations.

8 Branches only; at end-June 1985 there were 76 different foreign banks operating in Japan.

9 In the early 1970s there were about 50 foreign banking offices.

10 At end-June 1985, these offices represented approximately 350 institutions.

.. = no figures available.

Table 7.2

Foreign banks' assets in selected countries

(in per cent. of total assets of all banks
operating in selected countries)

Host country	1960	1970	1980	end-June 1985
Belgium	8.2 ¹	22.5	41.5	51.0
Canada .....	..	..	..	6.3
France	7.2	12.3	15.0	18.2 ²
Germany ³	0.5	1.4	1.9	2.4
Italy .....	..	..	0.9	2.4
Japan ³ .....	..	1.3	3.4	3.6
Luxembourg ⁴ ..	8.0	57.8	85.4	85.4
Netherlands ⁵ ..	..	..	17.4 ⁶	23.6
Switzerland ..	..	10.3	11.1	12.2
United Kingdom	6.7	37.5	55.6	62.6
United States ⁷	..	5.8 ⁸	8.7	12.0

1 End-1958.

2 End-1984.

3 Branches only.

4 Belgian-owned banks are not considered foreign banks.

5 Universal branches only.

6 End-1983.

7 Foreign agencies and branches only.

8 At end-1976.

.. = no figures available.

Secondly, a number of institutional barriers segmenting the domestic and international sectors of the securities markets have been broken down. A major step in this direction was taken in 1984 with the abolition in the United States, and shortly thereafter in the United Kingdom, France and Germany, of withholding tax on interest payments to non-residents. Moreover, in May 1985 the limitation of foreign issues in Germany to straight fixed rate bonds was dropped. With the exception of certificates of deposit and DM money-market fund units, virtually all types of instruments such as FRNs, zero coupon bonds and convertible bonds have been admitted on the German domestic market. Another change in the United States, which brought it closer in line with practices in the international securities market, was the introduction in 1982 of the use of the "shelf registration" form in lieu of registration requirements with the SEC for each new bond issue.

Thirdly, in the international FRN sector the dominating rôle of LIBOR has gradually been undermined by the use of other reference rates, such as the US prime rate or the Treasury bill rate, linking the yield on international securities even more closely than before to domestic interest rate developments.

The upshot of these various developments has been a greater convergence between domestic and Euro-rates. In particular, domestic rates on longer-term bonds issued in the United States have come very close to those prevailing in the Euro-bond market. This convergence between domestic and Euro-markets has further contributed to a harmonisation of issuing cost, a significant qualitative uprating of the international paper and relocation of the capital raising operations away from the offshore centres towards the major financial centres.

The growing use of securities markets is also producing a closer integration of some market sectors than would have been possible if the same financial flows had taken the form of bank credits. One effect has been to bring the equity and the bond markets closer together through the use of convertible bonds, bonds with equity warrants and FRNs issued by banks with features which enable them to be treated as capital for supervisory purposes. The latter have enabled banks to raise quasi-capital from a much wider range of investors.

Another effect of securitisation has been to link the capital markets more closely to the foreign exchange markets. Bonds have been issued with currency conversion options, with warrants exercisable into bonds in a different currency or with dual-currency features. In all these cases the bonds offer a combination of a capital-market asset and a foreign exchange or option contract.

C. The impact of the new financial instruments

The new instruments described in Part II of this Report (NIFs, swaps, options and FRAs) have also contributed, although in very different ways, to the process of financial integration which we have been describing.

At one end of the scale swaps have clearly facilitated the access of borrowers and lenders, albeit indirectly, to markets which would otherwise be closed to them either by regulation or by cost. This is most evident in

currency swaps. For example, the IBRD has been enabled to continue to raise Swiss francs by borrowing other currencies and arranging currency swaps, when it might have started to meet investor resistance had it tried to tap the Swiss franc market directly on a similar scale.

Overall, the volume of currency swaps has not grown as rapidly as that of interest rate swaps but even so probably amounts to about 20 per cent. of all international bond issues. Currency swaps are particularly significant in some less widely traded currencies (such as Australian and New Zealand dollars) and ECUs, where the possibility of arranging currency swaps has undoubtedly encouraged borrowers to tap markets which they would not otherwise have tapped. Currency swaps have therefore added to global integration by increasing the number of markets to which international borrowers have access.

The growth of currency swaps and the deepening of markets in non-dollar currencies have also contributed to a closer integration of longer-term sectors of domestic markets with the exchange market. This has indirectly provided liquidity for longer-term forward foreign exchange transactions.

The volume of interest rate swaps is much greater than that of currency swaps. Even when they are not cross-currency, they still often increase cross-border linkages and straddle two different sectors of the same currency: for example, the classic dollar interest rate swap is quoted in terms of a spread over US Treasury bond yields on the fixed rate side (a US domestic market rate) against LIBOR on the floating rate side (a Euro-market rate). They can therefore link market sectors by giving borrowers access to a type of funding which would not otherwise have been available to them. For example, less highly rated companies, which would otherwise have been restricted to issuing relatively expensive "junk bonds", have been able to raise fixed rate finance; and through interest rate swaps linked to the issue of "capped" FRNs, US savings and loan institutions have found non-US counterparties willing to assume some of the risk arising out of their interest rate mismatches.

It is difficult to assess to what extent interest rate swaps have been instrumental in integrating different sectors of the dollar bond market, for the abolition of the US withholding tax in 1984 also contributed to this. Before abolition, interest rate swaps provided a means of arbitrage between yields in the domestic and Euro-bond markets. Since then, the opportunities for large profits through swaps are said to have been eroded as yields in the two sectors have become more closely aligned, but the existence of some remaining barriers - such as the absence of bearer bonds in the US domestic market - means that there are still opportunities for swaps to act as a link between different sectors.

The case of yen-based interest rate swaps is somewhat different, as they have been designed to circumvent barriers within the domestic economy as well as between it and the rest of the world. The result is that they have been leading to greater domestic, as well as global, integration.

The question whether NIFs and Euro-commercial paper have led to greater global integration depends on what they are thought to have replaced. Where they have been substituted for syndicated Euro-credits there has been no real change, since they are no more global than the Euro-credit that went before. A significant number of NIFs, however, have been arranged as back-up lines to US commercial-paper programmes. In this case they have contributed to

global integration, for previously the back-up lines were provided only by banks in the United States, whereas through NIFs an international group of banks has been brought in. NIFs and Euro-commercial paper programmes may also provide the initial means of access to international markets for borrowers which have not raised money there before and may have opened the way to what may prove to be a new global market in short-term paper.

Finally, NIFs have contributed to global integration through the development of multiple-component facilities. These bring together in a single facility borrowing options in a variety of different currencies and a variety of different instruments, sometimes combining short-term instruments, such as Euro-notes or bankers' acceptances, with capital-market instruments such as FRNs. The ease with which the borrower will be able to switch between instruments and currencies will make it easier to take advantage of any discrepancies which arise between rates, and arbitrage them away.

There are two ways in which options may be leading to greater global integration of markets: European banks cover options written for their customers with options bought on exchanges in the United States, although to the extent that these options are replacing spot or forward foreign exchange deals, these would probably have been cross-border in any case; and the need to adjust the hedging of options positions twenty-four hours a day makes it necessary for banks to deal continuously around the world. The growing use of options has led to links between exchanges, as for example between the London and Philadelphia Stock Exchanges. These follow the example of links between futures exchanges, such as that between the Chicago Mercantile Exchange and Singapore International Monetary Exchange, allowing users to offset positions taken in one exchange on the other.

FRAs are unlikely to lead to a greater global integration where they are used instead of the interbank market, since the latter is already a well-integrated market. There may be a small contribution as FRAs are more efficient and cheaper to use than interbank transactions.

D. Other factors affecting the integration of financial markets

1. Institutional investment and international diversification

A further pressure for integration of financial markets has come from the growing number of institutionally managed funds (pension funds, insurance companies, unit trust or mutual funds) which have actively pursued a policy of diversifying their portfolios internationally. This drive to foreign diversification has recently been boosted by deregulation in some instances.

In the United States the Employee Retirement Income Security Act (ERISA) in 1974 had a major impact on the level of institutional investment by requiring pension funds, with some exceptions, to be funded and their investment to be prudently diversified. Although not specifically requiring international diversification, ERISA was followed by increased foreign investment, particularly after 1981 when foreign banks were permitted to hold the title of foreign assets, obviating the need to transfer them physically into the United States. It is estimated that about \$18 billion has been invested abroad since 1974 (of which \$8 billion is managed in the United Kingdom); this may only be a beginning, since probably still less than 2 per cent. of US pension funds' investments represents foreign assets.

The abolition of exchange controls in the United Kingdom in 1979 facilitated foreign investment from the United Kingdom. British pension funds' holdings of foreign securities rose from 5 per cent. of their total assets at end-1978 to 14 per cent. at end-1985, an increase of \$16 billion. At the end of 1984 about \$40 billion of funds was managed in the United Kingdom on behalf of foreign residents, of which at least 70 per cent. was invested outside the United Kingdom.

Since 1980 Japanese insurance companies and pension funds have been allowed to hold up to 10 per cent. of their portfolios in foreign assets and are estimated to have invested about \$20 billion abroad.

In Italy the newly established unit trusts have been allowed to invest up to 10 per cent. of their assets abroad without having to subscribe to the usual penal deposit at the Banca d'Italia.

2. Internationalisation of equity markets

The international diversification of investment has led to a growing number of equities being quoted and traded on foreign exchanges. Approximately 900 companies are officially listed on foreign stock exchanges, and Euro money has estimated that the stocks of over 200 multinational corporations are actively traded internationally. At the end of January 1986, 252 foreign securities, including 86 American Depositary Receipts (ADRs), were quoted in the National Association of Securities Dealers' Automated Quotation system (NASDAQ); turnover in these securities represented almost 5 per cent. of overall trading volume in NASDAQ. In 1984, £0.6 billion out of £4 billion of British Telecom shares were placed in the United States, Canada, Switzerland and Japan when the company was "privatised"; and in 1985 Nestlé sold bearer participation certificates (similar to shares, although without voting rights) through an international syndicate of banks.

International trading of equities is made easier by links between exchanges and more extended trading hours. A link exists between the Boston and Montreal exchanges and further links are under discussion. At least twenty foreign institutions have taken stakes in London Stock Exchange member firms with the intention of taking full control when this is permitted. Foreign banks and securities houses are anxious to obtain membership of the Tokyo Stock Exchange.

3. Taxation

The effects of taxation on global integration and international financial innovation must be seen in the context of the liberalisations taking place in various financial markets. Deregulatory measures, particularly with regard to capital movements, have permitted tax arbitrage opportunities which had previously remained unexploited. The movement of gross capital flows which these arbitrages have induced has added to the depth of existing markets and influenced the channels through which integration has taken place.

There are various examples of how this has occurred. One effect of taxation has been to stimulate the growth of instruments which are not subject to tax regulations or which benefit from special exemptions. For example, the existence of withholding taxes on non-resident interest earnings in the United States was in part responsible for the growth of the Euro-bond market. Before

the repeal of this tax in 1984, US companies often issued Euro-bonds through subsidiaries set up for this special purpose in the Netherlands Antilles and channelled the proceeds to their head office. At the time this country was chosen because the receipt of interest income from the United States was exempt from tax by virtue of a double-tax agreement. Another tax factor stimulating the Euro-bond market was the bearer form of the securities which has resulted in a de facto exemption of the interest income from the progressive income tax for many holders.

Zero coupon bonds and deep discount bonds provide another example of the manner in which tax provisions have encouraged the growth of specific instruments. These benefits arise because some countries tax the interest income on these bonds (which is paid at redemption) only on a realisation rather than on an accrual basis. Recognition of this tax advantage of deep discount bonds has also encouraged instruments that make use of "coupon-stripping" and are addressed to specific investor niches.

Taxation may also encourage the use of hedging instruments in particular ways. Thus, in countries where short and long-term capital gains and losses are taxed at different rates and can, under certain circumstances, be added to, or deducted from, other income (this has been the case at certain moments in the United Kingdom and the United States), futures and forward contracts have often been employed to transform income into more lightly taxed capital gains.

E. The growing use of non-dollar currencies

Financial innovations have tended to originate in the dollar-denominated markets, largely as a reflection of their relative size and depth. There has been relatively little diversification of activity into non-dollar currencies in the international financial markets owing mainly to the existence of national regulations controlling the variety of new instruments available for non-dollar borrowing, the lack of investor demand in some foreign currency sectors and the prominent rôle of US financial institutions in the international financial markets. More recently, however, the trend towards deregulation in a number of major countries, notably Japan, Germany, France and the Netherlands, has facilitated the spread of financial innovations to other currencies.

Table 7.3 and Figure 7.1 chart the growth of fixed rate international bond issues on the capital markets during the five years up to 1985. The proportion of dollar-denominated issues in the market has been especially high during periods of rising dollar exchange rates, notably in the second half of 1984. During the second half of 1985, greater access to the non-dollar international financial markets coincided with a fall in the effective exchange value of the dollar.

Any trend away from the dollar in the international capital markets in the past has tended to be short-term. Since 1983, however, diversification of bank lending into non-dollar currencies has accelerated (see Table 7.4). In particular, the increase in dollar assets during the first nine months of 1985 (\$37.6 billion) amounted to 2.9 per cent. of the outstanding stock of these assets at end-September 1985 (see Table 7.5), and represented only 39 per cent. of the increase in banks' external assets (after adjustment for

exchange rate effects) over this period. BIS lending figures for some countries exclude on-balance-sheet holdings of securities, notably FRNs, but even under the extreme assumption that all the FRNs purchased by banks were denominated in dollars, the inclusion of the missing FRN data would not change the main thrust of this trend. Another indicator suggesting the increased use of non-dollar currencies in bank lending is the growing share of syndicated credits carrying multi-currency clauses. The proportion of new credits with such clauses has risen from roughly 3 per cent. in 1980-83 to 10 per cent. in 1984-85.

Table 7.3

Currency composition of international fixed rate¹ bond issues, 1981-85

Currency	1981	1982	1983	1984	1985	
					first half	second half
	in percentages					
US dollar	49	54	44	50	50	44
Swiss franc ..	23	20	25	17	12	15
Deutsche Mark	7	10	11	9	7	8
Yen	9	7	7	8	10	13
Sterling	4	3	4	5	4	2
Guilder	3	3	3	3	2	2
ECU	1	2	3	3	6	6
Other	4	1	3	5	9	10 ²
<i>Total (in billions of US dollars)...</i>	<i>36.2</i>	<i>59.1</i>	<i>56.8</i>	<i>74.0</i>	<i>49.3</i>	<i>58.3</i>

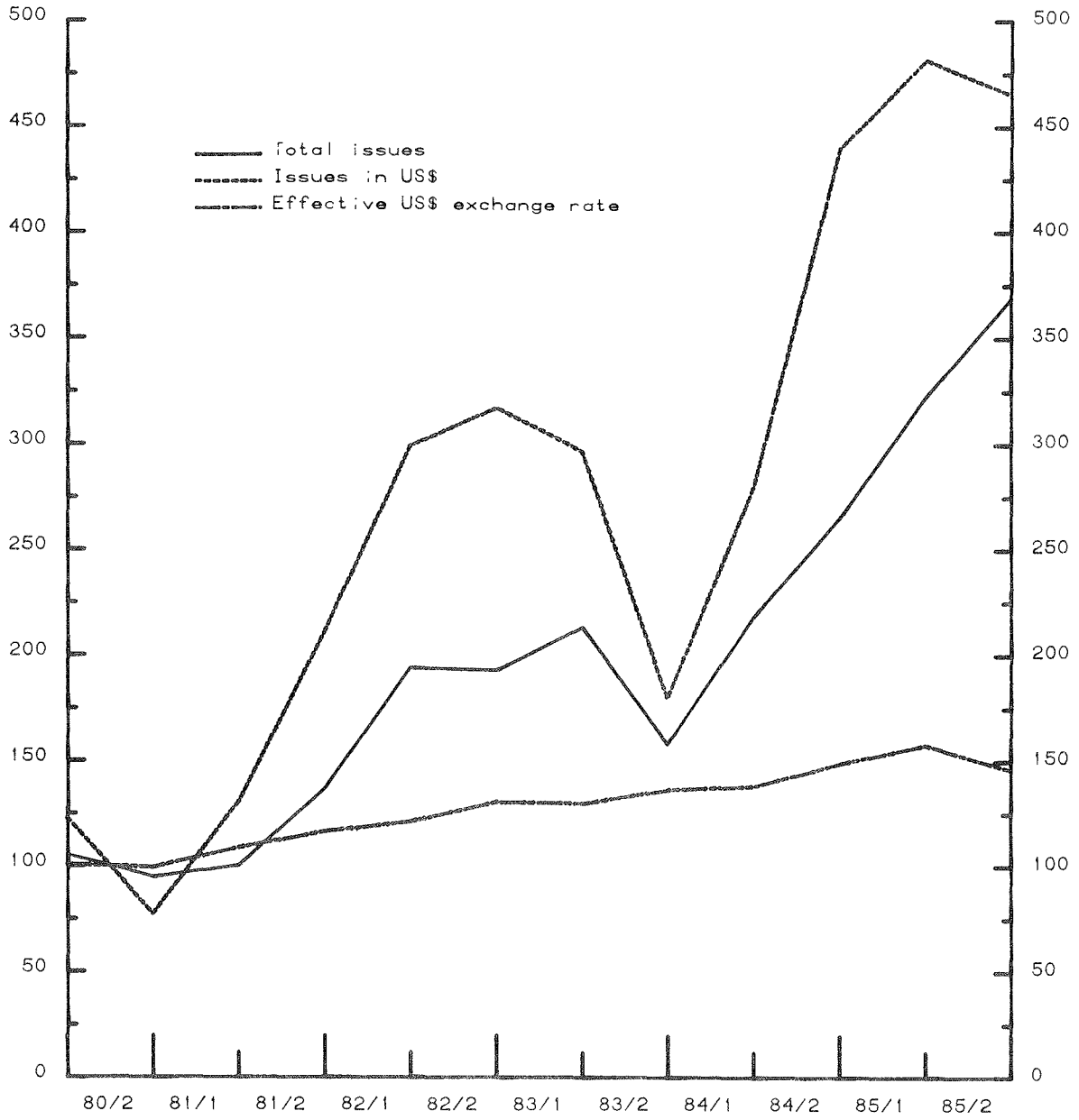
1 Including convertible bonds, warrants and zero coupons.

2 Including 4 per cent. in Australian dollars.

Source: Bank of England and own calculations.

Figure 7.1

Fixed rate international bond issues, 1980-85
(indices 1980=100)



Sources: Bank of England and IMF.

Table 7.4

Currency composition of new cross-border lending
by BIS reporting banks¹

(excluding exchange rate effects)

Currency	Percentage shares of assets out- standing at end-1980	1981	1982	1983	1984	1985 first nine months	Percentage shares of assets out- standing at end-September 1985
US dollar	67.9	192.0	130.4	65.8	40.1	37.6	73.9
Deutsche Mark ...	13.5	20.6	9.4	10.9	15.0	6.8	8.3
Swiss franc	6.1	13.8	6.6	5.1	4.6	9.0	4.3
Yen	2.1	11.8	5.5	6.4	18.3	16.7	3.9
Sterling	2.8	8.9	6.2	3.9	11.9	5.3	2.4
French franc	2.7	3.0	5.4	5.3	1.2	3.5	1.6
Guilder	1.4	4.0	3.2	3.9	1.3	0.7	1.1
ECU .....	..	..	..	..	13.1	8.4	1.3
Others and unallocated ²	3.5	9.9	13.8	4.7	14.2	9.9	3.2
Total (increase in billions of US dollars)	1,321.9	264.0	180.5	106.0	119.7	97.9	2,346.6

1 Includes bank lending in foreign and domestic currencies to non-residents, but not foreign currency positions vis-à-vis residents. Assets held by banks in non-industrial (i.e. offshore) reporting countries are treated as all being denominated in dollars.

2 Including foreign currency lending by banks in the United States for which no currency breakdown is available.

Source: Various issues of International Banking and Financial Market Developments, BIS.

With respect to both the capital markets and bank lending, the shift from dollar denomination has led to wide diversification of the currency composition of the assets of BIS-area reporting banks. Figures for the change in assets as a proportion of outstanding stocks during 1981, 1984 and 1985 (see Tables 7.4 and 7.5) point to a diversification away from the dollar, Deutsche Mark and Swiss francs towards yen, sterling and ECUs.

Table 7.5

Annual growth rate of cross-border claims of BIS reporting banks
(as a percentage of end-period stocks)

Currency	1981	1984	1985 nine months*
US dollar	17.3	2.4	2.9
Deutsche Mark..	11.8	9.5	4.8
Swiss franc ...	14.7	5.9	12.9
Yen	31.6	29.5	30.3
Sterling	23.2	28.6	13.7
French franc ..	9.6	4.3	14.1
Guilder	19.5	6.2	3.7
ECU	n.a.	72.8	48.3
Other	23.0	24.0	20.0

* Growth rate for nine-month period.

Source: BIS and own calculations.

Despite these trends, the dollar is likely to retain its dominant position in international financial markets for the foreseeable future. The degree of diversification thus far and continued volatility of exchange rates has prompted innovations to augment flexibility in borrowing. Lenders and borrowers seek to maintain an underlying base in their home or trading currency - which for many of course is the US dollar - while leaving themselves in a position to take advantage of expected movements in exchange rates. Innovations have been directed at creating a potential position in more than one currency which can be exercised at the discretion of borrowers and/or lenders. This may take the form of currency diversification within a portfolio of financial instruments, or it may involve attaching multiple-currency facilities to a single instrument.

Three approaches to currency diversification in the international financial markets can be identified:

- (i) the transfer of innovations developed in the dollar sector of the international financial markets to non-dollar borrowing. Examples of these are FRNs, zero coupon bond issues and NIFs;
- (ii) the construction by borrowers and investors of "hybrid packages" - bundling innovations, notably swaps and options facilities, into international financial-market transactions. For instance, borrowers can employ currency swaps in order to minimise the cost of funds or spread the currency basis of borrowing. In addition, dollar-based investors can use options facilities to construct packages which hedge the currency risks involved to create dual-currency facilities;
- (iii) a final alternative involves formalising these investor or borrower "packages", constructed outside the original transactions by employing swaps and options facilities, into the issuing instruments themselves to create multi-currency issues. Examples of these are dual-currency bonds and warrants employing currency options.

1. Innovation in non-dollar currency denominated instruments

The movement towards worldwide deregulation has created pressures on national authorities to open up currency sectors to new techniques. It is difficult to determine the degree to which domestic deregulation in non-dollar areas is a response to pressures for the adoption of new instruments developed in the dollar sectors, or instead a result of innovative activity in creating synthetic instruments by bundling together new techniques outside the control of authorities (outlined in Section B below). The use of currency swaps, for instance, has reduced the potential for existing national restrictions to control access to the currency sectors of capital and money markets (see Part II, Chapter 2).

(a) FRNs

The spread of floating rate notes to non-dollar currency sectors has been slow (see Table 7.6). This is in part a reflection of regulatory and other restraints placed on their use, notably in the Deutsche Mark, yen and French franc sectors. As a result, until recently sterling was the only currency other than the dollar to account for a significant proportion of the FRN market. During the second half of 1985, however, there was a marked increase in the share of new issues denominated in ECUs and Deutsche Mark.

Beginning 1st May 1985 borrowers were allowed to issue FRNs in the Deutsche Mark foreign bond sector and since 1st June 1985 Euro-yen FRN issues have been permitted. During the seven months after deregulation, only two Euro-yen FRNs have been issued. In the Deutsche Mark sector the trend has been erratic, with an initial burst of issues during May and June of 1985, followed by another spate of activity in November and December.

Table 7.6

Currency composition of floating rate note issues, 1980-85
(in percentages)

Currency	1980	1981	1982	1983	1984	1985	
						first half	second half
US dollar ...	93	94	98	94	92	92	80
Swiss franc..	4	2	1	1	1	1	-
Sterling	3	-	-	5	6	2	8
Other	-	4	1	-	1	5	12
<i>Total (in billions of US dollars)</i>	<i>4.71</i>	<i>7.88</i>	<i>12.57</i>	<i>15.28</i>	<i>34.06</i>	<i>31.27</i>	<i>24.04</i>

Source: Bank of England and own calculations.

(b) Zero coupon bonds

Table 7.7 shows the volume and currency composition of zero coupon bond issues in 1984-85. Until 1984 such issues were confined to the dollar bond markets. This partly reflects the opposition from tax authorities in places where existing capital gains taxes were low compared to taxation on the stream of coupon payments. In the sterling sector, zero coupon bonds were allowed to be issued only after an imputed tax system converting capital gains into an assumed income stream had been agreed upon. Public zero coupon issues in Euroyen and Deutsche Mark were deregulated at the same time as FRNs and had a similar response: a slow uptake in the former, and an initial burst in the latter which subsequently fell off.

Another innovation associated with the zero coupon formula has consisted of the repackaging of US Treasury bonds into "strips" - separating both the principal and each individual coupon into a zero coupon security. These instruments, known widely by their proprietary acronyms (CATS, TIGERS, STRIPS, etc.), were originally introduced in the United States in August 1982, and have spread slowly to other countries. So far zero coupon bonds based on government securities have been offered only in sterling.

(c) Partly-paid bonds

Partly-paid international bond issues are an exception to the general rule that innovation starts in the dollar sector. They have been used extensively in the UK gilt-edged government debt market since the late 1970s. Partly-paid issues appeal to investors who expect a fall in the exchange rate value of the foreign currency in which the lending is denominated, thereby reducing the cost in domestic currency of future payments. Investors are committed to paying one or more calls on the outstanding principal sum, usually more than 80 per cent. of the face amount, at predetermined dates. Partly-paid securities have been issued in only three currencies, the dollar, sterling and the Canadian dollar (Table 7.7). An increase in dollar issues during 1985 reflected growing expectations of a declining dollar exchange rate.

Table 7.7

Currency composition of zero coupon
and partly-paid bonds issued
in 1984 and 1985

Currency	Zero coupon	Partly-paid
US dollar	77	55
Deutsche Mark	5	-
Swiss franc ..	4	-
Yen	4	-
Sterling	8	44
ECU	2	-
Canadian dollar	-	1
<i>Total (in billions of US dollars) ..</i>	4.28	3.49

Source: Bank of England and own calculations.

(d) Note issuance facilities

Until the end of 1984 virtually all NIFs were in dollars. As the market has matured, interest has developed for a wider range of currencies.

The issue of short-term notes in sterling, Swiss francs, Deutsche Mark and yen - four of the most popular "alternative" currencies in the

international bond market - has not yet been permitted by the respective authorities. However, a number of facilities have been arranged in ECUs and it is fairly common for facilities to provide for the issue of notes in dollars and ECUs. A limited move to allow notes in sterling was made by the UK Government in March 1985, although only one to five-year maturities were permitted (longer than the usual maturities in the Euro-note market).

By the end of 1985 less than \$3 billion of NIFs denominated in non-dollar currencies had been arranged (only around 3 per cent. of total facilities outstanding). Drawings in non-dollar currencies probably accounted for only a small fraction of that total. In some currencies - notably Singapore dollars, Hong Kong dollars and Norwegian kroner - a small home-based short-term note market has developed as an offshoot of the commercial-paper market, with virtually all the facilities reserved for domestic borrowers. It is possible that the continued interest in non-dollar currencies, and in the NIF technique itself, may lead in due course to a multi-currency Euro-note market, especially if a fully-fledged Euro-commercial-paper market develops. Already, as a hedge against future developments and the freedom to issue in "alternative" currencies, a number of facilities have begun to provide for the issuance of notes in any major currency, as and when it becomes possible. As of early 1986, drawings in alternative currencies are often made possible by the inclusion of a multi-currency short-term advances option along with the note issuance option.

(e) Conclusion

The source of innovative instruments in the international financial markets has normally been the US dollar sector, reflecting in particular its size and the absence of regulations controlling the type of instruments issued (at least outside the United States).

The speed at which individual innovative instruments have spread outside the dollar-denominated sector has differed, reflecting the presence of national regulations and the suitability of a particular currency to the characteristics of the exchange rate expectations built into a particular innovation.

The scale of currency diversification in the major innovative instruments, notably floating rate notes, remains limited, particularly when compared with the share of non-dollar currencies in "straight" fixed rate bond issues.

2. Instruments created by bundling innovations together

The sustained volatility of foreign exchange rates in recent years has greatly increased interest by both investors and borrowers in diversification of portfolios across currencies. Such diversified portfolios can be constructed either by the outright purchase of securities in various currencies or the use of hedging instruments, such as currency options and futures. Borrowers have also been able to diversify the currency composition of liabilities by employing currency swaps. This may reflect a desire to match funds raised to final uses in an optimal fashion, to hedge currency exposures generated from normal business, to implement short-run asset/liability management strategies, or to speculate. Borrowers can also undertake swaps to avoid national regulations on access to financial markets (see Chapter 2).

(a) Currency hedges attached to international bond and FRN issues

Dollar instruments can be hedged into foreign currencies by combining, say, a non-dollar currency hedge with a US dollar-denominated bond issue. This objective has been achieved by "bundling" traditional debt instruments with currency options. With options non-bank customers can purchase tailored "insurance" to hedge exchange rate movements for the life of the original financial-market instrument purchased (see Chapter 3). More recently this strategy has been formalised into issuing instruments, notably dual-currency bonds and warrants facilities (see Section 3 below). In addition, dollar floating rate notes hedged into foreign currencies have created tradable money-market vehicles in currencies such as the Deutsche Mark and Swiss franc, where markets are less liquid.

(b) Swaps

The availability of currency swaps has given borrowers greater flexibility to raise funds in a market in which they enjoy relatively favourable terms and swap the proceeds into the currency which they need. As well as enabling borrowers to switch among well-established market sectors, this flexibility has resulted in a greater use of comparatively less actively traded currencies, notably Australian and New Zealand dollars. If the currency swap market continues to develop, the currency denomination of considerable capital-market activity may be determined less by borrowers' requirements than by the existence of profitable swap opportunities.

3. Innovations incorporating multi-currency facilities

The diversification of borrowing in the international financial markets out of dollar-denominated debt, which has proceeded more rapidly during 1985, has been complemented by an increased use of hedging facilities within instruments. In a hedged issue, the obligation arising from a publicly offered or privately placed debt facility denominated in one currency is exchanged for an obligation in a second currency. The play then revolves around the point at which the conversion or redemption exchange value is set. Two innovations have developed in the international bond market to facilitate hedging: dual-currency bonds and currency warrants.

(a) Dual-currency bonds

This innovation originated in the Deutsche Mark foreign bond market in the 1970s, was revived in the Swiss franc foreign bond market in 1981, and spread to other currency sectors, most notably yen, during 1985. The price and coupon carried by the bond are denominated in one currency, but the redemption value is set in a different currency, usually dollars, at a rate determined at the time of issue. This combination implies a forward break-even exchange rate. The investor is protected against a fall in the value of the redemption currency down to the break-even point, which has generally been 20-30 per cent. below current exchange values. \$3.3 billion of dual-currency bonds were issued in 1985 in Deutsche Mark, Swiss francs and yen and including a "reverse" dual-currency issue (denominated in dollars, but repayable in sterling). Yen issues made up 85 per cent of the total.

US borrowers, for instance, can issue a foreign currency bond, typically denominated in Swiss francs or yen, with a coupon lower than the

comparable Euro-dollar rate, without taking a currency risk on the principal repayment. Any exchange risk on the coupon payments can also be minimised by covering in the forward market. Investors outside the United States can also hedge their foreign currency receipts (coupon payments and principal redemption) in the forward market to create a high coupon issue redeemed at a discount. If the final redemption value were not hedged, then the return to the investor would depend on whether by the time of redemption the issue currency (usually US dollars) had depreciated more or less than was implied by the forward exchange rate.

Dual-currency issues are distinct from yen-linked dollar bonds, which have been offered from time to time in the international markets. These were yen bonds nominally denominated in US dollars, largely to overcome Japanese restrictions and withholding taxes formerly imposed on Euro-yen bonds. Coupon payments were in US dollars at a rate based on yen interest rates, and a single yen-dollar conversion rate was fixed for the lifetime of the bond.

Dual-currency issues differ from ordinary fixed rate international bonds in the degree to which the redemption exchange rate value rather than the coupon alone represents the major play between borrowers and investors. In addition, they represent an opportunity for currency swaps to be bundled into bond issues. Dual-currency bond issues pay below market interest rates for dollar liabilities, enabling the yen funds to be swapped for cheap dollars at or below yields on US Treasury bonds. The swap counterparties take on the redemption foreign exchange risk, and although they pay a relatively high yen coupon for the initial funds, they in effect speculate on the likelihood of cheap funding at maturity (usually in dollars).

A further refinement of the currency play involves indexed currency option notes (ICONS), where the redemption value is determined by the level of the dual-currency exchange rate at maturity rather than at issue. If the exchange value of the redemption currency (in the case of both issues so far the currency was yen) rises above the break-even point the principal repaid is reduced by a proportionate amount.

(b) Currency warrants

Detachable warrant facilities within financial instruments give holders the right to purchase additional issues from the borrower at a specified coupon and price. Similar option features have been incorporated into FRN offerings, notably through a series of capped FRNs issued during the third quarter of 1985 (see Chapter 5). So far issues have been made in three other currencies: Deutsche Mark, Swiss francs and guilders.

The currency composition of warrant facilities in the international bond market reflects the predominance of dollar-denominated issues up to the second half of 1984. Since then Swiss franc and Deutsche Mark warrant issues have been more prominent. In addition, there has been a growth of more complex instruments incorporating an option to purchase further bonds denominated in a different currency from the initial issue. So far, seven such issues have been recorded, all originally denominated in dollars, four involving options to convert into ECU bonds, one French franc, one Deutsche Mark and one sterling issue.

Dual-currency warrants were first issued in June 1984, and interest in these warrants increased sharply during the second half of 1985. In the case of ECU and Deutsche Mark warrants, a dollar investor receives a currency hedge without switching to lower-yield bond issues in either of the two currencies. The warrants are call options of longer duration than those normally traded on exchanges, and in this respect bridge the gap between the money and capital markets. It is also significant that ECU warrants accounted for the majority of issues. This can perhaps be explained by the absence until recently of exchange-traded ECU options; in this respect warrants are an example of a capital-market instrument providing a bundling which is not otherwise possible.

4. Conclusions

The long-run trend towards diversification out of a dollar base in the international financial markets seems to have been limited. In the bond markets, an increasing volume of non-dollar issuing activity was evident during the second and third quarters of 1985. This coincided with deregulatory measures in a number of important currency sectors, notably yen and Deutsche Mark, and expectations of a fall in the exchange value of the dollar. Even in these sectors, when innovatory instruments have been allowed, the rate of uptake has so far been slow. Moreover, these developments may prove to be only a temporary feature of an environment where the exchange value of the dollar is expected to decline.

Swaps have provided an important facility for borrowers to broaden the range of currencies in which funds can be raised. Currencies such as the Australian dollar have expanded their share in international borrowing as a result of swap transactions. The hedging features built into options and warrant packages have also allowed investors to minimise currency risks without altering the denomination of issue. However, the absence of data on the volume of swaps and options facilities attached to transactions in the international financial markets prevents any clear conclusions being drawn on their overall importance.

Bonds and FRNs have overtaken syndicated credits as the major instruments used in international financial markets. Multi-currency features developed within the syndicated credits market over a period of ten years reaching a peak in 1980-82. The growth of the NIF market has provided some substitute multi-currency facilities. A further development which has permitted diversification via currency-switching is the provision within some rescheduling agreements allowing banks to switch their loans from dollars to home-country currencies.

However, the overall growth of the bond and FRN markets at the expense of the syndicated loan market has reduced the volume of financing which incorporates a direct multi-currency feature. It is in this field that swaps may well be a central feature in achieving currency diversification within international bond markets.

Part IV

The causes of financial innovation

This part of the report analyses the economics of the process of financial innovation. Understanding the determinants of that process is a more complex problem than understanding what factors cause the emergence of some particular new instrument. The innovation process has produced many new instruments in a particular historical sequence. An ideal theory of the process should explain how changes in general economic conditions created specific profit opportunities for new instruments to emerge. It should explain all innovations and the order in which they arose and should relate to a wide range of historical experience. There is no accepted theory of innovations that meets all of these criteria.

A major impediment to theoretical advance is the necessarily imprecise nature of the concept of financial innovations. It is certainly possible to describe the innovation process in very general terms. Any financial instrument can be viewed as a combination of characteristics - yield, price risk, credit risk, country risk, liquidity, marketability, pricing conventions, size, duration and so forth. Financial innovation, then, can be seen as the process of unbundling and repackaging these characteristics to create new instruments. Real problems, however, show up when an attempt is made to go beyond this very general formulation. One basic difficulty is that observers often disagree whether a particular instrument is a truly new bundle of characteristics. But even when observers agree on that point, they may disagree about what an innovation does. This snag arises from the nature of the basic characteristics of financial instruments. Some - yield or size, for example - are directly observed and easily compared. Others, such as liquidity, are not. Until this measurement problem is overcome so that observers can agree on how the characteristics of innovations match up against those of existing instruments, a fully-fledged theory of the innovation process is unlikely to emerge.

Analysis of innovation, then, must rely on more or less ad hoc frameworks that abandon some parts of the ambitious full theoretical agenda. These frameworks still provide a great deal of insight into the process. In fact, there is rather wide agreement on the major economic and financial forces that have generated innovations, at least in recent years. Volatile asset prices, technological change, increased global integration of financial markets, greater financial competition, and the asset quality and capitalisation problems of commercial banks are commonly cited as important factors. The principal goal of this part of the Report is to provide a framework that relates these macro-economic and financial developments to the emergence of innovations in recent years.

Chapter 8

The demand for innovations

A. An analytical framework

Central to developing an economics of the innovation process is a taxonomy, or classification system, for financial innovations. A taxonomy establishes the important characteristics or functions of innovations. The demand for new instruments derives from the underlying demands for those characteristics or functions. The economics of the innovation process, then, can be expressed as propositions that relate the demand for those characteristics or functions to events in the global macro-economy. This is the essence of a demand-driven view of the innovation process.

A major shortcoming of this approach, however, is that a unique taxonomy cannot be derived from any generally accepted economic principles. But the substance of any analysis depends on the taxonomy used, since this creates a kind of reference system for the discussion of the economic forces at work. The best guiding principle is to try to find something that "works".

A useful classification scheme for financial innovations is one based on the type of financial intermediation function performed. The reference system employed here highlights three broad functions. Firstly, a financial sector provides a mechanism for economic agents to transfer risk among themselves. Secondly, a financial sector provides liquidity to the economy. Liquidity is taken in a broad sense, encompassing not just money-like deposit instruments but the marketability and transferability of claims generally. Finally, a financial sector provides claims on the revenues of economic agents; these claims are of two distinct types: debt obligations and equity shares.

These functional distinctions lead to the following classification of financial innovations:

- (i) risk-transferring innovations;
- (ii) liquidity-enhancing innovations;
- (iii) credit-generating (or debt-generating) innovations;
- (iv) equity-generating innovations.

Risk-transferring innovations are new instruments or techniques that allow economic agents to transfer among themselves the price or credit risks inherent in financial positions. Liquidity-enhancing innovations in general increase the "moneyness" or the negotiability or transferability of existing financial instruments or represent new instruments with enhanced liquidity properties.* Credit-generating innovations are those which broaden the access

* Innovations that enhance the liquidity available to non-financial agents may reduce the liquidity of financial intermediaries, but this is not a necessary condition. Liquidity-contracting innovations that reduce the liquidity available to non-financial agents, while not an outright contradiction, hardly offer a profit opportunity to providers.

of economic agents to credit supplies. These may result in a general increase in the volume of all credit or they may result in a shift from traditional credit channels for some agents - say, bank borrowings - to non-traditional channels - say, the capital markets. Equity-generating innovations broaden the access of economic agents to equity finance. Some innovations may result in an observed greater leveraging in the economy, i.e. a greater reliance on debt relative to equity, that has as a consequence an actual contraction of equity positions.

This framework, like any framework for the classification of financial novelties, cannot capture the full richness of the process of financial innovation. But it does provide a workable reference system for recent innovations that focuses on the macro-financial consequences of innovation that are of the most interest. Table 8.1 presents in matrix form a list of selected innovations ordered by this classification structure and distinguishes whether their use has direct balance-sheet implications or not. This list emphasises the major innovations of the past decade.

Table 8.1

A classification of innovations by financial intermediation function

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

Some particular innovations cannot be clearly slotted into only one function: they perform multiple functions. Certain classifications may need some clarification. Classifying options, swaps and forward rate agreements - three of the innovations analysed in depth in this study - as price-risk-transferring, off-balance-sheet innovations is hardly controversial. The classification of NIFs is more difficult. For example, a NIF has option-like price-risk-transferring features: the issuer can "call" on the underwriter to provide funds if the issuer's spread above the base rate exceeds some "strike" level. A NIF has some aspects of credit risk transference. The noteholder can shift credit risk to the underwriter at the roll-over date, although the inclusion of material adverse change clauses makes this feature very obscure when the issuer is in difficulty. But a central feature of the NIF is that it enhances the perceived liquidity of all parties involved. The issuer perceives secure funding over the tenor of the facility. The noteholder perceives a short-term liquid asset. The underwriter perceives only a contingent exposure. Not all of these perceptions can be simultaneously fulfilled under all circumstances: specifically, the underwriter's contingency may be realised. But under normal circumstances the NIF arrangement appears to squeeze some additional liquidity into the financial sector.

The position of credit-enhancing guarantees on securities as a liquidity enhancement may also appear somewhat mysterious. But these arrangements are rather distinct in their purpose from basic standby letters of credit, which are a clear-cut credit risk transference. A representative set-up may involve an AAA-rated insurance company writing a guarantee on a securities issue that is also supported by letters of credit from AA-rated banks. But the banks, not the insurance company, carry the actual contingent credit exposure. In fact, the arrangement can be structured so that the securities holders have recourse directly to the banks in the event of a performance failure and the insurance company need not get involved. Hence, an effect of inserting the insurance company's guarantee is to allow the paper to trade as if it has AAA backing. This makes it accessible to a wider range of portfolios and improves the liquidity of the instrument.

Zero coupon bonds are listed as credit-generating innovations. Compared to a conventional bond of the same maturity, this instrument has both a greater price risk - because its market value fluctuates more widely with changes in interest rates - and a greater credit risk - because all cash payments are postponed until the maturity date. Both of these effects limit the attractiveness of zero coupon bonds, but the benefits of the instrument have outweighed its drawbacks. These bonds are particularly appealing to investors following a buy-and-hold strategy who wish to avoid the reinvestment risk on coupon payments. Demand for zeros has also been driven by liberal tax rules in some countries, notably Japan, which allow the accretions in value over time in the instrument to be taxed at capital gains rates. The issuer sacrifices some value of gross proceeds per unit of face value but can achieve a lower all-in borrowing cost by offering an instrument tailored to the needs of certain investors. An innovation whose principal effect is to achieve a lower all-in cost of borrowing is usually classified as credit-generating.

This effect is also achieved by liability-based interest rate swaps. The rôle of swaps as a risk transference mechanism is straightforward. But the chief motivation for the classic debt-based swaps that created the interest rate swap market was to reduce all-in borrowing costs to the counterparties at each end of the swap chain. This consequence has an unambiguous effect on the demand for credit generally.

B. The economics of the demand for innovations

1. The basic propositions

The basic propositions of a demand-driven theory of financial innovations can now be stated rather simply.

- (i) Price-risk-transferring innovations are more likely to emerge the greater the perceptions of vulnerability of existing financial positions to the risk of asset price changes;
- (ii) credit-risk-transferring innovations are more likely to emerge the greater the perceptions of vulnerability of existing financial positions to deteriorations in creditworthiness;
- (iii) liquidity-enhancing innovations are more likely the greater the demand for liquidity in the economy;
- (iv) credit-generating innovations are more likely the stronger the demand for credit generally or the stronger the demand for broad sub-classes of credit, such as bond finance; and
- (v) equity-generating innovations are more likely the stronger the demand for equity finance.

2. The underlying forces

The 1980s have witnessed a rash of financial innovations in both domestic and international markets. The forces accounting for the emergence of these new instruments differ among the types of innovations considered. Both market forces - in financial markets and in the global economy generally - and government actions - whether macro-economic policies or financial regulations - have played a rôle.

(a) Price-risk-transferring innovations

The most prominent elements of the new wave of financial innovations are of a price-risk-transferring nature. Demand for these arose from perceptions of increased vulnerability of financial positions to asset price risk. All observers agree that the principal force behind such perceptions has been the increased volatility of asset prices, in particular exchange rates and interest rates. The volatility of these prices has increased over both the short terms - a day or a week - relevant to trading considerations and over the longer terms - a business or credit cycle - relevant to economic considerations.

The process of inflation itself, which proceeds unevenly, both over time and among countries, has also certainly played a rôle. But it is quite interesting to note that the most widespread of price-risk-transferring innovations are those that transfer asset price risk, not inflation risk. There have been some examples of the latter:

- (i) the issues of explicitly indexed UK and Italian government debt;
- (ii) assorted Euro-bonds linked to certain commodity prices - gold, silver, oil - that might serve as general inflation proxies; and
- (iii) a futures contract offered on the US consumer price index.

Overall, however, inflation-indexed financial instruments have not achieved the dramatic growth in use of financial futures, forwards, options and swap instruments.

One straightforward reason for this outcome is that inflation-indexed financial instruments have often been discouraged, and sometimes prohibited, by government authorities in a number of countries. Another reason is that it is technically easier to transfer inflation risk through financial instruments using asset prices than directly. Inflation-linked instruments use either a proxy price for general inflation or a constructed index. Prices of financial assets are no worse an inflation proxy, and probably a better one, than prices of individual commodities such as gold. Constructed indices of inflation are usually observable only once a month upon official release. In between release dates market participants would have little reliable information on underlying prices. This can have a dampening effect on the tradability of the instrument. All of the derivative instruments in this category of innovations are constructed on the basis of an underlying instrument whose market price is continuously observable.

But there is an important economic reason why the successful price-risk-transferring innovations are largely based on asset prices: inflation is not the only, or even the major, cause of their emergence. The volatility of real exchange rates and real interest rates has also risen significantly. There are a number of reasons why this has happened.

Firstly, policy régimes have changed in ways that permit much more movement in asset prices. For exchange rates, the Bretton Woods arrangements have been superseded by a general acceptance of floating rates. For interest rates, the widespread acceptance of monetary aggregates as the intermediate policy targets (whether adhered to rigidly or selectively) has increased the scope for price fluctuations. Secondly, the removal of interest rate ceilings applied to banking institutions has meant that in periods of monetary stringency the effects of tight policy have worked mostly through the price mechanism of higher interest rates and less through the quantity mechanism of reduced credit availabilities. So interest rates have fluctuated more during times of tight money than they did in the past.

Regulatory changes also contributed directly to the demand for price-risk-transferring innovations. The elimination of deposit rate controls threw some financial intermediaries, particularly thrift institutions, into a severe structural balance-sheet mismatch. They were then motivated to innovate floating rate instruments on their asset side and to utilise other innovations - futures, options, swaps, etc. - to hedge their price exposure.

(b) Credit-risk-transferring innovations

Demand for credit-risk-transferring innovations arose from perceptions of increased vulnerability of existing financial positions to

deteriorations in creditworthiness. It is important to stress that these were perceptions of abnormally large deteriorations: a range of credit problems associated with a normal business cycle would not generally be a spur to innovations. However, two factors can be cited to suggest that credit risks in recent years have been acute.

The first of these was the collapse of the energy sector boom. The relatively abrupt swing from conditions of excess demand in the oil markets to excess supply was chiefly a consequence of general energy conservation, greater use of non-oil fuels and expanded petroleum supplies. The second factor was the LDC debt crisis, which affected the creditworthiness of large segments of international claims. Neither of these developments was completely independent of the state of global aggregate demand. But to characterise them as just direct consequences of recession is a misleading exaggeration. Both the end of the energy sector boom and the LDC debt crisis had independent impacts on perceptions of creditworthiness. While they are both sectoral financial problems, the sectors here are so large and so widespread internationally that they have generated serious and pervasive credit problems on their own account.

The confluence around mid-1982 of the problems in the energy sector and the LDC debt crisis with the financial strains brought on by a fairly severe recession in large parts of the industrial world produced a new level of risk. The creditworthiness of many large international banks that were principal lenders to all classes of weakened credits was called into question. The most dramatic manifestation of these concerns was the "run" on Continental Illinois Bank in the spring of 1984.

Broad worries about credit problems spurred the development of innovations to transfer these risks. Banks became engaged in swapping problem credits to diversify extreme exposures. With investors worldwide somewhat more wary about putting their money in banks - and, therefore, somewhat more willing to hold the direct obligations of non-banks - a shift toward capital-market instruments emerged. Banks themselves sought to benefit from the trend by generating loans and selling them off, either directly or packaged as securities, or by expanding their rôle as guarantors of capital-market instruments.

(c) Liquidity-enhancing innovations

Innovations to enhance liquidity arose from increased demand for liquidity generally. The first generation of these innovations occurred in the late 1970s and has been extensively analysed. In general, it involved new techniques for providing transactions liquidity as high interest rates greatly increased the opportunity costs of holding transactions liquidity in traditional forms. Cash management programmes, money-market mutual funds and new types of negotiable deposit accounts all played this rôle. The most recent liquidity enhancements are geared to improving the liquidity of capital-market-type instruments.

Two factors other than the higher opportunity cost of traditional transactions vehicles account for increased demand for liquidity. The first is the greater worry about the creditworthiness of banks. This caused a shift of investor preference away from deposits to capital-market instruments, generally less liquid vehicles (after all, in normal conditions deposit instruments convert back into cash at full face value at notice, if not on

demand). This loss of liquidity, then, created a demand for innovations that would seek to restore it.

A second factor is increased leveraging, which has been an especially prominent force in the United States. Household debt/income ratios and corporate debt/equity ratios have increased. Furthermore, the perceived burden of these debt structures may have risen in an environment of subdued inflation. An increased demand for precautionary liquidity in the face of greater debt burdens is not unreasonable.

(d) Credit-generating innovations

Credit-generating innovations appear to work in two ways. The first concerns innovations that mobilise dormant assets to support new borrowings. One example here is leveraged buy-out financing, basically supported by the future expected cash flows of the firm. Another is the so-called equity access account, which basically allows homeowners to draw against a line of credit supported by the appreciated value of their houses. This is a substantially more convenient borrowing vehicle than a junior mortgage. Increased borrowing by households against the appreciated values of homes through a variety of financing vehicles has been significant in both the United States and the United Kingdom in recent years.

The second way in which credit-generating innovations work is to tap new sources of credit. This may be done directly, as in the case of so-called junk bonds, or indirectly, for example, through liability-based interest rate swaps.

Increased demands for credit generally or for broad subclasses of credit are a driving force behind credit-generating innovations. In recent years such demands have been particularly pronounced in US markets, where financial innovation has been most advanced. One important factor has been the burgeoning credit demands of the US Government. Because the US Treasury is the best name in the markets, increases in its supply of debt in the first instance displace other borrowers from access to credit supplies under traditional borrowing vehicles. Debt-financed fiscal expansions, of course, have the well-known macro-economic effect of raising the level of interest rates, thereby inducing additional credit supplies and reductions in non-government credit demands. For the innovation process, however, the point is that private borrowers will not passively accept such "crowding-out" but will look for new borrowing vehicles that create new access to credit. Potential crowding-out, then, spurs the development of credit-generating innovations.

A second force at work relates to broad demographic trends. The large number of people born in the years following the war have matured into the prime age group for family formation and acquisition of houses. As a consequence of this bulge, the population on average has a structurally high demand for mortgage credit to finance house purchases and for personal credit generally to finance associated purchases of consumer durables. This has produced a longer-term background force creating high general credit demands, which may have been at its strongest in recent years.

Corporate financial activity in recent years has moved aggressively in the direction of increased leveraging. This trend appears to be highly developed only in the United States, but the credit demands generated by US

corporations have had broad effects in international markets. A dynamic force behind this leveraging appears to be perceptions by potential take-over investors of the US stock market's undervaluation of many firms. The debt financing of actual mergers and acquisitions has been one result. But even the potential threat of a hostile take-over has driven existing managements to defend themselves by leveraging up through increased debt issuance and buy-backs of existing equity. This entire process of corporate leveraging - driven frequently by the threat of hostile take-over - has added another element to increased credit demand.

A final set of factors behind credit-generating innovations concerns forces producing broad shifts in the pattern of credit demand rather than overall increases. Three processes have been important:

(i) As already cited, concerns about bank creditworthiness prompted investors to shift their preferences towards the capital markets. This created opportunities for companies to tap into new pockets of investor preferences through innovatively structured securities issues. The list of Euro-bond issues with detachable warrants or detachable rate caps or dual-currency interest and principal structures or other assorted options is extensive.

(ii) In recent years a number of prominent, well-regarded companies - chiefly, but not exclusively, in the United States - have broadened their access to sources of credit, particularly in international markets. For short-term finance they relied increasingly on the commercial-paper markets. Beginning in late 1981, they started to utilise the Euro-bond market actively as an integral part of their financing plans. This process was promoted by the maturing of a liquid secondary market in Euro-bonds, which in turn supported sizable primary issues. These companies had had potential access to the international capital markets for some time previously. They did not fully utilise it until significant cost advantages had been combined with the scope to make large issues.

As top-name companies broadened their access to such sources of finance, lesser-known companies who were to some extent in competition with them for business were put at a potential disadvantage. The risk faced by these lesser-known companies - being relatively more dependent on traditional sources of finance, particularly bank borrowings - was that during some future period of monetary stringency the quantity of credit available to them might be limited, while their competitors still retained access to funds in a broader range of markets. In such conditions of uneven credit allocation, the market shares of their own business would be at risk, since the scale of their operations would be limited by the scale of available finance. This potential problem created demand among a broad range of companies for innovations that would widen their access to new sources of credit.

(iii) The uneven pace of financial liberalisation and deregulation in different national markets created complex arbitrage opportunities that were bridged by new instruments. Some classes of borrowers might have ready access to certain types of funds in particular markets, but no particular needs for such funds for their own use. Other borrowers elsewhere with restricted access had a desire for such types of funding. Conditions such as these were a common setting for complicated swap deals involving multiple-currency features. Different tax treatments of new instruments - for example, relatively liberal Japanese treatment of accrued interest on zero coupon bonds until end-1985 - also promoted the development and diffusion of financial innovations.

(e) Equity-generating innovations

Equity-generating innovations have been relatively limited in number in recent years compared to other types of innovations. Two examples are noteworthy. One is variable rate preferred stock, which is structured to pay a dividend that varies with market interest rates. This tends to preserve the asset value of the equity from fluctuations and enhances its liquidity and tradability. Variable rate preferred stock is a financing device that has been used principally in the United States. Perpetual floating rate notes, which have similar features, have also been used, especially by banks in the United Kingdom, as a means of raising primary capital. A second notable innovation is the mandatory convertible debenture, a debt instrument that must convert to equity in a definite time period.

Commercial banks have made extensive use of both of these new instruments. This is clearly a consequence of regulators' demands for increased capitalisation in banking. It is probably fair to say that those demands have been the dominant force behind equity-generating innovations. The demands of non-bank companies for equity finance have, on balance, been relatively limited in recent years, except during brief periods of strong bull markets.

Chapter 9

Determinants of supply of financial innovations

Chapter 8 analysed factors contributing to demand for financial innovations. The concept of demand used there differs from that employed in price theory - that is, a well-defined trade-off between the price and quantity of a specific commodity. The demand for innovations does not apply to any specific new instruments: rather, it refers to the desires of economic agents for new vehicles in general that perform certain financial functions. In price theory, a supply schedule defines the other side of a market. Analogously, there is a supply side to the process of financial innovation. It refers to the willingness of financial institutions to provide, or make a market in, new instruments.

It is very difficult to determine when the supply side is the binding constraint on the innovation process because there is nothing to observe. Even if the latent demand for certain types of innovation has increased, it may not be realised if the costs and difficulties of providing such innovations remain too high for financial institutions. A phenomenon such as this may be behind the paucity of inflation-indexed securities. As noted in Chapter 8, there are certainly good reasons to believe that in the inflationary environment of the past decade potential demand for indexed instruments has developed.

It is easier, however, to identify important forces that have increased the willingness to supply those financial innovations that have emerged in recent years. Four broad factors seem particularly important: technology; regulatory factors, notably pressures for increased capitalisation in banking; greater competition in the financial sector; and the historical dynamics of the financial innovation process itself.

A. The rôle of technology

Technological advances in telecommunications, information processing and computing are universally agreed to be a major factor underlying the growth of financial innovations. Technology has worked in three major ways to bring this about.

(a) Firstly, the greatly reduced costs and expanded scope of telecommunications have created a global financial market. This has allowed providers of innovations to match up end-users, either directly or indirectly, who were previously in isolated markets. It has also given greater breadth and depth to trading, thereby encouraging financial institutions to make markets in new instruments.

(b) Secondly, improvements in computing and information processing have made it possible for market-makers to design and price on a continuing basis new instruments with relatively complex financial structures. These improvements have also allowed market-makers to monitor almost continuously the exposures they have generated from running books in the new instruments and to design and carry out complex hedges for those exposures. A willingness to

supply innovations has not therefore been constrained by an inability to monitor and control exposures resulting from making markets, even in complex instruments.

(c) Thirdly, improved information flows have probably contributed to reduced earnings and more competitive pricing structures in traditional areas of business, thereby encouraging financial institutions to pursue more innovative lines. Widespread diffusion of rate screens, for example, has significantly reduced the search costs to market participants of finding the best prevailing market price. This reduction in search costs has cut into the margins of market-makers involved in trading traditional products. As a result, financial firms have been more inclined to provide innovative, customised products that, at least in the initial stages, would trade at wider margins.

B. Regulatory pressures for increased capitalisation

One of the very important consequences of recent deteriorations in the quality of banking system credits has been the increased pressure by banking regulators for a stronger capital structure in banking. This pressure, whether appearing as formal regulations or less formal suasion, has been widespread internationally. In general, banks have been required or encouraged to operate with a lower gearing ratio, that is, a lower ratio of balance-sheet assets to capital. At the same time, the costs to many banks of raising new capital were high, in large part as a very consequence of the asset quality problems that prompted the regulators' demands for enhanced capitalisation. Quite naturally, these conditions combined to push banks in the direction of earning revenues through off-balance-sheet activity that did not tie up capital.

All of this contributed to the evolution of financial innovations. The major innovations examined in depth in this Report - swaps, options, NIFs and forward rate agreements - largely entail off-balance-sheet activities of commercial banks. Banks also found innovative uses for more traditional off-balance-sheet vehicles, such as standby letters of credit and loan guarantees. US banks in particular devised new techniques to increase the earnings generated from balance-sheet exposures that were subject to capital requirements. These included expanded asset sales programmes and securitisation of assets, which allowed banks to turn over their asset positions more frequently, thereby increasing the loan origination and sales fees components of earnings per dollar of capital required against balance-sheet exposure.

It would be a mistake, however, to view such capitalisation pressures as the primary cause of the recent wave of innovations generally. Commercial banks are important providers of these new instruments, but not exclusive providers. For many of these instruments - options and swaps are good examples - the profit opportunities created by the demands of end-users were the primary force. It is likely that markets for such instruments would have developed even with a smaller involvement of commercial banks as providers.

While the markets would probably have developed, it is unlikely, however, that they would have flourished to the same degree without a prominent involvement by banks. Interest rate swaps may be taken as an example. Both investment banks and commercial banks lay claim to inventing this instrument.

It is clear, however, that commercial banks took the lead in acting as true market-makers by being willing to run an open position on uncollateralised swaps. This was probably the single most important development in the evolution of the swap market. Had it not occurred, the swaps market might have evolved in the direction of a collateralised instrument traded on an exchange with a different mix of participants. In any case, the capitalisation pressures that encouraged the active involvement of commercial banks in off-balance-sheet innovations certainly affected the evolution, if not the emergence, of new instruments.

Finally, it is worth noting that at least one class of innovations - recent forms of asset sales and asset securitisation without recourse - is driven primarily by capitalisation pressures. While this activity was supported by the greater willingness of non-bank investors to hold direct claims, it was initiated by commercial banks feeling the pressures of capital constraints.

C. Increased financial competition

Increased competition has also contributed to the willingness of financial institutions to supply new instruments. This competition has come in two forms: that between different national financial systems and that between banks and non-bank financial institutions within national financial systems. Both of these tendencies have been supported by a global regulatory environment that has become increasingly sympathetic to deregulation and liberalisation.

Technological advances have played a rôle here, too. Telecommunications equipment and computers are technologies commonly available to all enterprises, regardless of their business traditions. These technologies level the field of financial competition. They allow any company from any business tradition to generate and control offers of generic versions of financial services - loans, deposits, credit cards and insurance are all important examples - to the company's existing customer base. This gives rise to the concept of the "financial supermarket". Efforts to implement this supermarket strategy have led to intense competition in exploiting customer bases. Any company with a large existing customer base, such as a merchandise retailer, is at an immediate advantage in this competition, even if it has no tradition of financial services.

As this competition narrowed returns on generic financial services, financial institutions moved in two directions in response. Some concentrated on providing customised services, becoming "boutiques" that sought to profit from exploiting relatively limited niches. Others sought to innovate new products and generate new business. Such trends were also at work in international competition, although this was played out much more at the level of generic wholesale, rather than retail, financial services.

Finally, greater competition is a reflection of the stronger entrepreneurial attitudes in finance. A number of firms pursue as a goal of corporate strategy an aggressive programme of expansion with a national, or even global, reach. In part, these attitudes may have been transplanted by managements of non-financial companies diversifying into the financial services sector.

In sum, increased competition has made financial institutions more willing to make markets in new instruments and to do so on terms favourable to potential end-users.

D. The historical dynamics of innovation

A last factor to cite behind the supply of innovations is the historical dynamics of the innovation process itself. New innovations are based on older ones. Swaps, options, forward rate agreements, NIFs, asset sales and the like represent a new wave of innovations. These instruments followed earlier ones that have now become more traditional, such as futures, letters of credit, floating rate notes, RPs and so on. Some elements of the new wave would not have had active market-makers if previous innovations had not been established.

Exchange-traded options provide an illustration. The most successful of these are written on futures contracts rather than on primary securities. The futures markets generally provide a more liquid market in an underlying instrument for the options. This shows that the development of the options markets was clearly supported by the previous establishment of futures markets.

Futures and RPs also provide convenient hedges to market-makers for covering open positions in options or swaps. Without the development of these markets, hedging the new instruments would have been more difficult and the supply of the recent wave of innovations would have been more limited. This explicitly evolutionary character of the process of financial innovation has been, and should continue to be, an important element in the emergence of specific new instruments.

E. Is innovation here to stay?

To what extent does the dramatic growth of markets in new financial instruments represent long-lasting features of the innovation process and to what extent are the factors behind rapid change temporary and reversible? The analysis in the previous sections of the economic and financial conditions that generated innovations suggests that the pace of change in recent years was to an important extent the consequence of exceptional dislocations. Certainly, high volatility of asset prices and sharp changes in the creditworthiness of large economic sectors were major causes of innovation. An environment of more balanced growth with price stability would reduce many of the incentives for financial innovation.

There are, however, powerful long-lasting forces that support the growth and development of innovations even in a stable environment. Technological advance, both in its "hardware" aspects - computer and communications systems - and in its "software" aspects - sophisticated financial models and financial product designs, is a major long-term determinant. But even beyond technology, two other broad forces - the global integration of financial markets and the institutionalisation of financial innovation - deserve particular attention.

The global integration of financial markets and that of financial innovation can be viewed as conceptually distinct processes but they are very

closely intertwined. Both are driven in part by similar technological changes, and they build on each other. The integration of national financial markets has many aspects: round-the-clock markets in many financial instruments with institutions based in different countries participating in many national markets; highly mobile international capital flows; expanded international asset diversification by institutional investors in different countries. These and other aspects of global financial integration created profit opportunities that might be described as the substructure of financial innovation. Instruments such as NIFs and swaps arose to exploit those opportunities. But as the new instrument markets developed, they themselves provided additional avenues of financial integration. New Euro-bond issues that are combined up front with complex multiple-currency swaps and credit enhancements are an illustrative example of the interactions. So the two processes have worked in a mutually reinforcing way.

Financial integration is affecting the diffusion of new instruments as well as their development. Financial innovation is most advanced in the US markets and in the major Euro-markets that operate at the interfaces of national financial systems. As the new instruments developed there became successful, pressures arose for financial liberalisation in the domestic financial markets in Europe and Japan. The moves by the financial authorities in the national markets toward increased liberalisation can be seen as an aspect of the diffusion of innovations generated by the global integration of markets.

The integration of national financial markets is related to, and supported by, the broader force of the global integration of overall economic structures. These linkages through increased trade, investment and travel are a long-lasting process, working not only among the industrial nations but between them and the rest of the world as well. So, closer economic integration leads to greater financial integration, which, in turn, creates opportunities for new instruments to emerge. These connections then provide a fundamental, more permanent, support for the process of financial innovation.

A second important development affecting the character of financial innovations is the institutionalisation of the process at the level of the firm. A cornerstone of the economics of technological innovations - the so-called R & D relation - holds that there is at least a stochastic relationship between the "output" of the innovation process, however it is measured, and the amount of resources committed to the process, measured, say, as real research and development expenditures. It is extremely interesting to note, however, that no R & D relation, or anything similar, plays a rôle in the analytical literature on the process of financial innovation.

The reason for this discrepancy appears to be that the existence of an R & D relation presumes a definite institutional structure for the innovation process at the level of the firm. Quite generally, for technological innovations this structure may be thought of as the industrial research laboratory, which has existed for over a century. No such institutional structure for financial innovations has existed until very recently. But in the past few years a number of the major international financial institutions, both investment and commercial banks, have established within their organisational structures "new products" or "product development" groups. These can be viewed as the financial equivalent of the industrial research laboratory.

If the institutionalisation of financial innovations endures, it may change the nature of the economics of future innovation. Once a kind of R & D relation is established at the level of the firm as part of its organisational structure, the pace of future financial innovations may become chiefly a function of the quantity and quality of resources committed to product development. In other words, future financial innovations may be generated by a dynamic that works quite independently of the kinds of developments in the economy that generated innovations in the past. New instruments may be developed to exploit not just a few major profit opportunities but a large number of minor ones.

It is premature to assert that such a stage has already been reached. But even the prospect raises concern for policy-makers. If a more or less steady stream of innovations becomes a permanent feature of the financial environment, policy-makers may have to shift the emphasis of their thinking from particular instruments to the process of financial innovation itself. Policy structures have adapted to institutionalised technical change. Testing and review procedures on new products are required to ensure that standards of public health and safety are not jeopardised. Similar procedures may be needed for complex new financial instruments prior to their widespread availability to ensure that the safety and soundness of the financial system is not weakened. Also, legal concerns regarding patent and copyright protections for new instruments may become a more prominent issue as firms that made significant commitments to the development of new products seek to protect returns on those commitments.*

In summary, even in a more stable economic and financial environment than has prevailed in recent years, strong forces - technology, global integration and the institutionalisation of financial innovation - will work to support the continued development of new products.

* Such concerns are not exactly unknown already. In August 1980 Merrill Lynch filed for a patent on its Cash Management Account. In the summer of 1982, Merrill sued Dean Witter Securities for patent infringement. The case was settled out of court.

Part V

Issues raised by financial innovation

Chapter 10

The impact of financial innovation on financial stability

Financial transactions reallocate various categories of risk among lenders, borrowers and financial intermediaries. In part A of this chapter there are definitions of the five traditional types of risk associated with financial assets, followed by a description of how the new instruments change the nature of these risks, with special attention being paid to unbundling of the various types of risk. Part B looks at the relation between innovation and the aggregate risk of the financial system, part C at innovation and volatility of exchange and interest rates and part D at aggregate credit growth.

A. Financial system risk

1. Risks inherent in financial instruments: a definition

Market or price risk. Market risk is the risk that the market value of a financial instrument (adjusted to exclude accrued interest) will decline over time as a result of changes in exchange or interest rates.

Market risk arises whenever variability in exchange and interest rates changes an asset's market price and thus affects the value of that asset or a portfolio of assets. Unlike credit risk, market risk deals only with price variability, which exists regardless of an individual debtor's financial status or the nature of a particular contractual arrangement.

Credit risk. Credit risk is the risk that a counterparty to a financial transaction will fail to perform according to the terms and conditions of the contract (default), either because of bankruptcy or any other reason, thus causing the asset holder to suffer a financial loss.

Most defaults involve a debtor who fails to discharge his liabilities owing to bankruptcy. Other failures to pay may arise as a result of new laws and regulations, amendments of jurisdiction and technical shortcomings which delay contractual fulfilment or render it impossible.

Market liquidity risk. Market liquidity risk is the risk that a (negotiable or assignable) financial instrument cannot be sold quickly close to full market value. Market liquidity can change gradually over time, or rapidly in times of crisis.

Settlement risk. Settlement risk is the risk that arises at the time of liquidation when a bank pays out funds before it can be certain it will receive the proceeds from the counterparty. In addition to the problem of default, there is also the possibility that technical or operational difficulties can interrupt delivery of funds even where the counterparty is able to perform. When such technical interruptions occur, payment is likely to be delayed but recoverable.

Country and transfer risk. The risk that all or most economic agents (including government) in a particular country will for some common reason become unable to fulfil international financial obligations (country risk). More specifically, the risk that a given country will find itself unable or unwilling to service all international financial obligations because of an overall shortage of foreign exchange, even though all or most economic agents within that country remain solvent (transfer risk). Country or transfer risk generally applies to all types of financial instruments in the same manner, and therefore is not covered in Table 10.1.

2. Summary of financial instrument risks¹

(a) Note issuance facilities (NIFs)

The risks incurred with NIFs differ among various aspects of the facility. NIF participants which provide an underwriting commitment incur a credit risk closely analogous to that inherent in a loan commitment, since they are obliged to acquire an asset at the discretion of the borrower. Most facilities entitle the borrower to draw on the bank line in case the paper cannot be placed within a specified margin of a reference rate, where that difficulty is most likely to arise when the credit-standing of the borrower has deteriorated somewhat. Institutions which take part in a tender panel can choose whether or not to bid for notes.

Note holders acquire a short-term asset whose interest rate is fixed for the life of the note, and thus also incur market risk equivalent to assets of comparable maturity. Any sudden large movement in interest or exchange rates will affect the value of outstanding notes, but in this they do not differ from other short-term instruments.

(b) Currency swaps²

In a conventional swap, specific amounts of two different currencies are exchanged at the outset, and repaid over time according to a predetermined rule which reflects both interest payments and amortisation of principal. Normally, fixed interest rates are used in each currency.

Both price and credit risk are inherent in swap transactions. Price risk arises because interest or exchange rates can change from the date on which the swap is entered. Credit risk arises because a counterparty may fail to perform and that event may expose a swap participant to an unexpected and unintended mismatch.

Matching or hedging swap positions can eliminate all or most market risk, but does not reduce an intermediary's exposure to credit risk. An intermediary's credit exposure depends on the joint probability of an adverse move in interest rates and a performance failure by the swap counterparty. The credit exposure on a swap is the potential loss when a counterparty fails. The magnitude of this loss, which is determined by the market value of the swap contract at current interest rates, is limited to the cost of re-establishing the swap's interest and currency flows at current market rates.

1 The material below is a summary mainly of the discussion in the chapters in Part II dealing with individual instruments, offered to facilitate comparison among them.

2 The currency swaps discussed here are not those traded in foreign exchange markets involving simultaneous spot and forward transactions, but instead involve streams of interest payments, and may or may not involve exchange of principal either initially or at maturity.

Furthermore, when a swap transaction involves an exchange of currencies delivered to locations at different times or in different time zones, the swap party is exposed to settlement risk. This exposure arises when one party has fulfilled the obligation under the contract by delivering funds, but does not receive the offsetting funds from the counterparty. Most intermediaries attempt to minimise settlement risk by matching the timing of each set of payments as closely as possible.

Currency swaps allow participants to hedge certain narrow types of interest rate risk. Swaps create the opportunity to fix interest differentials between rates in two currencies relative to market fluctuations. Currency swaps can thus be used for fine-tuning interest rate risk without at the same time changing other risks (such as currency risks). However, hedging of interest rate risk is usually done in single currency interest rate swaps rather than in currency swaps.

(c) Interest rate swaps

In an interest rate swap no actual principal is exchanged either initially or at maturity, but interest payment streams of differing character are exchanged according to predetermined rules and based on an underlying notional principal amount. As in currency swaps, price and credit risk are also inherent in interest rate swaps. In addition to the price risk described above, basis risk arises with interest rate swaps when the floating rate indices on two matched swaps differ (e.g. paying six-month LIBOR and receiving a margin over the Treasury bill rate). With respect to credit risk, since the cash flows of the underlying principal are not exchanged, the credit risk is limited to the cost of re-establishing the swap's interest and currency flows at current market rates.

(d) Currency and interest rate options

Options, both currency and interest rate, differ from all other financial instruments in the patterns of risk which they produce. Both market and credit risk patterns are asymmetrical between writers and buyers of options. With respect to price risk, the holder of an option has the possibility of unlimited profit should the option move increasingly into the money, while the loss is limited to the amount of premium paid should the option expire at or out of the money. Conversely, the option writer's income is limited to the amount of premium earned, while in principle the loss is unlimited should the option move increasingly into the money.

With respect to credit risk, between the transaction date and the payment of premium, the writer of the option is exposed to the buyer for the amount of the premium. Thereafter, and through the life of the contract, the buyer must take the risk that the writer will fail to meet his obligations, while the writer incurs no credit risk since the buyer has no obligations to perform.

After exercise, there are also several possible settlement risks, but all involve obligations to perform by both parties. With foreign currency options, both parties are obligated to deliver one of the two currencies involved, whether the option is a put or a call. With interest rate options, exercise obliges the writer to purchase or deliver securities, while the buyer must deliver securities or cash.

Table 10.1

Comparative risk table

<u>Instrument</u>	<u>Credit risk</u>	<u>Market risk</u>	<u>Settlement risk</u>	<u>Market liquidity risk</u>
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 10.1 (contd.)

<u>Instrument</u>	<u>Credit risk</u>	<u>Market risk</u>	<u>Settlement risk</u>	<u>Market liquidity risk</u>
NIFs/RUFs	Principal amount for holders of paper, same as other guarantees for writers of standbys.	Writers of standbys face risk they will be called on to lend at below-market spreads if market conditions change.	Principal amount on payment date for borrower.	Liquidity of paper largely untested.
Forward rate agreements	Mostly cash settled, credit risk limited to amount of market risk.	Equal to market risk on deposit.	Limited to amount of market risk if cash settled.	Small market, limited liquidity.
Euro-bonds	Same as onshore bond.	Same as onshore fixed rate bond.	Largely same as onshore market.	Markets well developed, but secondary market less developed than major onshore markets.
FRNs	Same as bond.	Same as on short-term paper.	Largely same as onshore market.	Relatively new market, liquidity untested, thin secondary market.
Securitised credits	Derivative from credit risk of underlying asset, sometimes with explicit insurance back-up.	Same as conventional instrument of similar maturity.	Generally equal to similar conventional instruments, although some have payment date concentrations.	Markets well developed for long-standing instruments, less clear for new instruments. Thin secondary markets.
Asset sales (with recourse)	Equal to credit risk of selling institution.	Fixed by terms of sale.	Limited.	Limited liquidity.
Asset sales (without recourse)	Buyer takes credit risk of underlying debtor.	Set by terms of underlying credit.	Limited.	Limited liquidity.

(e) Forward rate agreements

Forward rate agreements (FRAs) mainly involve a replacement cost risk: if the counterparty to an FRA fails, the other party is at risk to the extent that interest rates have moved so that it would otherwise have expected to receive a payment from the counterparty. The risk of loss, therefore, depends on both the movement of interest rates and the default of the counterparty, and is limited since there is no exchange of principal amounts.

(f) Securitisation of bank assets

The securitisation of credits shifts credit risk from the bank to investors, unless the former continues to guarantee the debt. The marketability of the securities increases the liquidity (as compared with credits) of investors without simultaneously reducing the liquidity of any other party. Securitised assets contain price risk equivalent to that which (in principle) existed on the underlying loans.

3. How new instruments transform various risks

(a) Credit risk

The new instruments described in this study may be split into two groups with respect to credit risk: those which involve an extension of credit and those which do not. Of the new instruments discussed in Part II, only the NIFs/RUFs perform the economic function of extending credit, and these only in the minority of cases in which the facilities are actually drawn. Of the instruments described in Chapter 5, Euro-bonds, FRNs, asset sales and securitised credits all involve credit extension.

Credit extension involves bearing credit risk, equal to the full principal amount, and extending to the maturity of the credit obligation. Market acceptance of new credit instruments, therefore, has generally depended on their perceived low credit risk, which derives either from the high credit-standing of the borrower or, in the case of securitised credits, from the past low default rates on the large number of underlying assets of comparatively small denomination. With some securitised credits, there are explicit insurance schemes protecting some portion of the principal credit risk.

For those instruments whose prime function is not the extension of credit (i.e. options, swaps, FRAs and undrawn NIFs), the credit risks are significantly less than for conventional credit-extension instruments, either because the credit risk is limited to a fraction of the full face value or because it is for a shorter time. NIFs are most interesting in this respect, since most are used primarily as back-up lines. This means that their economic function is to improve the liquidity of the borrower. Where NIFs are drawn, the credit risk to the provider of funds is less than in a conventional syndicated bank loan because of frequent roll-over. The banks that issue the standby commitments associated with these facilities take longer-term risk, but in principle it is as much liquidity as it is credit risk, since the agreements generally require the banks to provide access to low-cost borrowing only on condition that the financial standing of the borrower does not deteriorate materially. Of course, whether these covenants will function as designed in times of serious financial-market stress remains to be seen. Therefore, the key risk feature of instruments that do not extend credit (i.e. swaps, options and

FRAs) is that they all serve the economic function of permitting a market participant to hedge a market risk or to convert a market risk from one form to another, and they do so with an associated credit risk which is generally a rather small fraction of the principal amount.

(b) Market liquidity risk

The new instruments by definition are trading in new markets, where the liquidity of the market has yet to stand the test of time and, in particular, to function effectively through periods in which associated markets experience major stress. In addition, all instruments trade either partially or entirely in over-the-counter markets, where liquidity can rapidly disappear.

Even without a major disruption of the main credit markets, the COMEX gold options market experienced a major problem in the spring of 1985 involving the bankruptcy of three exchange customers and serious repercussions for other customers not directly involved in the problem. This example demonstrates that both liquidity and credit risk remain even in the context of an exchange. Less forcefully, it also demonstrates that markets in new instruments can suddenly lose liquidity, adversely affecting liquidity and price movements in associated markets.

(c) Settlement risk

The process of global integration and deregulation of financial markets has dramatically increased the transactions volume in financial markets, especially in relation to the liquidity base of collected funds against which transactions are cleared. Communications, payments and transactions processing systems have been revolutionised, a process of change which is both in response to the increased flows and probably also a cause of further growth in transactions volumes. These trends obviously depend heavily on improved technology, which is the main vehicle through which transactions costs have been steadily and dramatically lowered. Some observers have contended, for example, that the costs of processing and transmitting information have declined by as much as 98 per cent. over the past twenty years.

Much attention has been paid to protecting these expanded transactions processing systems against error and breakdown of all kinds. Nevertheless, some believe that overall error rates in transactions processing worldwide have increased somewhat. The key question is whether there are scale effects, namely, whether overall transactions volumes have become so huge that, even with low error rates, the inevitable breakdown at a major concentration point in the funds transfer system can involve very large amounts.

The available data are limited, but certainly suggest greater vulnerability to disruption with respect to delivery failures than fifteen years ago. In general, the volume of aggregate clearings through payment systems in major markets has grown rapidly, mainly because of rapid growth of turnover in financial markets. Part of this trend reflects the appearance of new financial markets, many of which are actively arbitrated against one another and against the traditional markets, such as government securities, bank deposits or foreign exchange.

In the United States, electronic funds transfer systems have been under active development since the 1960s, but only recently has the technology enabled a wide range of market participants to have direct access to the network via computer. The value of daily clearings through the electronic transfer systems (Funds and Securities Transfer System and CHIPS) grew from about \$175 billion in 1974 to nearly \$800 billion in 1983 and averaged about \$1.1 trillion per day in 1985.

As the total volume of transactions has grown explosively, both customers and the banks processing these transactions have moved to economise on the cash balances maintained to settle accounts. This has been achieved by the development of automated transactions processing systems by most financial institutions. Much attention has been devoted to developing mechanisms to control risks, including means to resolve disputes as a result of processing errors. Nevertheless, major disruptions of the transactions process have occurred, as yet without systemic damage, and central bankers remain concerned that competitive pressures to cut transactions costs may make it difficult for financial institutions to retain even the present degree of control and protection.

(d) Unbundling credit from market risk

Many of the new instruments discussed in this report have the capacity to "unbundle" risks, that is, to separate market risk from the main burden of credit risk on the principal amount of a normal credit transaction. For example, both currency and interest rate options can hedge an amount of market risk equal to the face value of the contract for an extended period of time and with very limited credit risk. Moreover, many options are traded on exchanges, and have the credit risks associated therewith, which are generally regarded as less than bilateral counterparty risks. On swaps and forward rate agreements, credit risk is limited to a comparatively small fraction of the notional or face value of the contract. In addition, swaps, options and FRAs each structure credit and market risk quite differently, both from each other and between transactions. Swaps in particular can be designed with almost infinite variety to suit the specific needs of a single or multiple counterparties.

(e) The value of unbundling risks

Unbundling of risks in this way was not generally possible with the traditional credit-extending instruments, and is a particularly attractive feature of the new instruments. The wide variation in the way each new instrument unbundles risk allows an individual institution considerable flexibility and potential precision in managing a financial portfolio. More generally, the unbundling process affords financial institutions and corporations the ability to fine-tune their economic exposures according to the firm's broad objectives and expectations of prospective interest or exchange rate movements. Economic exposure here refers to the degree to which financial health is affected by changes in prices of financial assets, by changes in prices of or demands for its products, or by default of a counterparty.

A bank's or firm's most important consideration is its overall financial position and not the individual instruments it uses. For example, given that a firm has adequate amounts of funding, it will generally be most

interested in its overall exposure to changes in interest rates. If a bank has long-term assets and short-term liabilities, traditionally it has offset the associated maturity exposure by funding the assets with long-term borrowing, and making placements in short-term assets. But to do so involves credit risk equal to the face value of the additional assets and liabilities acquired for hedging purposes. Alternatively, an interest rate swap can hedge the original maturity exposure with far lower incremental credit risk. In this context, then, the firm or bank will find useful instruments which have a strong capacity to transform (hedge) exposure in a desired fashion, with minimum additional exposure to credit or other risks.

To take a very different example, the notion of liquidity from the firm's perspective is also somewhat different from that of individual instruments. Liquidity of an instrument depends on the depth and breadth of the market for it, while the liquidity of the firm depends both on market liquidity of the financial instruments it holds and on the structure of its overall portfolio. Thus the liquidity of the firm - its "balance-sheet liquidity" (referred to in Table 10.2 below) - will be enhanced by holding a greater proportion of short-term assets, or by expanding its capacity to raise additional funding quickly.

For example, issuers of NIFs that are underwritten but not yet drawn have the possibility of increasing credits in the short term, and thereby improving their balance-sheet liquidity. For the underwriter, there is balance-sheet liquidity risk since the outflow of funds is uncertain. The availability of such NIFs may thus lower the balance-sheet liquidity risk to some extent.

The table below illustrates the flexibility and precision in exposure management which can be achieved with unbundled financial transactions. These capacities are classified as zero (0), weak (W) and strong (S) according to judgement, since no precise definitions of these capacities are possible. The general notion is that an instrument whose exposure-transformation capacity in monetary terms is close to its face value is classified as "strong", those with no capacity as "zero" and those with transformation capacity equal to a comparatively small fraction of face value as "weak".

B. The effect of new instruments on aggregate financial system risk

The above discussion focused on the impact of banking innovations on traditional risks, viewed from the narrow perspective of the individual instrument and the individual bank or firm. But it is also important to examine the potential risks to the overall financial system.

A main conclusion of many observers with respect to new financial instruments is that market participants, at least those with access to all markets, are able to adjust their profiles of most categories of risk more precisely with the new instruments than previously. Overall, this enables credit to be extended by lenders to borrowers, while the various categories of risk historically associated with credit extension can be separated and spread more widely and, in particular, can be transferred to those who can absorb it by an offsetting exposure or to those who specialise in management of risk for a fee. Examples of this process were described in the immediately preceding section, including a description of its benefits, and the overall process is usually thought of as improving the efficiency of financial markets.

Table 10.2

Exposure-transformation capacities of new instruments

	Interest rate exposure	Exchange rate exposure	Credit exposure	Balance-sheet liquidity exposure
NIFs	S	O	S	S
Capital-market currency swaps	W	S	W	W
Interest rate swaps ...	S	O	W	W
Currency options	O	S	W/O*	W
Interest rate options..	S	O	W/O*	W
Forward rate agreements	S	O	W	W
Securitized assets	S	O	S	S

S = strong; W = weak; O = zero.

* Both currency and interest rate options have asymmetrical credit risk characteristics, zero to the writer and weak to the buyer.

The above argument is often extended to reach the conclusion that banking innovation is an unambiguous social good. That is, the effects in the aggregate are the simple sum of effects for individual economic agents, without any significant negative side effects (externalities). The possibility of negative side effects should be examined in detail, in terms of the various types of systemic risk described above. Sufficient data are not available to approach these questions with empirical economic models, but it is possible to examine the use of instruments by market participants and attempt to hypothesise about how markets for them might react in times of stress and how such reactions might spread through the financial system. The purpose of such an analysis is not to do a sort of "cost-benefit" analysis of new instruments, evaluating the efficiency gains against possible negative side-effects. Rather it would be to see whether such side-effects might exist, and whether policy actions could mitigate them.

For much of the last fifteen years there has been a general trend toward greater issuance of debt than equity in many industrial nations. In part, this phenomenon was associated with the accelerating inflation of the 1970s, which distorted the valuation of real as opposed to financial assets, but most analysts agree that leverage ratios are higher today than in 1970. The rapid growth in the United States of "leveraged buy-outs" - company takeovers through stock purchase financed by issuance of debt - has attracted much attention. Indeed, it may be that for a broad range of reasons, one can conclude that aggregate risks to the financial structure are greater today than

a decade or two ago, suggesting that equity capital in the financial structure and the economy more generally needs to be greater in relation to debt, rather than less.

Regulatory authorities in various countries have become concerned about whether the amount of equity capital is adequate in the financial structure, and in the banking system in particular, especially where global integration of financial markets appears greatly to increase the speed and force with which market strains may be transmitted around the globe. Vulnerability is thought to be generally reduced if all economic agents, but financial institutions in particular, have greater capital in reserve as compared to their risk exposures. This issue gives rise to concern about the "pricing" of credit transactions, that is, ensuring that the gross amounts earned on financial transactions permit accumulation of reserves sufficient to protect all parties to transactions.

It should be stressed that the notion that financial instruments can be underpriced in a market is not inconsistent with the idea that financial markets are efficient in the sense that they incorporate, on average, all available information into the price. This is different from the idea of a perfect market, which is efficient and in which there is perfect foresight. It is therefore quite possible that efficient markets "misprice" financial assets in the specific sense that they incorrectly forecast or fail to anticipate specific future events, and thus provide too great or too little margin for loss. If financial markets systematically overprice assets, then providers of financial services over time would earn excess profits, at the expense of users of such services. Financial markets are highly competitive, however, and there is continuous pressure to narrow profit margins. If, in this environment, markets seriously underprice assets, then losses will appear, which, if widespread, could dilute the capital base of financial institutions and expose the financial system as a whole to risk.

1. Rapid financial-market change and systemic risk

Thus the question of whether new financial instruments contribute to an increase in systemic risk depends in part on whether the various risks inherent in them are appropriately priced. That is, whether they produce sufficient profit margins on average to cover potential losses from market, credit or other risks, both in the short and the long run.

New instruments unbundle the risks of traditional credit transactions, but the risks involved are in general the same. Therefore, some light may be shed on the question by making a general comparison between pricing of new instruments and traditional ones, with emphasis on how these risks are priced during the crucial early stages in which new instruments are being introduced to the market.

In practice, traditional banking transactions were priced on the basis of rule-of-thumb approaches, developed through lengthy experience. In recent years many banks have added more sophisticated approaches based on statistical analysis. In a world of rapid innovation, both conventional statistical or rule-of-thumb approaches must be more suspect than in "normal" times. In such a period, markets for new instruments by definition grow quickly and may thereby preclude the capacity of either market-makers or their customers to accumulate experience in a variety of economic circumstances before managing large exposures.

In this sense, it seems plausible that markets for new instruments must in general be less efficient than mature ones, simply because there must be some cost of acquiring the knowledge and experience required for efficient pricing. The "learning costs" may appear in the form of underpriced transactions, which could generate either near-term or future losses. Such problems would seem most likely to crop up in rapidly growing new markets, and be of significance if new instrument activity were particularly concentrated among a small group of market participants.

A problem of this character may have developed in foreign exchange options trading in 1984 and early 1985. Some of the most aggressive new market entrants used rule-of-thumb pricing approaches derived from experience with trading the underlying instrument (foreign exchange) rather than experience with options on other financial instruments. These approaches were quickly shown to be inadequate, and sizable losses were incurred by some market participants. Traders soon adapted the more formal pricing techniques developed in the equity options industry to foreign exchange options.

A similar pattern may have developed in pricing of standby agreements associated with note issuance facilities. It can be argued that NIFs are reasonably close substitutes for commercial-paper lines in the United States, together with the normal standby commitments which back up such lines. In fact, some NIFs are established by US corporations for just such purposes. Market participants report that the standby agreements associated with NIFs are generally priced at no more than about half the fee associated with commercial-paper standby commitments, even though the risks in these two types of standby commitment are thought to be roughly equivalent. Some observers believe that the banks which first became active in writing NIF standby commitments were unfamiliar with the commercial-paper market in the United States. Whether the pricing of such commitments is below prudent levels remains to be seen, of course, but it is worth noting that some participants in the NIF market express concern on this subject.

The above are but two examples, but some market participants believe that there is a general tendency for new instrument markets systematically to underprice specific risks during a phase of development of a new market. New financial instruments in general are not subject to protection by the patent laws, as are many manufactured products, and this may help to explain the tendency new instrument markets have of quickly becoming extremely competitive.

Initially profitable margins earned by the innovator are narrowed to razor-thin amounts by new entrants seeking to establish a presence in a new market begun by others, normally other firms who have been traditional competitors. This pattern may in part be explained by the tendency of major financial institutions to seek to maximise profits in the long term, and thus to compete aggressively in the short run to maintain market share. It is frequently argued that the extremely thin margin characteristics of some of the most competitive new instrument markets are insufficient to justify the range of risks involved, and that margins will widen as markets mature.

2. Market pricing of financial risks in the long run

The preceding section argues that rapid financial-market change may generally increase the chance that market participants will accumulate some

undesired risk in the process of learning to price new instruments properly. This amounts to an argument that pricing of risk for new instruments may oscillate or overshoot above and below an "equilibrium" level before experience leads to the "correct" level. Systemic risk may arise if considerable exposure is accumulated during the "underpricing phase".

Whether or not the above result occurs, the general assumption of many observers is that market participants will soon learn that risks are mispriced and will adjust their pricing to reflect actual risks correctly. It is reasonable to question whether markets work in this fashion and, in particular, whether there are reasons to think that pricing of risks might also oscillate over the long run and, in particular, may go through extended phases of underpricing because of an inability to foresee long-run events, combined with pressures to compete in the short run.

To draw an analogy from a conventional market, it can be argued that foreign exchange rates have exhibited long-term oscillation about normal or "equilibrium" levels through much of the floating rate period, and especially in the last few years. Many believe this even though there is very general agreement that precise determination of an equilibrium is virtually impossible. For example, the dollar continued to strengthen for a considerable time (perhaps as much as a couple of years) after it was widely believed that it was above its long-term equilibrium value and would, in time, reverse course and decline. Thus, there is reason to ask whether there are similar long swings in risk pricing in various asset markets.

For example, it could be argued that major financial events of the past decade or so can be viewed in this light. The traditional risk-pricing approaches described in the preceding paragraphs were used over the last decade by banks to price credit transactions. During that time, financial institutions generally, and international banks in particular, accumulated sizable amounts of assets which subsequent events indicated were underpriced. Banks made long-term economic assumptions, on the basis mainly of short-term trends, to price sovereign loans and loans to the energy sector and exporters of primary commodities, whose prices rose compared to manufactured items during the accelerating inflation of the 1970s. In the United States sizable exposures were accumulated by money-centre and regional banks to real estate mortgages and the agricultural sector, also on the basis of very similar implicit expectations on real interest rates and price developments.

In time, the underlying assumptions on which these loans were made turned out to be incorrect. This occurred mainly because the deceleration of inflation and the associated rise in real interest rates in the 1980s affected a very broad range of the assets on the books of banks, not just a few isolated loans. Throughout the period during which those assets were being accumulated, lending margins over the cost of funds were under continuous downward pressure from intense competition in banking markets. The rise in real interest rates in the 1980s made it clear that risks associated with these assets were far greater than anticipated, leading to a very substantial augmentation of credit spreads in many of these classes of loans.

It is probable that this will always happen, at least to some degree, given the highly competitive nature of national and international financial markets and the great difficulty in long-term economic forecasting. The experience of the late 1970s provides a good example of the problems with

longer-term forecasting, which it is useful to examine with the full benefit of hindsight.

In the late 1970s, real interest rates were low or negative as inflation accelerated. It can be argued that it was unreasonable at the time to believe that these trends could continue indefinitely. But it was clearly impossible to predict when and under what circumstances inflation would slow and real interest rates return to their normal historical levels. Instead, it was implicitly assumed that the economic trends then evident would continue, and competitive pressures squeezed profit margins on many types of loans down to razor-thin amounts. In the event, real interest rates rose sharply in the early 1980s, not just to historical average levels, but well beyond. Moreover, they have remained high for an extended period, which surely was not generally anticipated.

At present, real interest rates appear to be well above historical levels, and again it seems both unreasonable to think that they will remain so indefinitely and impossible to predict when and under what circumstances they will return to more normal levels. It is even possible that some unanticipated event might push real interest rates even higher for a time before they come back down to historical levels.

Financial innovation may well have increased the micro-economic efficiency of financial markets, but in the sense just described it would appear that financial markets have no greater range of alternatives than they did in the late 1970s. Innovation has certainly not improved capacity to predict the longer-term future, but it clearly has both been a product of and contributed to the intense competitive pressure in financial markets. Thus, it would seem likely that financial transactions, whether traditional or innovative, will as before be priced mainly on the basis of current perceptions of risk and the immediate supply and demand pressures for the transactions in question, and thus may turn out to be underpriced (or overpriced) as economic circumstances change.

To put the question in more practical terms, a given financial institution may well see perfectly clearly, with hindsight, what mistakes were made in lending during the late 1970s, and seek to apply those lessons to the future. In the first instance, that suggests banks should seek wider profit margins in all activities in order to accumulate greater loss reserves appropriate to the newly perceived risk levels. In fact, banks undertook to widen credit spreads on many categories of loans which involved increased risk, especially after 1982. However, it has proved difficult to maintain wider spreads, partly because of the difficulty borrowers in difficult straits have in paying them and also in the face of competitive pressures.

But the lesson of the experience in the 1970s may lie more in the realisation that longer-term predictive capacities of market participants have not improved. In fact, there may be reason to expect matters to become more difficult for the foreseeable future. This could occur, inter alia, because the pace of overall economic and financial-market change appears to have quickened, but also for the very specific reason, stressed elsewhere in this Report, that greater use of off-balance-sheet transactions and securitisation of assets together makes it far more difficult to determine the risk exposures of various sectors of the economic structure. The implication of these notions is that, if possible, all transactions, and especially innovative ones, should be priced to

contain margins for loss above that implied by short-term expectations for overall economic circumstances. The practical difficulty in applying that approach is, of course, that an institution which does so, contrary to market trends, cannot hope to remain active and competitive in the short term, mainly because the going price in financial markets at any given moment is set by the individual participant willing to accept the thinnest risk spread.

It should also be stressed that the above argument is not intended to suggest that the monetary authorities have greater capacity for long-run forecasting than does the market. Any difference in view between the authorities and the markets on appropriate risk pricing is more likely to be found in the greater emphasis the authorities place on providing a generous margin of safety in the financial system as a whole against the risks of unanticipated strains.

To return to the new instruments themselves, with this history in mind, the most obvious practical implication of these ideas is that the margin of revenue over cost earned on unbundled instruments (to be appropriately priced for the longer run) should be no less than, and perhaps more than, what has been implicitly earned for the equivalent service in traditional credit transactions. There is no direct evidence on whether or not this is being done, but market reports suggest it may not be. However easy or difficult one may find it to agree with such a proposition, the practical problem is that there is no readily apparent pressure in the markets for these instruments tending to produce an extra margin in (especially credit) risk spreads to compensate for unforeseen or abrupt changes in the overall economic fundamentals.

A main function of financial-market regulation, at least that portion of it addressed to limiting systemic risk, can be described as ensuring that sufficient "cushion" exists within the financial structure. Central banks can provide liquidity support to financial markets, but the cushion against solvency risk must come from the capital of the banking system in particular, and the financial structure more generally. To the degree that short-run competitive pressures progressively squeeze that cushion (make more "efficient" use of capital resources), the capacity of the financial structure to temper the effects of macro-economic stress may be reduced.

3. Risk concentration

Quite aside from the issue of risk pricing, the financial system can be vulnerable if there are large concentrations of the normal market and credit risks which arise in credit transactions. For these purposes, it is important to distinguish between market risk, which in the aggregate must sum to zero, and credit risk, which by its nature cumulates in direct proportion to the volume of financial contracts outstanding. That is, all financial contracts are two-sided with respect to market risk: the holder of a fixed rate bond has at least a paper gain if interest rates fall, while the issuer of that bond has an equal and offsetting loss. From a systemic perspective, there is no net change. In that same contract, the credit risk is one-sided once the asset has been issued. Thus, events which affect the ability of the debtor to pay have an implied impact on the creditor, while there is no reverse exposure. These ideas can help clarify several separate aspects of risk concentration implications of financial innovation.

In preceding sections on the unbundling capacities of new instruments, it was pointed out that many observers believe that unbundling permits better allocation of risks systemically. That is, price risk can be separated to a substantial degree from credit risk, and the market risk transferred to another economic agent who has an offsetting exposure on his balance sheet. To the degree that markets function in this fashion, total systemic risk is reduced, since the creation of new instruments by definition cannot create net new price risk, but instead is used to "match" offsetting real exposures of economic agents. Some gain in reducing systemic risk may also derive from the lowering of credit risk for those economic agents able to lay off unwanted exposure to market risk.

But creation of new transactions to accomplish this purpose does create net new credit risk, since the two economic agents in the above example are now linked, probably through at least one intermediary, and thus the financial health of one becomes partly dependent on that of the other and on that of the intermediary. It is in this context that regulatory authorities express concern about the rapid growth of off-balance-sheet activities of financial intermediaries, especially where that activity appears to have grown at rates far above the capital of those institutions. This trend raises the question as to whether there are significant "aggregation effects" in this process: traders of new instruments argue that the associated credit risks are managed according to long-standing techniques applied to conventional transactions, while the statistical evidence of rapid growth of new instruments suggests that overall credit risk concentrations, in relation to capital, have grown significantly at financial intermediaries. This question obviously needs further detailed investigation, which up to this point has been impossible because of the lack of comprehensive information.

At least at this stage in their development, options appear to be the single new instrument which concentrates market or price risk in the aggregate. Until the market in options becomes more balanced, which some expect within a few years, most customers in the option markets will probably be buyers, suggesting that a comparatively small number of professionals at the central core of the market will continue to write more options to customers than they buy. This implies that exposure to market risk (exchange or interest rate variation) is transferred from the market generally to a few institutions, which manage that risk for a fee.

Some argue that options constitute a close parallel to the notion of insurance, and from the perspective of the buyer of an option contract this analogy seems to be apt. But the risks faced by a market professional with a large portfolio of written options differ from those faced by a company providing life or accident insurance. In the latter case, the chances that any specific policy holder will have a claim is thought to be generally independent of other claims. With options, however, movements in the price of the underlying affects the value of the entire portfolio, and it is extremely difficult to create a portfolio of written options whose value is completely unaffected by large movements in the price of the underlying. It is this factor which probably contributed to the sizable losses incurred by some market participants in 1984 and early 1985, when options writing was expanding rapidly. Partly as a result of these problems, prices of interest and exchange rate options tended to rise, and probably thereby slowed growth in demand for options.

4. Does unbundling lead to greater aggregate debt burdens or higher leverage ratios?

Unbundling presumably allows market participants more fine-tuning possibilities with respect to their financial exposures, and the noticeable success of new instruments suggests strong market demand for financial services with this attribute. One possible interpretation of this phenomenon is that market participants in the past took on unwanted risks as a side-effect of normal credit transactions, where the unwanted risks constrained the firm to a level of borrowing and investment below where it wished to be or felt comfortable being.

With new instruments, firms have a way to hedge unwanted risks and so may decide on their desired level of borrowing and investment on the merits of the investment opportunity alone. It is possible that this process may permit some firms to take on more debt than they otherwise would, and in the aggregate contribute to increasing total debt burdens on the economy. To take a specific example, thrift institutions may face greater maturity mismatch risk than they wish to carry because many borrowers still prefer fixed rate mortgages, and liabilities of comparable maturity are not readily available to thrift institutions from traditional sources. Interest rate swaps offer a presumed solution to this problem, and thereby enable thrift institutions to continue making mortgages well beyond limits imposed previously by market constraints.

The above example is highly specific, of course, and by itself is an insufficient base from which to infer that unbundling will in general lead to increased debt burdens. For example, there are multiple channels of credit to the mortgage market, and it is unclear whether particular market constraints on thrift institutions would affect overall supply of credit to this market, or the price at which it is offered. If, on the other hand, removal of such market constraints led to greater availability of credit, which might imply that its cost declined, then greater credit flows might result. If the latter type of effect were to be repeated widely, then there is the possibility of significant aggregate impact.

A concern about the possible acceleration of aggregate credit growth springs mainly from the conventional idea that the financial structures of modern industrial societies may be vulnerable to periodic financial crises arising from the potential for individual entities to suffer cash-flow squeezes if highly leveraged. To the degree that unbundling of financial transactions allows assumption of greater debt burdens or increased risk exposures, it might contribute to this potential problem.

As yet there is no concrete evidence that the processes just described have produced significant acceleration in private-sector borrowing; that is, there is no evidence that private credit in industrial economies is growing in relation to overall economic activity. An examination of these trends (see Section D below in this chapter) suggests that overall credit growth in the United States, where the innovation process has been most active, has accelerated since 1980, but that no similar pattern is obvious in other industrial nations.

Another quite different sort of effect might help account for the apparent growth in leverage ratios in the economy broadly, that is, the increase in the ratio of debt to equity financing of commercial enterprises

generally. Prior to 1970 debt in many countries had been more often at fixed than floating rates, whether obtained in credit markets or from banks. Borrowers were concerned about accumulating large amounts of fixed-term debt relative to equity financing, owing to the risk that the firm would suffer a cash-flow squeeze which could threaten solvency in case of variations in the firm's income over the course of the business cycle.

The broad process of financial innovation has of course included a shift from fixed-term to floating rate financing, which alters the nature of this risk but has also greatly broadened the range of specific tools available to manage exposures. For example, as interest rates rose through the 1970s, it became common to attach call provisions to bond financings, to enable the borrower to adjust the cost of debt liabilities if market conditions improved. Today swaps, options and a wide range of floating rate instruments taken together dramatically increase the range of choices available to the borrower, both in respect of new financing and the capacity to alter the terms and exposures of outstanding liabilities.

It may well be that greater flexibility in borrowing arrangements has made corporations far more comfortable with progressively higher leverage ratios. It is also argued that an extended period of rapid inflation has led to significant understatement of the current market or replacement value of fixed assets such as plant and equipment, with the implication that corporations feel that higher nominal debt levels are not troublesome. But financial innovation has so far only increased the flexibility to shift among various financing maturities, that is, along the term structure of interest rates. As yet markets have produced far fewer new techniques to raise equity capital more flexibly, which is of greatest importance in protecting the individual firm from sustained periods of high real interest rates at all maturities.

5. Risk assessment and risk taking by individual firms

With traditional banking or securities-market instruments, the risk characteristics were well understood and were generally consistent from one transaction to the next, even though their numerous risks were bundled together. Pricing of such instruments never did and still does not include separate charges for the various risks. Rather, experience determined prices which were thought likely to protect the lender on an overall basis. Since this approach was well accepted, both management and outside observers felt comfortable that balance-sheet analysis could produce a reasonably clear picture of overall risk.

In contrast, new instruments require new, specially designed analytic techniques to price the risks involved, especially since they so often involve risk unbundling. Banks and investment banks have worked out approaches to the accounting for these transactions, generally by trying to adapt approaches used for conventional instruments. There remains considerable variety in approaches, and as yet few institutions fully disclose these transactions in published financial statements. The accounting profession in a number of industrial countries has begun work on devising standards for new transactions, but as yet few standards have been defined, especially for those transactions which are classed as contingent assets and liabilities.

The most important aspect of the present situation in new instrument accounting, from a systemic risk perspective, is that a principal purpose of

public accounting - disclosure of financial condition to shareholders - is significantly weakened with respect to those bank and non-bank firms that make extensive use of certain new instruments. Indeed, if the economic exposures contained in publicly reported on-balance-sheet financial assets and liabilities are significantly altered by contingent commitments which are not publicly reported, then conventional financial statements can in fact be misleading. Investors in these firms may under-estimate the degree of risk involved, and unwittingly take on additional risk themselves.

It is difficult to establish clear-cut connections between risk taking and the problems of internal risk assessment and reporting within banks and other firms. It appears that most institutions have adopted an "instrument-specific" approach to the new instruments, where approaches are sought which index the risk aspects of the new instruments to the control mechanisms used for traditional exposures. For example, interest rate exposure of swaps is translated in terms comparable to conventional asset/liability mismatches, and aggregated with the latter. Credit risks are indexed to conventional loan exposures, and aggregated with overall credit risk. The same general approach is applied to all instruments individually.

Will the difficulties of risk assessment of new instruments, and the fact that these are less visible to outside observers, lead an institution to take greater overall risks? It can be argued that the proliferation of new instruments, and their complexity, implies that the approaches described in the preceding paragraph should be subject to an additional external check. That is, the assumption that instrument-by-instrument approaches produces no overall incremental risk should be challenged, perhaps best by attempting to develop independent comprehensive risk-assessment techniques that specifically examine how the individual risks fit together from the perspective of the institution as a whole. Some institutions are tackling these problems directly, at least for separate categories of risk. For example, some institutions are seeking indices of market risk to apply across various instruments. The success and comprehensiveness of these approaches is as yet unclear, however.

6. Growth of multinational portfolios

The global integration of financial markets has been closely associated with a parallel trend for financial portfolio managers to increase the share of foreign currency denominated assets. Such actions can be taken for a variety of purposes, including that of hedging. These trends have been observed generally for years, but appear to have accelerated recently, especially in the United States. As the practice has grown, it is useful to ask whether some cases might involve lessened or heightened exposures to market risk. Greater diversification of portfolios might well reduce risk exposures. At the same time, there may be reasons to believe that assets managers deliberately increase the risk exposure of the portfolios they run in order to improve performance.

Portfolio managers can of course hedge currency risk when acquiring assets abroad, but to do so would necessarily sacrifice all or most of any potential yield gain arising from interest rate differentials. Quite to the contrary, it is widely known that both cross-currency investments and borrowings are frequently unhedged. Decision-makers instead are content to monitor markets to determine the appropriate time to cover. The most common example of this phenomenon is the massive inflow of financial capital to the

United States in the 1980s, the overwhelming majority of which is thought to be exposed to exchange rate risk. Previously, much of this liquidity presumably would have been invested locally, so that the growth of multinational portfolios seems clearly to increase aggregate exposure to market risk.

Recently, it has become apparent that in association with the global integration of markets, dollar-based portfolio managers are emulating their overseas cousins, and are looking to increase the foreign currency composition of their portfolios. This is being done even though the dollar asset markets are deep and broad, and despite the fact that their liabilities tend to be highly concentrated in dollars. In many cases, the interest yields available in most of the popular alternative currencies - yen, Deutsche Mark and Swiss francs - are at present somewhat or even substantially lower than in dollars. The return can be brought up to that in dollars by use of forward foreign exchange transactions or currency swaps, but the latter transactions carry transactions costs which may mean that the all-in return to the investor is inferior to that obtainable in dollars for equivalent credit risk. Generally the currency risk is not hedged, with the implication that the investor is in fact taking an exchange rate risk intentionally, hoping thereby to improve the long-term yield on his portfolio compared to that attainable in dollars alone. It is possible that these trends explain much of the overall acceleration in trading activity and product innovation in international markets compared to growth in world output or even world trade.

An assumption underlying these practices is that asset prices vary and markets function as they have in the past, that is, that both asset and currency markets maintain depth and liquidity in the face of attempts to hedge or reverse these exposures. Information on economic and other events is available virtually instantly around the globe, and common interpretation of specific events may produce common reactions, which in turn can overload markets and destroy liquidity. Thus it would seem that the trend toward greater international management of portfolios in the aggregate can increase the risk of currency and interest rate volatility increasing sharply, at times when it is most damaging.

The increasing international trading of all financial instruments also complicates the problem of ascertaining risk and could potentially add to the risk of the financial system. Firstly, the laws of other countries may govern contracts, and may or may not be well known to all involved. This is especially important in the context of unbundled, off-balance-sheet transactions, where in many cases the legal standing of the contract has yet to be tested in any country. Also, the new instrument markets have grown up very much on an international basis, and an element of country risk may indeed enter a transaction which is otherwise purely domestic if one counterparty in a large set of transactions is located offshore.

C. The volatility of markets

It is generally accepted that volatility of exchange and interest rates has increased in recent years, both in day-to-day movements and over the course of the business cycle. There is little doubt that these phenomena have multiple causes, many of them related to the fundamental economic trends cited earlier as causes of the process of financial innovation itself. Moreover, it is likely that volatility causes innovation as much as innovation causes

volatility. This understanding helps to explain why, once financial markets suffer a sequence of major macro-economic shocks as they did in the 1970s, it can be a lengthy time indeed before a relative stability returns to markets.

1. General considerations

Several factors prevent a precise assessment of the extent to which volatility of interest and exchange rates can be attributed to financial innovation. Firstly, the rise in volatility has coincided with a period of macro-economic upheaval, including the shift to floating exchange rates and major changes in the thrust and implementation of monetary policy. Although these developments have produced quite different specific consequences, they have all tended to increase volatility of financial markets. Moreover, it is apparent that some greater variability of interest rates and exchange rates, over a business-cycle time frame, was an accepted consequence or even part of the purpose of these very basic policy changes.

A second development, which has sometimes preceded and other times followed specific financial innovations, has been price deregulation in the form of the lifting of interest rate ceilings or of exchange controls. This has meant that, independent of innovations in financial instruments, interest rates on existing instruments have had more scope to vary than would have been possible under similar circumstances in the past.

Thirdly, assessing the effect of innovation on volatility is difficult because the demand for a number of new instruments arises from a need to hedge against this volatility. Futures markets for interest rates, for example, did not exist before interest rates became more volatile.

Finally, it is important to recognise that financial innovation and the unbundling of different risks may have contributed to a redistribution of the impact of volatility within the economy. Although volatility may have increased, it is conceivable that its social costs may have been reduced as a result of this redistribution. On the other hand, it is also conceivable that such a redistribution may have led to more fragile financial structures and possibly itself contributed to volatility. (See Section B.4 for a discussion of the impact of unbundling on the aggregate risk of the financial system.)

2. The impact of speculators and technology on volatility

(a) Effects of speculators on organised exchanges

There has been much debate about the possible effects of futures and options markets on the volatility of prices of the assets in the underlying cash markets. The principal reason for believing that volatility is spread from these markets to the cash markets is the close arbitrage relationship that exists between most cash and futures markets. In the early stages of futures market development, such arbitrage was performed by small specialised firms of limited capital. It quickly became clear that price pressures on the futures exchanges frequently produced profitable arbitrage opportunities too large to be exploited and closed by small arbitrageurs with limited capital, prompting a number of the large firms to develop specialised trading operations for this purpose. The result is quick and generally complete transmission of price movements, both from futures to cash markets and the reverse.

The exchanges themselves provide trading opportunities to the general public which were largely unavailable previously. The main characteristics of these opportunities are the relative ease with which positions can be opened and closed in organised exchanges, the high leverage available there and the capacity to handle a large volume of activity. Here again the relationship between the innovation (the development of the exchanges) and volatility is clearly bi-directional. Some degree of volatility was necessary in order to prompt innovators to develop the idea and invest the capital to create the exchanges, and to attract additional capital into the business of speculating with these new instruments for profit. As these phases of development passed, it is hardly surprising to find that on a number of occasions market participants have contended that trading by speculators has in turn been the cause of additional price destabilisation in cash and futures markets.

Others have argued that such processes will work in the opposite direction, namely to stabilise prices in both futures and cash markets. They believe that speculators will sell when prices are believed to be high and buy when prices are believed to be low, tending to promote price stability and at the same time help to disseminate information to the market.

If speculation is to work in this stabilising manner, however, several critical, and usually unstated, assumptions must be met. In the first instance, there must be a group of individuals or institutions willing to stake capital to trade on the markets with the main objective of earning a speculative return. Speculators' forecasts must be reasonably correct and reflect fundamental factors (such as the demand and supply for the cash instrument by non-speculators); secondly, speculators must generally refrain from joining "bandwagons" and, thirdly, speculators must refrain from or be unsuccessful in attempts to "rig" the markets. That is, they must be unable to benefit at the cost of other market participants by exaggerating swings arising from new information or producing capricious price movements.

The view of many market participants and close observers of futures markets is that these assumptions are untrue at certain times, generally for relatively short intervals, and that even in normal times they are virtually never completely true. Of particular importance here is the fashion in which new information is treated in markets and its relation to the susceptibility of markets to bandwagon effects. These two topics are explored further in the next section.

(b) The impact of technology on volatility

One of the most important results of the growth in technology has been the significant increase in the efficiency with which information is disseminated and interpreted in world financial markets, both cash and futures markets. New information with respect to economic and political events is received almost simultaneously by all participants around the world. At one time, when the dispersion of information was slower, it was also channelled more through trading institutions at the centre of markets, especially the cash markets, and these institutions specialised as well in the interpretation of information for clients. Today, the trading institutions have lost much of their control over these processes, and increasingly a broad range of financial firms outside the central core of markets, as well as commercial firms and individual investors, have equal and ready access to information in terms of timeliness, and also have the capacity to interpret it.

The idea that efficient distribution and interpretation of information stabilises markets depends on the assumption that there will be dispersion in the interpretation of new information, but on average the market will view it "correctly". That is, the market will, on average, see that, for example, an increase in dollar interest rates by a modest amount probably means that the dollar itself will settle at a higher level, prompting traders and investors to buy dollars and thereby bid its value up further in the exchanges.

The alternative hypothesis, that efficient distribution of information might destabilise markets, rests on the notion that the process just described does not and probably cannot work quite so neatly. While traders and investors may get the direction of change right in many cases, rarely do they get the amount right. Thus it is difficult to know when a market move starts, when it will stop or, more precisely, when it should stop (when a new "equilibrium" has been reached). Moreover, many traders believe that the market's response to any new information, at least in the short term, will depend first on how the new information compares to the market's expectations as to what it would show, and perhaps even more on how the other market participants are likely to interpret it rather than on what is the "correct" interpretation. In addition, the market may also respond to irrelevant information without an unbiased dispersion of views. It is these tendencies of traders and speculators which produce bandwagon effects, and also tend to make markets vulnerable to being pushed by speculators willing and able to commit sizable amounts to speculative short-term positions. More efficient distribution of information, simultaneously available to a large number of speculators, can in this way contribute to greater rather than reduced short-term market volatility.

The practice of using "technical analysis" (charting and related techniques) to forecast price movements can be viewed in much the same way. Technical analysts believe that better insights into future price movements can be obtained by studying how prices have behaved in the past rather than by studying why prices have acted in a certain fashion. Based on past observations, analysts derive what essentially are rules of thumb about future movements, based on either fairly simple or highly complex methods. Computer technology is heavily used to handle large volumes of data and to produce the charts. The basic notion is that markets exhibit characteristic patterns of movement, which repeat themselves and which can be a basis for trading. The "rules of thumb" generally dictate specific actions based on certain preconditions.

For present purposes, it is essential to note that current technology allows such quick and efficient dissemination of the price information on which these techniques are based, and that the use of the techniques themselves has become fairly pervasive. Even those that do not have the capability themselves to perform technical analysis have ready access to it through the electronic information distribution media, or other sources. As with "fundamental analysis", there tends to be some degree of similarity in the conclusions reached by the broad community of technical analysts and a knowledge of this among the trading community. Thus there is often a ready belief in a market that the predictions of technical analysts will materialise, causing some to trade accordingly even if they do not agree with the prediction. This process can generate self-fulfilling momentum to price movements and also increase the amplitude of the price movements.

For example, suppose, firstly, that it was widely reported in the market that DM 2.50 was regarded by technical analysts as a "support level" for the dollar on a typical day and, secondly, that market participants with long dollar positions placed stop-loss orders at this exchange rate. If the dollar then fell through this level, large sales of dollars would be generated, tending to depress the value of the dollar further. Such processes could arise and continue for a time without significant causes from changes in economic fundamentals, or be triggered by such changes, and thereby increase the volatility in the market.

3. Delta hedging in the options markets

The potential effects of options trading on the volatility of cash or futures markets have been a subject of active debate. Some argue that options reduce volatility since the hedging of a written option will always be a fraction of its face value and therefore will apply less pressure on the cash market at the time the option is written than would occur if the original customer had purchased cover in the spot or forward market.

Others believe, however, that options trading increases market volatility since writers' efforts to manage their net options positions on a delta basis require them to buy the underlying foreign currency or interest rate instruments when the price of the underlying is going up and to sell the underlying when the price is going down.³ In the absence of other factors it is argued that these purchases and sales tend to reinforce existing price movements. The degree to which this phenomenon actually occurs is unknown. But, in isolated instances, cash-market participants, especially in foreign exchange, have suspected that movements of exchange rates into ranges in which a large number of options had been written may have exacerbated short-term rate movements.

It may be that the impact of options on market volatility is also a function of whether the options are in addition to or a substitute for activity in forward markets or covering spot. If options writing is additional business, the existence of the options market could accentuate spot price movements, particularly at times when the exchange market was already in a state of unrest. Only in a situation when there was great confidence in the persistence of the prevailing price structure would their impact tend to be neutral or fairly modest.

However, to the extent that options serve as a substitute for the forward markets or covering spot, their incremental impact does not seem to be large. The immediate impact on the spot rate of delta hedging is smaller than that of covering spot or forward. On the other hand, the banks' covering will only have a one-time impact, whereas in the case of delta hedging there will be a continuous effect on the foreign exchange market so long as exchange rates move.

The volume of options activity compared to activity in the underlying market also appears to affect the transmission of volatility from options to the underlying market. Participants in interest rate options are less concerned about this problem, noting the high volume of activity in the spot and futures market for securities relative to the options activity. Daily trading volume in the markets for US Treasury and Federal agency securities averaged about \$80 billion per day in early 1985. In addition, daily trading in futures

3 For a complete explanation of this see options chapter, Section 2 and Section 4.

contracts on Treasury bills and bonds averaged approximately \$25 billion in nominal principal amount, while the trading in the Euro-dollar futures averaged about \$35 billion in nominal principal value.

The concentration of writing option at commercial and investment banks is also seen as contributing to the possible transmission of volatility. In the development of the options markets thus far, customer buyers have turned to bank writers who have been delta hedgers in the underlying markets. By finding natural writers who would not need to pursue delta hedging strategies the banks could play more of a rôle as intermediaries and reduce their asymmetrical risk exposure.

4. Empirical evidence of the effects of innovation on volatility

Theoretical reasoning alone cannot resolve the question of whether speculation in the futures and options markets stabilises or destabilises prices in the underlying cash markets. In recent years a number of studies have appeared which examine the impact of futures and options markets on the underlying commodity or financial markets. The approach taken in these studies has been to compare the relative degree of variation of prices in cash markets before and after the introduction of futures trading.⁴ These studies generally suggest that prices in cash markets were subject to no more, and often to less, fluctuation after the introduction of futures markets. Similar results have been found for the impact of options on individual equities on the underlying market.

Another widely documented empirical finding which has bearing on the volatility of financial markets is what statisticians refer to as the "random walk" movement of asset prices. This means that there are no systematic and thus predictable patterns in stock price movements once allowance is made for long-run upward or downward trends; at any moment in time the probability that prices will increase is equal to the probability that they will fall. Evidence for the random walk character of asset price movements has been found in stock markets as well as foreign exchange markets. The principal implication of this finding is that speculation does not generally cause a "speculative bubble", where prices rise to unsustainable levels before falling sharply as a result of panic selling. While the bulk of empirical finding concludes that markets do not appear to overreact or underreact to new information, more recent studies appear to suggest that during specific episodes the hypothesis of the existence of a speculative bubble cannot be rejected.

D. Aggregate credit growth

1. Theoretical considerations

On a priori grounds the relationship between the various innovatory trends discussed in this Report and credit growth would seem to be a positive one. But the shape of this relationship is not likely to be very stable and uniform, as it may differ from instrument to instrument, and its quantitative significance is by no means established.

4 The principal findings of these studies have recently been reviewed in A study of the effects on the economy of trading in futures and options commissioned by the Committee on Agriculture of the House of Representatives in the United States.

To begin with securitisation, there can be little doubt that the increasing efficiency of the international securities markets, their greater depth and the proliferation of instruments tailored to the particular needs of borrowers and investors have eased borrowers' access to long-term credit and rendered it more attractive for them. Moreover, to the extent that this recourse to the securities markets has been at the expense of intermediation by the banking system, there will have been some economising on required reserves. Global integration of the financial markets must have had similar effects, reducing large borrowers' dependence on - usually more costly - domestic financial channels and opening up to them the wider gamut of instruments available in the international financial markets.

As regards individual types of instruments, long-term currency and interest swaps in particular would have the credit-expanding properties discussed in the preceding paragraph, opening up new and cheaper sources of finance to borrowers, including those with less than top credit-standing. NIFs, too, will tend to increase the ease of access and reduce the cost of borrowing. Moreover, because of the greater flexibility that they offer, they will largely obviate the need for raising funds in advance of actual borrowing requirements, thereby reducing the amount of redepositing and the resultant double-counting of credit. This would leave more scope in the financial system for the type of lending that is translated directly into increased spending.

Futures and options will tend to have a somewhat similar effect; by reducing the banks' need for recourse to the interbank market for hedging or speculative activities, they will help to avoid a congestion of balance sheets by interbank operations. As a result, a given amount of capital may support a larger amount of final lending. Certain types of off-balance-sheet items, such as credit guarantees and back-ups (including NIFs), will tend to have the same effect by pushing credit flows off the balance sheets of the banks and outside the reach of reserve requirements. Greater capital leveraging may also occur in the non-bank corporate sector when the increased borrowing opportunities and attractions offered by the bond markets tend to reduce the amount of external equity financing.

In more general terms it may be said that by offering firms convenient ways to hedge unwanted risks the new instruments may have made it more attractive for firms to incur additional debt for the funding of investment projects in the real or financial sector.

All in all, there would therefore seem to be grounds for an a priori assumption that at the margin the various innovatory developments discussed in this Report have contributed to the growth in final lending. This is most likely to have been the case in the United States, whose financial markets have played a pioneering rôle in most of these innovations and where, because of the worldwide rôle of the dollar, the links with the international markets are particularly close.

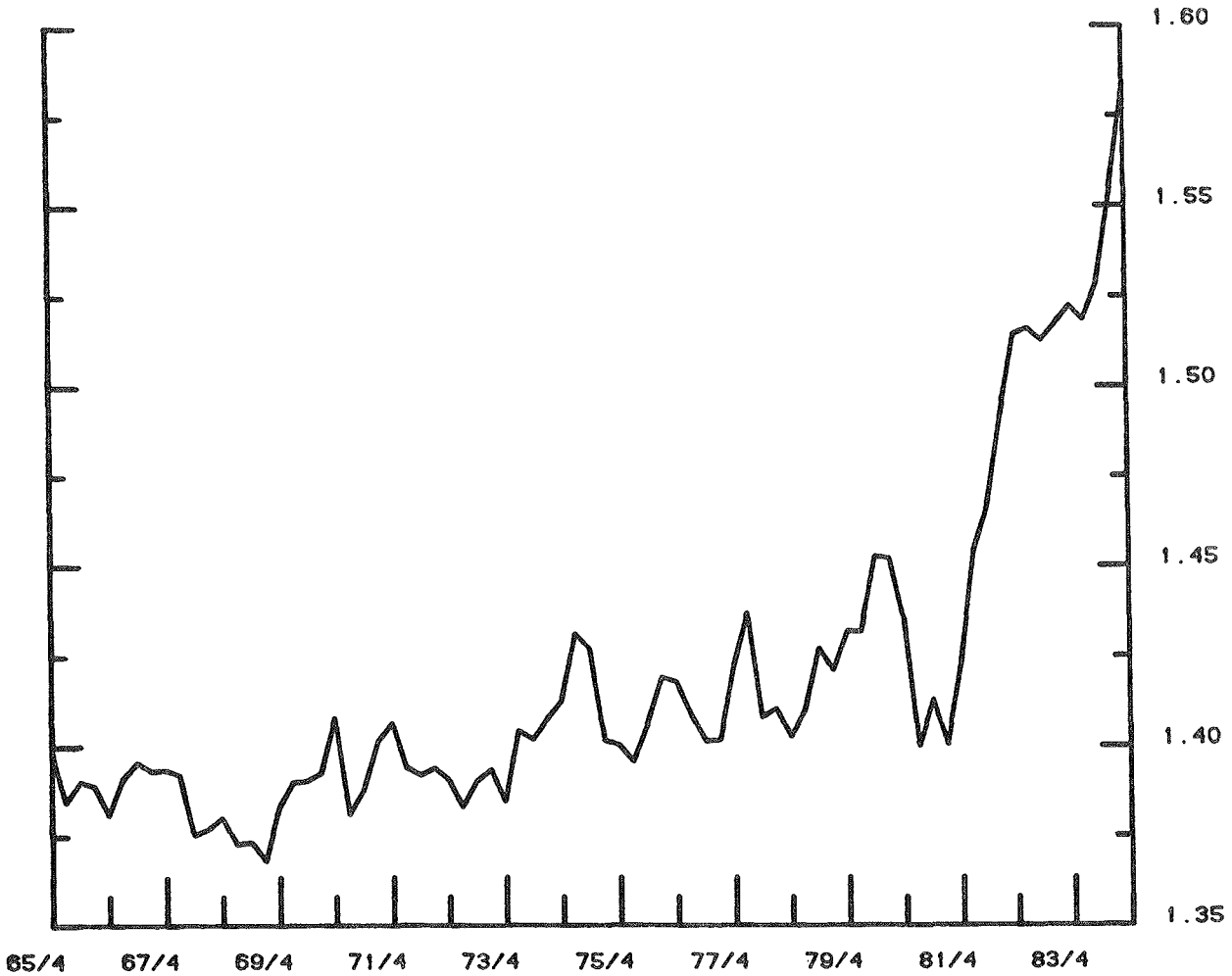
It may be added that even to the extent that innovation adds to credit growth, this would not necessarily have to be reflected ex post in a rise of the debt/GNP ratio, since the additional expenditure associated with this credit growth will also lead to faster growth of nominal GNP. In the event that the increase in expenditure pushes up inflation, the debt/GNP ratio, particularly given fixed nominal interest rates on the bulk of outstanding debt, might even tend to decline. Moreover, the development of the debt/GNP ratio might be heavily influenced by a large number of exogenous factors, with the result that, as the following section attempts to show, its usefulness in tracing the impact of innovation in credit growth might be very limited.

2. Empirical evidence: broad trends

The latest wave of financial innovation has been accompanied in certain countries by the breakdown of the stability of some apparent aggregate long-term financial relationships. One set of relationships which has a potential bearing on the stability of the financial system is that between credit aggregates and GNP. This ratio has changed very markedly in the United States, where after a long period of stability since 1982 the ratio of gross debt to GNP of the domestic non-financial sectors has shown a sudden and continued growth in conjunction with a sharp cyclical rebound (see Figure 10.1).

Figure 10.1

United States domestic non-financial sectors' debt/GNP*



Source: Federal Reserve Board, Flow of Funds.

* Including trade credit.

In contrast to the sudden growth of debt/GNP in the United States it appears, as shown in Figure 10.2, that at a very aggregate level, taking all the major Group of Ten countries together, there was no change in the constant trend of the ratio of gross debt to GNP after 1982. An analysis of individual countries reveals that, even after the increase in the ratio of debt in the United States after 1982, that ratio was lower in the United States than in some other major countries. Also, none of the other countries (as shown in Figures 10.3 and 10.4) seems to have exhibited a stability in the debt/GNP ratio comparable to that shown by the United States before 1982. Indeed, this observed stability for the United States and France (not shown in the chart) is atypical. In the United Kingdom the debt/GNP ratio fell continuously until 1980; in Japan the ratio has been rising continuously, and the same has been true to a lesser extent of Germany. In Canada (not shown in these charts) this ratio fell gradually until the mid-1970s and then grew sharply. By itself, the very diversity of these particular trends suggests that the process of domestic credit creation does not appear to be directly related to financial innovation and in particular that financial innovation does not produce sufficient effects to be evident in aggregate statistics.

Three further problems of trying to relate such broad measures of debt/GNP ratios to financial innovation should be mentioned. Firstly, because of redepositing ("round-tripping"), particularly in the Euro-deposit markets, and in certain instances double-counting of credit positions, it is difficult to produce a satisfactory measure of total aggregate gross debt. Secondly, it is also difficult to establish what rate of growth of such ratios is sustainable and the precise relationship these ratios should have to financial innovation. Thirdly, it is not possible to state in general terms whether financial innovation represents a substitute for or an addition to existing credit-market instruments, in particular because financial innovation has been closely associated with deregulation, which by itself is bound to have a considerable impact on the size and composition of sectoral financial flows.

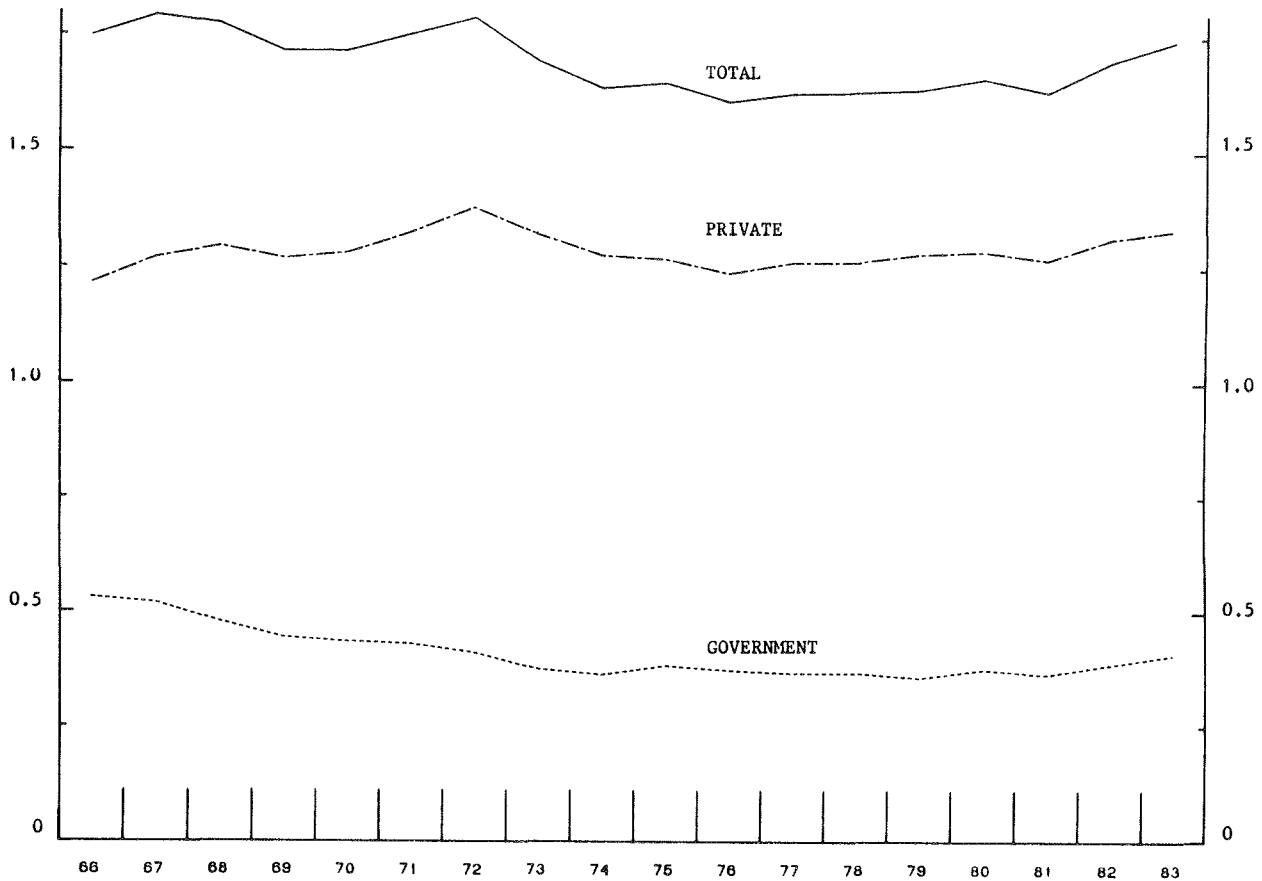
3. Sectoral measures of debt

(a) Public-sector debt

The instability shown by the aggregate debt/GNP ratio in most countries is a reflection of shifts in the components of the debt between the public and private sectors, and within the private sector between the corporate sector and households. In countries such as Canada, the United Kingdom and the United States the progressive decline in the ratio of government debt to GNP until the mid-1970s reflects the gradual amortisation of war debt, the growth of GNP and the effects of inflation. In the United States, specifically, the growth in the aggregate debt/income ratio since 1982 is closely associated with the sharp rise in the government deficit and to a lesser extent the decline in inflation. On the other hand, after the war, debt levels in Germany and Japan were very low. This low initial level, in conjunction with public-sector deficits, particularly in Japan, and very modest inflation rates explain why the ratio of government debt to income should have expanded at such a rapid pace.

Figure 10.2

Ratio of debt to GNP for the domestic non-financial sectors
in some major G-10 countries*



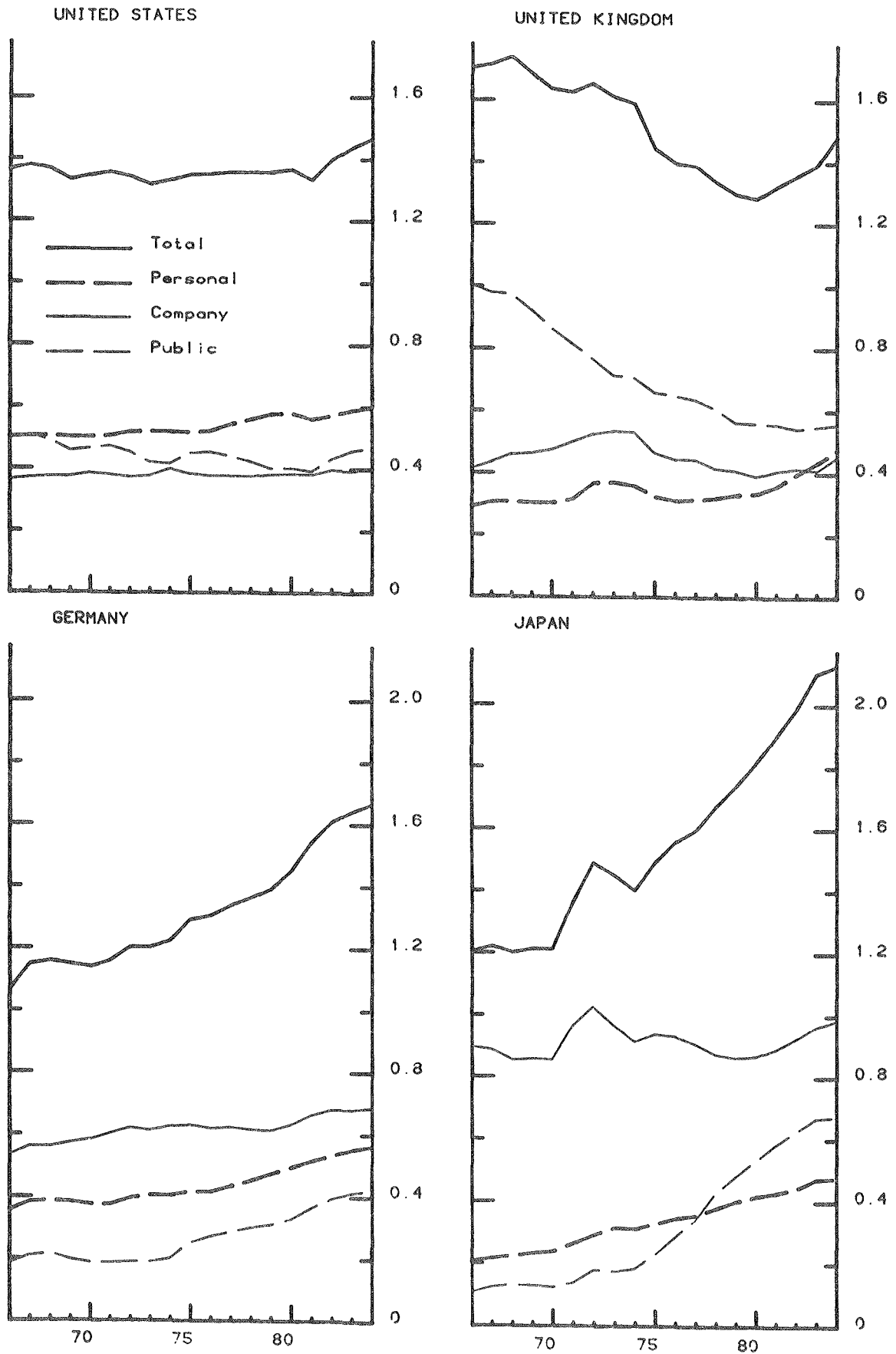
Aggregate ratio for the following countries: United States, Canada, Germany, Japan and the United Kingdom.

* Including trade credit.

At the same time, it is also difficult to find a causal link from financial innovation to the growth of public-sector indebtedness. Public-sector deficits may, however, indirectly have a bearing on financial innovation. Firstly, in order to finance their borrowing in a more flexible and efficient and less costly manner, and because of their high credit-standing, governments may initiate or promote the acceptance of new financial instruments. One example of this rôle in international markets has been in the market for note issuance facilities, where some sovereign borrowers, most notably the Kingdom of Sweden, have been very active in initiating new borrowing techniques in order to lower their cost of funds. Secondly, since the market for government debt is broad and deep it may support derivative financial instruments such as those in the form of "coupon-stripping". Finally, government deficits, by attracting private-sector savings, may stimulate financial innovation in the private sector as it attempts to vie for available funds.

Figure 10.3

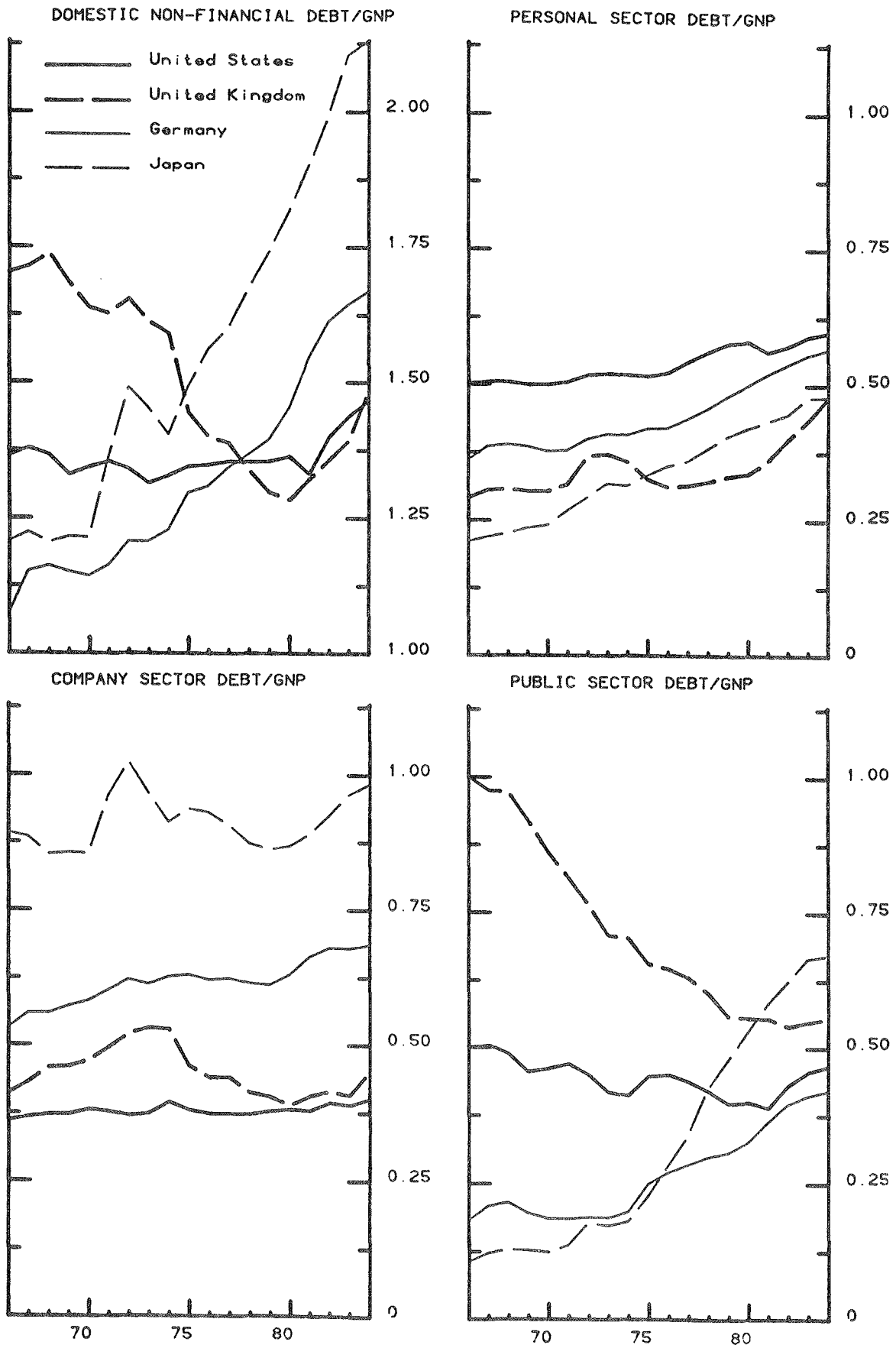
Debt/GNP ratios by country*



* Excluding trade credit.

Figure 10.4

Debt/GNP ratios by sector*



* Excluding trade credit.

(b) Private-sector debt

Whilst the relation between public-sector indebtedness and financial innovation seems to a great extent to be tenuous, changes in the size, composition and interest rate sensitivity of private credit flows appear to be more closely related to financial innovation.

In those countries in which there have been controls on credit, the relationship between regulation, financial innovation, and the volume and type of credit flows to the private sector appears to be rather close. However, the precise manner in which this has manifested itself has varied from country to country.

In countries such as France, Italy and the United Kingdom, where the flow of bank credit to the private sector has been strictly monitored during certain periods, this has given rise to structural distortions in the allocation of credit by different financial institutions, the growth of intermediation outside regular channels (such as intra-sector loans between non-financial companies), and the development of new instruments not included in the credit aggregates being monitored. In other instances, the growth of credit has coincided with deregulation of such controls. In the United Kingdom credit to households and companies surged in the early 1970s following the move away from credit controls as a mechanism for implementing monetary policy. Credit to households accelerated again after 1980 with the abolition of the "corset" and the removal of hire-purchase controls.

This close association between innovation, regulation and deregulation and the size of credit flows contrasts with developments in those countries where credit controls have not existed or have been very limited. In Germany and the United States, for example, the growth of the ratio of private-sector debt to income has continued for a long time, and it is difficult to associate this apparent secular growth with specific episodes of financial innovation.

In summary, it is difficult to establish on the basis of simple aggregates any clear causal nexus from financial innovation to aggregate credit flows. Furthermore, the lack of a theory of the determinants of aggregate and sectoral indebtedness - at least in the domestic context - and the wide differences in the value of these aggregates across countries and over time mean that little guidance is offered to the precise manner in which innovation might affect these flows.

Chapter 11

Impact of innovation on financial statements and statistical reporting

The various innovations and changes in financial structure discussed in Chapters 1-7 have important consequences for the context and interpretation of financial reports of firms and of flow-of-funds statistics.

As regards the monitoring of international credit flows these developments significantly affect the breadth of coverage and adequacy of the existing international financial statistics. The first half of this chapter looks at some of these issues. Sections A.1-A.4 are concerned with the statistical problems arising from the trends towards securitisation and the increased rôle of off-balance-sheet items. Section A.5 suggests some ways in which statistics could be improved and broadened to permit continued monitoring of international financial markets and external indebtedness from a macro-economic and a macro-prudential point of view.

Securitisation and the growing rôle of off-balance-sheet business may also have important consequences for national flow-of-funds statistics, potentially impairing their usefulness for purposes such as monitoring sectoral credit distribution or the financial exposure of main sectors of the economy. Since these problems are country-specific, they are not discussed in this Report.

The second half of this chapter is concerned with the broader issues raised by off-balance-sheet business for the internal managerial accounting of firms and for the transparency of external financial reporting. Section B.1 looks at the specific accounting difficulties associated with financial futures, swaps and sale-leasebacks. The general relevance of this problem for the users of financial accounts and for risk taking is discussed in the subsequent section.

A. International financial statistics

1. Some general considerations

One important corollary of freer and more pervasive markets is the need for fuller disclosure. Such information will be of use not only as a guideline for the market participants themselves, but will also be required for monitoring the system's overall stability and its macro-economic dimensions.

Unfortunately, the various innovatory trends discussed in this Report have tended to impair the coverage and usefulness of the present international and financial statistics, which are heavily focused on the banking sector.

Securitisation significantly reduces our knowledge of both cross-border exposures and sectoral exposures within national economies by taking a growing proportion of credit transactions off banks' balance sheets; by giving