BANK FOR INTERNATIONAL SETTLEMENTS

RECENT INNOVATIONS IN INTERNATIONAL BANKING

APRIL 1986

Prepared by a Study Group established by the Central Banks of the Group of Ten Countries

Second impression

Preface

At the request of central-bank Governors of the Group of Ten countries a Study Group was established in early 1985 to examine recent innovations in, or affecting, the conduct of international banking.

The Study Group carried out extensive discussions with international commercial and investment banks that are most active in the market for the main new financial instruments. The purposes were both to improve central-bank knowledge of those instruments and their markets as the situation existed in the second half of 1985, and to provide a foundation for considering their implications for the stability and functioning of international financial institutions and markets, for monetary policy, and for banks' financial reporting and the statistical reporting of international financial developments. Alongside this work the Basle Supervisors' Committee has undertaken a study of the prudential aspects of banking innovations and a report on the management of banks' off-balance-sheet exposures and their supervisory implications was published by that Committee in March 1986.

The Study Group's aim was not to recommend detailed policy changes but rather to develop a general framework in which the Group of Ten central banks and the BIS could consider their implications for the evolution of the structure and functioning of the international banking system. While the main purpose of the report is to raise issues for internal discussion it is being published in the hope that the general framework offered may contribute to what is likely to be a continuing public debate, both internationally and within countries, on these issues.

The report should be considered solely as the product of the Study Group's work and not as necessarily representing the views of either the central banks of the Group of Ten countries or the BIS. The members of the Study Group were:

Chairman:	Mr. Sam Y. Cross - Federal Reserve Bank of New York
Belgium:	M. Jean-Jacques Rey - National Bank of Belgium
Canada:	Mr. William E. Alexander - Bank of Canada
France:	M. Jean-Paul Redouin - Bank of France
Germany:	Mr. Gerhard Laske - Deutsche Bundesbank
Italy:	Dr. Giovanni Cristini - Bank of Italy
Japan:	Mr. Keiji Matsuda - The Bank of Japan
Luxembourg:	Mme Andrée Billon - Luxembourg Monetary Institute
Netherlands:	Mr. Wouter L. Benard - Netherlands Bank
Sweden:	Mr. Ake Törnqvist - Bank of Sweden
Switzerland:	Dr. Bruno Müller - Swiss National Bank
United Kingdom:	Mr. Lionel D.D. Price - Bank of England
United States:	Mr. Charles M. Lucas - Federal Reserve Bank of New York
BIS:	Dr. Helmut W. Mayer
Secretariat:	Dr. Julian S. Alworth - BIS

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Part I

Recent Innovations in International Banking
Summary of Study Group Report

A sharp acceleration in the pace of innovation, deregulation and structural change in recent years has transformed the international financial system in important ways. Major new financial instruments - mostly taking the form of off-balance-sheet commitments - have either been created or have dramatically increased their rôle in the financial structure; international credit flows have shifted away from loans through large international banks into direct credit markets; the volume of daily transactions has multiplied; financial markets have become far more closely integrated worldwide; capital has become much more mobile.

In many respects, innovation has improved the efficiency of international financial markets, mainly by offering a broader and more flexible range of instruments both for borrowing and for hedging interest and exchange rate exposures. These changes have clearly aided banks and their customers to cope with stresses associated with the greater volatility of exchange and interest rates in recent years. These beneficial effects are noted in the Report which follows and have been widely discussed elsewhere.

The Study Group sought to examine in detail whether these trends at the same time either increase risks within the financial structure or alter the functioning of the financial system over the longer term, in ways which suggest the need for central banks to adjust their approaches to monetary or macro-prudential policy. The group also considered whether these developments alter the usefulness or content of statistical data.

To varying degrees both the banks and their customers from all industrial countries are active in innovative business in the international markets. Although the new instruments are traded to some degree in most financial centres, the international market-places are principally located in the United States and the United Kingdom. In the United States particularly there has been active cross-fertilisation of domestic and international financial markets. The domestic markets of other countries are also increasingly affected by these international developments, and these influences are likely to strengthen as present trends, especially deregulation, continue and their effects spread.

The stimulus for financial innovation is strong, arising from the interaction of a changing regulatory environment, expanding technology, volatile markets, shifting current-account balances, and growing competition among financial institutions. We cannot predict whether the momentum of this process will advance further or wane. But it is clear that a number of the forces supporting it are unlikely to recede soon. Moreover, even if the pace of innovation were to slow substantially, the cumulative effect of changes already introduced will impinge on the broad categories of policy for which central banks are responsible.

Innovation is changing both the specific problems central banks face and affecting the tools they customarily employ. The policy responses required under present circumstances may need to be more rapid than in the past and may call for closer co-operation between banking authorities and those responsible

for capital-market regulation at national and international levels. Because of the market's ability to innovate rapidly and flexibly, it can be more difficult than in the past to design policy changes and be confident that those changes will for long achieve desired results, without unwanted side effects.

The Basle Supervisors' Committee has recently examined one aspect of these trends, the rapid growth in off-balance-sheet activity of banks, and concluded that it poses urgent challenges to supervisory authorities. The study presented here concludes that central banks must in addition be concerned with other far-reaching policy issues that arise from the process of innovation and structural change. Issues in the fields of macro-prudential policy (that is, the safety and soundness of the broad financial system and payments mechanism), monetary policy, and financial reporting and statistics are examined in Part V of the Report and summarised in the paragraphs below.

A. Macro-prudential policy

For a variety of reasons, the large international banks appear to have lost comparative advantage to international securities markets as a channel for credit intermediation with respect to large high-grade borrowers, and in response have themselves moved heavily into certain capital-market (largely off-balance-sheet) activities.

These developments have had their main impact on international credit flows and in markets used by large corporations. If these trends continue - and have a more pervasive influence on domestic markets - there could be important consequences for the banking and financial systems:

- with the highest quality borrowers increasingly turning to direct credit markets, the average quality of banks' loan assets may gradually decline by comparison;

- in view of its narrower base, the international banking system might become less responsive to sudden liquidity needs or other shocks in the corporate or other borrowing sectors;

- a greater share of credit is likely to flow through capital-market (rather than bank) channels, which may be characterised by less supervision, by less complete information on which to base credit decisions, and by more distant business relationships between debtor and creditor, perhaps complicating the task of arranging rescheduling or financing packages for those with debt servicing problems;

- both bank and non-bank financial institutions are relying more on income from off-balance-sheet business;

- the distinctions between banks and other financial institutions are becoming progressively blurred.

These trends, taken together, may require the authorities to consider substantial adjustments and adaptations with respect to financial regulation and other policies.

The above considerations all, to a greater or lesser extent, reflect concern that innovation may heighten vulnerabilities in various ways, even as certain benefits clearly accrue to financial and non-financial users of the new instruments. The rapid innovation currently taking place in international banking and financial markets - and also in some nations' domestic markets - enables consumers to choose among many new products and to benefit from the reduced costs and enhanced protection those products bring. From the perspective of the individual buyer there are improvements in efficiency. But, in a world financial system with many imperfections, there can be no guarantee that increased efficiency of financial intermediation at the individual firm level will necessarily improve economic welfare overall. Many innovations have been designed to exploit existing imperfections in the financial system. Some of the "imperfections" around which innovations are manoeuvering their way represent official measures, such as capital adequacy requirements imposed in the interest of safety and soundness of the financial structure, or measures to deal with liquidity problems or to promote market stability. Others constitute regulations designed to meet the needs of domestic monetary and credit policy objectives; and still others are meant to serve investor protection needs.

A major source of concern derives from the difficulties in pricing new instruments and the possibility that many new instruments appear to be, at least to some degree, underpriced, that is, that gross income from the transactions is insufficient, on average, to compensate fully for their inherent risks. Since it may be necessary to accumulate experience over a variety of circumstances and cyclical conditions in order for market participants fully to understand and assess all elements of risk, this problem may appear especially before the market for a new product has reached maturity. Underpricing may also be resulting from intense competitive pressures, as individual institutions struggle to hold market share in changing markets, or from inability to predict longer-run swings in economic circumstances.

There are several other ways in which innovation may contribute to systemic vulnerabilities. The presumed superior liquidity of securitised assets over conventional bank loans may turn out to be a mirage if a substantial number of the creditors of a single debtor attempt to liquidate their holdings simultaneously, or nearly so. That is, the risk that the liquidity of these assets will disappear is likely to be greatest when it is most needed. At such times, banks may be exposed to liquidity pressure from drawdowns on commitments which backstop many securitised assets. Moreover, the general trend toward increased off-balance-sheet activity and "unbundling" (which involves separating market risk from credit risk), as well as the complexity of multiple linked transactions, can mask the interlocking of risks, for bank management, regulators and market participants alike. Indeed, in any corporation using the new instruments there is an important need for all levels of management to acquire knowledge and understanding of the risks inherent in them, and to adapt internal accounting systems sufficiently to ensure adequate control. Because of the pace of innovation, use of the new instruments may be running ahead of these necessary changes. A further point is that the new instruments transfer price or market risk from one economic agent to another, but do not eliminate that risk. And, in the process, they create new credit exposures, and thereby increase the ways in which the default of one borrower can adversely affect others. This problem may be exacerbated by the hitherto untested legal status of many of the new financial instruments. Moreover, since the growth of these transactions on the part of a relatively few large financial intermediaries has been very rapid, there is some possibility that,

in the aggregate, credit risk is becoming more concentrated within the financial structure, even as exposure to price or market risk may be more widely distributed.

The rapid growth in the volume of transactions being settled through the payment system can also contribute to potential systemic risks. An important feature of innovation has been the huge reduction in transactions costs - some estimates are that costs of many transactions have fallen by more than 90 per cent. in the past two decades because of major technological improvements. As a result, financial institutions find it possible, and profitable, to undertake a much larger number of transactions. There is a risk of overloading or congestive interruption of the payment system.

An important question is whether innovation has added to, or subtracted from, the degree of volatility in financial markets. Theoretical reasoning alone cannot resolve the issues, and market participants are divided in their views. Where there are empirical studies examining the impact of futures and options markets on the underlying cash markets, those studies suggest that prices in cash markets were subject to no more, and often less, fluctuation after the introduction of futures markets. At the same time, there are particular day-to-day situations in which the hedging activities of market participants, especially in options, do seem to increase the volatility of the price of the underlying asset. It is possible that the new instruments tend to cause short-term volatility in certain circumstances but longer-term stability, particularly if the market is a broad one with a large number of participants.

A further question is whether financial innovation leads to growth in overall debt. All in all, there are indications that global integration and innovation have contributed at the margin to credit growth, particularly in the United States, whose markets and institutions have played a pioneering rôle in most of the innovations and where, because of the rôle of the dollar, the links with international markets are close. Nonetheless, looking at the record of the major Group of Ten nations, individually or on an aggregated basis, it is difficult to establish any clear causal nexus from financial innovation to aggregate credit flows in most countries.

B. Monetary policy

Monetary policy is being influenced - in some countries more than others - by the effects of innovation, deregulation and structural change:

- the scope for monetary policy to operate via changes in the availability of credit is being reduced relative to the rôle of prices (that is, interest rates and exchange rates);

- the rise in the international mobility of capital has resulted in some countries in the exchange rate increasing in importance as a channel of monetary policy;

- the many new instruments and hedging techniques available to market participants and the shift to variable rate financing can make the timing and incidence of monetary policy less certain; and

- innovation is changing and may erode the meaning and usefulness of the monetary and credit aggregates as indicators of monetary policy.

These developments may have several important implications for the conduct of monetary policy.

The external sector has become a relatively more important restraint on the conduct of an independent monetary policy in some countries, as the relative importance of the exchange rate as a channel through which monetary policy has its effect on the economy has risen along with the increasing degree of international capital mobility. For the smaller members of the EMS as well as other countries whose economies are particularly open, developments in the external sector have long been an important consideration when formulating policy. For some larger countries, the change has been more noticeable. It has become necessary in recent years in formulating policy to recognise the increasing degree of macro-economic interdependence among the industrial countries.

Moreover, the developments noted above have combined in the larger economies particularly to shift the sectoral incidence of the effects of a change in monetary policy. Although the situation varies from country to country, the rising importance of the price channel accompanied by the declining significance of credit allocation techniques means that it is no longer true that the incidence of monetary policy changes falls mainly on the housing and business fixed-investment sectors of the economy. In contrast, monetary policy increasingly has its effects on the competitive position of the export and import competing industries, with a potentially damaging effect on investment decisions in those sectors.

This is not to imply that the exchange rate has replaced interest rates as the principal channel of monetary policy in a significant number of countries or that there has been a widespread move towards exchange rate targeting. With respect to the effect of interest rates, the increased use of variable rate financing and interest rate hedging techniques can have an important influence on the working of monetary policy. Once the fear of being locked into higher interest rates is removed, the incentive to delay spending is reduced, particularly when tighter monetary policy is expected to be temporary. In addition, monetary authorities, when considering interest rate increases, must take account of the fact that under today's circumstances such increases can have more important cash-flow implications than before and may give rise to potential solvency problems over a broader component of the domestic and perhaps the international economy.

Finally, new instruments may shift the incidence of monetary policy among sectors of the economy in ways that are not easily predictable. The new instruments may concentrate risk in the financial sector, which can make it more vulnerable to large, unexpected changes in the macro-economic environment.

These various considerations will have to be taken into account and will certainly influence the way in which central banks make discretionary changes in monetary policy.

C. Financial reporting and statistics

The growth of off-balance-sheet transactions and the unbundling of different types of risks have rendered the analysis of financial statements more complex in several ways:

- for a bank's management, there are important questions about how best to account for, monitor and manage a bank's risk exposure, and how to fold in off-balance-sheet activities with its other exposure;

- counterparties and shareholders of banks and other institutions face similar problems of understanding the full scope of the institutions' activities since conventional financial statements are often not complete and are clouded by the growth of off-balance-sheet transactions;

- supervisory and regulatory measurement of risk exposure can also be significantly affected by off-balance-sheet transactions, and the authorities have taken major steps to determine how to treat them for measures of liquidity and capital adequacy, specific loan concentration limits, and for assessing the overall health of banks;

- in addition, the absence of accepted accounting techniques with respect to off-balance-sheet items allows leeway in the presentation of financial accounts that may have encouraged firms to assume more risks.

With respect to the monitoring of international capital flows, the usefulness of our international statistics has been impaired by financial innovation and structural change:

- "securitisation", that is, an increasing tendency for credit to take the form of negotiable instruments, and the expanding rôle of contingent commitments have reduced the content of available information on international exposures by taking a growing proportion of credit transactions off banks' balance sheets;

- institutions outside the present reporting systems have played an increasing rôle in credit intermediation;

- the negotiability of assets makes it more difficult to keep track of their ownership; in particular because of asset trading, changes in reporting banks' assets may not necessarily accurately reflect changes in borrowers' liabilities;

- since many off-balance-sheet transactions are of a complex nature, detailed data would be required to permit the kind of analysis that has been possible with conventional on-balance-sheet positions.

In view of these problems, consideration should be given to broadening the coverage of the data on international capital flows and, in particular, to obtaining:

- fuller and more detailed information on banks' involvement in the securities markets;

- information on the arrangements and use of NIFs and other back-up facilities;

- information from outside the banking sector on outstanding bond indebtedness and short-term securities, using where possible data from trade associations and other sources;

- information on banks' off-balance-sheet business, arranging when possible for data to be collected by supervisory authorities in a manner useful for macro-analysis.

* * *

The foregoing discussion summarises the Study Group's findings with respect to the policy implications of innovation and structural change in the international financial markets. The following paragraphs outline the factual material gathered with respect to the main new instruments actively traded in international markets, as well as the analysis of the driving forces behind the process of financial innovation and structural change generally.

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Forces stimulating financial innovation

The stimulus behind financial innovation arises from the confluence of a series of disparate trends during the 1970s and 1980s. For one thing, macro-economic trends have helped to foster stuctural change and innovation. Most important are the sharp rise in inflation and the increased volatility of interest rates and exchange rates. Higher volatility has generated an increase in the risk exposure of those financial intermediaries which fail to maintain a strict match in the term structure of their assets and liabilities. There has been a need on the part of both financial intermediaries and non-financial institutions to develop effective hedging devices and strategies to deal with the increased risks related to volatility, and there has been an incentive to develop new financial instruments which can be used to transform and shift the burden of risk. We have seen a proliferation of new financial instruments and techniques with the capability of meeting these needs.

A sharp shift during the 1980s in the geographic pattern of net flows of international savings and investment, as reflected in the distribution of current-account imbalances, has also been a contributing factor. To the extent that this shift has interacted with the distinct preferences of investors and borrowers in different geographic areas for particular forms of financial assets and liabilities, it can be held at least partly accountable for the changes in the structure of international financial intermediation and the development of new financial instruments. Thus, the sharp fall in OPEC investible surpluses and the reduced access to credit by the major LDC borrowing countries after the onset of the international debt crisis are consistent with a reduced supply of bank deposits and a matching reduction in syndicated bank credits. Similarly the switch in the rôle of the United

States from large net provider to large net taker of funds, combined with the growth of current-account surpluses in Europe and Japan, is consistent with the increased use of marketable debt instruments in international financial markets.

Another important trend has been the changing regulatory environment affecting national financial markets. There have been two aspects to this. One has been the growing worldwide tendency to deregulate and to reduce structural rigidities and barriers to competition in domestic financial markets. The moves toward deregulation (as well as the extent of previous regulation) have varied substantially from country to country, and include such measures as the abolition of exchange controls, the phasing-out of interest rate ceilings on deposit and lending activities of key financial intermediaries, the opening of domestic markets to foreign financial institutions, tax reductions and the relaxation of certain traditional boundaries limiting the types of financial activity in which particular financial institutions may engage. The other aspect of the regulatory environment fostering innovation has been the increased attention which supervisory authorities have begun to pay to the adequacy of financial institutions' capital ratios, particularly as the quality of some international and domestic assets have come into question. The effect has been to create an incentive for banks to increase their activity in business subject to less stringent capital requirements - a powerful motivation to shift to off-balance-sheet products.

Another trend which has spurred innovation and structural change is the recent widespread application of new communications and computer technology to financial markets and financial transactions. This encompasses the expansion of worldwide information and new service companies, and improvements in accounting and information-processing systems in financial institutions. Similarly the application of advanced computer technology to the international payment systems and to transactions processing generally has acted as a stimulus to innovation and structural change. The lowering of transactions costs to a fraction of earlier levels has given a powerful impetus to innovation.

Finally, growing competition in international financial markets is a factor increasing the pressure for innovation and structural change. There are at least two sources of the rise in competition over and above the worldwide trend towards deregulation, and these sources have both a direct and an indirect effect in the process of innovation. Firstly, technological change appears to foster a rise in competition as the developers of new technology seek to exploit its advantage in as many markets as possible. Secondly, the shifting patterns of savings and investment may put pressure on financial institutions whose markets are shrinking to innovate and to compete more aggressively for a larger share of their traditional market or to expand into new areas of business, and for institutions resident in geographic areas with excess liquidity to seek new ways of deploying it.

The interaction of these forces has led to an explosion in the demand for innovative financial instruments - that is, to the desire of economic agents for new vehicles that perform the functions of transferring risk, enhancing liquidity, and generating debt and equity - that help to meet the requirements of the changing financial landscape. These forces have also fostered very rapid growth in the supply of new instruments - supply in the sense of an increased willingness and ability of financial institutions to

provide, and to make markets in, these new instruments. The influence of demand and supply factors with respect to particular innovations is discussed in Part IV of the Report.

A look at four major new instruments

New financial instruments (or those that have newly re-emerged) have had a particularly prominent influence in international financial markets in the past two to three years. These newest entries to the financial arena represent the latest generation of innovative instruments. They are examined in depth in Part II of this Report on the basis of discussions with market participants, and our findings are summarised below. Each of the four instruments differs from the others in terms of form and purpose. Together they show not only the importance of the new instruments but their diversity and the pervasiveness of the spread of innovation to so many sectors and corners of the market.

1. Note issuance facilities (NIFs)

A NIF is a revolving facility which enables a borrower to issue a stream of short-term notes, generally known as "Euro-notes", over a medium-term period.

This technique separates the functions performed by a single institution in a traditional syndicated credit and allows them to be perfomed by different institutions. The function of funding the borrower's requirements is transformed from one of lending money into one of setting up a borrowing mechanism. The function of maturity transformation is turned into one of underwriting.

The credit risk is shared between the holders of the notes, who stand to lose if the borrower fails before the notes mature, and the underwriters, who face the prospect of having to take up the notes of a borrower in whom investors have lost confidence. For holders of Euro-notes, the notes are an asset and as such will appear on their balance sheets. The underwriting commitment, however, does not appear on the face of the balance sheet.

The popularity of NIFs benefits not only from the cost savings of unbundling but also from the market's current preference for lending to high-grade borrowers through securities rather than bank loans. The attractions of NIFs to a borrower are principally their low cost combined with great flexibility in the form of drawing. In a large number of cases NIFs have been arranged to replace existing, more expensive borrowings.

The market for NIFs is developing into a Euro-commercial-paper market which provides a mechanism for high-grade borrowers to raise funds cheaply without directly associated credit backing by banks. The popularity and continued future potential of NIFs is illustrated by the fact that the market has grown tenfold in the past two years to $75 billion, although outstandings lag behind at $10-15 billion. Corporate borrowers increased their share of the NIF market from around 45 per cent. in the early 1980s to more than 60 per cent. in 1985.

2. Currency swaps* and interest rate swaps

The swaps referred to in this Report are financial transactions in which two counterparties agree to exchange streams of payments over time according to a predetermined rule, which reflects interest payments and may also reflect amortisation of principal. Swap markets are utilised for several broad reasons: to obtain low-cost financing, to obtain high-yield assets, to hedge interest rate or currency exposure generated from the structure of normal business, to implement short-run asset/liability management strategies, to earn fees, and to speculate.

The currency swaps evolved as a successor to the traditional back-to-back loans, but are designed to avoid most of the drawbacks associated with that technique. Swaps do not usually increase assets or liabilities on the balance sheet, and they limit credit risk, since a performance failure by one counterparty should relieve the other party of his obligations.

Government regulations have stimulated currency swaps. Official restrictions limit access to some European capital markets, including Euro-bond sectors, and swaps can be used indirectly to access these markets. In addition, restrictions can make it more expensive for certain classes of borrowers in particular national markets. Moreover, swaps can be helpful to a borrower to gain access to a particular market where he has already borrowed heavily and investors are wary about taking on more of that borrower's debt.

The market in swaps accelerated sharply during the first part of this decade and from available evidence is most likely to continue to expand rapidly. The major step in the evolution of the swap market was the extension of the swap concept from the currency market to credit-market instruments denominated in the same currency in about 1982. At this time, the global market for swaps was estimated to be about $3 billion. By late 1982 and 1983 the swap market had evolved further and interest rate swaps began to be conducted between domestic counterparties such as regional banks and thrift institutions. Swap activity accelerated sharply in 1984 and 1985. Large commercial and investment banks developed the capacity to make markets in swaps and began to book swaps without an offsetting swap in hand. Variations on the standard "plain vanilla" swap multiplied in 1984 and 1985. Swaps became callable, extendable or deferred. Options on swaps and swaps on zero coupon bonds became common and there has been some discussion of fitting swaps to mortgage-backed securities. A market in secondary swaps has also developed, encompassing reverse swaps, swap sales and voluntary terminations. At the end of 1984 outstanding swaps were estimated to amount to $80 billion and by mid-1985 this figure had jumped to almost $150 billion. In their early stages, swaps were most often executed in conjunction with another capital-market transaction, such as the flotation of a Euro-bond. More recently, swaps have come to be traded mainly as completely independent transactions, often to transform the currency of denomination or the interest terms of assets or liabilities already on the books of a financial or non-financial firm.

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* The currency swaps under discussion here are not those traded for years in the foreign exchange markets involving simultaneous spot and forward transactions. Those under consideration in this Report in all cases involve streams of interest payments over the life of the contract, and may or may not involve exchange of principal either initially or at maturity. The same term is used by market participants to describe both types of transactions.

3. Foreign currency and interest rate options

An option is a contract conveying the right, but not the obligation, to buy or sell a specified financial instrument at a fixed price before or at a certain future date. Options differ from all other financial instruments in the patterns of risk which they produce. Both the market and credit risk patterns are asymmetrical between writers and buyers of options. With respect to market risk, the buyer has the possibility of unlimited profit if price moves in his favour but his loss is limited to the amount of premium paid (option price) if price moves adversely. Conversely, the writer is limited in his income to the amount of the premium earned, while in principle he is exposed to unlimited loss. With respect to credit risk, the writer of the option is exposed to the buyer for the amount of the premium between the transaction date and the payment of 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 has no credit risk since the buyer has no obligations to perform.

Options involve a high degree of exposure to price risk, and for this reason most option traders pursue various hedging techniques. They may lay off some of their exposure by buying options from other banks or in the option exchanges - where standardised contracts of both currency and interest rate options are traded. Alternatively, they may establish and then manage cover by buying or selling appropriate amounts of the underlying asset (delta hedging), following various mathematical formulae (e.g. Black-Scholes). Such formulae cannot assure full protection, however, since they rely on estimates of future volatility, and also because transactions costs can quickly mount up in unsettled markets.

Options have existed for many decades on foreign currencies or interest rates. Active trading, however, surged in the early 1980s spurred by growth in customer demand, as both corporate customers and institutional investors began to express a wish that banks offer, for a fee, what amounted to insurance against the effect of rising interest rates as they reached unprecedented levels and as exchange rates became increasingly unpredictable.

Growth of this market, however, has been hindered relative to the markets for NIFs and swaps owing to the sheer complexity of options, and as a result there is a lack of uniform rules governing accounting regulations and procedures, such as the booking of premium income. In addition, the absence or ambiguity of regulations governing the trading and tax treatment of options has been a factor limiting the further expansion of the market in some countries.

4. Forward rate agreements (FRAs)

An FRA is an agreement between two counterparties, one wishing to protect itself against a future rise in interest rates and the other against a future fall. Without any commitment to lend or borrow the principal amount, the parties agree to an interest rate for, say, a three-month period beginning six months hence. At maturity, they settle by paying (receiving) only the difference between the interest rate agreed earlier and the then current interest rate.

FRAs are used mainly by banks and some non-bank customers for the sole purpose of hedging interest rate exposure. There is little use of FRAs as a source of arbitrage profits. The FRA is the least visible, least risky of the four new instruments discussed in this Report.

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. A forward/foward deposit or loan ensures the availability of a deposit or loan at a certain price in future but at the same time expands a bank's balance sheet. An FRA covers the interest rate exposure without expanding the balance sheet, but does not ensure the availability of a deposit or loan.

The main attraction of FRAs is the fact that they cover interest rate exposure without expanding the balance sheet and enable banks to reduce their interbank book (in some cases by as much as 40 per cent.) to the benefit of capital ratios and return on assets.

An FRA is in effect an over-the-counter cash-settled financial future. It offers some advantages over traditional financial futures in terms of simplicity, flexibility, absence of margin requirements, and the possibility of an instrument tailored to meet exactly an interest rate mismatch. But it is less attractive in other respects; most importantly, it lacks the advantages of a central market-place where instruments can be bought and sold. Differing accounting treatment in a number of countries and differences in some nations' gambling laws can alter the relative attractiveness of the two instruments. Also, the FRA may involve greater credit risk because of the absence of margin requirements or exchange backing.

FRAs or similar instruments have been offered for about two years, and the volume of business continues to grow rapidly. Towards the end of 1985, it was estimated that deals with notional principal of about $7 billion were being done each month.

The broad process of financial innovation

The scope of this study is not limited to these four new instruments - NIFS, swaps, options, FRAs - which represent the latest wave of innovation. Our interest also encompasses "innovation" in the form of other instruments introduced earlier which have grown enormously in use and importance - such items, for example, as floating rate notes, asset sales and financial futures. But the focus of this Report is not directed just toward individual instruments or techniques - we are looking more broadly at the process of financial innovation taken as a whole.

In that wider context, the evolution of international financial intermediation over recent years has shown three main strands: firstly, a trend towards securitisation and a related blurring of distinctions between bank credits and the capital markets; secondly, the increasing importance of off-balance-sheet business; and thirdly, the global integration of financial markets. These trends are discussed in Part III.

The first of these trends, the move towards securitisation, has been driven by the broad forces described earlier, but also by certain more specific influences. Firstly, the gradual decline of long-term interest rates from the abnormally high levels of several years ago and the restoration of positive-sloped yield curves have clearly enhanced the appeal of long-term marketable instruments and facilitated the recovery of bond markets. Secondly, the impact on banks' portfolios of the international debt problems has stimulated banks to improve the liquidity and marketability of their other assets and has

encouraged them to strengthen their balance sheets by funding themselves through longer-term bond issues. Thirdly, the highly publicised problems of a few banks in various countries and the weakening of banks' balance sheets more generally because of exposure to problem debtors at home and abroad have impaired banks' comparative advantage as a channel for lending, at least to prime borrowers with recourse to securities markets.

Securitisation has shown up in a massive shift from international bank credit to international securities markets. Between 1981-82 and the first half of 1985, syndicated Euro-bank loans fell by a factor of four (from $100 billion to an annual rate of $25 billion), while international bond and note issues rose by a factor of almost four (from $44 billion to an annual rate of about $160 billion), and NIFs, also a securitised instrument, grew very rapidly as well.

The banks' balance sheets have reflected the trend towards securitisation in many ways other than the decline in international loan activity. On the liabilities side, banks have become far more important borrowers in the international bond markets, motivated by the need to strengthen their capital bases, by a desire for closer symmetry between their long-term lending and their funding, and by the new opportunities to benefit from participation in interest rate and long currency swaps.

On the assets side, banks' own holdings of long-term marketable securities have increased strongly in most if not all countries for which information is available. Also, innovative steps have been taken to increase the marketability of bank assets by such techniques as sales of participations, loan swaps and loan sales, and, mainly in the United States and the United Kingdom, by using assets such as mortgages, automobile loans and export credits as backing for marketable securities.

All of these changes have important ramifications for banks, not just in their balance sheets, but also in their sources of income, their modes of operation, their management strategies and indeed the very structure of the banking industry and the rôle of banks versus other financial institutions in the intermediation of international financial flows.

Closely related to the trend towards securitisation, and to some extent a by-product of it, is the increasing importance of off-balance-sheet items in international banking. Banks have become strongly attracted to off-balance-sheet business, in part because of the increased focus on and desire to improve return on assets, and in part because of constraints imposed on their balance sheets by the need to improve capital ratios. They have looked for ways to hedge their interest risks without having to inflate balance sheets by recourse to the interbank market.

All four of the most recent new instruments discussed above - NIFs, swaps, options, FRAs - and many additional ones feature off-balance-sheet business, and in some cases much of their attractiveness depends on that feature. The growth in off-balance-sheet items has been spectacular. The volume of international back-up facilities in the form of NIFs, one of the most successful off-balance-sheet items, has grown extremely rapidly. Euro-dollar futures, used by international banks to hedge interest risks without expanding balance sheets by interbank operations, have grown fourfold in the past two years, and have become by far the most important item traded in the financial futures exchanges.

The third main trend in international financial intermediation in recent years has been the sharp acceleration in global integration of financial markets. It is now possible to discern the outlines of what could be called truly global markets for individual financial instruments. This process of integration has been greatly helped by - and has itself greatly contributed to - the tide of deregulation and dismantling of domestic and international controls that most or all industrial nations have, to a greater or lesser degree, experienced in the past decade. Technology has made this high degree of integration possible by cutting transactions costs drastically, facilitating the prompt dissemination of information and linking different exchanges and markets. The borderlines between international and individual domestic markets are becoming increasingly blurred. Securities markets as well as the banking sector are becoming globally integrated, fostered in part by the growing international diversification of investment. The high degree of integration is leading to alternative sources and methods of finance becoming close substitutes, with the result that differences in the level of real returns between various financial markets tend to be rapidly offset by capital flows.

The future of innovation

To what extent will the dramatic growth of markets in new financial instruments continue and to what extent are the factors behind rapid change temporary?

Certainly, the exceptional economic circumstances of the early 1980s - high inflation, volatile interest and exchange rates and sharp changes in the creditworthiness of large economic sectors - were major spurs to innovation. Within that environment, the innovations themselves were, to some extent, an effort to restore the kind of world that existed before those events erupted. A more stable environment would therefore reduce many of these incentives for financial innovation.

There are, however, 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 certainly going to continue. But even beyond technology, the momentum for two other broad forces - the global integration of financial markets and the institutionalisation of financial innovation - is likely to continue.

The global integration of national financial markets has many aspects: around-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 create profit opportunities that might be described as the substructure of financial innovation. International integration is affecting the diffusion of new instruments as well as their development. As the new instruments developed, pressures arose for liberalisation in the domestic financial markets in Europe and Japan. The moves by the 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 forces of the global integration of overall economic structures. These linkages through increased trade, investment and travel are 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 more permanent support for the process of financial innovation.

Moreover, the shift from banks to direct credit channels that has occurred in recent years has led to the development or revival of financial markets in some countries. Bond markets that were inactive in some countries have been restored. This has been viewed in the countries affected as a healthy result of innovation.

It should be acknowledged, however, that the current trend toward greater reliance on capital markets as channels of credit to the large prime borrowers reflects to a large extent the particular circumstances of the present, and the market's view about the relative credit-rating of banks versus the major corporations, as well as other reasons. Perceptions will change as conditions change, for both banks and large prime borrowers. For example, strengthened bank capital can improve the perceived attraction of bank intermediation, and a shift of credit flows back into the banking system is certainly possible and has occurred in the past.

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 research and development relation - holds that there is at least a statistical 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. In the past few years a number of the major international financial institutions, both investment and commercial banks, have established "new products" groups within their organisational structures.

If the institutionalisation of financial innovation endures, it may change the economics of 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 in part a function of the quantity of resources committed to product development. In other words, future financial innovation may be generated by a dynamic that does not rely on the developments in the economy that generated innovations in the past. New instruments, or variations in existing ones, may be developed to exploit not just a few major profit opportunities but a large number of minor ones.

Part II

New financial instruments

This second part of the report examines in separate chapters four new types of instruments - note issuance facilities, currency and interest rate swaps, currency and interest rate options and forward rate agreements - which in the past two or three years have become prominent in international financial markets.

Each chapter describes the principal characteristics of the specific innovation, the manner in which the structure of each market has evolved over time, the function and purpose of the instruments and the nature of the risks to which they may give rise. The chapters report the findings of extensive discussions carried out with market participants in the different financial markets and also look at some unresolved policy questions, in particular those having to do with accounting practices.

Chapter 1

Note issuance facilities (NIFs)

A. The instrument

Note issuance facility (NIF) is the most common of several terms used to describe a medium-term arrangement under which a borrower can issue short-term paper,[1] known as Euro-notes, backed up by commercial-bank underwriting commitments. Other terms - which are specific to either particular organisations or to specialised types of facility - include revolving underwriting facility (RUF), note purchase facility and Euro-note facility.

A rather different instrument, also discussed in this chapter, is the non-underwritten NIF, known generally as a Euro-commercial-paper programme. These arrangements closely parallel commercial-paper issuance in the United States, which is usually done without any underwriting or back-up facility explicitly attached.[2] This chapter mainly describes NIFs, however, since these facilities entail off-balance-sheet underwriting commitments by banks.

1. Definition

A NIF is a medium-term legally binding commitment under which a borrower can issue short-term paper in its own name, but where underwriting banks are committed either to purchase any notes which the borrower is unable to sell, or to provide standby credit. For bank borrowers the paper is usually short-term certificates of deposit, while for non-bank borrowers it is in the form of promissory notes (commonly known as Euro-notes).

The NIF commitment is typically for five to seven years, while the paper is issued on a revolving basis, most frequently for maturities of three or six months. Over time a broader range of maturities has become available, including maturities up to one year, as short as seven days and odd dates. Most Euro-notes are denominated in US dollars and are issued with high face values (often $500,000 or more), intended for professional or institutional investors rather than private individuals. Holders of notes (whether or not they have underwritten the facility) show them as an asset on their balance sheets, but an underwriting commitment normally does not appear on the face of the balance sheet.

The NIF has been successful mainly because it allows the various functions performed by a single institution in a syndicated credit to be separated and performed by different institutions. Instead of lending money, as in a syndicated credit, the NIF arranger provides a mechanism for placing notes

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1 Throughout this report, the terms underwriting and underwritten are intended to refer to the broad process whereby banks commit themselves under certain circumstances to acquiring notes or making advances to issuers. The use of these terms should not be taken to mean that these banks are engaged in securities underwriting as defined in national law.

2 Most commercial-paper issuers do, however, arrange a separate standby commitment in support of their programme, generally to ensure a better credit-rating on their paper.

with other investors when funds are required. Maturity transformation (assuring the borrower access to short-term funds over the medium term) is provided by the underwriting commitment, which remains off-balance-sheet unless called upon. Short-term credit risk is taken by the holders of the notes, who stand to lose if the borrower fails before the notes mature, but longer-term credit risk is taken by the underwriters, who face the risk of having to lend to a borrower in whom investors have lost confidence.

2. Growth and evolution

The NIF market has expanded with striking speed, especially in 1985. NIF techniques continue to evolve, particularly in the areas of paper placement and borrowing options, the changes designed mainly to enhance the flexibility and attractiveness of the instrument to borrowers, and to a lesser extent to investors as well.

The first publicly announced facility was arranged for New Zealand in 1981 (although earlier unpublicised facilities are believed to have been arranged). In that arrangement, the managing banks fully underwrite the issue of notes, which they purchase on a discount basis at a yield of 1/4 per cent. per annum over LIBOR. The notes are either held by the managing banks or distributed to other investors. An underwriting fee of 1/4 per cent. per annum is paid as long as the facility is not drawn.

An alternative technique, known as a revolving underwriting facility (RUF), was developed in 1982. It differs from the first technique in separating the functions of underwriting and distribution. The lead manager acts as sole placing agent and is responsible for placing any notes issued. The underwriters take up any notes which cannot be placed or extend loans of an equivalent amount. (This may be necessary in some cases to enable interest to be paid gross of withholding tax.) This technique is attractive to the lead manager, which retains total control over the placing of the notes and is able to earn a small placement profit (by placing the notes at a higher price than it pays).

The sole placement agency technique had two drawbacks. Firstly, since the notes were placed by the lead manager, the underwriters could not be sure of securing any notes to place themselves. In 1983 a facility incorporating a tender panel of banks was developed for the distribution of notes. The tender panel is separate from, but usually with many members common to, the group of underwriters. The panel members bid for any notes issued, up to a predetermined maximum spread. The underwriters take up any notes not bid for or extend loans of an equivalent amount. This technique allows the borrower to benefit from any improvement in terms available in the market, while still being assured of funds at a known maximum cost. The tender panel banks generally expect to place any paper they receive rather than hold it themselves. The tender panel technique was further extended in 1984 through the system of a continuous tender panel. Under this method the underwriters are entitled to purchase notes from the lead manager up to their pro rata share at any time during the offer period, subject to availability, at the price at which notes are being offered to the market. This gives the underwriters access to paper which they can place with their clients.

The second shortcoming of the sole placement agency was that the spread on notes was preset and consequently borrowers could not benefit from

any improvement in the terms available. This shortcoming was removed by arranging NIFs with an issuer-set margin. Under this technique the issuer determines the margin over LIBOR at which notes will be offered and thus is able to benefit from any improvement in market conditions. The notes are placed by the placing agent, but senior underwriters have the right to take up a prearranged share of any notes issued. Any notes not taken up at the issuer-set margin are allocated to underwriters at the pre-agreed maximum (cap) rate.

By the middle of 1985, the tender panel technique was being used in about two-thirds of NIFs, with the issuer-set margin accounting for a further 15-20 per cent. Many older facilities using sole placement were modified to include a tender panel. More recently, greater quantities of paper have come to market, and the debate on the most appropriate distribution method has intensified. The tender panel continues to be widely used, but many question whether the technique promotes efficient placing of paper with investors. Increasingly, dealerships of two or three firms have been formed, which ensure that competitive pricing is available to the borrower. In addition, the dealers are sure of receiving paper to place whenever the borrower decides to issue, and therefore can maintain more regular investor relationships.

The multiple component facility, first used by the Kingdom of Sweden in 1984, is another major development in the market for Euro-notes. This type of facility allows the borrower to draw funds in a variety of forms, including short-term advances, swingline credits, bankers' acceptances, etc., all of which have been included with a NIF. The borrower gains greater flexibility in choosing the maturity, currency and interest rate base of his drawings. The variety of forms enables the borrower to draw funds in a currency in which Euro-note issuance is not permitted.

A growing proportion of new facilities include extra borrowing options, to the degree that few facilities now are arranged with just a note issuance option. The most popular option is short-term advances, which enable borrowers to draw in a greater number of currencies and are also preferred by some banks as an alternative to holding notes. Advances options were included in around 45 per cent. (by value) of the underwritten facilities arranged in 1985.

Swinglines enabling borrowers to draw at short notice (generally same-day funds in New York) to cover the delay in issuing notes or making other forms of drawing were included in 35 per cent. (by value) of underwritten facilities arranged in the same period. (It is likely that more facilities include this and other options than are publicised.)

Bankers' acceptances, generally in US dollars and pounds sterling, are a fairly recent addition, first appearing in a facility for ICI in March 1985. Since then a growing number of facilities have included this option. The option featured in around 10 per cent. (by value) of underwritten facilities arranged in 1985.

The ICI facility was also the first to include an option for the issuance of sterling 1-5 year notes, which was made possible in March 1985 by changes in the UK Banking Act. Several further facilities - all for UK or US borrowers - have included the option, although it is not thought that any such notes have yet been issued.

Multiple component facilities enable the borrower to draw funds under whichever option is cheapest or most convenient at the time, or can be tailored to meet the borrower's particular funding requirements. An example of the latter is the borrower's option for notes and underwritten standby (BONUS) technique. Under this technique, first used by Volvo in 1985, an uncommitted NIF, a US commercial-paper (CP) programme, and a committed standby, each for the same amount, are combined in a single package. If conditions are unfavourable for the issue of Euro-notes or commercial paper, the borrower can draw on the standby as a revolving credit.

In favourable conditions, the borrower can issue the full amount of both the commercial paper (supported by the backstop, as a swingline) and the notes (sold via a tender panel on a best-efforts basis). Under these circumstances, outstanding paper will total twice the value of the committed standby, but the underwriting banks remain committed only for the amount of the standby. By contrast, under a conventional underwritten NIF, once the notes have been issued and placed with investors, the underwriting commitment cannot be used to back up any other facility.

A number of transferable RUFs (TRUF) have been arranged. Each underwriter has the ability - usually subject to the prior approval of the borrower - to transfer all rights and obligations under its underwriting commitment to another institution at any time during the life of the facility. This practice, however, might be undesirable for the borrower if banks less creditworthy than those who originally made the commitments are substituted. (It is not known in how many cases the borrower has any real power of veto.) Twelve facilities in 1985 (value $2.8 billion) can be identified as including this provision. It is likely, however, that there are similar arrangements in other facilities.

3. Non-underwritten facilities

As mentioned in the introduction, more NIFs have recently been arranged partly or entirely without underwriting commitments. The appearance of such facilities dates back to the second half of 1984, but the trend may have been encouraged by the actions of some supervisors in 1985 to include underwriting commitments in measurements of capital adequacy. Non-underwritten NIFs expanded from about 5 per cent. of the total of NIFs arranged in the second half of 1984 to about 15 per cent. in the first half of 1985 and in the second half reached nearly 50 per cent. These facilities are similar to underwritten NIFs except that they do not include underwriting or a standby credit in case notes cannot be sold. The borrowers under such facilities are of the highest credit rating and are therefore confident of their ability to sell notes. As a result they are able to dispense with the cost of underwriting a separate back-up (although many borrowers will already have considerable unused bank lines).

The details of non-underwritten facilities often remain sketchy. They often take the form of a general undertaking by the arranging banks to place notes for a borrower if required, rather than a facility which is likely to be substantially drawn. Some are even for an open-ended amount and maturity.

Since the middle of 1985, NIFs have become more like US commercial-paper programmes. The issuance of notes has been separated from the standby arrangement, more paper is issued for shorter and odd maturities, quick

drawdowns are available (same-day funds in some cases), rates are set on an absolute basis (instead of a spread over LIBOR), and paper has been rated in a small number of cases. Such non-underwritten facilities are known as Euro-commercial-paper programmes, and should be considered quite separately from underwritten facilities as they entail no bank commitments to back the issue of notes.

A major distinction between Euro-commercial-paper facilities and standard NIFs concerns the process of note issuance. Under a NIF, the issuer requests propositions for a given amount of paper on a given date, while Euro-commercial-paper issuance can be driven by the market (the dealers), who bid for paper from the issuer in response to investor demand. Variable maturities are also more generally available under the Euro-commercial-paper structure, as is same-day settlement. Several clearing systems can arrange same-day settlement, either by physical delivery or more commonly by book entry. Under at least one facility, note issue is purely a book-keeping exercise as no physical notes ("definitive instruments") are in fact issued.

Facilities can quickly become outdated in a rapidly changing market. It is not uncommon to revise a facility substantially after only a few months to incorporate new features. Thus there is no definitive Euro-note facility, but rather a spectrum of facilities incorporating various methods to issue notes, different forms of drawing and back-up. It seems likely, however, that the market will converge on one or a few standard formats as it matures. Most probably a distinction will emerge between mostly non-underwritten commercial-paper programmes for the very top borrowers and underwritten NIFs (possibly with a number of extra borrowing options) for other borrowers.

B. The market for NIFs

1. Structure of the market

The NIF market has evolved through three roughly distinguishable phases. In the first phase (1981-83) facilities were generally for fairly small amounts (up to $300 million). The main borrowers were banks and OECD governments and state entities. There were also several facilities for Latin American borrowers. At that stage, many facilities were essentially disguised syndicated loans.

Late in 1983 and throughout 1984 the techniques rapidly gained popularity, mainly as a low-cost substitute for syndicated credits. High-quality corporate borrowers entered the market, and a number of very large multiple component facilities were arranged for smaller but good-quality OECD sovereign borrowers such as Sweden, Spain and Denmark. The introduction of these better-quality borrowers and the growth in the market encouraged a wider range of banks to take underwriting positions, and in the process they insisted on being given a chance to bid for and place paper. The latter development led to the introduction of the tender panel as an alternative to the sole placement agency. The average size of facilities grew from under $200 million in 1982 to over $500 million.

In the third phase (1985), non-bank corporations from major and minor OECD countries, particularly the United States, Australia and the United Kingdom, became the largest borrowers. Corporate borrowers rose from an

average of 41 per cent. of the market in the previous four years to over 60 per cent. For these borrowers NIFs are not an alternative to syndicated loans, but an alternative or a supplement to FRNs and to US commercial-paper programmes.

Table 1.1

Geographical distribution of borrowers in the NIF market*

	1981	1982	1983	1984	1985
	in billions of US dollars				
Major OECD	-	0.53	1.73	6.31	29.27
of which: France	-	-	*0.78*	*1.24*	*2.98*
Netherlands	-	-	-	-	*1.32*
Switzerland	-	-	-	*1.10*	*0.07*
United Kingdom	-	-	-	*0.70*	*3.81*
United States	-	*0.43*	*0.35*	*3.05*	*17.52*
Minor OECD	0.50	1.17	1.25	11.24	17.55
of which: Australia	-	*0.25*	*1.03*	*2.70*	*7.89*
Denmark	-	-	-	*1.02*	*0.40*
New Zealand	*0.50*	*0.10*	-	*2.05*	*0.74*
Sweden	-	*0.05*	*0.07*	*4.73*	*4.81*
Others	0.53	0.67	0.31	1.28	2.67
of which: developing countries	*0.53*	*0.58*	*0.15*	*0.27*	*1.00*
oil exporters	-	*0.05*	*0.10*	*0.23*	*0.52*
international institutions	-	-	-	*0.50*	*0.85*
Total	1.03	2.37	3.29	18.83	49.49
of which: underwritten NIFs ..	*1.03*	*2.37*	*3.29*	*18.20*	*33.14*
non-underwritten NIFs/Euro-commercial-paper programmes ..	-	-	-	*0.63*	*16.35*

* These data record the value of facilities arranged rather than drawings. They include underwritten and non-underwritten facilities (Euro-commercial-paper programmes) and multiple component facilities. Compilation is by announcement date.

Source: Bank of England.

In 1985 nearly two-thirds of the total facilities arranged were for the borrowers of just three countries - the United States (35 per cent.), Sweden (10 per cent.) and Australia (16 per cent.). Non-OECD countries (including developing, oil-exporting and eastern European countries) accounted for only around five per cent. A few facilities were also arranged for international institutions.

Although the market is at present dominated by OECD borrowers, there are signs that less-developed countries are becoming more active. Already several borrowers from South Korea, Singapore, India and Indonesia have arranged facilities, although mostly for small amounts. As the market becomes more established, it is possible that something approaching the range of borrowers with access to the syndicated credit markets will also be able to arrange NIFs.

Table 1.2

Type of borrower in the NIF market

	1981	1982	1983	1984	1985
	in percentages				
Government	48.7	25.3	-	40.2	7.7
Financial	9.8	29.3	53.9	17.1	27.5
Industrial	41.5	45.4	46.1	40.1	63.0
International institutions	-	-	-	2.6	1.8

Source: Bank of England.

Facilities have predominantly been arranged in US dollars; a few have been arranged in Singapore dollars, and multiple component facilities often offer ECU notes as an alternative form of drawing. The issue of Euro-notes in pounds sterling, Swiss francs, Deutsche Mark or yen has not been permitted, although it is believed that there would be considerable interest in issuing notes in some of these currencies if it were allowed. (Sterling 1-5 year notes were permitted in certain circumstances by a UK regulation change in March 1985.) Activity in the market remains centred largely in London. In some centres, such as Singapore, a small local market has developed, catering mostly for domestic borrowers and with notes issued in local currency rather than US dollars.

Table 1.3

Alternative borrowing options included in NIFs

	1984		1985			
	3rd quarter	4th quarter	1st quarter	2nd quarter	3rd quarter	4th quarter
	in billions of US dollars					
Short-term multicurrency advances	1.60	1.95	2.20	6.85	1.93	3.92
Swingline	0.52	1.95	3.08	5.56	1.00	1.89
Bankers' acceptances (generally US dollar and pound sterling)	-	-	0.48	0.94	1.45	0.79
Pound sterling 1-5 year notes	-	-	0.45	1.82	0.30	0.12

Source: Bank of England.

2. Drawings on NIFs

Although more than $75 billion of facilities (including multiple component facilities) has now been arranged ($17 billion of which is non-underwritten), the proportion of facilities actually drawn remains quite low. According to some estimates, no more than $10-15 billion of Euro-notes has been outstanding under the facilities at any time. In addition, some multiple component facilities have been drawn in other forms, such as short-term advances or bills of exchange. There are various reasons for this low use of facilities. A large number of facilities have been arranged as back-up lines to US commercial-paper programmes, but have remained as a back-up since interest costs on commercial paper have been lower than on Euro-notes.

The usage of NIFs in any case should be expected to build up gradually. Some NIFs were arranged in anticipation of borrowing needs, but many others were explicitly designed as standby facilities. Other facilities may only be drawn down in stages to avoid flooding the market with paper.

Recently the number of drawings has begun to pick up. Secondary market bid and offer prices are publicly available for the notes of around a hundred different borrowers, both in the press and on screens, although there is no indication of the volume of secondary-market trading (which is believed to be very small).

Little is known about the identity of investors in the notes issued under NIFs. The underwriting function on NIFs has largely been assumed by commercial banks, with US, French, Japanese and some Canadian, Swiss and UK banks being prominent.[3] These banks seem to hold only nominal amounts of paper, mainly in their cash management portfolio (they may be less inclined to do so when interest rates are rising). Banks do not generally consider Euro-notes as an investment vehicle and little paper has been placed with the underwriting banks. Until recently most of the paper was placed with smaller banks, since placement of paper with non-bank investors is not very highly developed.

There are differences of opinion about which banks hold Euro-notes. French, Italian, Canadian, Middle Eastern and (increasingly) Far Eastern (for example, South Korean) banks are mentioned as note holders, although no data are available. Japanese banks are thought by some to be particularly important, partly because they may have access to cheap funding through interest rate swaps. But their interest in holding notes is limited by the very low yields on most notes and the generally short maturities, which may not fit in with their investment policies.

Only a minority of notes is held by non-bank investors, although the proportion is rising. According to various estimates, in early 1985 non-bank investors purchased between a quarter and a third of notes issued, roughly double the proportion of 1984. By late 1985 some firms with strong placement ability claimed that 50 to 75 per cent. were sold to non-banks, and several firms organised familiarisation seminars for potential investors. The principal non-bank investors appear to be money-market fund managers, corporations, insurance companies, wealthy individuals and (for some issues) central banks. For these investors Euro-notes offer an alternative to bank deposits, which may have lower credit-standing than the liabilities of some prime non-banks. Many may also be able to earn a higher return than is available to them on Euro-currency deposits. For example, a non-bank investor may be unable to place in volume at LIBID in the deposit market, but can purchase notes at just a few points below. A firm's existing customers may therefore invest in Euro-notes as an alternative to bank deposits or certificates of deposit.

A number of obstacles are cited in explanation of non-bank investor reluctance. Firstly, the paper often has a high face value, generally $100,000-500,000, which is considerably higher than the $10,000-50,000 typically found on FRNs. Large denominations may exclude smaller banks as well as non-bank corporate and institutional investors. To counter this problem, some recent facilities have provided for notes in denominations as low as $10,000.

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3 Euromoney lists the top ten underwriters in 1985 as Banque Nationale de Paris, Crédit Suisse, Orion Royal Bank/RBC, IBJ, Sumitomo Bank/Sumitomo Finance, Bankers Trust, Crédit Lyonnais, Swiss Bank Corp./SBCI, Bank of America and CIBC Ltd.

Secondly, the paper is not generally rated (unlike US commercial paper). Certain major investors are restricted by their articles or regulations to purchases of rated paper only, and corporate treasurers are often prevented from investing in Euro-notes by stringent credit approval requirements. This problem may soon fade, since both Standard and Poor's and Moody's rating services have begun to rate Euro-notes. There is concern, however, that some dealers may be misleading investors by quoting a borrower's US rating as also applying to their Euro-notes. At times a US rating is based on backing by an irrevocable letter of credit (which is used to improve the rating), but is not available for Euro-notes.

Thirdly, the secondary market for notes remains relatively undeveloped. Trading is thin and concentrated in the first few days after notes are issued. Most short maturity notes are apparently held to maturity. There is some secondary-market activity in the three and six-month maturities. Some, but not all, traders make a market in the paper they sell, although the lead manager of the facility would not necessarily expect to support prices in the secondary market in the way that it would for FRNs.

An active secondary market is a requisite for assuring investors of liquidity, in part because it allows investors to obtain desired maturities not available in the primary market. This function is becoming less important as variable maturities and investor-driven issuing have begun to emerge. In the absence of these developments, an investor seeking a two-month asset might purchase a three-month note and then sell it in the secondary market after two months, or buy a three-month note with two months left to maturity. It is now becoming possible for investors (through a dealer) to request that an issuer make available paper of the required maturity. Maturities tailored more closely to individual investors' requirements may therefore become more commonplace over time and the artificial maturity creation function of the secondary market may become less important.

The handful of firms most active in distributing paper are making great efforts to broaden the investor base, and there are signs that a multi-tier market may be developing. Many borrowers issue at a margin over LIBOR and their notes are held largely by banks. Better regarded borrowers can issue at around LIBID, and such investments are an alternative to bank deposits for non-bank investors. The very top borrowers (some sovereign-guaranteed borrowers and multinational corporations) are able to issue at yields of around 1/16-1/8 percentage points below LIBID, and such notes are comparable in investment to certificates of deposit. Euro-notes thus compete with several different investments.

At least one borrower (Canada's Export Development Corporation) has been able to sell paper at even lower yields: 25-30 basis points below LIBID for six-month paper, 45 basis points below for three-month and even 60 basis points below for 30-day paper. There are several reasons for these low yields. Firstly, attempts have been made to attract the US Treasury bill investor, for whom the notes can be viewed as offering a sizable differential (say, 50 basis points) above the return on Treasury bills rather than a similar differential below the benchmark of LIBOR or LIBID. Secondly, the tranches of borrowing have been kept small. Thirdly, the notes have flexible maturities and unusually small face values ($10,000 compared with $100,000). Fourthly, the programme's dealers have been successful in placing paper with niches of untapped investors. Investors in the paper, in order of importance, are said to be Swiss institutions, central banks, corporate investors and Japanese entities.

While only an extremely limited number of issuers can attain such low yields, there are already signs that other top borrowers are seeking similar results. Many market practitioners believe that lower yields relative to LIBOR are attainable and that purchases by non-banks (on which increasing volume depends) can be increased. This will require a continuing process of education to familiarise investors with the concepts, attractions and issuers of Euro-notes. The routine rating of notes is also an important factor.

3. Standardisation and documentation

The documents prepared for a NIF typically include agreements covering the underwriting of the notes, the issuing and paying agency and operation of the dealership or tender panel, and a brief information memorandum for circulation to prospective note buyers. The notes themselves are generally bearer instruments, and so must be printed to high security standards. It is not usual to prepare a prospectus.

The documentation for each facility is drafted separately taking into account the individual circumstances of the borrower, but on the basis of more or less standardised master contracts. The documentation seems to follow a general pattern closely based on that for syndicated credits with only minor variations. For the protection of the underwriter, covenants and "escape" clauses nearly identical to those in syndicated credits are being used. These fall into two distinct categories: firstly, those which relate directly to the borrower's circumstances; and, secondly, those which relate to external circumstances.

The clauses relating directly to the borrower's circumstances are generally the same as in a conventional syndicated credit and include cross default and negative pledge clauses and representations and warranties (legal and fiscal). However, most contracts also include one of two sets of special clauses. The first contain specific convenants: for example, that the borrower undertakes to maintain a given "own funds" ratio or that the funds borrowed must be earmarked for a specific use. The second, generally entitled "material adverse change" (MAC) clauses, specify that the underwriting banks may by majority decision obtain release from their commitment if they ascertain and are able to prove that a major change - in the activities, assets or ownership of the borrower - impairs the borrower's ability to repay.

US corporations have preferred the former type of clause, objective covenants, since under Financial Accounting Standards Board (FASB) Statement No. 6 they are permitted to treat such facilities as long-term borrowings. Thus, replacing a revolving credit facility with a NIF can improve their reported liquidity by substituting what are shown as long-term borrowings for what are shown as short-term borrowings.

Views differ on the degree of "comfort" underwriters may take from these clauses. Some banks see covenants as providing mere early warning signals, which would do no more than trigger talks when a borrower's situation has started to slip. Others, however, believe that these covenants would allow banks to extract themselves from the underwriting commitment, provided they are unambiguously worded.

The clauses relating to external circumstances include either an increased cost clause, which permits the underwriting banks to pass on to the borrower the consequences of a change in national legislation which leads to an increase in the costs borne by the underwriters, or clauses relating to changes in market conditions such as the method of quoting the currency, the calculation of the benchmark rate, or the impact of exchange controls.

A majority of underwriting banks have to agree on certain of these provisions before they can be invoked.

4. Bank and investment-bank marketing strategies

For investment banks the NIF technique has the attraction of transforming an activity for which they have no particular expertise or capacity (taking deposits and making loans) into one of their traditional activities (placing paper with investors). A number can draw on their experience as sole or joint placers of commercial paper in the United States. The most prominent arrangers of NIFs have been either investment banks or the merchant banking arms of commercial banks.[4] As well as front-end fees for arranging facilities, these banks are able to earn placement profits from placing notes with investors at lower yields than those at which they received them. They generally do not expect to have any exposure to the borrower. However, they are not always able to withstand the pressure to join the underwriting group.

The commercial banks, too, consider it in their interest to act as the arranger, which enables them to keep the custom of the issuers and to benefit from any spin-off business (such as other borrowings or foreign exchange transactions). On the other hand, banks have little desire to participate in a subordinate capacity (at the level of manager or underwriter). That rôle can use up internal (and, in some countries, regulatory) customer limits for a small return. In addition, undertakings to lend in the future can cause difficulties for liquidity management.

Nevertheless, not infrequently banks have joined underwriting facilities at very thin margins, mainly in order to maintain customer relationships. Banks have joined in the arrangement of prestige facilities (for example, Kingdom of Sweden and Nestle), and when the facility replaced a syndicated credit in which the bank was involved. Some banks participate in order to retain a presence in the market, and so that their foreign office networks might also maintain their share of the market in certain highly competitive financial centres (for example, London or Singapore).

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4 Euromoney lists the top ten arrangers of facilities in 1985 as Citicorp Investment Bank, BankAmerica Capital Markets Group, CSFB, Merrill Lynch Capital Markets, Morgan Guaranty, Chase Manhattan Ltd., Salomon Brothers International, Bankers Trust Co., S.G. Warburg & Co. and Bank of Tokyo International.

5. The attractions of the instruments

Borrowers like NIFs because of their low cost and great flexibility. An issuer may use a NIF for funding or to hold in reserve as a standby facility. A NIF that is drawn regularly may replace an alternative source of variable rate funding, such as a floating rate note (FRN) or a syndicated loan. (The most notable drawback is the lack of choice on currencies.) Under present market conditions, a number of NIFs have been arranged to replace existing, more expensive borrowings. When arranged as a standby, a NIF may back up other types of financing, such as US commercial paper, or act as an emergency funding source.

For US corporations the US commercial-paper market probably remains the cheaper source of funds in most cases. Therefore, most of the US corporate NIFs, while giving the borrower the option to issue in London, for the present serve as supplements, and perhaps ultimately as substitutes, for the corporations' domestic revolving credit arrangements that back up their commercial-paper programmes. For non-US corporations, the NIF (Euro-commercial-paper) market may be as cheap as the US commercial-paper market, given the premium that foreign issuers pay in the commercial-paper market. This is particularly true for new issuers who must go to the time and trouble of obtaining a rating before they can enter the market. Other borrowers who require flexible financing but who have neither the size nor the rating necessary to gain access to the US market may also see advantages in entering the Euro-market, especially as it matures.

6. Regulations, government restrictions and accounting considerations

The Appendix to this chapter contains details of the differing regulatory approaches to the underwriting commitments under NIFs and RUFs adopted by member countries. Although no common approach is yet discernible, most supervisory authorities have either already instituted regulations governing commitments under such facilities or are actively considering them. In many cases underwriting commitments are covered in some way by existing regulations.

In April 1985 the Bank of England required banks in London to include underwriting commitments under NIFs in the measurement of capital adequacy. As a provisional measure, pending the outcome of a review with banks and other institutions of the full range of banks' off-balance-sheet business, such obligations will be treated as contingent liabilities for capital adequacy purposes. They will be included at a weight of 0.5 (half the weight accorded to normal commercial lending) in the calculation of the risk asset ratio, whether or not the facility has been drawn by the borrower. Where an institution holds paper issued under a facility of which it is an underwriter, its holding of the paper will be weighted as a balance-sheet item, and the amount of its underwriting obligations reduced accordingly.

Shortly afterwards the Japanese authorities indicated their intention to accord these obligations a 0.3 risk weight (equivalent to 30 per cent. of the weight applied to normal commercial lending). In January 1986 proposals emerged from the US Federal Reserve to apply a 0.3 risk weight and in February 1986 a 0.5 risk weighting was proposed by the German supervisory authorities.

It is too soon to assess the full impact of these measures on the volume of facilities or on terms.

C. Bank assessment and control of market and credit risk

1. Definition of risks

The risks incurred by banks participating in NIFs depend on the rôle they play and the technique used. Most exposed are those banks which provide an underwriting commitment, whereas banks which take part in a tender panel have the choice whether or not to bid for notes. Where the underwriting banks have taken part in a facility of the type arranged for New Zealand (as described in Section A.2), their obligations are closely analogous to a loan commitment. That is, the banks are obliged to acquire an asset whenever the borrower chooses to call for funds, and do so at a maximum spread over LIBOR. For banks underwriting a facility using the single placement agency, dealership or tender panel techniques, their obligation is closer to a contingent liability, since they will only be called upon to acquire Euro-notes if these cannot be placed elsewhere. Moreover, this is likely to occur in circumstances when there are doubts about the creditworthiness of the borrower.

NIFs also involve liquidity risk. This is the risk that banks will be called upon to provide funds at a time when they cannot easily do so, either because the individual bank is unable to fund itself at market rates or because of the general conditions in the interbank market. While this risk has generally attracted less attention, banks now appear to be becoming increasingly concerned about funding risk and the extent to which they may be protected by documentation.

Banks holding notes issued under NIFs face straightforward credit risk on the issuer for the life of the notes. If the bank holding the note is not also an underwriter of the facility, then over the banking system as a whole there will be an element of double-counting of exposure since both the bank holding the note and the bank underwriting the facility will be recording exposures to the same borrower. Clearly, any sudden large movements in interest or exchange rates will affect the value of outstanding notes, but in this they do not differ from other short-term instruments.

2. Assessment and control of risks

Underwriting commitments on NIFs seem always to be included by banks under their country or customer limits for similar instruments. Practice differs over whether underwriting commitments are treated analogously with undisbursed loan commitments or with guarantees; the former seems to be rather more common. In many cases a significant proportion of NIFs is booked in overseas offices. In the case of Japanese banks, all underwriting commitments are booked abroad, mainly with subsidiaries in London, in order to meet legal requirements on the separation of banking and securities business. But most banks (including the Japanese) require head office approval before they can enter into commitments.

Some protection against being required to buy the notes of a borrower in difficulties may be provided by "material adverse change" clauses or financial covenants in the underwriting agreement (described in Section B.2).

Such clauses are untested in law and, on the whole, underwriting banks seem not to place very great reliance on them. Most agreements also apparently contain provisions for underwriters' fees to be increased or for underwriters to opt out if costs increase owing to regulatory changes.

Less information is available on the means adopted by banks to control the funding risk on NIF underwriting commitments. Some Canadian banks place a limit on particular NIF underwriting commitments, which is related to the maximum commitment that they would be prepared to fund at short notice. Similarly, Japanese banks are starting to control their funding risk by limiting their overall commitments under NIFs in relation to capital, by ensuring the availability of funding through back-up lines or long-term funding or by including all outstanding NIF underwriting commitments in internal gearing calculations.

The information available suggests that banks' holdings of Euro-notes are treated like credits to the issuer of the notes.

3. Pricing

The costs to the borrower consist of two components: the rate paid on the notes issued (or on other forms of borrowing), and fees relating to the arrangement and operation of the facility.

Where the facility provides for notes to be issued through a tender panel or similar mechanism, the rate paid on these drawings will vary, depending on conditions at the time of issue (although there may be a cap rate - see below). Prime borrowers have been able to issue notes through tender panels at very low rates, often sub-LIBID. Borrowers such as the Kingdom of Sweden, Commonwealth Bank of Australia and Unilever have consistently been able to issue notes at yields well below LIBID, usually five or ten basis points below (Canada's Export Development Corporation, as described in Section B.1, has obtained yields nearly 50 basis points below LIBID). These, of course, are the terms which the most highly rated borrowers are able to achieve, and others pay rates above LIBOR.

The majority of facilities arranged to date have set a ceiling on borrowing costs in relation to market rates. This is done either by having the issue of notes underwritten at a predetermined spread, or by including in the facility a standby credit, again at a predetermined spread. This ceiling is usually set in relation to LIBOR (occasionally Singapore interbank offer rate - SIBOR) and represents the coupon on the notes or the yield achieved by issuing notes at a discount. For prime borrowers the ceiling rate may be as low as LIBOR flat, and range up to LIBOR plus 20 basis points depending on the standing of the borrower. In some cases the ceiling rate may vary according to the extent to which the facility is drawn, for example, LIBOR plus 20 basis points if less than 50 per cent. of the facility is drawn, and LIBOR plus 25 basis points if 50 per cent. or more of the facility is drawn. In some cases the ceiling rate rises over the life of the facility, for example, LIBOR plus 5 basis points for the first five years, then LIBOR plus 12.5 basis points for the next two years, and LIBOR plus 20 basis points for the last three years. The ceiling rate is often still below the rate which a borrower would have to pay for a regular standby. This may be because the banks making the NIF-related standby expect to make an additional profit when they receive notes and are willing to concede a lower cost on the back-up because they appraise the facility as a whole.

Where facilities incorporate a swingline option this usually carries a cost of US prime rate.

Four types of fee are payable on NIFs, although not all are necessarily present in every facility.

(i) Participation or front-end management fees are single payments made when a facility is arranged. They generally range up to 15 basis points and sometimes vary with the size of each participant's commitments.

(ii) Underwriting fees are paid annually to the institutions underwriting the issue of Euro-notes and are usually paid on the full amount of the facility regardless of the amount utilised at any time. They tend to vary between 5 basis points for the very top borrowers and 15 basis points for others.

(iii) Commitment or facility fees are also paid annually and are usually an alternative to underwriting fees (although there are a few facilities with both an underwriting and a commitment fee). Sometimes the commitment fee is payable on the full amount of the facility regardless of utilisation, sometimes only on an unused portion. In some facilities the borrower is able to designate part of the facility as unavailable, on which no or a lower commitment fee is payable. (A notice period is often required before this part of the facility can be redesignated as available.) Commitment fees range from 5-10 basis points, and sometimes rise over the life of the facility.

(iv) Utilisation fees are charged on a small number of facilities and range up to 20 basis points depending on the degree of utilisation of the underwriting commitment.

A recent comparison of the costs of note issuance facilities and syndicated credits has shown that, in the small number of cases where it is possible to compare the two, NIFs may be between 10 and 50 basis points cheaper than a syndicated credit. The saving to the borrower is in the lower interest spread; this is reduced slightly by the higher fees generally payable on NIFs.

There may also be additional agency and administration fees and one-time payments to cover out-of-pocket expenses.

4. Rôle of banks' profitability

As described in the previous section, banks' possible sources of income from NIFs are the following:

(i) a spread on any notes held;

(ii) placement profits;

(iii) front-end fees;

(iv) annual underwriting or commitment fees;

(v) possibly, utilisation fees;

(vi) agency and administration fees.

There is a widespread consensus among banks that NIF underwriting fees have been driven down to the point where they do not, on their own, represent adequate compensation for the type of exposure incurred. Since margins are extremely fine, Euro-notes are not generally considered very attractive instruments for major banks to hold. The profitability of NIF operations therefore depends on other factors.

Since the arrangement of NIFs tends to be dominated by a fairly small number of investment or merchant banks, the majority of banks look to other sources of income for their profits. Placement profits (earned on the difference between the rate at which the bank is awarded Euro-notes and the rate at which it resells them to its customers, supplemented in some cases with placement fees) can amount to around 5 basis points and may be repeated at six-monthly intervals. To earn them, however, it is necessary for banks to have access to the notes which are issued (underwriting banks are not necessarily able to obtain paper to place themselves) and to have a client base with whom the notes can profitably be placed.

Most banks, then, would regard the arrangement of NIFs as the most profitable form of participation, followed by participation in the distribution of notes with the opportunity to earn placement profits. Participation as an underwriter with no additional fees is widely regarded as unattractive.

5. Impact of taxation

Two cases have been noted where taxation may affect the attractiveness of NIFs.

(i) In Switzerland stamp tax is payable on notes which are actually issued and on secondary trading in Euro-notes, but this is not an impediment to facilities being arranged in Switzerland, as long as only a small proportion is drawn.

(ii) In Australia withholding tax is not payable on widely distributed bearer debentures issued outside Australia, provided the funds are for use in an Australian business. The distribution mechanism on a NIF normally meets this requirement, making a NIF an attractive source of funds compared with syndicated loans, which can only be exempted from withholding tax if they are raised by an entity in which there is substantial Australian participation. This may partly explain the relatively large number of NIFs arranged for Australian borrowers, particularly Australian offices of foreign banks.

6. Evidence of underpricing

It is a widespread opinion that competitive pressures have driven down underwriting fees on NIFs below the levels which offer an acceptable return on the risks incurred. Apart from the arrangement of facilities and placing of notes, there is thought to be little opportunity for profit. Except in the interest of customer relations banks seem to have become reluctant to accept underwriting positions without opportunities for placing notes. One response to this view has been to give underwriters a greater rôle in the distribution of the notes (as described in Section A.2) to allow them to supplement their underwriting fees with placement profits. Another consequence has been a growing proportion of NIFs which are not fully underwritten (as also described in Section A.2). Nevertheless, there is still no sign of any tendency for underwriting fees to rise on facilities for prime borrowers.

Appendix

Regulatory approaches to NIF underwriting commitments*

Belgium: No capital adequacy requirements for underwriting commitments or off-balance-sheet business of this kind. Changes to the requirements are under consideration by the Commission Bancaire.

Canada: Included in capital requirements in principle. Changes are under consideration by the Inspector General of Banks.

France: Included among off-balance-sheet items subject to the solvency ratio with a weight of 5 per cent. if the facility is for a bank and 25 per cent. if it is for a non-bank.

Germany: The supervisory authorities have proposed that underwriting commitment should be made subject to capital adequacy requirements with a weight of 50 per cent. Hearings on this proposal will be held shortly.

Italy: There are no capital adequacy requirements in Italy. Banks are subject to a rule that "crediti di firma" in lire and foreign currency should not exceed 15 per cent. of total deposits (excluding interbank). Although the issuance of NIFs does not come under these ceilings, banks in practice consider NIFs as "crediti di firma".

Japan: At present claims on non-residents must not exceed 14 times capital. As from the beginning of May 1985 the authorities asked the Japanese banks to report, on a trial basis, their calculated risk asset ratio with the intention of introducing certain capital adequacy requirements in the future. Commitments under NIFs have a weighting of 30 per cent. in this calculation. This compares with a weighting of 100 per cent. for medium and long-term loans.

Luxembourg: No capital requirements for off-balance-sheet business.

Netherlands: Underwriting commitments attract a weight of 50 per cent. in the computation of solvency ratios.

Sweden: No capital adequacy requirements for underwriting commitments or off-balance-sheet business of this kind. Changes are under consideration.

Switzerland: Guarantees are generally included within capital adequacy tests but commitments to lend may not be. Banks regard NIF underwriting commitments as commitments to lend.

United Kingdom: Holdings of notes are subject to capital requirements on the same basis as other loans. Commitments are subject to a risk asset weighting of 50 per cent.

United States: Proposals for the inclusion of some off-balance-sheet items in risk asset ratio calculations were disclosed in January 1986. Commitments under NIFs would attract a weighting of 30 per cent.

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* In the absence of precise guidelines from regulatory authorities the treatment of NIFs in measurements of capital adequacy may depend in some countries on whether they are reported to the supervisory authorities as guarantees or commitments to lend.

Chapter 2

Currency and interest rate swaps

A. The instruments and the markets

1. Definition

A swap is a financial transaction in which two counterparties agree to exchange streams of payments over time. The two main types are CURRENCY SWAPS and INTEREST RATE SWAPS.

The term CURRENCY SWAP generally refers to a transaction in which two counterparties exchange specific amounts of two different currencies at the outset and repay 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. In some cases there is no exchange of principal amount initially, and in others not at maturity either.

The currency swaps under consideration here, which have come into common usage only in the past few years, differ from those which have been traded for many years in foreign exchange markets. The latter transaction involves the sale of one currency against another for one delivery date with simultaneous agreement to reverse the transaction at a future date. In such transactions only the principal amounts are exchanged on the initial and again on maturity dates, with no exchange of interest streams in the interim.

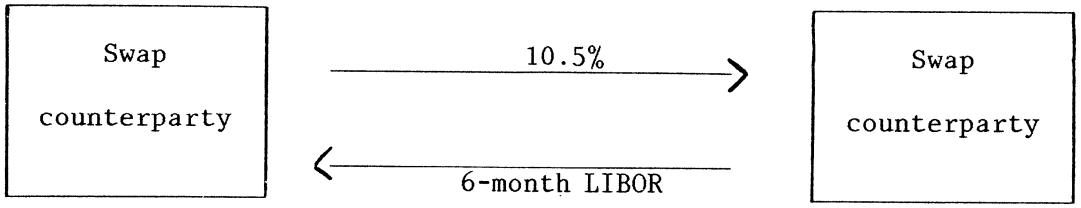
At the present time, the term currency swap is applied to both types of transactions, and no generally agreed terminology has appeared to distinguish them. Throughout the present study, all references are to currency swaps involving exchange of interest streams, and there is no discussion of the currency swaps historically traded in the foreign exchange markets.

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. The three main types are: COUPON SWAPS (or fixed rate to floating rate swaps), BASIS SWAPS (from floating rate against one reference rate to floating rate with another reference rate) and CROSS-CURRENCY INTEREST RATE SWAPS (swaps of fixed rate flows in one currency to floating rate flows in another).

In a coupon swap, one party pays a stream of fixed rate interest payments and receives a stream of floating rate payments, both denominated in the same currency. The counterparty, of course, receives fixed and pays floating. No cash flows of principal are exchanged. For example, one party may agree to pay a fixed rate of 10.5 per cent. on a notional amount of $10 million for five years. In exchange, this party receives six-month LIBOR payments based on the same notional amount (see Figure 2.1).

Figure 2.1

Example of interest rate swap

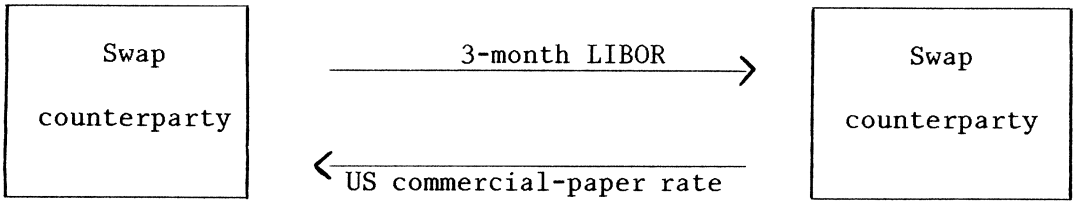


Notional amount: $10 million.
Maturity: 5 years.
Payment frequency: both fixed and floating rate payments are made semi-annually.

In a basis swap the interest payments exchanged are calculated from two different floating rate indices, e.g. three-month dollar LIBOR against the US commercial-paper composite rate (see Figure 2.2).

Figure 2.2

Example of basis swap

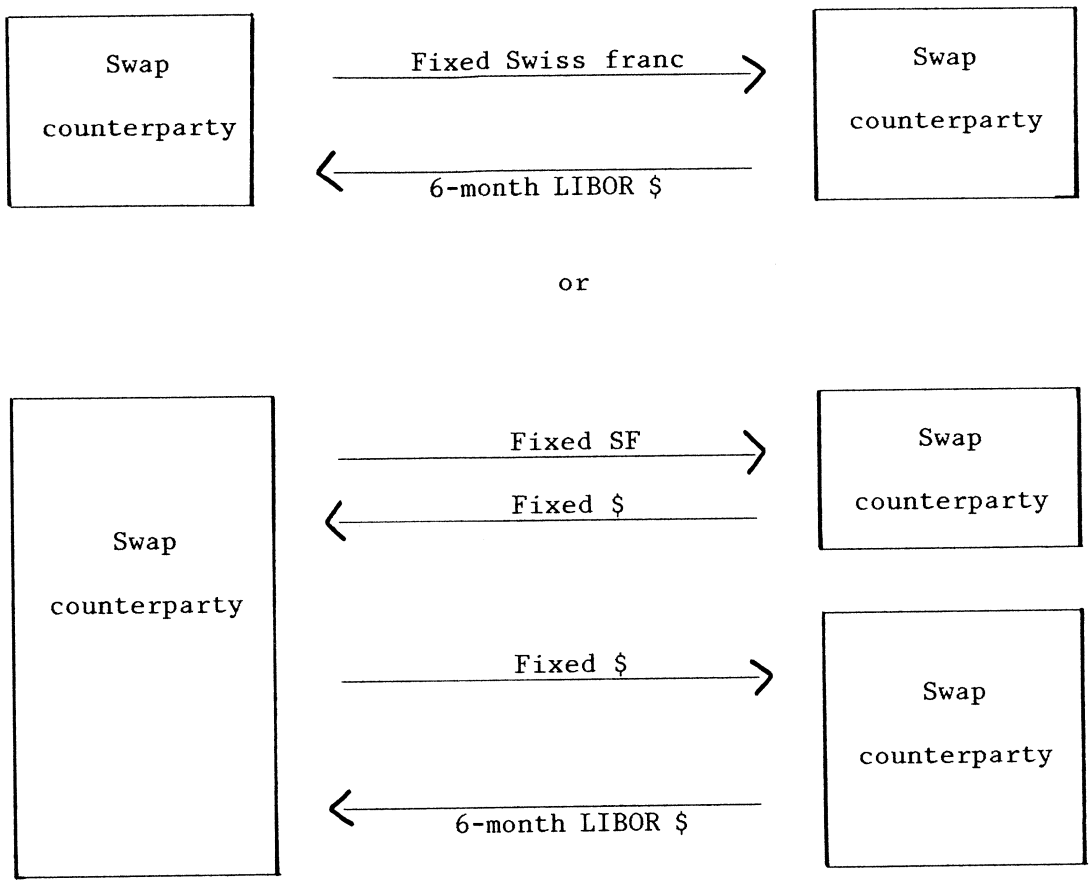


Notional amount: $5 million.
Maturity: 3 years.
Payment schedule: every three months.

A cross-currency interest rate swap involves the exchange of payments in different currencies and also on different interest rate bases, such as floating rate to fixed rate. Some dealers execute such arrangements as a single transaction, while others separate the cross-currency and interest rate components. Typically, this type of swap involves the exchange of non-dollar fixed rate interest payments for dollar floating rate interest payments (see Figure 2.3).

Figure 2.3

Example of cross-currency interest rate swap



2. Market size

The volume of swap transactions and the outstanding amount are both normally measured in terms of the notional principal on which payments are made. Global swap-market volume is difficult to estimate, and there is little historical data. Market participants estimate that the outstanding amount of interest rate swaps at mid-1985 was between $100 and 150 billion of notional principal. The market is concentrated in New York and London, but is not exclusive to those centres.

The outstanding volume of currency swaps is less than that of interest rate swaps, but is growing rapidly. Currency swap activity has generally been concentrated in Europe, Japan and Australia, and in 1985 activity picked up in New York.

Most coupon swaps are denominated in dollars, largely because of the important rôle of the dollar in world finance. Also, there are many willing payers of fixed dollar interest rates, and open dollar swap positions can easily be hedged in the broad and deep dollar asset markets.

Small amounts of coupon swaps have been transacted in other currencies as well, mainly pounds sterling but also Swiss francs, Deutsche Mark, Japanese yen, ECUs, Dutch guilders, Canadian dollars, Australian dollars and Belgian francs. In fact, one of the first coupon swaps was effected in sterling between a bank and a UK local authority, the bank paying a fixed rate and hedging with a Euro-sterling bond. The sterling coupon swap market was estimated at £1 billion in 1984. Currency swaps have been written in all the major currencies.

Basis swaps, according to one estimate, account for 10 per cent. of the interest rate swap market, but recent indications suggest that they are growing relatively rapidly. A large portion of basis swaps are initiated by dealers who have entered into two coupon swaps in which the interest rate index used for the two floating sides differs. For example, one coupon swap might be from fixed to floating (LIBOR), while the second might be from fixed to floating (prime-based). To cover against the basis risk involved in paying LIBOR and receiving prime, the dealers arrange a third swap, from LIBOR into prime.

3. The evolution of the swap markets

The history of swap activity varies somewhat between its main sectors. While assorted claims have been made that each type of swap was done on an ad hoc basis well back in the 1970s, currency swaps in fact have an earlier origin than interest rate swaps.

The currency swap has evolved as a successor to the back-to-back loan. In a back-to-back loan, two parties in different countries make loans to one another, of equal value, each denominated in the currency of the lender, and each maturing on the same date. In such transactions, the payment flows are identical to those of spot and forward currency transactions, since the initial loan is concluded at the spot rate, while the interest payments and repayments of principal are set to correspond to forward foreign exchange rates. Back-to-back loans were developed when exchange controls were in force in the United Kingdom in the 1970s to provide non-residents with a means of borrowing fixed rate sterling. After the abolition of exchange controls in 1979, they continued to be used as a means of creating or hedging long-term foreign currency exposure at lower costs than in the foreign currency markets.

The back-to-back approach had some drawbacks, however. Under most circumstances, each loan is a new debt obligation on the balance sheet. In addition, the two loans are usually covered by separate agreements. If one party fails to make a payment, the other is usually still obligated to continue payments.

The currency swap can be seen as a natural evolution of the back-to-back loan, since it avoids most of these problems. Firstly, it does not usually increase assets or liabilities on the balance sheet. Secondly, it limits credit risk, since a performance failure by one counterparty relieves the other party of its obligations. Thus, risk is limited to the cost of replacing the expected income streams, which depends on interest and exchange rate movements since the time of commitment. Interest rates and exchange rates are generally as likely to move in favour of the surviving counterparty, so it is quite possible that default will result in a gain to the surviving firm.

The World Bank was a major driving force in the development of the currency swap market. It sought low interest rate borrowings, mainly in Swiss francs or Deutsche Mark, since it wished to make loans in these currencies. The World Bank borrowed considerable amounts directly, but at times wished to issue more debt in the Swiss and German markets than could be absorbed easily. On the other hand, it could borrow relatively cheaply in the larger dollar markets. These circumstances created a natural opportunity to carry out swaps with counterparties who had European currencies or good access to borrowings in Europe, but who needed dollar finance. Indeed, a currency swap between the World Bank and IBM in August 1981 was a strong catalyst to the development of the currency swap market.

Government restrictions have also stimulated currency swaps. Official sanctions limit access to some major European capital markets, including Euro-bond sectors, and swaps can be used to gain indirect access to these markets. In addition, restrictions can make it more expensive for certain classes of borrowers in particular national markets. For example, swaps involving the New Zealand dollar were extremely active in the second quarter of 1985: foreign investors were attracted to New Zealand dollar assets because of a combination of high nominal interest rates and the appreciation of the New Zealand dollar against the US dollar, but a withholding tax of 15 per cent. deterred them from buying domestic government bonds. Foreign borrowers issued New Zealand dollar Euro-bonds at yields as much as 300 basis points below comparable New Zealand government bonds, swapping the proceeds into US dollars. The firm floating the New Zealand dollar Euro-bond obtained cheap US dollars, and a New Zealand counterparty, which borrowed abroad and swapped into New Zealand dollars, obtained funds below the rate available in the domestic market. During the second quarter of 1985 NZ$ 260 million (US$ 120 million) of New Zealand dollar Euro-bonds were issued, probably all linked with currency swaps. In early 1986, a similar spate of Australian dollar floating rate notes was issued in the United States, apparently motivated in large part by withholding tax considerations in Australia, the proceeds of which were swapped into US dollars.

The major step in the evolution of the swap market was the extension of the swap concept from the currency market to credit-market instruments denominated in the same currency. The paternity of this breakthrough innovation is hotly contested. Most observers agree, however, that by 1982 interest rate swaps had grown beyond isolated deals to the point where one could speak of a market.

The most common interest rate swap concluded in 1981 and 1982 has come to be known as the classic, or "plain vanilla", swap. It is a five to seven-year swap of six-month LIBOR-based floating rate funds against fixed rate funds, both denominated in US dollars. Deal size was typically $50-100 million or greater. Swaps were generally tied to Euro-bond issues of the end-users, which provided the fixed rate funds, but which wished floating rate funding at reduced all-in costs. Fixed rate payers, which had comparatively better access to floating rate money, entered into swaps to obtain a lower cost substitute for bond finance or to acquire fixed rate funding that was otherwise unavailable.

The global market in 1982 was estimated to be about $3 billion. Floating rate payers were usually highly rated European banks. Fixed rate payers were typically BAA-rated US companies, although non-US banks and

corporations were also involved. As a result of the swap transaction, floating rate payers were able to raise floating rate funds at perhaps 200 basis points or more below LIBOR. Swap arrangers received 50-75 basis points in fees on a "plain vanilla" swap.

By late 1982 and 1983 the swap market had evolved further and interest rate swaps, which began as a decidedly international transaction, began to be conducted between purely domestic counterparties, mainly in the United States. Regional banks and insurance companies in the United States appeared on both sides of the market. US thrift institutions became active as fixed rate payers, frequently with the Student Loan Marketing Association of the United States as the end-user counterparty which wished to pay floating rates. Minimum size was reduced to $25 million, and swaps were no longer tied exclusively to new bond issues. Swaps were concluded against existing assets, encouraging use of the swap market for routine asset/liability management. With increased activity strictly among US counterparties, Treasury bills became a commonplace index on the floating rate side. The estimated size of the interest rate swap market in 1983 was $20 billion.

Swap activity accelerated sharply in 1984 and 1985. Large US and UK commercial and investment banks developed the capacity to make markets in swaps as they do in other financial assets, and began to book swaps without an offsetting swap in hand. They developed techniques to hedge an open swap position until an offsetting deal could be arranged, which greatly enhanced the liquidity of the market. Real estate companies, leasing companies and other financial firms entered the market as fixed rate payers, as did high-grade US corporations. US thrift institutions and corporations became active as floating rate payers. Federal Home Loan banks in the United States began to execute swaps for their own accounts and in some cases wrote letters of credit to support the swap activity of member thrift institutions. Swap deals were broken into units as small as $1 million, and shorter maturities became more common. Heavy competition among intermediaries reduced fees to the 12 1/2 - 25 basis point range or lower. Most swaps were transacted between an end-user and an intermediary or among different intermediaries. Coupon swaps were being transacted in non-dollar currencies.

By mid-1985 the link between swaps and new Euro-bond issues had apparently weakened significantly, although a considerable difference of opinion remains on this score. Some believe that about half of all fixed rate dollar Euro-bond issues remained swap-related (with nearly all such issues made by banks), with about 25 per cent. of new non-dollar Euro-bonds being linked with swaps. Euro-bond activity was thought to account for over half of swaps with end-users on the fixed rate side. Other observers, however, have suggested that only 10-20 per cent. of recent coupon swaps were tied to new Euro-bonds. Instead, fixed rate funds were more often being provided by banks through certificates of deposit, corporations with US market bond financing (both public issues and private placements), existing fixed rate assets and liabilities, and firms unwinding earlier swaps.

Variations on the standard "plain vanilla" swap multiplied in 1984 and 1985. Some swaps are callable or extendable, others are deferred, i.e. written to begin after a fixed interval. In some contracts, the floating interest rate is reset more frequently than usual (e.g. a six-month LIBOR reset monthly) to correspond to rates on "mismatched" floating rate notes. Options on swaps and swaps on zero coupon bonds are now common and there has been some

discussion of fitting swaps to mortgage-backed securities. Large financing packages often include swaps as one component.

A "secondary" market in swaps has developed, encompassing reverse swaps, swap sales and voluntary terminations (described below in Section V). This trend was enhanced by the development of master documents by leading market-makers. New floating rate indices have become common, including US certificates of deposit, US commercial paper, bankers' acceptances, US prime, Federal funds, and the average thrift cost of funds. The basis swap market between these indices has grown rapidly. In 1984 outstanding swaps were estimated to amount to $80 billion; by mid-1985 this figure had grown to well in excess of $100 billion.

Although growth in the swap market has been very rapid, current estimates of swap volume overstate the volume of assets and liabilities on which exposure has been swapped. Furthermore, estimates do not exclude swaps between dealers or "mirror" swaps with the original counterparty.

4. The nature and motivations of swap-market participants

There are two broad classes of participants in the swap market: end-users and intermediaries. An end-user is a counterparty which engages in a swap in order to change its interest rate or currency exposure for some economic or financial reason. An intermediary (or a dealer) enters into a swap in order to earn fees or trading profits. In principle, then, end-users and intermediaries are distinguished by their motivations. In practice, however, some institutions are active on both sides.

(a) End-users

A wide variety of end-users are involved in the swap markets today. Banks and corporations around the world, thrift institutions and insurance companies, government agencies, international agencies and foreign states have all been active. End-users utilise the swap markets for five broad reasons: (i) to obtain low-cost financing; (ii) to obtain high-yield assets; (iii) to hedge interest rate or currency exposure generated from the structure of normal business; (iv) to implement short-run asset/liability management strategies; and (v) to speculate.

In the currency swap market the main motivations are to obtain low-cost financing or to hedge existing structural exposures. A borrower may wish to obtain, say, Swiss francs to finance business expansion in Switzerland but may not be able to obtain funds readily or at low cost in the Swiss capital market. At the same time, that borrower may have ready access to dollar capital markets and be able to borrow there on relatively attractive terms. If a counterparty exists who has, say, a net asset position in Swiss francs and a desire for low-cost dollar funds, the opportunity for a currency swap exists.

The main motivation of end-users in the early stages of the interest rate swap market was to exploit differential borrowing advantages to raise funds cheaply. In the classic swap, a highly rated European bank raised fixed rate funds in the Euro-bond market and swapped these out to a lower rated US corporation that had raised floating rate funds in the international banking markets. Price was the primary motivation. Because the international bond markets required a higher premium for the corporate borrower relative to the

bank borrower than did the international banking markets, a borrowing cost wedge existed that could be exploited. Each borrower raised funds in the market where it had a comparative advantage and traded the obligations to mutual benefit.

Swap-market participants offered a variety of reasons to account for this relative borrowing cost differential: relatively greater risk aversion in the bond market; over-capacity in the bank loan market, which has reduced the premium for high-risk borrowers; differences in information across markets; banks' superior ability to manage deteriorating credits; or banks' desires to diversify out of their LDC risks.

Some of the explanations provided by participants describe temporary arbitrage opportunities in the financial markets. As the swap market develops, these opportunities may disappear. Other factors, however, such as the difference in information and risk aversion of lenders across markets, may persist. Most swap dealers believe that the evolution of the market depends on the exploitation of new arbitrage opportunities as they develop.

Another explanation for the attraction of swaps is that they offer corporate treasurers flexibility in the timing of borrowing and in the management of assets and liabilities. A treasurer who has a need or opportunity to borrow now, but believes rates are going to fall, can borrow fixed now and swap to paying floating. He would immediately benefit to the extent that short-term rates are lower than long-term rates. When rates later fall, he can reverse the swap and lock in the lower fixed rate. As asset and liability management tools, swaps are relatively inexpensive and have no balance-sheet implications.

Availability of access to fixed rate funds for the weak side counterparty is also cited as a factor in the rise of swaps. There have, however, been no obvious legal or institutional impediments to access for lower-quality borrowers in the international dollar bond markets (unlike the case for bond markets in other currencies). Furthermore, the increased volume of new so-called "junk" bond issues suggests that at least some low-grade borrowers could obtain direct access to fixed rate funds, but at costs that were unattractive compared with the swap market.

It soon became apparent that the swap market was a vehicle that <u>any</u> borrower with access to bond finance on relatively attractive terms could use to generate cheap floating rate finance. A wide range of financial institutions and official agencies became involved in liability-based swaps as fixed rate providers. And, US thrift institutions, needing to hedge risks inherent in making fixed rate mortgages with floating rate deposits, were drawn into the swap market on the other side as a way of raising fixed rate funding.

Swaps could also be used to transform exposure on the asset side. Suppose an institutional investor, such as an insurance company that holds high-grade floating rate assets, desires to switch into fixed rate assets to obtain attractive yields. This could be done by entering into a swap as a floating rate payer instead of making an outright sale and purchase of the underlying assets and thereby exposing the asset principal amounts to price risk or credit risk to obtain a high fixed rate yield.

(b) Intermediaries

In the early days of the swap market, most intermediaries merely brought together the two swap parties and arranged swaps. At times, they also provided letters of credit or other forms of credit enhancement for weaker credits. As the variety of end-users on both sides of the market increased, potential counterparties grew increasingly reluctant to accept the credit risks involved in a purely brokered swap. This created the opportunity for large commercial and investment banks to take on the rôle of intermediary by entering into two offsetting swaps. Today most large intermediaries act almost exclusively as counterparties, and frequently the intermediary is a more acceptable counterparty credit risk to both end-users in the swap chain. More recently a few of the largest end-users with high credit ratings have begun entering into swaps directly with other highly rated end-users, eliminating the need for intermediaries.

The largest intermediaries in the swap market are major US money-centre banks, major US and UK investment and merchant banks, and major Japanese securities companies. Commercial banks in Canada, France, Japan, Sweden, Switzerland and the United Kingdom are also active. These institutions have undertaken dealing in swaps in order to earn fee income and to profit from trading opportunities. For both commercial and investment banks, swaps are an attractive source of off-balance-sheet earnings as well as a product which facilitates other types of business (e.g. underwriting Euro-bonds).

But commercial banks and investment banks have different approaches to the swap market. Commercial banks tend to view swaps as an extension of more conventional banking business. For example, when a bank combines a floating rate loan with a swap, it is creating the equivalent of a fixed rate loan for a borrower. In the past, banks have found it difficult to extend fixed rate loans outright because their fixed rate funding costs have been high, sometimes as high as those faced by some of their customers. Moreover, they felt obliged to accept prepayments on fixed rate loans when rates had moved to the disadvantage of the borrower. By unbundling the components - the floating rate loan and the swap - banks can price each more efficiently. Commercial banks stress that as swap-market intermediaries they offer a large customer base and expertise in assuming long-term market and credit risks.

Investment or merchant banks tend to view swaps as tradable securities. They are in the forefront of efforts to standardise swap contracts and market practices in order to improve the liquidity of the swap market. Investment banks also attempt to equalise the credit exposure on all swaps by incorporating collateral provisions in the contract. These provisions give the investment bank (and sometimes the other counterparty) the right to call for an amount of collateral equal to the credit exposure on the contract. As intermediaries, investment banks are able to offer competitive pricing because of their trading and hedging expertise.

By mid-1985 there was an active market in swaps between swap dealers that serves to match end-users in much the same way that the interbank Euro-market connects non-bank depositors with ultimate borrowers. Thus, for example, a bank (which is not a swap specialist) may enter into a swap with an end-user for which it has arranged a bond issue. It covers itself by entering into an offsetting swap with a dealer, who in turn enters into an offsetting swap with another dealer. This second dealer may then find a bank which wants

to offset a swap it is arranging with an end-user. In this example, a swap between two end-users has given rise to four intermediate swaps. One report estimates that the interdealer share in the swap market rose from 40 per cent. of the market in 1983 to 55 per cent. in 1984.

Among dealers, more or less continuous quotations are available for the standard types of swaps, generally with a bid/offer spread of 10-15 basis points. Deals are agreed to by telephone, with the most significant variables confirmed by telex. Detailed documentation may sometimes take months to be put in place.

5. The secondary market in swaps

The secondary market in swaps includes three distinct types of transactions: swap sales (or assignments) to a new counterparty; voluntary swap terminations; and reverse swaps. Of these only swap sales are directly analogous to the secondary market in securities. One estimate puts the secondary market - sales, terminations and reverses - at 20 per cent. of the total market, or $25 billion. Sales and terminations both involve a cash payment and the extinction of the seller's swap obligations. Reverse swaps are merely new swaps arranged as a perfect or near-perfect offset to existing swaps. Some define the secondary market to include only sales and terminations, which together are estimated to constitute 10-15 per cent. of the market. The growth of the secondary swap market springs from the enhanced use of swaps as an integrated technique of asset/liability management, the increased rôle of market-making by intermediaries and the desire of dealers to generate trading profits from swaps.

The purpose of swap sales and terminations is typically to realise the capital gain on a swap. If, for example, a fixed rate receiver entered into a five-year swap one year ago when rates were, say, 14 per cent. and rates on four-year money today are 11 per cent., his swap has accrued a capital gain. He can realise this gain (at least, in part) by assigning the rights (and obligations) to a third party or by negotiating a termination of the swap with his counterparty, each in exchange for a cash payment. Or he can lock in the gain by entering into an offsetting swap in which he pays 11 per cent. fixed for four years.

The secondary market for swaps has developed unevenly. The volume of swap sales or assignments has reportedly remained low. There are a number of reasons for this. The remaining original counterparty to a potential swap assignment may and often does object to the assignment because he would wind up with a different counterparty credit risk. The assuming counterparty may be unacceptable for some reason or outstanding credit lines to that counterparty may be fully utilised. Assignment clauses must be drafted to ensure that all rights are properly transferred and documented. In addition, many swap contracts are highly customised, making assignment cumbersome or making it difficult to find parties willing to assume at all. Finally, swap sales usually entail a lump-sum cash payment from the assuming party to the assigning party that can be difficult to agree upon. In some cases, the lump-sum payment is undesirable for tax or accounting reasons.

Cash payments are also involved in voluntary terminations, and this method of realising gains is simpler and more popular. There are none of the credit risk problems involved in assignments. Frequently, the method of

calculating close-out payments is specified as part of the original swap contract. Still, the amount of the cancellation fee is normally negotiated and this can make voluntary termination an unwieldy technique. As a consequence, the most common technique for reversing swap exposure is to put in place a roughly equal but offsetting swap.

Unlike a swap sale or a termination, a reverse swap does not entail a lump-sum cash payment. The party that is closing out its swap exposure does not realise a one-time gain; rather it locks in a stream of cash payments over time. There are two ways of effecting a reverse swap: writing a reverse swap into the market or writing one with the original counterparty.

Writing a reverse swap into the market is technically the easiest kind of secondary-market transaction. But it has two drawbacks from the point of view of the party seeking to lock in gains on the original swap. Firstly, it doubles the party's credit exposure. Secondly, if the original swap was highly customised, it can be difficult or expensive to find a market counterparty willing to write an exactly offsetting swap. In this case, there may be some residual exposure resulting from different payments frequencies, price reset frequencies, or floating rate bases.

Writing an offsetting swap with the original counterparty (a "mirror swap") avoids most of these problems. Mirror swaps reduce credit risk, since all amounts payable under the original agreement are applied against amounts receivable under the second agreement. Since the mirror swap is written with the original counterparty, there should be no practical difficulties in duplicating any customised details of the original contract. A mirror swap is an alternative to termination that avoids a large cash outlay.

From the point of view of an observer, distinguishing a reverse swap written into the market from a new swap is difficult. For one party in the reverse swap, of course, there exists an original swap that is an offset. For the other party to the reverse swap, however, no such offset need exist and it may very well perceive that swap as a new one. This ambiguity in classification suggests that treating reverse swaps written into the market as part of secondary-market activity may be inappropriate. Mirror swaps, on the other hand, are more easily identified as secondary-market transactions because they offset agreements with the original counterparty.

B. Pricing of swap transactions

The cost of a typical coupon swap is expressed in the rates on the fixed and floating interest payments. The cost of a currency swap is the forward exchange rate implicit in the currency payments. Few swaps now include additional upfront or arrangement fees, although these were common in the early days of the swap market.

More specifically, the price on a non-dollar interest rate swap of a given maturity is quoted as an absolute fixed rate (for example, 10 3/4 per cent.) against a floating rate index, quoted flat (with no margin over or under the index). The price on a generic dollar coupon swap is quoted as a spread over the fixed rate index against the floating rate index flat: for example, an intermediary might quote the price on a seven-year Treasury-LIBOR swap to a fixed rate payer as "the seven-year Treasury rate plus 60 basis points versus

six-month LIBOR". Under market convention, this is an "offer" swap price, i.e. the price at which the market is willing to sell fixed rate exposure. The spread quoted to a floating rate payer is the "bid" swap price. In such a swap, the intermediary receives six-month LIBOR flat and makes fixed payments. The trade date is the date on which the counterparties commit themselves to the swap.

The precise definition of the "seven-year Treasury" rate in the above example can be the subject of dispute, and will normally be agreed upon at the time of commitment. Generally, it is either:

(i) the semi-annual yield on an actively traded US Treasury security with a maturity of seven years; if the swap's maturity lies between that of two actively traded securities, the yield is computed as a weighted average; or

(ii) the semi-annual yield to maturity of the specific US Treasury note or bond with a maturity closest to that of the swap.

The second approach is often criticised because it does not exclude thinly traded securities with anomalous prices.

Swap prices are closely tied to the cost of hedging swap exposure. Before a swap is matched with another swap, it is generally hedged with a combination of securities, futures contracts and some form of floating rate funding such as repurchase agreements. For example, if the intermediary is the fixed rate payer on the swap, the hedge usually involves the purchase of an appropriate amount of Treasury securities with the same maturity as the swap. The purchase of securities is in turn financed by borrowing in the repurchase agreement market. The Treasury security creates a hedge against capital loss if long-term interest rates change, and also generates fixed rate income which matches the fixed payments of the swap. The floating rate income from the swap covers the floating rate cost of the repurchase agreement.

Swaps of shorter maturity are more likely to be hedged in the futures market. Although cash-market hedges offer a wider choice of maturity and payment dates, they appear on the institution's balance sheet and potentially tie up capital. Futures contracts avoid these costs.

The effective date on a swap is the date on which fixed and floating interest starts accruing. Normally, this is five business days after the trade date. The settlement date is the date on which the transaction is priced for value. Normally in swap transactions this is the same as the effective date.

Apparently, some swap agreements are executed on an "as of" basis; that is, the agreement is prepared and executed some time after the effective date. This custom enhances the liquidity of the swap market, but should a party fail before the contract is executed, the protection offered by the agreement, obviously, might not be present.

1. Market factors which influence swap pricing

Apart from hedging costs, the price on a generic swap reflects arrangement fees, risk, the level of competition among swap dealers and the supply of and demand for fixed rate funds.

Over the past few years there has been a loose association between swap prices and the yield spread over US Treasury securities for typical A-rated industrial borrowers in the bond markets. Early in 1985 a rush of new Euro-bond issues provided a steady supply of parties willing to pay floating rates and receive fixed rates. The oversupply tended to depress swap prices, particularly in the five to seven-year range. This was partly offset by increased competition among swap dealers for the business of these floating rate payers. Still, there was a pronounced supply/demand mismatch at different maturities, and quotes on seven-year LIBOR swaps fell to 40 basis points over the yield on US Treasury securities of similar maturity, compared with 60-70 basis points for three-year swaps, where floating rate payers remained scarce.

A second example of price movements due to changes in the demand for and supply of fixed rate funds can be found in the sterling coupon swap market. With a dearth of fixed rate payers, the swap price was actually below the corresponding gilt yield from May 1984 to April 1985.

Another market factor which sometimes influences swap prices is an intermediary's decision to raise or lower the price on a swap in order to maximise gains from a larger set of transactions. For example, as explained above, many swaps have been related to newly issued Euro-bonds. In order to be both the underwriter and the swap dealer on a particular issuance, an intermediary may subsidise either the underwriting fees or the swap price.

2. Pricing of customised swaps

The all-in cost of a swap can be affected by the introduction of a deviation from generic terms, including abnormally high or low principal amounts, different amortisation structures (not a bullet loan) and long maturities for which markets are thin. On the fixed payments side, generic terms call for a semi-annual (sometimes annual) payments frequency and a 30-day month/360-day year basis for accruing fixed interest.

On the floating payments side, generic conventions are as follows:

(i) no spread above or below the floating index;

(ii) payment frequency equal to the term of the floating index itself. The payment frequency on a prime-based swap is quarterly; Federal funds-based swaps are compounded daily to a mutually agreeable payments frequency;

(iii) the day count convention is 360, except for Treasury-bill based swaps, where it is actual/actual;

(iv) the reset frequency is equal to the term of the floating index itself; except for Treasury-bills, for which the index is reset weekly, regardless of term; prime is reset daily;

(v) the quotation basis for floating rate payments in swaps is the CD equivalent, with the exception of Treasury-bills, which are quoted on a bond equivalent basis.[1]

Deviations from generic features will cause the swap price to differ from the market price for a generic swap. For example, a swap may be structured to incorporate a spread of 25 basis points below six-month LIBOR on the floating rate side (perhaps reflecting creditworthiness considerations, in this case a highly regarded floating rate payer). To express this swap price according to market convention it should be quoted as a fixed rate against LIBOR flat. The conversion is more involved, however, than simply adding 25 basis points to the all-in cost of the market price for a generic swap. The swap dealer has to take account of the different day count conventions between the fixed and floating payments sides of the swap.

Mismatches in payments frequency, day count conventions or reset frequency can also cause the price on a customised swap to deviate from the quoted market price on a generic swap. In many cases the valuation of these customised details or deviations from the generic standard cannot be precisely and objectively determined but has to be negotiated between the counterparties. Such necessarily subjective elements in the pricing of swaps, together with credit risk, are a major impediment to the development of secondary-market transactions. Assignment of an existing swap with customised features, for example, may be difficult because a third party will not place the same value on non-generic terms as the original counterparties did.

To illustrate some of the problems, let us consider the case of a reset frequency mismatch. A reset frequency mismatch occurs when the reset frequency does not agree with the maturity of the floating rate index, as with monthly resets of six-month LIBOR, for example. Frequent resets will generally have a valuation effect. Investors who choose a six-month maturity have forsaken shorter maturities and more frequent repricing opportunities. Theoretically, on average the market's expectations for the course of interest rates over the next six months will be incorporated in the six-month rate. Therefore, altering the reset frequency will generally have valuation effects relative to the generic swap structure. The specific valuation effect, however, will vary with the expectations and portfolio considerations of swap counterparties and cannot be objectively priced.

A swap may trade into the secondary market with a first floating rate payment period different from those for the remainder of the swap's life. For example, consider a generic six-month LIBOR swap with four months to go until a floating rate payment. Clearly, the two months' accrued interest on both the fixed and floating rate sides of the swap must be factored into the swap price. The appropriate index to use for the floating rate over the next four months remains subject to debate, especially if the original swap was based on six-month LIBOR reset monthly. There is no definitive market convention on this question. The need to negotiate these points is another impediment to secondary-market liquidity.

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1 If d is an interest rate quoted on a discount basis, the bond equivalent (b) and CD equivalent (c) are given by:

$$b = \frac{365 \times d}{360 - d \times t} \quad \text{and} \quad c = b \times \frac{360}{365}$$

where t is the actual number of days in the floating rate period. Treasury bills, bankers' acceptances and commercial paper are quoted in the cash market on a discount basis; LIBOR, prime, certificates of deposit and Federal funds are quoted on a CD basis.

C. Risk management by swap intermediaries

Parties engaged in swaps must contend with two major kinds of risk: price risk and credit risk. Price risk arises because interest rates or exchange rates can change from the date on which the swap is arranged. Credit risk arises because a counterparty may fail to perform and that event may expose a swap participant to an unexpected and unintended mismatch.

1. Price risk

The preferred method of controlling exposure to price risk on a swap is to close it out by entering into an offsetting swap. If inflows match outflows, apart from spreads taken by the intermediary as income, the intermediary is fully hedged against price risk. Mismatches in payment dates, reset periods or floating rate indices lessen the coverage of the hedge.

In the current market, only a small proportion of swap dealers match each swap as it is taken on. Under competitive pressures, most dealers now buy and sell each swap independently; that is, most dealers are ready to commit themselves to one swap before an offsetting swap has been arranged. This is done on the assumption that the offsetting side of the transaction can be completed without an adverse change in the market during the interim period. The length of time dealers are willing to carry an open swap varies across institutions. Some intermediaries seek to close their book by the end of the day; others are willing to carry an open swap for weeks.

Most unmatched positions are in single-currency interest rate swaps rather than in currency swaps. This is explained by the difficulty of hedging long-term currency exposure in any market other than the swap market. Furthermore, the majority of intermediaries' open coupon swap positions are swaps in which the counterparty is a floating rate payer. This is because floating rate payers often enter into swaps in conjunction with issuing fixed rate debt. The swap is done at the time the financing is arranged. The timing of swaps with fixed rate payers is usually more flexible.

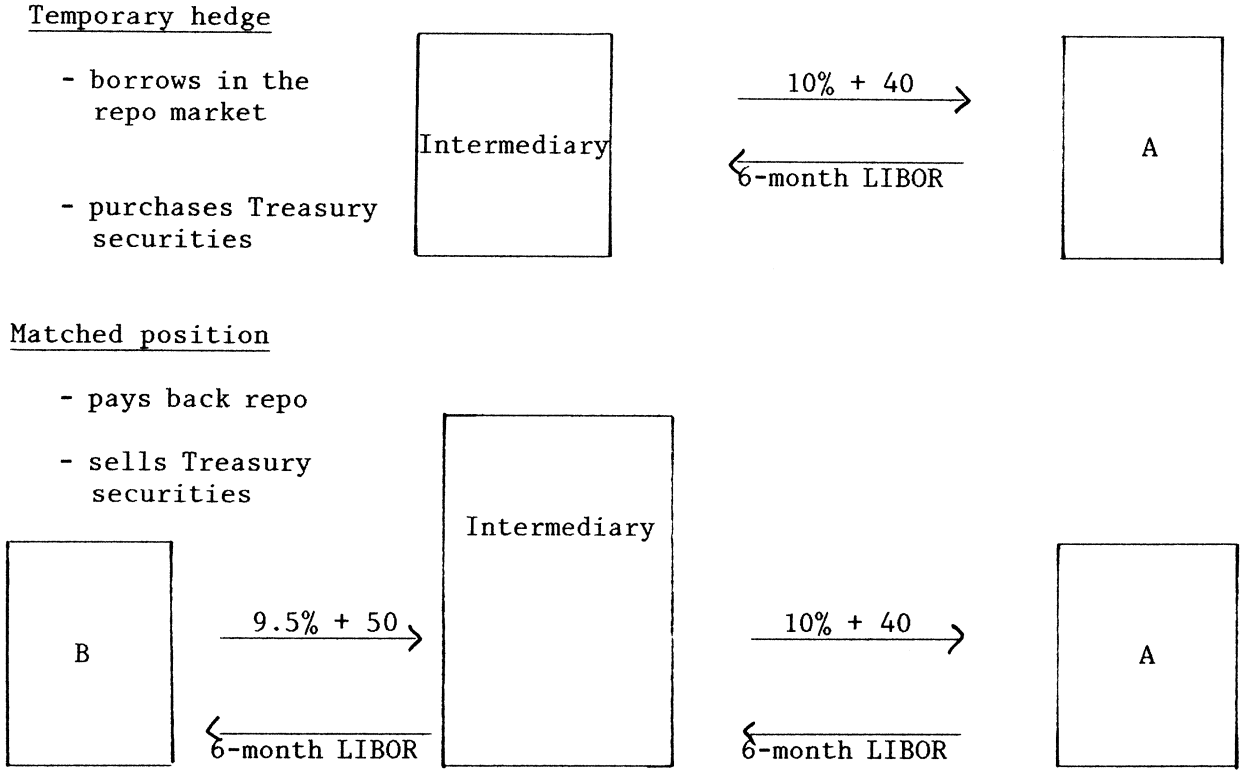
Before a swap is matched, it is always at least partially hedged. The typical hedge for a dollar coupon swap was described above. While this hedge protects the dealer from a move in the level of market interest rates, it does not cover a change in the spread over US Treasury securities. Let us consider the following example.

Suppose the intermediary commits itself to a five-year swap with a corporation (A) when the yield (T) on five-year US Treasuries is 10 per cent. It pays 10 per cent. + 40 basis points in exchange for six-month LIBOR and hedges the swap temporarily with Treasury securities. A few days later, the bank decides to match the swap. In the interim the spread on swaps has remained constant at T + 40 (bid), T + 50 (offer), but the yield on five-year US Treasuries has fallen to 9.5 per cent.

Looking only at the matched swap position, the bank loses 40 basis points on the notional principal at every payment date. This loss is more than offset, however, by the gain on the Treasury holdings. In total, the intermediary earns 10 basis points on the matched swap position.

Figure 2.4

Examples of hedged and matched dealer position



Suppose that before the swap is matched, Treasury yields remain constant but spreads decline to T + 30 (bid), T + 35 (offer). The Treasury hedge does not cover this type of exposure. The intermediary loses 5 basis points on the notional principal at each payment date.

Intermediaries must also be able to manage other types of market risk. They face basis risk when the floating rate indices on two matched swaps differ (for example, paying six-month LIBOR and receiving a margin over the Treasury bill rate). Differences in the maturities of matched swaps or between the swap and the underlying instrument create other gaps. Another type of risk arises when the reset date on swap flows differs from that on its hedge.

The interest rate exposure generated by open swap positions is effectively folded into the global interest rate exposure of the dealing institution. A common way of doing this is to have the swap desk buy its hedge internally from another area, such as the Treasury function, that has overall institutional responsibility for managing the interest rate exposure of the bank. Similarly, the swap desk often handles all swap requests from other divisions or affiliates of the dealer institution.

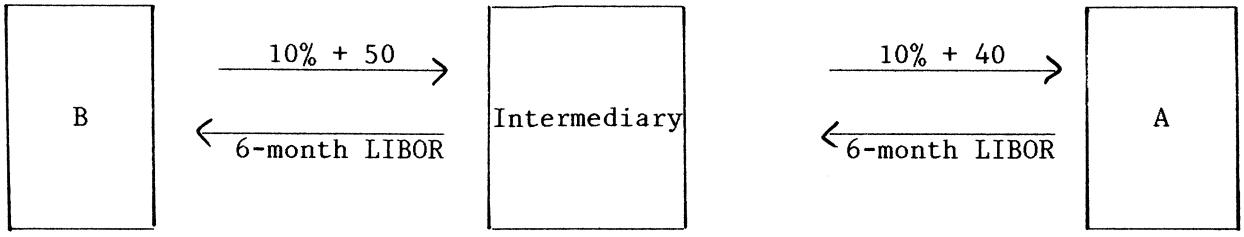
2. Credit risk

Matching or hedging swap positions 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 following example describes a swap dealer's exposure to the possible default of its counterparties when two swaps are perfectly matched.

Figure 2.5

Example of credit risk on dealer's exposure



SWAP 1 SWAP 2

An intermediary commits itself to two $30 million five-year coupon swaps simultaneously. On one it receives 10.5 per cent. (T + 50 bp) in exchange for paying six-month LIBOR. On the other it pays 10.4 per cent. (T + 40 bp) for six-month LIBOR. There are no mismatches in payment or reset dates. If both counterparties perform according to their contracts, the bank is exposed to no interest rate or market risk. It is, however, exposed to credit risk.

A fall in the five-year Treasury yield to 9.5 per cent., however, increases the value of the dealer's swap with B because the dealer is now receiving above-market rates. Similarly, the swap with A has fallen in value, because the bank is paying above-market rates. If these two swaps were marked to market (that is, valued at current interest rates), the gain on the swap with B would be equal in magnitude to the loss on the swap with A.

The opposite would be true if rates had risen. The swap with B would have negative value, the swap with A would have positive value. Of course, if rates had not changed, neither swap would have changed in value, assuming that the payment flows related to the swaps could be replaced at current market rates with no loss or gain.

The credit exposure on a swap is the potential loss when a counterparty fails. The magnitude of this loss, or the market value of the swap contract at current interest rates, is the cost of re-establishing the swap's interest and currency flows at current market rates. The value of the contract to the party receiving fixed rate payments is the difference between (1) the fixed rate payments discounted at current rates and (2) the present value of the floating rate payments.

Alternatively, we can think of the potential loss as the cost of re-establishing the swap payments by borrowing and investing in other markets. The intermediary could re-establish its floating rate payments by issuing a floating rate note with a coupon of LIBOR. Its fixed rate receipts can be re-established by purchasing a security or group of securities yielding payments identical to those on the swap. The potential loss is the difference between the discounted value of the two securities plus any issue costs.

Credit risk is managed internally with limits on expected exposure by counterparty, periodic monitoring of actual exposure over time and, in some cases, calls for collateral.

Before executing a trade, swap dealers must obtain approval from the credit desk for the expected exposure on the swap. The most common and simplest practice is to calculate potential exposure by assuming that the consumer defaults shortly after the swap is written when rates have moved against the customer by a specific amount. The resulting exposure is expressed as a fixed percentage of the notional principal per annum. The method yields a simple rule of thumb that exposure is 2-3 per cent. of notional principal times the number of years until maturity.

A more sophisticated approach is to base the assumptions of interest rate movements on an analysis of historical data and to base exposure on a movement of two standard deviations immediately, with the band widening over time. Exposure is then taken as the present value of the consequent loss. This approach is less restrictive, and probably more realistic, than the rule-of-thumb method described above. For a ten-year swap, it typically gives a maximum exposure of 24 per cent. of notional principal at the start of the swap. Some banks, having made calculations using the more sophisticated present-value approach, have subsequently reduced it to new rules of thumb, such as 5 per cent. in the first year and 2 per cent. thereafter.

Credit officers in some institutions merely approve or disapprove credit extensions on swaps, charging the exposure against the institution's overall credit line to the counterparty. Others approve the swap only if the institution receives a certain number of basis points for credit risk. In some cases the swap dealer actually pays the credit officer shadow income for the exposure. Typically, however, the swap dealer does not pass this charge explicitly through into the quoted price of the swap. If the swap officer cannot cover this charge at the prevailing swap price in the market, he does not do the deal.

An estimate of the minimum spread required between two offsetting swaps for profitability can be obtained by charging such a premium on the estimated credit exposure. A "shadow charge" of 6 basis points to a particular customer might be arrived at in the following fashion. A loan to a customer would normally incorporate a spread of 3/8 of 1 per cent. over the bank's cost of funding the loan. For a swap where the credit exposure is calculated to be 16 per cent. of notional amount, the charge to cover the credit risk is 3/8 of 1 per cent. of the 16 per cent., or 6 basis points (.0006). This covers the exposure to the failure of one counterparty.

In addition to setting aside credit lines for expected exposure, most swap dealers also monitor actual swap exposure as prices change. Management is periodically informed of the potential exposure if some or all counterparties were to default.

Practice differs among dealers on whether they monitor their credit exposure to a counterparty with which they have swaps in opposite directions. Some examine their exposure on a gross basis on the assumption that the counterparty could default on each swap only when interest rates have moved in the wrong direction. Others monitor exposure on a net basis, assuming that if the counterparty fails, the bank gains on some swaps and loses on others.

Rights of offset provided by the swap contracts and the national law under which the contracts are made are important factors in making this choice.

In some institutions, credit lines are a serious constraint for swap traders. When a line with a particular customer is limited, swap dealers often compete with other divisions of the bank for credit approval.

A third method used in the management of credit risk is to request some form of credit enhancement (for example, a letter of credit) or collateral from counterparties. When necessary, a letter of credit is usually written for the amount of initial expected exposure. Collateral may be requested in the form of an initial margin which is reduced over the life of the contract, or the bank may retain the right to make a call on collateral over the life of the swap if exposure increases. The contracts of some intermediaries include a two-way call for collateral - both the intermediary and his counterparty have the right to call for collateral from the other.

In general, investment banks request collateral more frequently than commercial banks. Investment banks favour collateral over a more complex set of credit agreements to facilitate the trading of swaps as securities. The competitive advantage of commercial banks in the swap market, however, is their willingness to assume long-term credit risk. They prefer not to see collateral used to equalise the credit-standings of all counterparties.

Performance failures in the swap market have been extremely rare so far. One swap has come to court in a dispute over whether termination was justified. Only one dealing institution mentioned an instance of actual counterparty default and this involved a very small probable loss. A number of dealers, however, cited their concerns for the future, suggesting that such incidents would be highly likely in the wake of such rapid market growth.

3. Other risks

A swap transaction involving an exchange of currencies delivered to locations at different times or in different time zones exposes the swap party to settlement risk. This exposure arises when one party has fulfilled the obligation under the contract by delivering funds, but has not received 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. Whenever possible, only net amounts are actually transferred.

D. Accounting and tax issues

1. Accounting for swap transactions

The central issue in accounting for swaps is whether to view all contracts as trading positions or to treat them as hedges of underlying assets and liabilities. Trading positions and portfolios are generally marked to market daily, that is, they are priced at their daily liquidation value. Other on-balance-sheet assets and liabilities, on the other hand, are usually valued at cost or at whichever is lower, cost or market. Some argue that a swap put in place to change the exposure on an underlying position should receive the same treatment as the underlying position.

Four different types of swap positions can be distinguished:

(i) swaps that hedge commitments valued at cost;

(ii) swaps which involve an open position on exchange rates or interest rates;

(iii) swaps which hedge other swaps;

(iv) swaps which hedge or are hedged by trading positions.

Contracts in the first group usually receive the accounting treatment applied to other long-term assets or liabilities. The second type of swap is most often valued at market prices. There is no general consensus on treatment of swaps in the third and fourth groups.

A fundamental problem in swap accounting is that there are no authoritative accounting standards which cover interest rate swaps. Rulings on similar instruments have been discussed in the United States by the American Institute of Certified Public Accountants (AICPA) in Accounting for forward placement and standby commitments and interest rate futures contracts, and by the US Financial Accounting Statements Board (FASB) in Statement No. 80, Accounting in futures contracts. US standards applying to currency swaps are set forth by FASB in Statement No. 52, Foreign currency translation. Some accountants have indicated that FASB-52 criteria are clearest in their application to fixed-fixed currency swaps but that they can be interpreted to apply to cross-currency interest rate swaps as well.

(a) Accounting for currency swaps

A currency swap is construed to be a series of forward exchange contracts. Under FASB-52, accounting rules for forward contracts differ depending on whether the position is a hedge or a position taken in expectation of exchange rate changes. A forward contract (and by implication a currency swap) qualifies as a hedge if it reduces exposure related to (1) a net investment in a foreign subsidiary, (2) an identifiable, firm foreign currency commitment (for example, an obligation to pay or a right to receive interest), or (3) some other existing exposure (for example, a foreign currency receivable or payable). A currency swap is a hedge for accounting purposes if it is designated as a hedge and is effective as such.

The accounting treatment for forward contracts identified as hedges first separates the gain or loss on the position into two parts:

(i) the original discount or premium - that is, the foreign currency amount of the contract multiplied by the difference between the contracted forward rate and the spot rate at the start of the contract;

(ii) changes in the spot rate from the start of the contract until the time of expiration.

The treatment of the two components depends on the nature of the commitment that is hedged.

(i) For hedges of a net investment in a foreign subsidiary, the gain or loss arising from changes in the spot rate is included in the foreign currency translation component of shareholder equity. The original discount or premium is amortised over the contract's life either to income or to the translation component of equity;

(ii) For hedges of an identifiable firm commitment the gain or loss from spot rate changes is deferred to the transaction that is hedged. For hedges of interest, the gain or loss from spot rate changes is included in interest income or expense when payment becomes due. The original premium or discount may either be amortised to income over the contract's life or deferred to the hedged transaction when that occurs;

(iii) For hedges of other exposures, the gain or loss from spot rate changes is included in current income, where it offsets the loss or gain from the hedged item. This includes hedges of principal. The original premium or discount is amortised to income over the contract's life.

The accounting treatment required for open positions (non-hedges) is to include all gains and losses due to price changes in current income.

If a currency contract that hedges a foreign currency commitment is terminated before the commitment is satisfied, the gain or loss on the contract continues to be deferred. For example, if a currency swap that was used to hedge interest expenses is terminated early at a loss, that loss will not be reflected in income immediately but will be spread out over what would have been the remaining life of the swap. In other words, once a hedge, always a hedge.

(b) Accounting for interest rate swaps

While no authoritative standards have been set forth for interest rate swap accounting, current practice generally utilises a type of hedge/deferral accounting which is similar to that applied to currency swaps. Each of the four types of swaps noted above are treated separately.

Payments related to swaps which hedge commitments valued at cost are usually accrued over each period and reported as a net adjustment to the interest payment/expense of the underlying asset/liability or income. This has the effect of changing the terms on the underlying asset or liability to reflect the swap payments. For example, suppose a corporation issues a floating rate loan at LIBOR plus 40 basis points and then swaps into fixed rate funds for the same maturity at 10.5 per cent. If payment dates are identical the treatment of the floating rate loan plus swap would be equivalent to the treatment of a fixed rate loan at 10.90 per cent.

Costs incurred in executing the swap, such as commission, brokerage or organisation fees and legal fees, are also deferred and amortised over the term of the swap agreement. That is, they are not treated as expense.

This treatment, as far as it goes, is in accordance with authoritative standards set forth in FASB Statement No. 80 on Accounting for futures contracts. But FASB-80 has stricter criteria for

considering a contract as a hedge than does current practice for swaps accounting. Under FASB-80 a contract serves as a hedge only if it hedges a firm commitment that exposes the party to interest rate risk as assessed on a total enterprise basis, i.e. considering other commitments and existing assets and liabilities.[2] FASB-80 also requires an ongoing assessment of the correlation between the hedge and the hedged commitment. If this criterion were applied to swaps it would require the interest rate on which the swap is based and the interest rate of the hedged item to have been highly correlated in the past and remain so. Relative to these criteria, current accounting practices for swaps are very flexible.

Swaps which take interest rate positions are generally either marked to market or valued at whichever is lower, cost or market. This is consistent with the treatment of speculative off-balance-sheet positions.

There is no difference between valuing swaps perfectly hedged with other swaps at cost or at market value. Gains on one are always offset by losses on the other. Differences arise when there are mismatches in payment dates, reset frequencies, floating rate bases or any other terms. Most institutions mark these swaps to market.

The treatment of swaps which hedge or are hedged by other trading positions (primarily dealers' unmatched swap positions) also varies among institutions. As explained above, these positions are generally only partially hedged. Many dealers mark the unmatched swaps to market on a daily, weekly or monthly basis to reflect the liquidation value of the position. The basic problem with marking swaps to market is that market value is not well defined. The prices used in the procedure are somewhat subjective since there are often no readily available quotes for thinly traded swaps. An alternative valuation is to use the termination payment derived from the close-out calculations built into the contract.

Other problems arise with some swaps valued at cost and others valued at market prices. Under different circumstances traders face incentives to move swaps from one book to another in order to realise short-term gains.

Similar issues arise in the treatment of swap terminations - either those involving a cash settlement or those done with a reverse swap. Again, the approach taken generally depends on whether the swap is a hedge or a non-hedge. Current treatment of forward currency contracts and futures contracts suggests that the gain or loss due to termination of a hedge before maturity should be deferred over the life of the hedged commitment. In the autumn of 1984, the Emerging Issues Task Force of FASB proposed that deferral and amortisation be the standard. The US Federal Home Loan Bank Board has taken the same view.

Finally, similar hedge/deferral approaches are generally applied to options on swaps. The institution first determines whether or not the option is a hedge for accounting purposes. Non-hedges are marked to market. The intrinsic value on the option premium is deferred; the time value is amortised to expenses during the option period.

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2 The FASB-52 requirements for a definition of a hedge that apply to currency swaps do not require that risk exposure be assessed on a total enterprise basis.

(c) Disclosure

Assuming a swap has a material effect on the financial condition of the firm, the existence of the swap and its terms (including its impact on the interest rate of the underlying borrowing and the period of the agreement) should in principle be disclosed in the footnotes to the financial statements (usually in the note dealing with debt).

At this juncture most accountants in the United States apparently consider swaps not to be material, and few appear in public financial statements. This significantly lessens the usefulness of company accounts.

2. Legal and tax issues with swaps

A swap contract has become a relatively standardised document. It usually runs to about 10-12 pages and has two or three principal sections. The first part defines the payments to be exchanged, including the method of calculation, the amounts and the timing of each payment. The second section provides for the early termination of the swap. The agreement defines specific events of default and defines the amount, if any, which must be paid by one party to the other as a result of the termination. Finally, some contracts include a third section on credit-related issues.

In mid-1985 the International Swap Dealers Association (ISDA) published a "Code of standard wording, assumptions and provisions for swaps" with the intention of standardising interest rate swap contracts used by different counterparties. The Code covers the definition of cash flows and the calculation of amounts payable at early termination. Credit-related issues are left to parties to negotiate among themselves. The ISDA hopes to publish a similar code for currency swaps in the near future.

Another group of swap-market participants has been meeting in London under the auspices of the British Bankers' Association (BBA). Its focus is on short-term transactions, up to two years, between banks. The BBA recently adopted new standard interest rates and exchange rates for settlement purposes, beginning in September 1985.

Much of the documentation for swaps draws on standard loan documentation. Events of default usually include:

(i) non-payment; in some cases there is a grace period;

(ii) making of representations and warranties that are incorrect in any material aspect;

(iii) failure to perform covenants other than promises to pay;

(iv) mergers involving the defaulting party in which it is not the servicing entity.

In addition, some contracts include a cross-default clause which ties performance on the swap contract to performance of all other contracts with each counterparty.

Other circumstances are usually specified in which the swap may be terminated without either counterparty being in default. These include optional terminations agreed to by both parties, termination in the event of the imposition of withholding taxes (in cross-border swaps)[3] and termination due to supervening illegality, that is, when changes in laws, regulations or treaties make payments under the swap illegal.

The ISDA Code provides three different options for settlement on the early termination date:

(i) "Agreement value" fixes the profit or loss on the basis of quotations from market-makers at the price of a replacement swap that would generate the same payment streams as the rate swap being terminated;

(ii) "Formula" calculates profit or loss on the basis of hypothetical alternative borrowings and investments available on the early termination date. Adjustments for an element of fault or differences in creditworthiness of the parties may be made by specifying spreads above or below the relevant borrowing and investment rates;

(iii) "Indemnification" allows the parties to calculate damages on the basis of a general indemnity.

Some contracts stipulate that payments are to be made on a "fault" basis. The party suffering the greater loss recovers only if it cannot be held accountable for the event that caused the early termination. If neither party is at fault, whichever suffers the greater loss is compensated by the other. Other contracts are written on a "no-fault" basis and use two-way payment procedures regardless of which party is responsible for the default.

The central legal concern is that no swap documentation has been tested in court. Thus the bankruptcy implications are at present unknown.

Additional legal concerns in the United States have not been tested in court. They focus on the power of a bank to enter into swap agreements and the possible applicability of gambling laws. Generally a bank would be likely to be found to have the power to enter into swap agreements that are hedged or that hedge other commitments under its power to take actions that are "incidental to" the powers expressly conferred on the bank. The power to enter into unhedged swaps is less well established. The extent to which swaps hedge other commitments is also likely to be an important factor in determining the applicability of gaming or gambling laws.

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3 Other contracts require the payer to bear the costs in the event that withholding taxes are imposed. The payer adjusts payments such that the net amount actually received by both parties free and clear of taxes is equal to the amount that the party would have received had no such taxes been withheld.

Chapter 3

Foreign currency and interest rate options

This chapter describes options on foreign currency and interest rate instruments, but much of the material applies equally to options on any other financial instrument or commodity. Indeed, the theory of option pricing was developed mainly for equities in the 1970s and only in the last few years has it been modified for fixed-income securities and foreign exchange.

A. The instrument

1. Definition

An option is a contract conveying the right, but not the obligation, to buy (CALL) or sell (PUT) a specified financial instrument (the UNDERLYING) at a fixed price (EXERCISE or STRIKE PRICE) before or at a certain future date. There are two parties to an option contract: the option seller (WRITER or GRANTOR) and the option purchaser (BUYER or HOLDER). The buyer purchases from the writer a commitment that the option writer will stand ready to sell or purchase a specified amount of the underlying instrument on demand. The option buyer's cost for this right (PREMIUM or OPTION PRICE) is paid to the option writer, and can be expressed in a variety of ways, e.g. as a percentage per unit of the underlying, or in cents (or other currency units) per unit of the underlying.

The option extends or is "alive" until a set EXPIRATION or MATURITY DATE. If the option contains a provision to the effect that it can be exercised at any time (EXERCISE DATE) between the date of writing and the expiration date, it is termed an AMERICAN OPTION; if it can be exercised only at maturity, it is termed a EUROPEAN OPTION. On the expiration date, the option owner can exercise his right to buy or sell the underlying, can let the contract expire, or, under certain conditions, can sell the option contract in the market.

As an example, an investor pays a premium for an American call option on £50,000 sterling with an exercise price of $1.25 and an expiration date of 15th October. This gives the purchaser of the contract the right to buy £50,000 at a rate of $1.25 per £1 any time between issuance of the contract and 15th October. The writer of the contract is obligated to sell £50,000 at a rate of $1.25 if the contract is exercised.

To take another example, an investor may purchase a European put option on $1 million in US Treasury bonds with an exercise price of $72 (per $100 face value) and an expiration date of 15th October. This gives the purchaser of the contract the right to sell $1 million in US Treasury bonds of a particular issue at a price of $72 only on the maturity date, 15th October. The writer of the contract is obligated to buy $1 million in US Treasury bonds at a price of $72 if the contract is exercised.

Options are purchased and traded either on an organised exchange or in the over-the-counter (OTC) market. Exchange-traded options are standardised

contracts on specified underlying instruments, in multiples of standard amounts, with predetermined exercise prices, set according to predefined formulae and with standard maturities. OTC option specifications are generally negotiated as to the underlying instrument, amount, exercise price, exercise rights and maturity. Some OTC options are written to correspond to exchange-traded instruments in exercise price and expiration, although generally not in amount.

The PREMIUM PAYMENT DATE is the day on which the premium is due and payable, and is usually the same as the transaction date for exchange-traded options, and usually one or two business days after the transaction date for OTC options. The SETTLEMENT DATE is the day on which delivery of the underlying is required, and is always specified in relation to the exercise date. For American options the settlement date is generally one or two business days after exercise, and for European options it is normally one or two days after the expiration date. SETTLEMENT PRICE is the price of the underlying at the point at which the option is exercised. Most option contracts specify an objective basis on which the settlement price will be determined, such as the closing price on exercise date for exchange-traded options or a market price at a predetermined point in time on the exercise date for OTC options.

A call or put option whose exercise price is the same as the spot or cash price of the underlying is termed AT-THE-MONEY. A call whose exercise price is below the current spot price of the underlying or a put whose exercise price is above the current spot price of the underlying is termed IN-THE-MONEY. A call whose exercise price is above the current spot price of the underlying or a put whose exercise price is below the current spot price of the underlying is termed OUT-OF-THE-MONEY.

The option owner will only exercise the contract if it is profitable to do so, i.e. if it is in-the-money. Otherwise the contract will expire unexercised. When the market price of the underlying increases, the value of a call option increases as well, since it moves towards, or further into, the in-the-money range. Under the same circumstances, the value of a put option decreases, since it moves towards, or further into, the out-of-the-money range.

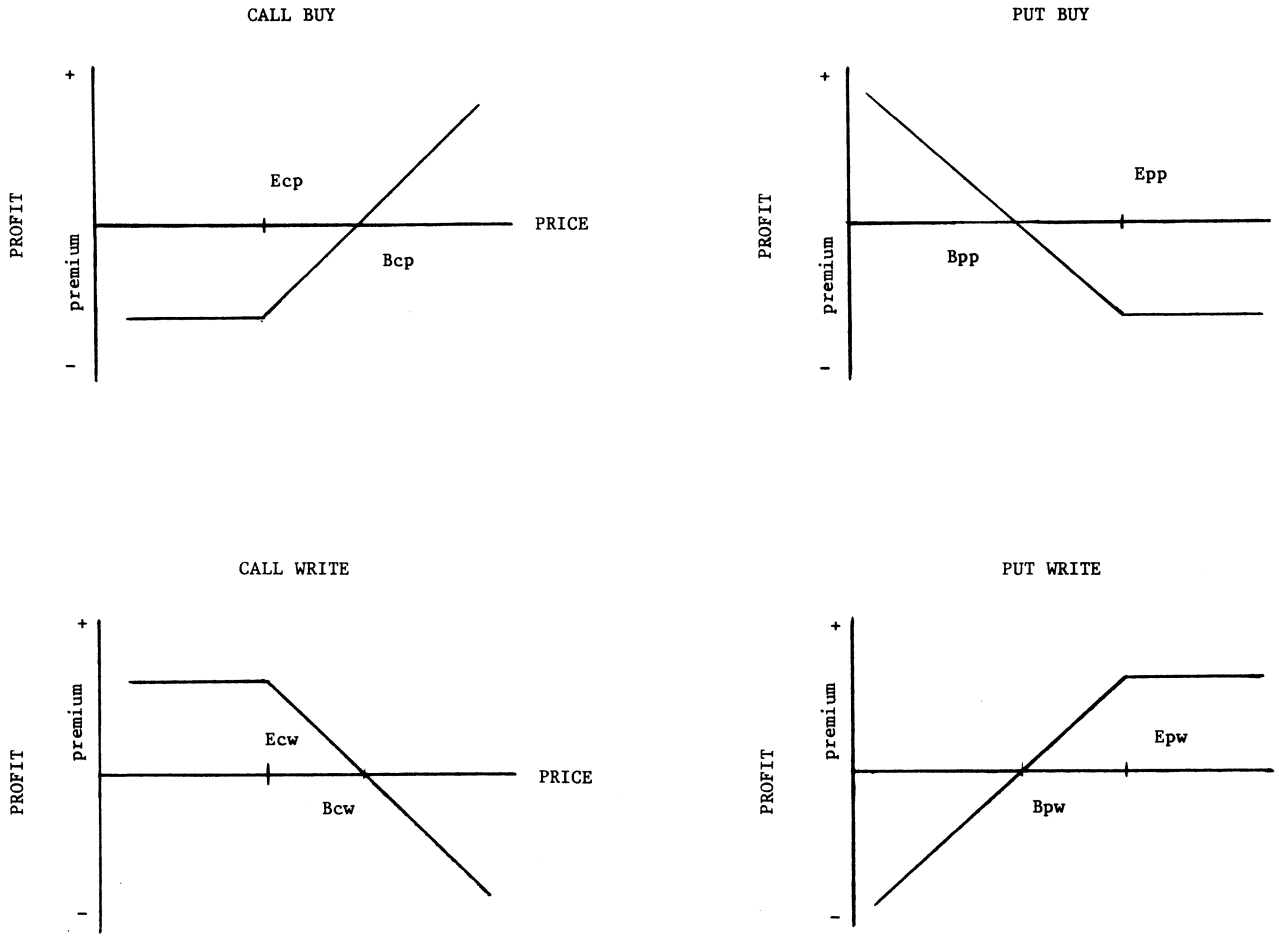
Options differ from all other financial instruments in the patterns of risk which they produce. Both the market risk and the credit risk patterns are asymmetrical as between writers and buyers of options. The holder of an option has the possibility of unlimited profit should the option move increasingly into-the-money, but his loss is limited to the amount of premium paid should the option expire at or out-of-the-money. Conversely, the writer of an option is limited in his income to the amount of premium earned, while in principle he is exposed to unlimited loss should the option move increasingly into-the-money.

As shown by the graphs below, the purchase of a call option involves limited market risk when the exercise price of the option (Ecp) is above the market price of the underlying. The break-even point (Bcp) for the option purchaser is the exercise price plus the premium paid. A rise in the price of the underlying beyond the break-even point results in a profit for the call purchaser which is potentially unlimited. Conversely, for the writer the sale of a call option involves unlimited market risk when the exercise price of the option (Ecw) is below the market price of the underlying. The break-even point (Bcw) for the option writer is the exercise price plus the premium received. A

fall in the price of the underlying below the break-even point can, at most, result in a profit equal to the premium received.

Figure 3.1

Option profit versus underlying price change



The graphs also show that the purchase of a put option involves limited market risk when the exercise price of the option (Epp) is below the market price for the underlying. The break-even point (Bpp) for the option purchaser is the exercise price less the premium paid. A fall in the price of the underlying below the break-even point results in profits for the put purchaser which could be substantial. Conversely, for the writer the sale of a put option involves substantial market risk when the exercise price (Epw) is above the market price. The break-even point (Bpw) for the put option writer is the exercise price less the premium received. A rise in the price of the underlying, at most, results in a profit equal to the premium received.

The distribution of credit risk is also asymmetrical. 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 has no credit risk since the buyer has no obligations to perform. After exercise, there are 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.

Some OTC option contracts are CASH SETTLED, which means that no delivery of the underlying is made upon exercise. Instead, the cash value of the option contract is determined by taking the difference between settlement price and strike price, and that sum is remitted in cash. In such cases, the settlement risk changes substantially, and only the party receiving payment, the option holder, will be at risk.

Exchange-traded option contracts exist both with an actual currency or financial asset as the underlying, or with a futures contract on a currency or financial asset as the underlying. For example, on the Philadelphia Stock Exchange (PHLX) the Deutsche Mark currency option contract requires delivery of Deutsche Mark. The Deutsche Mark option contract traded on the Chicago Mercantile Exchange (CME) requires delivery of a futures contract on Deutsche Mark. Likewise, there are options on both interest rate instruments and futures contracts on interest rate instruments. Options on actual underlyings produce precisely the same profit and loss profiles as do options on futures, since the prices of futures and their associated underlying instrument move in virtually identical patterns.

2. History

Options on foreign currency or interest rates have been written in various forms for many years, but only on a very limited basis and almost entirely in OTC. Active trading in options surged in the early 1980s, spurred initially by growth in customer demand in the OTC market and then by the introduction of new option contracts on organised exchanges around the world. Option contracts were first introduced in the Netherlands on the European Options Exchange in 1978. They were first introduced in Canada on the Montreal Exchange in 1982. The first contracts introduced in the United States, in 1982, were options on the pound sterling and the Deutsche Mark on the Philadelphia Stock Exchange, and options on US Treasury bond futures on the Chicago Board of Trade (CBT).

By early 1986 the number of major option contracts traded on organised exchanges had expanded dramatically, as had transactions volume. Options on six major currencies as well as the ECU are traded on the PHLX and options on three currency futures contracts are traded on the CME. The Chicago Board of Trade is the centre of activity for options on US Treasury bond futures and the CME trades options on Euro-dollar futures. The European Options Exchange also trades options on three currencies, precious metals and Dutch government bonds. There are also five currency options traded on the Montreal Exchange and recently currency option contracts began to be traded in London.

OTC options on currencies and interest rates predate exchange-traded contracts by many years, but trading in OTC options grew rapidly at the same time as exchange-traded options. The acceleration since 1982 in the growth of options trading in both markets appears in general to spring from the desire by

corporations and financial institutions to manage foreign currency and interest rate risks more effectively and in particular from an increased willingness to surrender a fee in order to transfer such risks to another party. Indeed, as among all recent financial innovations, options seem most strongly to be a product of demand by the ultimate corporate and institutional buyer, and almost all commentators suggest this reflects the view that the high level of interest rates and the volatility of exchange rates and interest rates have increasingly exposed firms to risk of loss from developments which were difficult to predict and in any case beyond their control.

3. Incentives and uses of options

Commercial and investment banks generally believe that the growth of the market for interest rate options was driven by customer demand. In the late 1970s and early 1980s, both corporate customers and institutional investors began to express a wish that banks offer, for a fee, what amounted to insurance against the effects of rising interest rates. Plainly, firms engaged in producing products where the production process was lengthy and the demand for the product was interest rate sensitive could be expected to be most interested in such protection.

The most obvious examples of this type of problem would be a builder of residential or commercial real estate, where his capacity to sell the property once construction was finished depended on the interest rates prevailing at the time. By purchasing an option on an interest rate instrument, he could expect to recoup much or all of the potential loss on the project which might occur if interest rates rose and the value of the property was therefore lower. The interest rate option in such a case could take the form of an extra fee to fix the maximum rate on a prearranged credit, or of an actual option on a long-term financial asset, where the offsetting gain would come in the form of a cash payment. The popularity of fixed rate mortgages in the United States is certainly one source of the greater activity in interest rate options there.

Thus, demand for OTC interest rate caps and other forms of options appeared most strongly in the early 1980s when interest rates were reaching unprecedented levels. More recently, however, demand has apparently slackened off for loan caps or for other interest rate options used for similar purposes since interest rates have fallen considerably from their earlier levels. Implicit in this view is that customers do not think rates will move back up to levels that would be catastrophic for their businesses.

Foreign exchange options also developed mainly in response to customer demand, although the source of that demand stemmed more from the trend in the early 1980s towards greater exchange rate volatility than from any particular level of exchange rates. With exchange rates increasingly unpredictable, firms were attracted to the possibility of paying a fee to purchase insurance against an adverse rate move, but preserving the chance to gain should it move favourably. Also, the use of options enables firms to retain their competitive position relative to other firms that have not hedged, if rates move in their favour.

Typical examples of users of options might be financial firms holding large investments offshore, where sizable unrealised gains had occured because of exchange rate changes, and where these gains were thought likely to be partially or fully reversed. Also, limited use of foreign exchange options has

been made by firms while bidding on foreign contracts, where the foward purchase or sale of the currency for hedging purposes would expose the firm to sizable actual loss should the contract not be won. OTC options have proved to be attractive to non-bank firms which do not wish to manage their exposure actively, or which lack experience and do not have the ongoing needs that would warrant the expense of developing the experience necessary to do so.

Some banks offer forward transactions contingent upon winning a foreign contract. These are not true options because the firm must fulfil the forward transactions if it wins the foreign contract, even if exchange rates have moved adversely. However, the firm is released from the forward contract if it is unsuccessful in the bidding.

A number of banks apparently first entered the foreign exchange option market either because they saw the opportunity to profit by meeting this customer demand, or because they were concerned that the customers might go elsewhere. At the same time, some banks apparently began writing options to gain experience so that they might use them to hedge their own market risks better.

The sections above described how pricing of options by the writer or seller is normally based on one of the formulae. But higher prices for options will of course tend to reduce the amount demanded, and once in the business, option writers feel competitive pressure to reduce the price, especially at times when expected volatility is high. With respect to interest rate options in particular, several banks in the New York market concluded in 1985 that competitive pressures had forced prices down to levels that were not profitable and therefore pulled back from the market. Volatility of foreign exchange rates rose dramatically in the spring of 1985 forcing option prices up as well. During this period many market participants indicated that customer demand fell off sharply. On the other hand, market participants in all major centres frequently express the view that some dealers, especially new market entrants, underprice options slightly or sometimes substantially in order to gain business.

The developments in early 1985 point to an interesting difference of views between option writers and buyers. Writers consider that the key variable in selling options is the volatility component. Many buyers, however, feel they are buying insurance. Certainly these perceptions are not inconsistent, and with the growth of trading in options some firms, usually more likely to purchase options, have begun to write options in order to earn the premium income. One common strategy is "covered writing" of interest rate calls, in which a portfolio manager, controlling large holdings of long-term fixed rate securities, writes calls on the option on the bond futures contract. So long as the option expires unexercised, the premium generated can add significantly to the portfolio's average rate of return over time. However, a strategy of covered call writing can involve sizable lost opportunities during market rallies such as the US Treasury market experienced in May and early June 1985, since the assets are likely to be called away just as they appreciate in value or the options must be bought back at substantially higher prices.

B. Pricing

The terms "OPTION PRICE" and "PREMIUM" are interchangeable. The price is expressed in various ways, the main variations being either as a percentage per unit of the underlying or as a number of cents (or other currency units) per unit of the underlying. For example, a $1.25 call on sterling, priced at a premium cost of 4 per cent. of the exercise price, may be quoted either at 4 per cent. per pound or at $0.05 per pound.

From a theoretical point of view, the value of an option is comprised of two components: INTRINSIC VALUE and TIME VALUE. Intrinsic value is the financial benefit to be derived if an option is exercised immediately, reflecting the difference between the exercise price and the market price of the instrument. For example, the intrinsic value of a call option on pounds sterling with an exercise price of $1.25 and a market spot rate of $1.27 would be $0.02 per pound. The intrinsic value falls to zero when the market price equals the exercise price (reaches the "at-the-money" level). An option will generally sell for at least its intrinsic value.

During the time remaining before an option expires, the price of the underlying can move so as to make the option profitable, or more profitable, to exercise. That is, an option which is out-of-the-money can move into-the-money or one already in-the-money can become more so. The chance that an option will become profitable, or more so, is always greater than zero, consequently the time value of an option is greater than zero.

Therefore the selling price, or total value, of an option generally exceeds its intrinsic value. This is true for American style options because the time value is always positive up to the expiration date. However, the case is more ambiguous for European style options, since increasing the time to maturity may not increase its value, given that it can only be exercised on the maturity date. That is, a European style option may be in-the-money before expiration, yet by the later maturity date it could be out-of-the-money.

The time value and intrinsic value of an option can always be calculated separately, most simply by calculating the intrinsic value and total value, and then taking the difference between them. For example, the $1.25 call on pounds sterling mentioned above, given a current spot rate of $1.27, may cost $0.03 per pound with four months remaining until expiration of the contract. The $0.02 would represent the option's intrinsic value, the $0.01 per pound would represent the option's time value.

It should be understood that exactly the same calculation is required to quote a price on a new option contract before it is agreed, or to calculate the current value of an option during its life. In principle, it is the expected volatility of the underlying over the remaining life of the option that determines its current value, and for this reason an existing option can increase or decrease in market value simply because the market changes its expectation of future volatility.

The most common pricing models for interest rate and currency options derive from the Black-Scholes European call option valuation formula, developed originally for the pricing of options on stocks. The principle behind this formula is to seek a "riskless hedge". Starting with a long position in the underlying, one should be able to sell a number of calls so that every fall

in the underlying's value will be offset by the premium income from the short call position. Conversely, starting with a short position in the underlying, one can buy a number of calls so that every rise in the underlying's value will be offset by the profit on the long call position. Since this is a riskless portfolio, it should bear the same return as the risk-free rate of interest. Thus, the underlying plus options portfolio has the same beginning and ending values as a "risk-free" underlying instrument. From this one can determine what the beginning and ending values of the option must be.

1. The basics of time value

The section above described how the time value of an option can be inferred from the difference between the total and intrinsic value. It is also useful to examine directly the determinant of time value, especially the expected variability of the price of the underlying instrument. The direct calculation of time value is complicated because it involves both the volatility element and interest rate considerations.

Statistically, the price of the underlying is a continuous random variable. For a continuous random variable, the probability of any given price occurring is determined by a mathematical function, typically portrayed by a density function or probability distribution. The volatility component of option pricing is measured by evaluating a form of the cumulative normal distribution of prices for the underlying. The "log-normal" distribution is generally used for commodity or financial asset prices because it implies that the price can rise to infinity, but not fall below zero.

The normal model is characterised by a symmetric distribution that is completely described by its mean and variance; 67 per cent. of the observations should fall within one standard deviation and 96 per cent. within two standard deviations of the mean, etc. The normal distribution assumes that the price in the future is as likely to rise as to fall, and thus that the current price reflects the mean of the distribution of expected future prices. The area under the curve between any two points gives the probability of being between those two points. The model, in effect, calculates the difference between current price and exercise price, in terms of the expected standard deviation of the normal distribution, in order to estimate the chance that an unprofitable option will become profitable, or a profitable one more so.

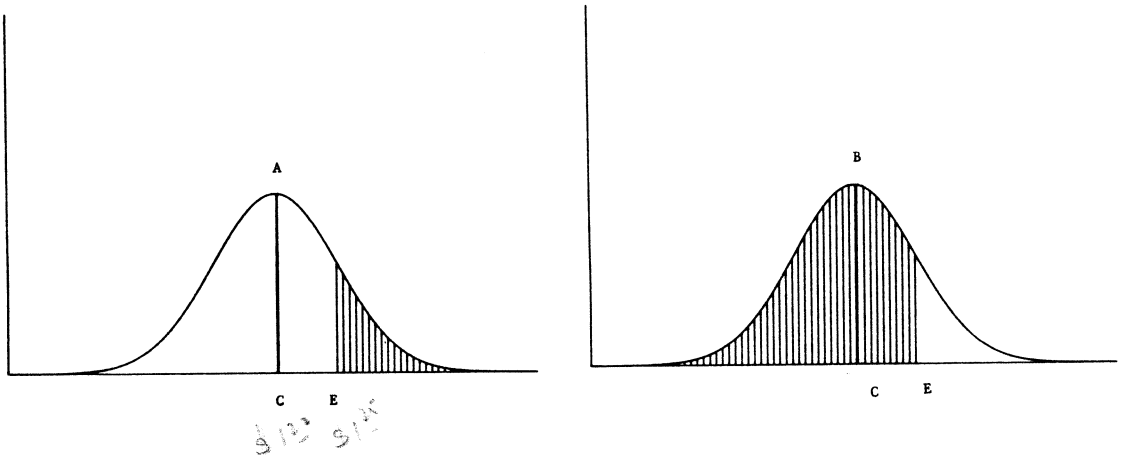
However, these probabilities apply to the end of the time period. They say nothing about the chances that the underlying might fall below or rise above a particular price at some time during the period. The time element thus enters directly since the actual chance that an option will increase (or decrease) in value declines as the period to expiration shortens, and does so at an increasing rate.

It is most common to use some form of the cumulative log-normal distribution in option price formulas, but considerable work has been done by theoreticians and market practitioners on the applicability of other distributions. There are technicians who contend that short-term movements in the price of many financial instruments are not normal, in particular that chances of extreme movements are considerably higher than are predicted by a normal distribution.

Figure 3.2

Graphs of normal distributions

Example: September $1.25 sterling call



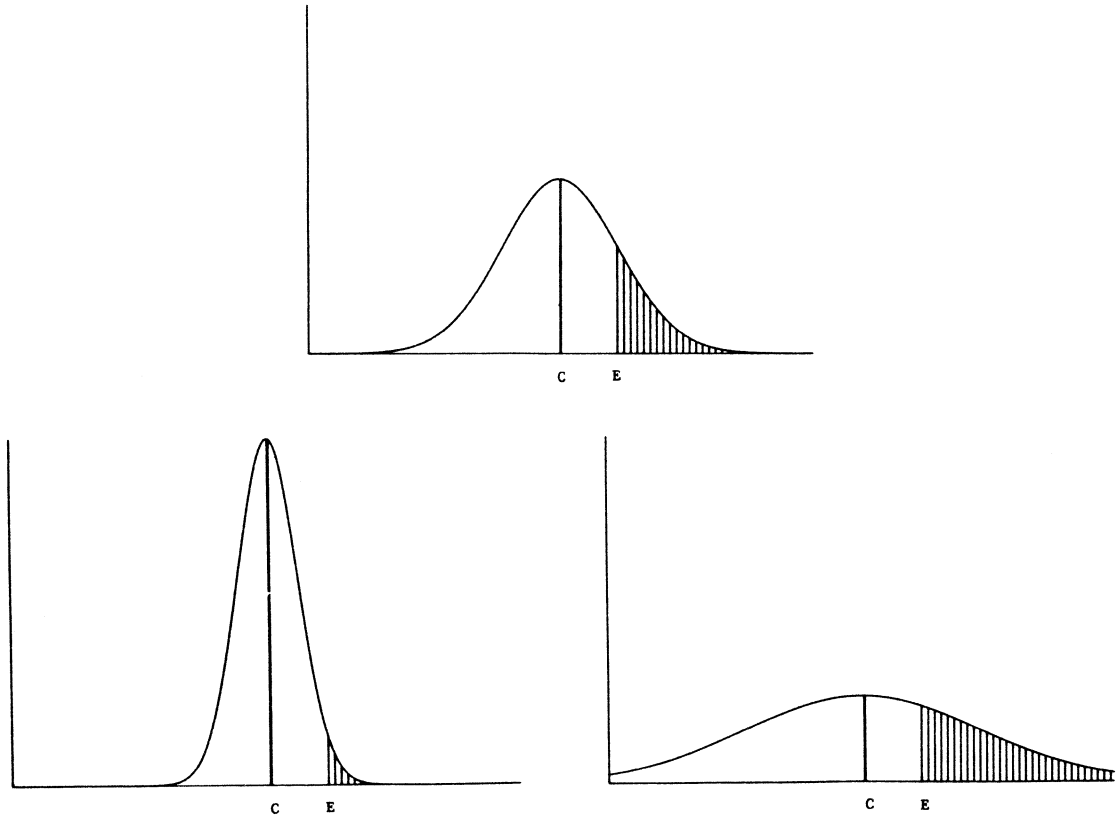
A = Probability that sterling price will be greater than $1.25

B = Probability that sterling price will be less than $1.25

C = Current spot price = $1.22

E = Exercise price = $1.25

Normal distributions with the same mean but different standard deviations



C = Current spot price = $1.22

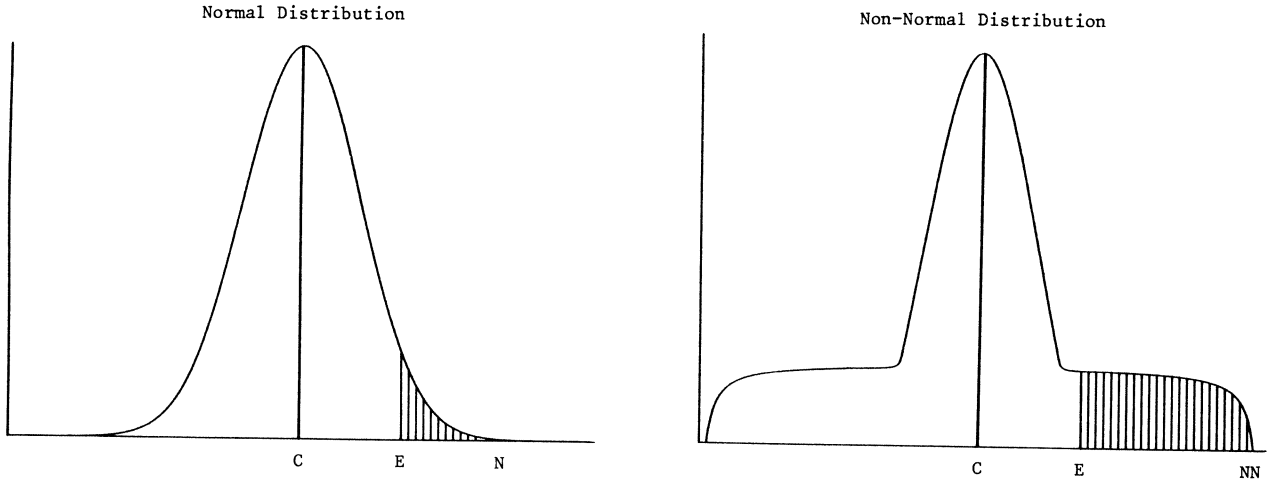
E = Exercise price = $1.25

Shaded area: probability that sterling will be greater than $1.25

A few studies done on the distribution for exchange rate changes find that their distribution differs from the normal in two major ways: firstly, the frequency of extreme observations is much larger than expected under a normal distribution and, secondly, the distributions are more peaked in the centre. These two ideas may seem inconsistent, but as the graph below illustrates, may be captured by a given distribution.

Figure 3.3

Graph of normal and non-normal distributions



C = Current spot price
E = Exercise price

Both distributions have same mean and standard deviation but E,N is less than E,NN

Correct information about the shape of the distribution is extremely important to a market participant, since it defines the true picture of the riskiness of options positions or of the potential cost of choosing not to cover a future exposure. The chance of sizable loss if cover is not provided will differ greatly depending on which distribution corresponds to reality, as will the amount of money which the hedger is willing to pay to avoid that loss.

The second aspect of time value involves interest rates. On any given date the option has a specific present intrinsic value, determined by the exercise price and the price of the underlying. Since the option is a claim on a certain amount of the underlying over a period of time into the future, that claim must have a return in line with market interest rates on instruments of comparable maturity. Therefore, a rise in the interest rate will cause the value of a call to rise and put values to fall. In theory, the interest rate required for option pricing is the expected rate over the life of the option.

However, foreign currency option pricing requires the consideration of both the domestic and foreign interest rates. This is primarily because a foreign currency normally is at a forward premium or discount vis-à-vis the domestic currency, the forward premium or discount determined by relative interest rates. Consequently, for foreign currency options, call values rise and put values fall when the interest differential increases, either because the domestic interest rate increases or because the foreign interest rate decreases.

2. Volatility

The chance that an option will increase in value owing to changes in the price of the underlying gives it most of its time value. Option pricing formulae take into account the manner in which the price of the underlying may move, and options would be comparatively easy to price if the pattern of price movements over the life of an option contract always followed that of the past. But it is possible that the probability distribution of future price movements may change, and it is this possibility which makes option pricing difficult.

The variability of price movements of the underlying is called VOLATILITY. Given that pricing formulae generally assume a cumulative log-normal distribution of prices, volatility is usually measured by calculation of a standard deviation, and future volatiliy is frequently projected by extrapolation from some past period. Thus, past volatility is generally measured by the standard deviation of daily changes in the price of the underlying, expressed at an annual rate, and calculated over some relatively short recent period, commonly one to three months. There are variations in practice, however, and some option traders prefer to use projections of volatility based on long historical periods or use other means, such as technical analysis (charting).

Volatility, in fact, is the only variable influencing option pricing which is not determined either arbitrarily or in some other market. Exercise price and expiration date are set arbitrarily by agreement among counterparties, or by standard formulae of an exchange. The current price of the underlying is set in the cash market for the instrument in question, and the interest rates are also market-determined. Viewed in this way, it is clear that the market for an option on any underlying is in fact a "market" for volatility on the price of that underlying, quite separate from the price of the underlying itself.

The notion that volatility is itself a price is manifested in the way in which many option traders approach the market. Most keep a close watch on prices of options in the exchanges and then convert these prices into IMPLIED VOLATILITY by solving the standard pricing formulae "backwards". That is, they treat the current option price as a "known", take market prices for the underlying and interest rates, contract specifications for exercise and expiration, and solve the formula to determine the level of volatility implied by the current market price of the option. The implied volatility can then be compared with what the trader considers appropriate, and the comparison used as a guide to trading the option.

When implied volatility is considered to be high, relative to what the trader believes is actually likely to occur, traders will tend to write options or combinations of options that will profit from an anticipated decline in implied volatility. When implied volatility is "low", buying strategies predominate. In other words, volatility itself is thought to rise and fall quite independently of the price of the underlying, and option traders can and do take sizable positions in options entirely on their views about volatility and without any expectation whatsoever as to whether the price of the underlying will rise or fall. This is in contrast to the commercial buyer of options who purchases the contract as insurance against volatility and, more precisely, against one-way movements of prices to his disfavour. Generally, the writers of options leave the task of profiting from directional moves in

exchange or interest rates to others who specialise in trading the underlying instrument directly in spot, forward or futures markets.

C. The market

1. Market structure

OTC foreign exchange options are traded to varying degrees by banks in virtually all financial centres, although activity is concentrated in London and the US market. Rough statistical evidence on market activity has been collected from major bank and investment-bank market participants, which suggests that the US and UK markets are probably about equivalent in turnover and outstanding amounts. It is generally thought that outstanding foreign exchange options in each market are not more than $10 billion in face value. Switzerland is thought to be the next largest market.

Option activity centres on the major currencies, most often involving US dollars against pounds sterling, Deutsche Mark, Swiss francs, Japanese yen and Canadian dollars. Branches of foreign banks in the major centres are generally willing to write options against the currency of their home country (for example, Australian banks in London write options on Australian dollars). OTC options are generally traded in round lots, commonly $5-10 million in the New York market and $2-3 million in the London market. The average maturity of OTC options ranges between two and six months and very few options are written for more than one year. American options are most common. However, European options are popular in Switzerland and Germany, reflecting customer demand and familiarity.

Commercial and investment banks actively trade foreign exchange options on the organised exchanges in Amsterdam, Chicago, Philadelphia and Montreal. As of January 1986, outstanding open interest, in dollar equivalent at face value, amounted to $0.4 billion on the European Options Exchange in Amsterdam, $7.8 billion on the Chicago Mercantile Exchange, $9.9 billion on the Philadelphia Stock Exchange, and $0.1 billion on the Montreal Stock Exchange. Some of the banks in the Netherlands confine themselves to trading on the European Options Exchange only.

Commercial and investment banks often write option contracts for their commercial customers. Banks' willingness to be net writers, however, has dwindled, in part as a result of the sizable increases in exchange rate volatility in early 1985, and a perceived reluctance of customers to pay commensurately higher premiums. Most customers are corporations active in international trade or financial institutions with multi-currency asset portfolios. These market participants are apparently willing to pay what amounts to an insurance premium to protect against unfavourable exchange rate movements, but in circumstances where they preserve the possibility to profit should exchange rates move favourably. These customers, of course, can purchase foreign exchange puts or calls on organised exchanges, but generally turn to the banks for options in order to find precisely the terms which match their needs. Transactions are commonly tailored with respect to amount, strike price, expiration date and currency.

Most market participants suggest that at this juncture few customers are willing to write options, in view of the limited premium income and the

potentially unlimited risk of loss. Thus it appears appropriate to describe the OTC options market as consisting of two sectors, a "retail" market composed of non-bank customers who purchase what amounts to customised insurance against adverse exchange rate movement from banks, and a "wholesale" market among commercial banks, investment banks and specialised trading firms, which may take the form of interbank OTC trading or trading on the organised exchanges. The "wholesale" market is used by banks mainly to hedge or "re-insure" the risks undertaken in trading with customers, or to take positions in options themselves ("volatility positions").

Banks' practice in buying back options previously sold varies widely. Some sellers discourage the practice by quoting fairly wide bid asked spreads. A number of European banks seek to avoid buying back options out of concern about customer relations, presumably feeling that customers would only seek to sell options on which they had taken an unwelcome loss. Along these lines customers with a gain would exercise their options.

The growth of exchange-traded options, especially for "wholesale" purposes, is apparently putting pressure on the OTC markets for greater standardisation in interbank trading. In some instances, OTC foreign currency options are traded for expiration on the third Wednesday of March, June, September and December, to coincide with expiration dates in the US exchanges. In general, the market structure just described is distinctly asymmetrical as compared with the ordinary market for spot or forward foreign exchange, where customers are expected to be more equally balanced between purchase or sale of currency, and thus where the interbank market likewise has a reasonable balance.

In contrast to foreign exchange options, the interest rate options market appears to be less developed. Only in the United States do banks report significant involvement in both OTC and exchange-traded interest rate options, although the extent of participation varies widely among banks. Banks in the Netherlands and, to a lesser extent, in Belgium are active on the European Options Exchange. Canadian and British banks apparently see a limited flow of customer interest in OTC options such as interest rate caps, but actually write very few contracts.

Usually OTC options are written against short-term lending rates (mainly LIBOR), prices of US mortgage-backed instruments, and prices of US Treasury securities. One attraction of the OTC market for customers is the bank's ability to customise the option contract as to size, particular rate or security involved, strike price and expiration date. Buyers of mortgage-backed options are frequently trying to offset exposure against those rates, while buyers of options on Treasury securities are frequently seeking to offset movements in their borrowing rates which they feel are likely to move in tandem with Treasury yields. The maturities on these types of options are usually in a range of three to six months.

LIBOR-based options are often written as interest rate caps and may run for as long as three years, although they generally consist of a series of options covering discrete, consecutive three-month intervals. As the name implies, cap rate options place a ceiling on the maximum rate a borrower will be obliged to pay on a particular loan. Currently most cap rate products are priced explicitly and may be sold to customers who are actually borrowing at a different institution. Most banks assert that they are hedging these positions

in an option-like fashion, presumably delta hedging. In the past, however, particularly in the 1970s, banks did not always explicitly price and hedge option features such as rate ceilings on loans. This approach proved to be very costly when rates moved up in the late 1970s and early 1980s.

Option features have been included in Euro-dollar issues from time to time. In the autumn of 1984 Euro-bond borrowers incorporated detachable warrants in their offerings, giving the holders the right to purchase additional bonds from the borrower at a specified coupon and price. More recently, option features were incorporated in floating rate note offerings (FRNs). In late June and early July 1985, approximately twenty issues, mostly by large banks, offered $2 3/4 billion of capped floating rate notes with a maximum coupon generally set at about 13 per cent. and most maturities at twelve years. In return for forgoing interest rates above the ceiling, the investors received a slightly wider spread above LIBOR compared to the going spreads in the market for uncapped FRNs. While it may not have been explained as such, the investors were in essence writing a capped rate loan option to the bank borrowers. Having purchased such options, the banks were in a position to turn around and sell similar options. The upfront fee from the sale of the options reduced the banks' overall cost of borrowing, in some cases to rates 5 to 10 basis points below LIBOR. A series of floating rate notes were issued incorporating a "deferred cap". These issues were generally of five to seven years' maturity, with the interest free to float for the first two or three years.

In the simplest form, the banks operated as intermediaries, buying options from one group to sell them to another. The identities of the buyers of these options are not clear, although speculation centred on US savings and loan associations facing the mismatch between short-term liabilities and long-term fixed rate assets. In a number of instances, though, the options were sold to other intermediaries. The overall investor demand for capped FRNs proved to be limited, since the spate of issues ended as abruptly as it emerged.

As in the currency option market, the customers form a retail base for the banks. In some options, such as contracts used to put a ceiling on interest rates, there does not appear to be a wholesale market for the banks to try to offset directly the risks undertaken. For other products there is a wholesale interdealer market, most notably for options on mortgage-backed instruments such as Government National Mortgage Association (GNMA) pass-throughs of mortgage pools. Standardisation of the GNMA option has helped this process. There is only one delivery date each month, the current production interest rate is used (based on rates on home mortgages guaranteed by the Veterans Administration or insured by the Federal Housing Administration) and the strike price is set very close to the market price. Therefore, a firm selling a GNMA option to a customer can frequently offset the risk by buying a similar option from another dealer soon afterwards.

Organised exchanges also provide a ready outlet to hedge risks undertaken in writing interest rate options. However, until recently the only active interest rate option contract covered long-term US Treasury bond prices (actually the bond futures contract at the Chicago Board of Trade). Trading of the option on the bond futures contract had grown rapidly to about 80,000 option contracts per day on average in the early part of 1986, for a nominal principal amount of about $8 billion per day. The Chicago Mercantile Exchange inaugurated an option on its Euro-dollar futures contract in early

1985. This Euro-dollar option contract also expanded rapidly with a daily average volume of nearly 6,000 contracts per day in January 1986, for a nominal principal amount of $6 billion daily. It may be that the high volume in these contracts arises mainly because they are used by banks and investment banks as approximate hedges on the wider variety of OTC interest rate options they write. Also, banks may have devised strategies for incorporating the Euro-dollar option in managing their asset/liability maturity mismatches.

Naturally the standardised exchange-traded option contracts cannot hedge all the risks a bank takes in writing a customised contract for a customer. The bank is left with the risk that the price of the option purchased will not move in lock-step with the exposure on the option sold to the customer. Writers of OTC interest rate options often manage a sizable and complex book of options, hedging the net exposure in relevant cash or futures markets. A sizable amount of the activity in exchange-traded options probably represents the mix of speculation, arbitrage and professional hedging experienced on the underlying futures markets. Customer activity in exchange-traded options reportedly contains a higher element of speculation than customer activity in the OTC market. That is, there is a higher incidence of individuals trading for their own account and fewer business firms hedging exposures generated in the normal course of their business.

Complicated financial transactions with currency and interest rate features have also begun to appear, and in some cases the aggregate value to the bank of the individual components of the transactions may exceed their combined cost. For example, currency option features on some Euro-bond issues, when separated or "unbundled" from the financial package, can be worth more than the additional value the option feature brings to the package. As in the case of capped floating rate notes or detachable warrants, the bank may separate out the option portion of the transaction and either take it into its own option portfolio or sell it into the option market. The original risk is thereby redistributed and the bank is able to realise as profit the amount by which individual elements of the transactions may have been priced below their true value.

2. Standardisation and documentation

Exchange-traded option contracts are of course all standardised. Expiration dates, nominal principal amounts, delivery points and agents, strike prices, margin rules, counterparties, position limits, trading hours and exercise provisions are all set by the exchanges. Participants need only agree on the price and number of contracts being traded. Documentation is straightforward once contract positions are accepted at the clearing organisation. (Of course, disagreements may arise on disputed items, so-called "out-trades", which the clearing house cannot process properly.) Trades take place on the exchange floor among exchange members or other affiliated parties. Some banks own subsidiaries that are members of the exchange and have their own employees transact the business. Others place their orders with independent members or firms. Customers choose the firms or banks through which they wish to operate, possibly receiving advice on strategies and tactics or making their own decisions.

OTC options, on the other hand, are most commonly tailored to meet the needs of individual customers, and the elements that are standardised on the exchange-traded options are open to negotiation. Indeed, the main

attraction of OTC options to customers is customisation, but nevertheless efforts have been made to standardise OTC interest rate options to a degree. Some option writers have standardised forms and documents to achieve greater efficiency and reduce the need to negotiate every point. Greater standardisation of documentation also simplifies back office confirmation of agreements made in telephone conversations. In at least one case a loan cap rate contract had been reduced to a one-page legal document with blanks to be filled in to specify elements such as expiration, strike price (interest rate) and premium. The British Bankers' Association has prepared standardised terms for the interbank currency options market which became effective in the fall of 1985. In general, however, the progress toward standardisation of OTC options across banks or among national markets has been slow.

3. Regulation

The growth of foreign exchange and interest rate option trading does not appear to be the result of regulations or government restrictions which have produced unusual profit opportunities. However, pilot programmes by US regulatory agencies permitting such exchange-traded options beginning in 1982 gave the overall market a boost. The popularity of exchange-traded options highlighted the uses of options for customers and provided bank writers with an outlet to offset positions. Earlier, there was a sharp increase in investors' interest in options following the opening of the European Options Exchange in Amsterdam in 1978. In Japan, currency option trading began in April 1984 after the authorities had abolished the actual demand principle in foreign exchange trading.

The relative novelty of the market has meant that accounting regulations and procedures, such as the booking of premium income, have not been uniformly established and some market participants believe that this problem has hindered market growth. In addition, the absence or ambiguity of regulations governing options has been a factor limiting the further expansion of the market in some countries. Canadian banks suggest that the lack of regulatory, tax and accounting guidelines, along with a need for greater liquidity, were factors limiting the growth of the market in OTC foreign exchange options. In the United States the absence of a specific ruling by the Financial Accounting Standards Board on foreign exchange options has engendered a more cautious approach by corporate treasurers. Some Swiss banks take premiums into income when they are paid, while others value the options periodically or wait until the options have been exercised. Belgian banks face the same question in the absence of official rules.

On the other hand, some feel that the introduction or growth of options has been held back by regulations. For example, currency controls in Italy have hindered the introduction of options. In Germany, regulations indirectly affect the relatively small number of banks willing to write options. At present currency options are not taken into account when a bank's foreign exchange position is calculated for supervisory purposes. Banks' hedging options sold in the spot and forward markets are thus creating a nominally open position, although they are effectively covered.

4. Accounting practices

At this point there appears to be little to guide market participants as to standard accounting approaches to options. At least some market

participants believe this has limited the growth of the market, in part by prompting some caution among corporate treasurers who constitute the principle long-term potential market of customers. The necessity of receiving approval from boards of directors is another constraint.

An example of the difficulties faced by US option writers and buyers is the different definitions of a hedge under generally accepted accounting principles (GAAP), regulatory accounting principles (RAP) and tax accounting. A further complication is that generally accepted accounting principles for options must be inferred from the treatment of other contracts, often futures contracts and standby commitments. Using those guidelines, a GAAP hedge on a purchased option must meet two conditions: the option must be designated and effective as a hedge; and the underlying commitment must be firm. Through hedge accounting, gains or losses are deferred until a transaction takes place with regard to the item being hedged. Speculative positions in purchased options and all options sold are marked to market with gains and losses recognised in income immediately, which can add to the volatility of reported income.

The definition of a hedge is crucial to tax accounting because the tax rate applied can depend on the definition. Based on rulings by the US Supreme Court and Tax Court, a hedge requires a balanced market position and the transaction must be a method of protecting ordinary operating profits realised in a firm's day-to-day business. General definitions, of course, allow some scope for selecting a hedged option position over an unhedged position. Banks in other countries have noted the ambiguity in accounting for options. In the absence of firm rules some banks apparently have wide latitude in choosing book fee income on options.

D. Risk

1. Hedging options exposures

As described briefly above, buyers and writers of options face asymmetrical exposures to changes in prices of the underlying. The buyer has unlimited profit potential if the price moves in his favour but risk is limited to the premium paid for the option if prices move adversely. Conversely, profit for the seller is limited to premium income, and loss from adverse movement in the price of the underlying is in principle unlimited.

The option writer can seek to hedge against the effect on the value of the option of an adverse movement in the price of the underlying. Given the asymmetrical pattern of risks, the only certain way to hedge an option completely is through purchase of an equivalent option, identical with respect to all attributes of the exercise price, face value and expiration date. The premium cost of an option purchased as a hedge will probably roughly equal that received for an option written. Therefore, if options written are hedged with identical options purchased, trading profit opportunity will in principle be limited on average to a bid/offer spread between the two. In practice, at least some market participants claim to achieve higher profits than implied by this notion.

One of the attractions of trading options on exchanges is that contracts are standardised in key ways, and thus it is possible to hedge or close out an options position completely. In contrast, OTC options markets

generally lack sufficient depth and liquidity to hedge the customised options written for customers by precisely matched purchased options. The option writer may be able to purchase a "similar" option whose contract specifications may differ in one or more of several features, such as underlying instrument, face value, exercise price and maturity. For example, the sale of an October $1.25 pound sterling call may be hedged by the purchase of an October $1.27 pound call. If sterling trades below $1.25, both calls will expire worthless and the hedger will at most profit by the premium it received from the $1.25 call, less the premium paid for the $1.27 call and transactions costs. If sterling trades above $1.27, then both calls will be exercised, resulting in the hedger's maximum loss being the difference in the call exercise prices, $0.02, less the net credit received in call premium. (See APPENDIX A for additional hedging and trading strategies.)

Other hedging techniques have been developed which do not involve hedging an option sold with another purchased option. The most common of these, DELTA HEDGING, involves hedging in the cash or futures markets for the underlying, and is based on option pricing formulae. Since a pricing formula shows the option price for any price of the underlying, it can also be used to calculate the "risk" exposure of the option to any change in the price of the underlying. The common practice is to calculate the change in the value of the option for a given change (usually one cent) in the price of the underlying. The ratio of these two is called the DELTA. (See Appendix B for a typical option transaction.)

The delta of an option has a value between 0 and 1. A delta of one means that the value of the option increases in proportion to the price of the underlying: one dollar for every one-dollar increase in the value of the underlying. A deeply in-the-money option will have a delta close to or equal to one, since the intrinsic value of the option will increase in proportion close or equal to the increase in the price of the underlying, while the time value will become very small. A deeply out-of-the-money option will have a delta close to 0, since it will have no intrinsic value and low time value owing to the small chance that it will become profitable.

The ability to calculate a measure of the sensitivity of option value to the price of the underlying suggests a natural way to hedge option-market risk. The notion is that a writer of a call option can cover his price risk by purchasing an amount of the underlying in proportion to the delta, for any given price of the underlying instrument. For example, a call option written on £1 million sterling with a delta of 0.6, an at-the-money option, will rise or fall in value by about 0.6 per cent. for each 1 per cent. fall or rise in the sterling exchange rate. Therefore, the option writer can purchase £600,000 in the spot market, and in theory the value of the cash position will move in exactly offsetting fashion to the value of the option written on sterling, leaving the financial position of the option writer unaffected by changes in the exchange rate. An option which is hedged by an offsetting cash position according to this approach is called DELTA-HEDGED, or DELTA-NEUTRAL.

Delta hedging of a short option position may not provide full protection against adverse movements in the price of the underlying, however. This is because the delta of an option changes as the option moves further in and out-of-the-money. For example, £100,000 face value $1.25 sterling call may have a delta of 0.5 if it is at-the-money, while an increase in the price of the underlying to $1.26 may imply that the delta rises to 0.6. If so, the hedge

position must be adjusted from £50,000 to £60,000 in order to preserve "delta neutrality".

Moreover, the rate at which the delta changes itself varies with the price of the underlying. For deeply in-the-money or deeply out-of-the-money options, the delta is highly insensitive to changes in the underlying. For example, a deeply in-the-money option will have a delta close to one, and the delta will remain generally unchanged over wide movements in the value of the underlying. On the other hand, the delta of an at-the-money option is quite sensitive to changes in the value of the underlying.

The variability of deltas creates a practical complication when delta hedging a large book of options, since in general strike prices will be spread out over a wide range above and below any current price of the underlying. Thus some options will require frequent adjustments of the hedge position to maintain delta neutrality, while others will require little. To cope with this problem, option traders measure the rate at which the delta changes in response to a change in the price of the underlying, called GAMMA. In the preceding example, a $1.25 at-the-money sterling call, the delta moved from 0.5 to 0.6 when the price of the underlying increased by $0.01 to $1.26. The gamma in this case is 0.1, and is defined as the change in the delta per unit change in the price of the underlying (measured here in cents).

To simplify hedging, a "gamma position" is calculated, which is the product of the gamma for a specific option times the underlying amount of the contract. For example, if the above sterling call option was written for a face value of £1 million, has a delta of 0.6 and a gamma of 0.1, the delta-equivalent position of the option would be short £600,000. If the writer wanted a delta-neutral position he would purchase £600,000. The gamma position would be £100,000. Since a $0.01 move in the price of sterling will change the option's delta to 0.5 if the rate move is down, or 0.7 if the rate move is up, to remain delta-neutral the writer would have to adjust the underlying position by £100,000 for each one cent change in the price of the underlying. (It is important to remember that in addition to now having a new underlying price and a new delta, a new gamma would also be in effect since it is a derivative of the price and the delta.)

The gamma is a key factor for the management of a short option position on a delta basis. Since a given rate movement can potentially cause significant changes in the exposure profile of an option portfolio, traders attempt to limit and often "neutralise" the gamma position of the option book. This is because a book can have a delta-neutral position but still have a large gamma exposure.

Generally, traders try to achieve a gamma-neutral position by balancing options sold against options purchased on the basis of the proper delta and its gamma. For example, the short sterling position mentioned above has a gamma of £100,000, indicating that if the price of sterling increased by $0.01, then the delta-equivalent position would increase by £100,000, or if the price of sterling decreased by $0.01, then the delta-equivalent position would decrease by £100,000. If, in addition, the trader purchased a call option on £250,000 with a delta of 0.5 and a gamma of 0.4, then the delta-equivalent position would increase or decrease by £100,000 for a $0.01 rise or fall in sterling. Since the trader is short the call option on £1 million and long the call option on £250,000, the gamma position will be flat or neutral.

With this background, the notions of delta and gamma neutrality can be stated more simply. A delta-neutral option or book of options (at least partially hedged with offsetting positions in the underlying) is one whose value is unaffected by (small) changes in the price of the underlying. A gamma-neutral option book is one that remains delta-neutral as the price of the underlying changes (by small amounts).

There are three important characteristics of gamma: (1) the shorter the time to expiration the higher the gamma will be; (2) at-the-money options have the highest gammas in relation to other options in the same expiration period; and (3) gammas vary with volatility, but in a complex way. Gammas tend to decrease on medium to long-term options (i.e. options with 60 days or more to expiration). For short-term options (with 45 days or less to expiration), the gammas of out-of-the-money options increase as volatility increases, but decrease as volatility increases for at-the-money options. These features of the gamma are important considerations for delta-hedging management as they address the need for active rehedging of option positions.

2. Risk assessment and control

Writing an option involves the seller in a contingent liability: the bank must perform at the choice of the buyer. In one sense, the contingencies are fairly straightforward since buyers will only exercise in-the-money options. Using pricing models the sellers can assess the likelihood that a particular option will finish in-the-money (in practice most writers judge the risk arising out of their entire portfolio of options). As mentioned earlier, the writer must estimate the key variable in determining risk in an option, i.e. the price volatility of the deliverable item over the life of the option. Consequently the writer's risk assessment is only as good as the writer's ability to estimate volatility. In recent months some option writers have come to feel that measured volatility is highly variable and difficult to estimate.

In general a firm's risk exposure in options is communicated frequently to senior management, generally once a day. Traders typically monitor exposure throughout the trading day, including overall marking to market of positions, expressed on an outright basis, a delta position, and a gamma position.

Senior management generally imposes various limits on option trading, on items such as:

- the instruments and currencies against which options can be written;
- positions with counterparties;
- the face value of options written and purchased, aggregated globally and by country;
- expiration concentration;
- concentrations of strike price and settlement date;
- maximum allowable losses from contingent market developments such as a specified change in rates or volatility.

Most of the above risks are managed specifically. Concentration of settlements with particular non-bank counterparties - a combined settlement date and counterparty risk - can be reduced either by spreading settlements over several days or by only making payment against confirmed receipt of funds. Concentrations of settlements are frequently greater with other bank counterparties, however, and these present special management problems. Most banks wish to maintain large lines with bank counterparties to facilitate interbank trading. Thus far the problem has been handled mainly by imposing restrictions on the number of counterparties or on the amount of options written relative to those purchased from individual bank counterparties. Some banks have proposed net settlement of options as a longer-term approach, although to date there appear to be no agreements between banks for net settlement.

The limit on counterparties mentioned above reflects some concerns about credit risk. In writing options bank writers assume market risk while the buyer assumes credit risk, with the possibility that the writer will be unable to perform. The credit risk concern may be one reason why banks do not often buy options from their non-bank customers, although the prime reason is that customers have shown little inclination to assume the market risk in writing options. Those banks that do purchase options from customers assert that they perform careful credit checks before taking on the credit risk.

Liquidity risk is a concern at some banks, mainly the problem that an individual market participant may dominate the market and so limit its scope to adjust position without exaggerated price movement. Consequently, some banks limit their overall positions in certain markets, notably in exchange-traded markets where liquidity is vital.

3. Management of price risk

The principal problem for option-trading banks is to manage the basic market risk arising from changing prices of the underlying and changing volatility. Dating from the inception of trading in options in interest rates and currencies, there have been three fundamental approaches taken, which are known as: (1) biased view; (2) pooled insurance method; and (3) delta-neutral hedging.

A "biased view" of option exposure management dictates that the option position or book is a reflection of management's view on the price direction of the underlying. This practice frequently led to some banks writing uncovered options and then taking no action to hedge the exposure, on the expectation that the price of the underlying would move in the direction (with the "bias") expected by the trader. This approach was commonly taken by foreign exchange option writers, where the option trading was added to an existing foreign exchange trading desk. This approach produced sizable profits in cases where the expectations of the trader on exchange rate movements were fulfilled, but substantial losses were also suffered at times. In fact, this method was an inefficient way of expressing a view on rate movements because profits were limited to the amount of the premium, while losses could be substantial. Market participants believe that by early 1985 no major option-trading bank was still using this approach.

The "pooled insurance" method of managing exposure stipulated that if an option book had a good dispersion of exercise prices and maturities and

balance of puts and calls, the book would be self-hedging. The theory behind this approach is that various combinations of purchased and written puts and calls can be shown to be synthetic forward positions in the underlying. Balanced long and short forward positions will effectively hedge market risk. The problem with achieving this result, many participants found, was that customer demand for options "clustered" around certain exercise prices and maturities and that there was frequently an imbalance between demand for puts and calls. Accordingly this approach had also fallen into general disfavour by early 1985, although some market participants maintain that it will revive again as an approach if the option markets continue to expand.

Early on, many participants began to manage exposure based on the "delta-neutral" hedging approach, briefly described above. The delta of an option indicates the amount by which the option will increase or decrease in price if the underlying moves by one point. The delta can be used as a guide to hedging, since it indicates the paper gain or loss on the options which arises from any change in price of the underlying. An offsetting cash position in the underlying will theoretically leave the option writer fully hedged. The delta or hedge ratio is multiplied by the exercise amount of the contract to indicate equivalent level of cash-market exposure. For example, a call option on £1 million with a delta of 0.6 will indicate a short cash-market exposure for the call option seller of 0.6 times £1 million, or £600,000. The purchase in the cash or futures market of an equivalent amount is the delta-equivalent or hedge-equivalent position.

Delta-neutral hedging does not completely eliminate risk, however. Indeed, the degree of risk in delta-hedging option positions has come to be fully appreciated by some market participants only through hard experience. The fundamental difficulty is that the delta is derived from the estimate of future volatility, which can turn out to be wrong. If the price of the underlying does vary more widely than expected, then a delta-hedging strategy will prompt far more active trading than can be covered by the premium income earned, since trading always has positive transactions costs. Especially in volatile markets these transactions costs can become very large, as bid/offer spreads widen and markets become thin. Even if volatility remains fairly stable, strict delta hedging can be more costly than expected if a market becomes nervous and choppy. Delta hedging also requires the writer to monitor the position around the clock to adjust hedge positions, an approach which can be quite costly.

As the market grew rapidly in 1983 and 1984, commercial banks relied heavily on delta hedging their option exposure, and several wrote very sizable books of options on this basis. However, the deficiencies of delta hedging large exposures resulted in a number of the most aggressive banks sharply curtailing the amounts of options they were willing to write without cover in the form of an offsetting option.

The reassessment of delta-hedged exposure limits by a number of major commercial banks has apparently led to some redistribution of option positions among active option trading institutions. It is likely that, as a result, less of the total outstanding amounts of options written to customers are delta hedged, but instead have been transferred to option specialists who hedge using a variety of specialised trading strategies. Some of these will be described in a subsequent section.

4. Influence of options markets on the cash markets

The potential effect of option trading on the underlying cash or futures markets has been a subject of active debate. Some argue that delta hedging may serve to reduce volatility. The argument for this view depends on the comparison of the likely behaviour of a corporate buyer or seller of foreign exchange who can choose between forward cover or an option. If the customer has a known forward exposure of £1 million, one choice is to cover fully on a forward basis, or alternatively to purchase an option on the same amount. Of course in the latter case that option will be written by another counterparty who may end up delta hedging the option. When writing an at-the-money call option on £1 million sterling where the delta is about 0.5, the option seller enters the cash market to purchase £500,000, or one-half of the nominal principal amount of the option. This applies less pressure on the cash market at the time the option is written than would occur if the original customer had purchased the forward cover.

The counter-argument that options increase volatility is as follows. Writers' efforts to manage their net option positions on a delta-neutral basis require them to buy the underlying foreign currency or interest rate instrument when the price of the underlying is going up and to sell the underlying when the price is going down. For example, in the above case the writer of the option would have no incentive to change his position in the cash hedge so long as the exchange rate remained unchanged. However, if the exchange rate were to rise, the hedger would purchase the underlying, and would do so regardless of whether the option written were a put or a call. If a call, the hedge cover would be a purchase of sterling, and if the exchange rate rose the delta would also rise, requiring an additional purchase. If the option were a put, then the initial cover would be a short sterling position, and a rise in the exchange rate would reduce the delta and require a parallel reduction in the short sterling hedge position (a purchase of sterling). In the absence of other factors these purchases and sales would tend to reinforce existing price movements. The degree to which this phenomenon actually occurs is unknown, but in some instances cash-market participants have suspected that large amounts of options written at closely concentrated strike prices have tended to exacerbate short-term rate movements in the foreign exchange markets. Participants in the London market believe this phenomenon has occurred a number of times in 1985.

The extent of trading and position-taking is believed to have an important bearing on the transmission of volatility. Participants in interest rate options appear less concerned about the problem, noting the high volume of activity in the underlying cash and futures markets relative to the option activity. Also bank and non-bank dealer firms and trading accounts in the United States often take sizable net long or short positions in securities. Consequently, the hedging activity in the underlying instruments associated with writing options may be small relative to other positions. Foreign exchange option writers have expressed more concerns about the transmission of volatility, possibly reflecting the tendency for banks to carry fairly small net positions in currencies. With a dearth of speculators willing to take a view on exchange rates, positioning related to option writing can at times be relatively sizable compared to overall open positions.

The concentration of writing at the commercial and investment banks is also seen as contributing to the possible transmission of volatility. Until recently customer buyers turned to bank writers who were delta hedgers in the

underlying markets. Recently a number of banks, seeking to reduce their net exposure, have begun to ask portfolio managers, investors and corporations with specific interest rate and foreign currency positions to become writers. By finding natural writers the banks could play more of a rôle as intermediaries and reduce their asymmetrical risk exposure.

Some private banks see a rôle for central banks to write options at times when the underlying currency markets are highly volatile. In their view, central banks might at times want to stabilise markets without enforcing or defending a particular exchange rate. Some have suggested that central-bank selling of options in periods of high volatility would have a calming effect on the exchange market, since selling options to the market would reduce the need for the commercial and investment banks to delta hedge their current positions, thereby reducing their activities in the spot or forward markets. Also, the commercial and investment banks would pass the options through to their customer buyers seeking the protective insurance of options. Central banks could also signal a desire to reduce overall volatility by selling both puts and calls. The two-sided nature of the operation would indicate that the banks were not taking a view on the level or direction of rates but only on the level of volatility.

Appendix A

Trading strategies

The trading of options in the equities markets has long been associated with a broad range of trading strategies. Some of these are simple and straightforward, others complex and subtle, some for hedging purposes and others to speculate. Many of them have been directly adapted to trading in foreign currency and interest rate options.

By and large, the complex and subtle strategies are more frequently used in trading on the organised exchanges, since they can require a variety of different contract terms, each trading with sufficient depth to enable a complex position to be first established and later unwound. The following describes a basic number of the many strategies used by active market participants. It should be understood that such a list cannot be regarded as complete, since there are virtually infinite permutations and variations which a creative trader can devise to suit a specific set of circumstances and market expectations.

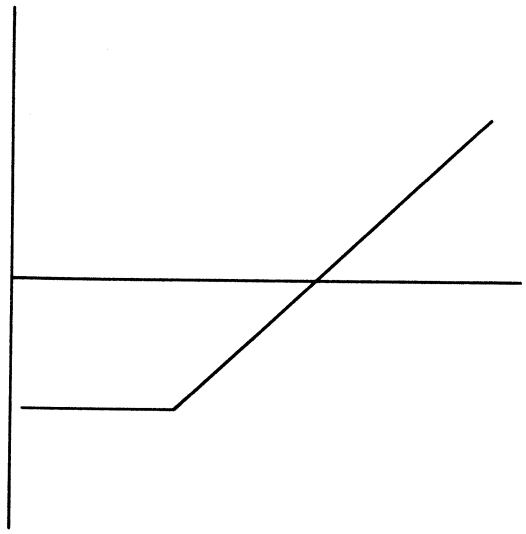
The basic option strategies allow the market participant to take a straightforward position based on expectations of movement in the price of the underlying, the relation between prices in the cash market and the options market, or the variability of the price of the underlying. These strategies fall into three broad categories: (1) a "bullish" or "bearish" view on the price of the underlying; (2) arbitrage profits between the options market and the market for the underlying; or (3) a view on the volatility of the underlying.

But even in these simple strategies, the risk characteristics and leverage of the position will generally be substantially different from those associated with a long or short position in the cash or futures market. For example, strategies may provide for (1) unlimited loss/unlimited profit; (2) limited loss/limited profit; (3) unlimited loss/limited profit; and (4) limited loss/unlimited profit. Only the first, unlimited loss/unlimited profit is directly parallel to the conventional long or short position in cash or futures markets.

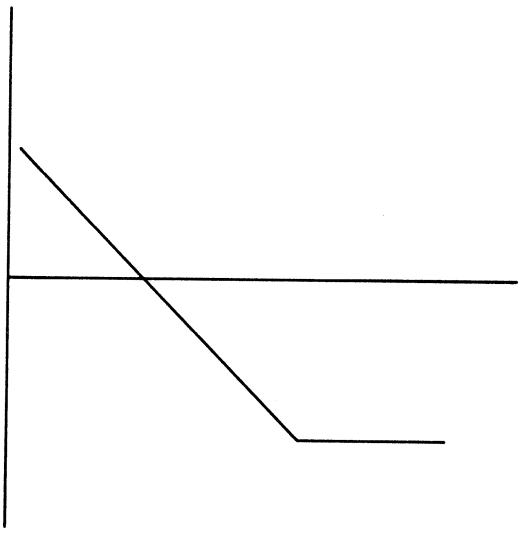
Bullish (or bearish) view: options positions taken in the expectation that the price of the underlying will rise (or fall).

The simplest bullish (bearish) strategy is of course an outright "PURCHASE OF A CALL" ("PURCHASE OF A PUT"). This purchase gives the holder the benefit of unlimited profits on an appreciation (depreciation) of the underlying, while any loss would be limited to the premium paid; that is, the asymmetrical risk/return profile that distinguishes an option from all other financial instruments.

CALL BUY

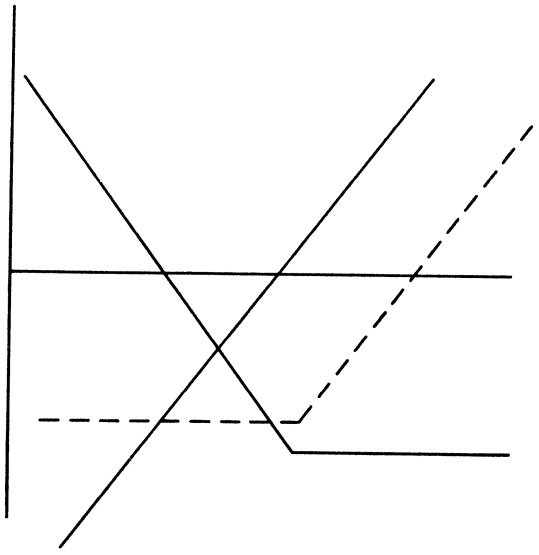


PUT BUY

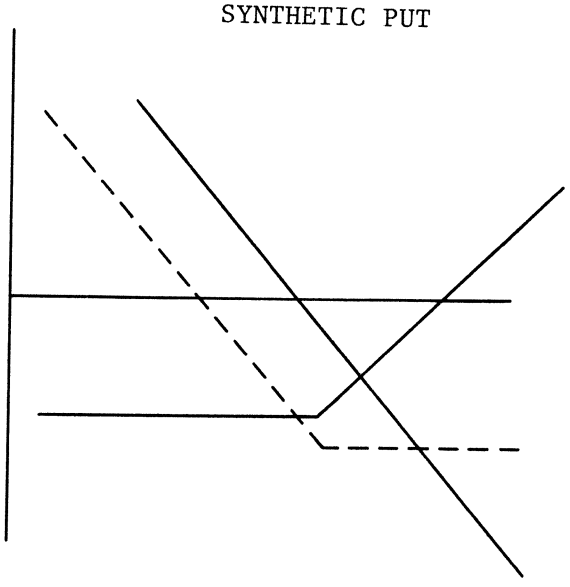


If a trader is unable to obtain a call (put) option, a "SYNTHETIC CALL" ("SYNTHETIC PUT") position can be established by the purchase of a put (call) option and the purchase (sale) of the underlying. The long (short) position in the underlying provides the feature of unlimited profit from an appreciation (depreciation) in price. The purchased put (call) provides the feature of limited loss from a depreciation (appreciation) in price.

SYNTHETIC CALL



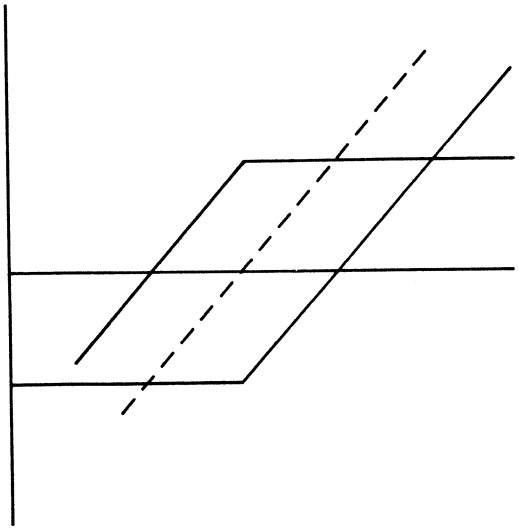
SYNTHETIC PUT



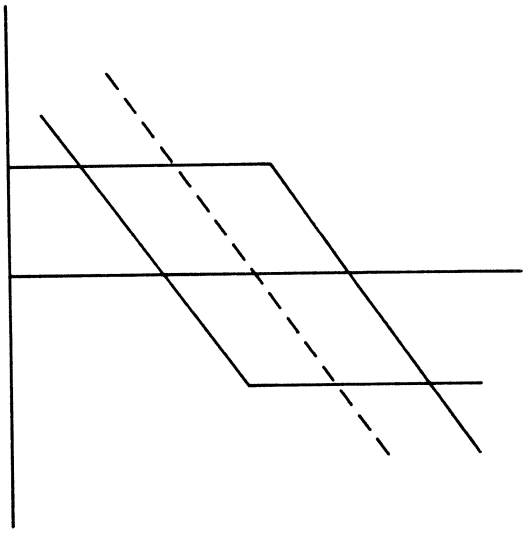
It should also be noted that options can be used to establish a position essentially similar to a long (short) position in cash or futures. This is called a "SYNTHETIC LONG" ("SYNTHETIC SHORT"), and is established by buying a call (put) option and selling a put (call) option with the same exercise price and expiration date. This will produce a return profile of unlimited loss/unlimited gain on a pro rata basis with movement in the price of the underlying, just as the outright purchase (sale) of the underlying would.

If both options are at-the-money, the premium income earned by writing the put (call) will be fairly close to that paid for buying the call (put), so that the cost of establishing the position will be comparatively small.

SYNTHETIC LONG



SYNTHETIC SHORT

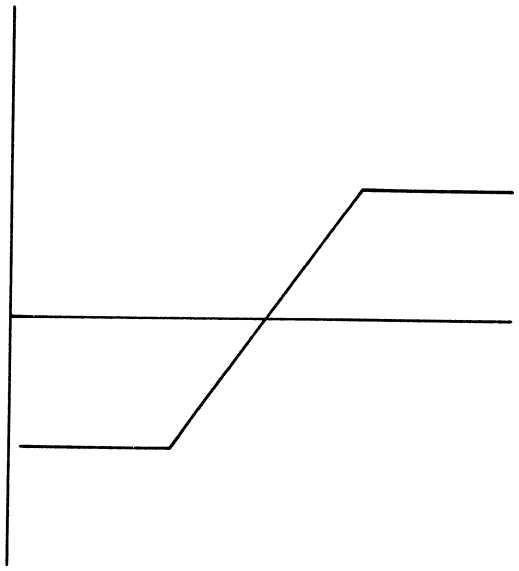


Frequently, for options traded actively on the exchanges, it is possible to use the options market in this way to establish a long (short) position in the underlying at a cost not much greater than that available to institutions trading in the interbank markets. The most important point illustrated by a comparison of a synthetic long (short) strategy and an outright call (put) purchase is that options can be used to duplicate risk profiles of positions in the cash market, but not the reverse.

The most common variant of a bull strategy is a "VERTICAL BULL CALL SPREAD", which differs from a synthetic long or call purchase in that both profit and loss are limited. This position is established by the purchase of a call at one exercise price and the sale of a call at a higher exercise price. The maximum loss in this strategy is the net difference between the premium earned on the sale and that paid on the purchase. The cost of the purchased call with the lower exercise price will always be more than the income received from the call with the higher exercise price, and the difference will increase with the difference between the two exercise prices. Obviously, the opportunity for gain increases as the spread between the two exercise prices widens, while the cost of establishing the position will likewise be greater.

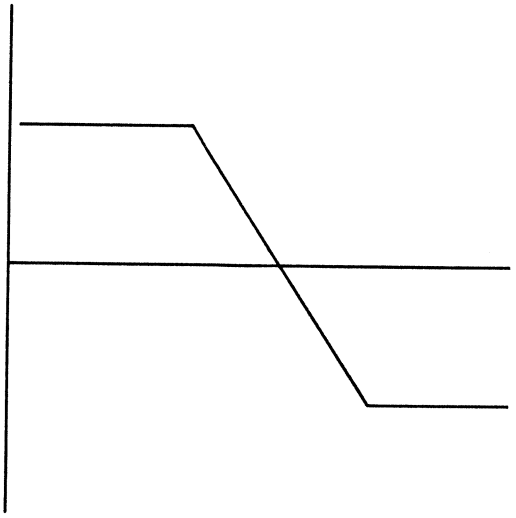
If both options expire out-of-the-money the trader will suffer a loss equal to the net premium paid. Profit is generated if the option purchased moves into-the-money, and reaches a maximum when the option written is at-the-money or in-the-money. The trader will generally close the position at this point, since the profit cannot increase further but may decline if the price of the underlying moves back towards the exercise price of the purchased call.

VERTICAL BULL CALL SPREAD



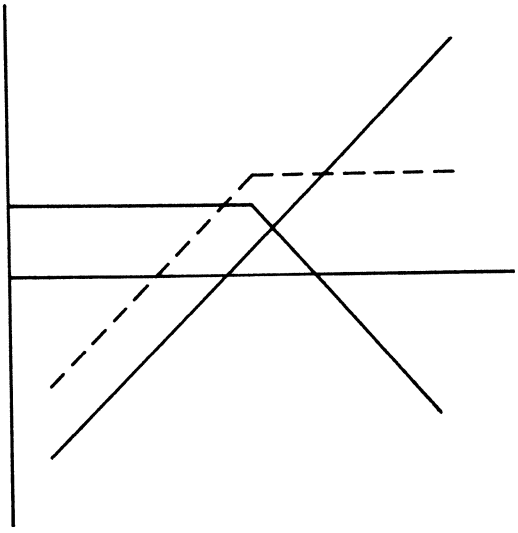
A "VERTICAL BEAR PUT SPREAD", the mirror image of a vertical bull call spread, can be established by purchase of a put at one exercise price and sale of a put at a lower exercise price. Loss is limited to the net of the premium received for the sale and that paid for the purchase. Maximum gain will occur if the price of the underlying falls to the exercise price of the put written.

VERTICAL BEAR PUT SPREAD

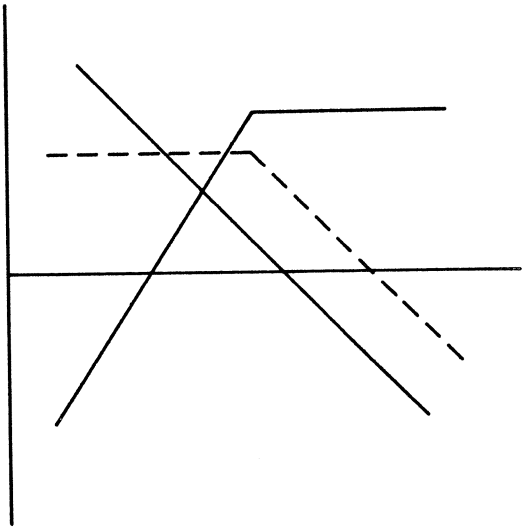


Another common bullish (bearish) strategy is "COVERED CALL WRITING" ("COVERED PUT WRITING"), which consists of writing a call (put) option while also owning (shorting) an equivalent amount of the underlying. Profit is generated from a rise (fall) in the price of the underlying but is limited since an appreciation (depreciation) of the underlying beyond the exercise price of the written call (put) will cause it to be exercised. Loss is unlimited if the trader continues to hold the underlying as its price falls (rises) beyond a level at which his loss is offset by the amount of the premium received for the call (put) written. Consequently the risk/reward profile of a covered call (put) write is identical to that of a put write (call write).

COVERED CALL WRITE



COVERED PUT WRITE



Covered call writing is very common in the equities market, where a trader wishes to increase the gain from holding a stock whose price he expects to be steady or to rise (fall) at a modest pace. Similar strategies are adopted by firms that have natural foreign currency positions when exchange rates are expected to be steady or rise (fall) slowly.

Covered put writing is far less common than covered call writing in financial asset markets, since there are far more commercial firms which will naturally be holders of assets than there are firms which are naturally short. Theoretically, one might expect there to be a more even balance between covered put writing in foreign exchange and covered call writing, reflecting the balance between firms naturally long and naturally short a given currency. In reality neither practice is widespread, and commercial firms seem more comfortable trading a call than a put for reasons of familiarity.

Arbitrage: strategies which take advantage of price differences among markets for the same good, without a view on price movement of the underlying.

Synthetic long and short positions can be used to take advantage of arbitrage opportunities in the cash or futures markets for the underlying. For example, purchasing the underlying and establishing a synthetic short position (buying a put and selling a call) results in a position unaffected by movement

in the price of the underlying. Profit from the position results from inconsistent prices between the cash or futures markets and the options markets. This trading strategy is a "CONVERSION". Alternatively, by selling the underlying and establishing a synthetic long position (selling a put and buying a call) a "REVERSE CONVERSION" or "REVERSAL" is established.

Volatility view: positions established on the expectation that the variability of the price of the underlying will change.

This final group of strategies is by far the most complex and subtle, but does not involve an expectation on the direction or level of the price of the underlying. Instead, a trader may take a view on volatility itself, and do so in a myriad of ways.

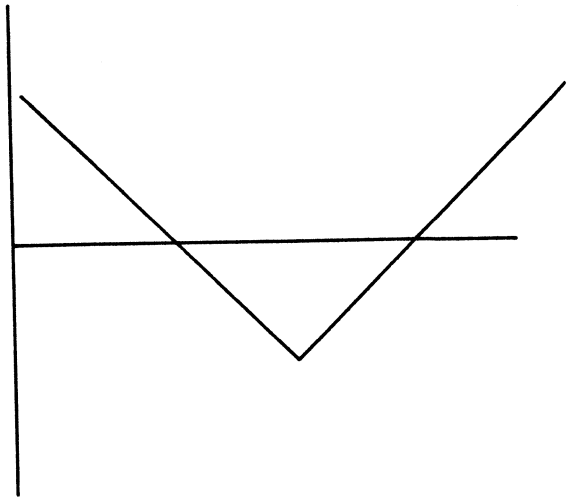
Among the most common means of establishing a position which takes a view on volatility is simply to buy or write options and undertake to delta hedge that position. In principle, a trader will profit if he writes options and delta hedges so long as the actual volatility of the underlying is less over the life of the option than was implied by the price of the options when originally written. Thus, if the trader expects volatility to decline in the future, he will write options, a strategy known as "SELLING VOLATILITY" or establishing a "SHORT VOLATILITY" position. This trading strategy is very frequently adopted by options-market-makers and by floor traders on the options exchanges.

A less common approach is the mirror-image strategy, i.e. to "BUY VOLATILITY" or take a "LONG VOLATILITY" position by purchasing options and establishing a "delta-hedge" position in the underlying ("REVERSE HEDGE" or "SIMULATED STRADDLE"). Note that this idea is the reverse of the delta hedging described earlier, which is normally applied to a book of written options. This position would be taken if the trader expects the actual volatility of the underlying to exceed that implied by the current price of options, and the profit is achieved by alternately buying and selling the underlying as its price varies. The purchased options provide protection against the risk of sizable loss.

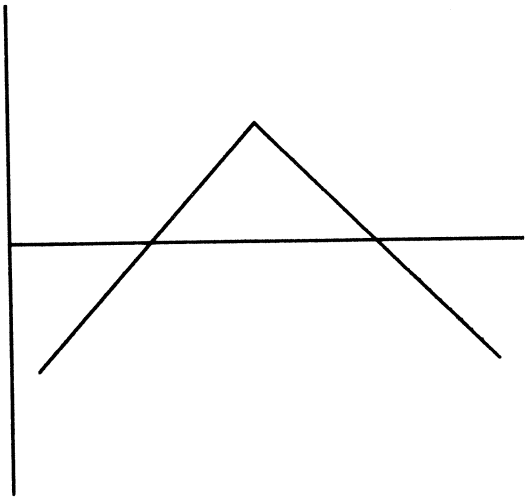
Another common volatility position is a "STRADDLE". A long straddle position is based on expectations that the volatility of the underlying will increase. The return profile is limited loss/unlimited profit. A straddle is established by buying a put and a call with the same exercise price and expiration date. Profit is generated if the price of the underlying moves enough in either direction to cause the gain from either the in-the-money put or call to exceed the total premium paid. Losses are limited to the premium paid.

Conversely, if a trader expects volatility to remain stable or decrease, he can establish a "STRADDLE WRITE", consisting of writing a put and a call with the same exercise price and expiration date. Profits from a straddle write are limited to the premium earned, while losses are potentially unlimited if there is a substantial movement in the price of the underlying.

STRADDLE BUY



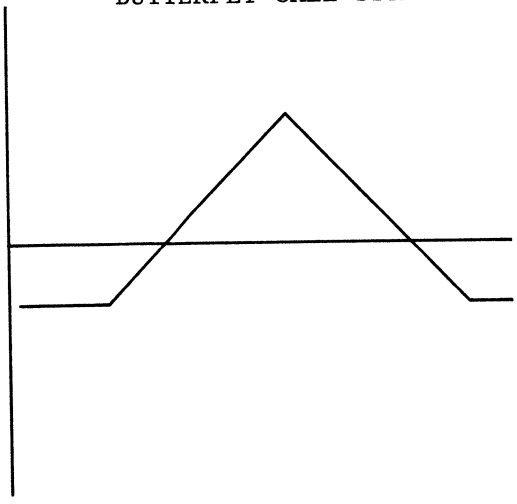
STRADDLE SELL



Even though a straddle is basically a play on volatility, a trader may feel that the underlying is more likely to trade in one direction than in another. A straddle position can be biased to reflect a bullish or bearish view. For example, if the trader desires a long bullish straddle, a "STRAP" may be established by purchasing a greater number of calls than puts. This will increase the trader's profit if volatility increases and the price of the underlying increases. If the trader desires a long bearish straddle, a "STRIP" may be established by purchasing a greater number of puts than calls. This will increase the trader's profit if volatility increases and the price of the underlying decreases.

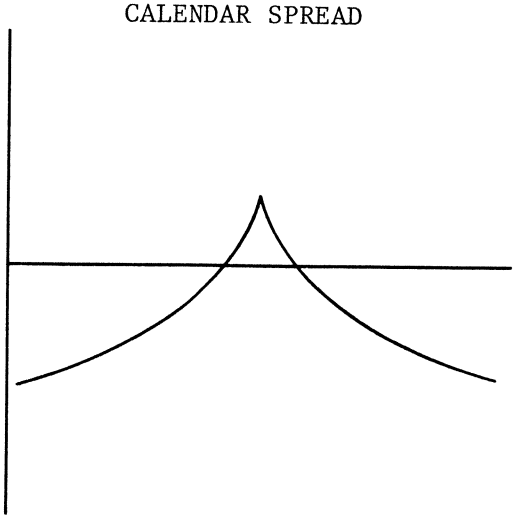
A strategy reflecting an expectation of stable or decreasing volatility and which has a profile of limited losses/limited profits is a "BUTTERFLY CALL SPREAD". This spread is constructed by combining a bull spread and a bear spread. A call is purchased with a low exercise price, two calls are written with mid-range exercise prices, and a call is purchased with a higher exercise price. Profit is generated when the price of the underlying remains within an establishing range. Loss is limited to the amount of the net debit required to establish the spread.

BUTTERFLY CALL SPREAD



Another such strategy for stable or decreasing volatility is a "CALENDAR or TIME CALL SPREAD" (sometimes called a "HORIZONTAL SPREAD"). This position is established by selling a near-term call option while purchasing a further-dated call. If volatility does not increase, time will erode the value of the near-term option at a faster rate than that of the far-term option. Thus the premium spread between the two options will widen and a profit may be made by closing the position at the expiration date of the near-term option.

CALENDAR SPREAD



Finally, a strategy that reflects an expectation of increasing volatility and has a profile of unlimited profits/unlimited losses is a "RATIO CALENDAR SPREAD". In the ratio calendar spread, the trader sells a number of near-term calls while buying fewer far-term calls. Since more calls are being sold than are being bought, uncovered options are involved. The uncovered call position at the near-term leaves the trader exposed to unlimited losses should the price of the underlying appreciate beyond the exercise price. The long far-term call position offers the trader unlimited profit opportunities if, after the expiration of the near-term calls, the price of the underlying appreciates.

Appendix B

Example of an options transaction

The following description is intended to provide a practical illustration of just how an options transaction might be contemplated, executed and accounted for by a typical market participant.

Phase 1

An international corporation based in the United States faces a contingent liability, to a British supplier, in three months. Such a liability may arise where the supplier has won contracts in the past and has indicated it will bid on a contract to supply goods in the future, but where the contract has not yet been awarded. The prospect of this future sterling payment exposes the corporation to a possible foreign exchange risk if the firm wins the contract and the dollar cost of sterling rises in the interim.

The corporation's treasurer has several alternatives to consider: he can (1) wait three months to determine whether the liability will be realised and then, if necessary, purchase the sterling; (2) enter into a forward contract now with a bank to buy sterling three months forward; (3) purchase a sterling futures contract now; and (4) purchase a call option on sterling.

Alternative (1), doing nothing until payment time, exposes the corporation to exchange rate risk over the next three months in the event that the payment must be made, i.e. sterling could appreciate relative to the corporation's base currency, thus making the payment more costly than current rates indicate.

Alternative (2), entering into a forward contract, guarantees a rate of exchange three months forward but the corporation will be unable to benefit if the price of sterling depreciates relative to the base currency, i.e. if sterling is "cheaper" three months hence, the corporation must still pay the higher rate. More important, if the supplier fails to win the contract, and payment does not therefore have to be made, the corporation will be left with a long sterling exposure.

Alternative (3), purchasing a futures contract, has similar drawbacks to a forward contract, with other inconveniences. Firstly, futures contracts are standardised agreements with pre-established contract amounts and maturities. The maturity date and contract size may not match precisely the needs of the corporation, resulting in residual exposure to maturity date and underlying amount risk. Secondly, exchange-traded futures contracts are marked to market, i.e. revalued on a daily basis. Compensation for a loss in the value of a position must be included in the margin posted with the exchange. This implies that the corporation may be subject to cash-flow problems over the next three months.

Alternative (4), purchasing a call option on sterling, guarantees that the purchase of sterling will not become more expensive even if the exchange rate appreciates, allows the corporation to benefit from a lower sterling rate should the exchange rate depreciate, and (except for the premium

payment) does not involve cash flows over the next three months, regardless of the rate movement. In addition, if the option is purchased, from a bank "over-the-counter", the terms of the contract can be tailored to accommodate the specific needs of the corporation. If the supplier fails to win the contract, the option can be permitted to expire unexercised for a maximum cost of the premium, or, if it has remaining time value, some portion of the premium cost may be recovered.

Phase 2

The treasurer decides to purchase a call option on sterling. Several banks, with which the corporation has dealing relationships, are asked to quote a price on a sterling call option with a specified exercise price for a three-month period. Generally, a response to this request will be received within 15 to 20 minutes at most, and the quote may only be in effect for a very short period.

The treasurer decides to pay the offer on the call option to Bank A. At this juncture, both parties to the agreement are exposed to credit risk. Bank A is exposed to the credit risk of the corporation until it receives the fee or premium charged for the option contract. Generally, payment is made to Bank A within a few days. The corporation, on the other hand, is exposed to the credit risk of Bank A for the life of the contract since the corporation is dependent on Bank A to fulfil the terms of the agreement should the contract be exercised.

Since a contract has been executed it will affect both the balance sheet and the income statement of both parties. Since the contract is contingent, the option itself may be treated as an "off-balance-sheet" or memorandum item, and may not be reflected in the actual balance sheet of either firm. For the bank writing the option it will be a contingent liability, for the corporate buyer it will be a contingent asset.

But execution of the contract also has an immediate effect on the balance sheet, reflecting the payment of the premium. In the first instance, the firm will show a decrease in a cash account and an increase in an account such as "premium paid". The bank will show reverse entries, an increase in a cash account and an increase in an account such as "premium received".

CORPORATION

Assets	Liabilities
-cash	
+premium paid	

BANK A

Assets	Liabilities
+cash	+premium received

These transactions will also have potential implications for the income statements of both the corporation and the bank, which will continue for the life of the option. But here the accounting treatment is far less uniform among various market participants and there remains considerable debate as to appropriate treatment. Some banks selling options will immediately transfer

"premium received" into another account such as "premium earned", which in effect counts the premium as realised profit. If subsequently the delta hedging of the option, for example, were to incur costs which cut into that premium earned, it would be booked directly as a loss.

An alternative approach, regarded by some as more precise, is to hold the premium earned in its separate account, and transfer from this account to a profit account only as the time value of the option erodes, and only insofar as the premium is not consumed in the process of delta hedging, or in the purchase of other options to hedge the written option. This approach is obviously more expensive from an operational point of view.

The final alternative would be to defer all entries to profit or loss accounts until the written option has expired, without any accrual to profit as the time value of the option erodes.

Phase 3

Bank A, having sold an option, is now exposed to unlimited exchange-market risk. If the price of sterling stays below the exercise price, Bank A's maximum profit is the premium received from the corporation. If the price of sterling is above the exercise price and the corporation calls on Bank A to fulfil the terms of the contract, then Bank A will have to sell sterling to the corporation for a price lower than it can acquire it in the market.

Bank A, if it chooses to manage its market risk, can hedge its exposure by (1) buying an option identical to the one sold; (2) buying an option similar in terms to the one sold; or (3) buying sterling in the spot or forward market.

Buying an identical option would perfectly hedge the risk of the short option position but would limit any profit for Bank A to the bid/offer spread. In addition, if Bank A has sold a customised option, it may be difficult to find another counterparty willing to write an option with the same features.

Bank A, unable to obtain an identical option and eliminate its risk, may attempt to limit its exposure by the purchase of an option with similar terms and features. The purchased option may differ from the option sold in maturity, underlying amount, exercise price, underlying currency and/or exercise features. A certain amount of risk will remain but it should be substantially less than the exposure from the original short option position.

Bank A may also choose to "delta neutral hedge" its short option position. A purchase of sterling in the spot or forward/futures markets, in amounts dictated by the degree the option is in or out-of-the-money, should have the effect of balancing any gains or losses occurring on the short option position as a result of rate movement. However, a delta-neutral hedge does not eliminate volatility risk.

Different approaches by Bank A to managing this options exposure will have different balance-sheet implications. For present purposes, the choice of a matched or only similar purchased option to hedge the written option will produce identical balance-sheet impacts, while the delta-hedge approach will be quite different. These two approaches are set out below in stylised form.

BANK A

Option-hedge approach

Assets	Liabilities
-cash +premium paid	

Delta-hedge approach

Assets	Liabilities
-cash +foreign currency	

Note that the amount of premium paid on the option purchased will, in general, not match precisely the amount of premium earned on the original option written. It is the difference between these two which will be taken to profit or loss, either on an accrual or cash basis.

Phase 4

The option contract will expire worthless if the price of sterling is below the exercise price of the contract at maturity. If, on the other hand, the market price of sterling rises above the exercise price and the corporation finds that it does not have to make a sterling payment, it may be able to sell the option (usually back to Bank A) and recover some, if not all, of its premium cost. However, if the contingent liability is realised, the corporation will decide to exercise the option. This gives rise to a new risk for both parties: settlement risk. The corporation is exposed until Bank A delivers sterling, and Bank A is exposed until the corporation delivers the base currency. Once the contract expires or is exercised and settlement occurs, the transaction is complete.

Appendix C

Interest rate and foreign exchange options

	Amount	Introduction	Open interest[1]	Turnover[2]
			in millions of US dollars	
	Philadelphia Stock Exchange (Settlement dates: Mar., June, Sept., Dec.)			
Currency				
Pounds sterling	£ 12,500	1982	2,285	2,469
Deutsche Mark	DM 62,500	1983	2,365	2,776
Swiss francs	Sw.fr. 62,500	1983	1,841	1,576
Japanese yen	Yen 6,250,000	1983	2,565	3,492
Canadian dollars	Can.$ 50,000	1983	696	809
French francs	Fr.fr. 125,000	1984	191	51
Interest rate				
3-month Euro-dollar	US$ 1,000,000	1985	-	-
	Chicago Mercantile Exchange (Settlement dates: Mar., June, Sept., Dec.)			
Currency				
Deutsche Mark[6]	DM 125,000	1984	5,227	9,643
Pounds sterling[6]	£ 25,000	1985	1,154	1,399
Swiss francs[6]	Sw.fr. 125,000	1985	1,371	2,285
Interest rate				
3-month Euro-dollar[6]	US$ 1,000,000	1985	60,689	129,576
	European Options Exchange (Amsterdam) (Settlement dates: Feb., May, Aug., Nov.)			
Currency				
Dutch guilders	US$ 10,000	1982	275[3]	446[4]
Deutsche Mark	US$ 10,000	1984	11[3]	3[4]
Pounds sterling	£ 100,000	1984	30[3]	5[4]
Pounds sterling v. guilder	£ 10,000	1985	32[3]	59[4]
ECU	ECU 10,000	1985	5[3]	15[4]
Interest rate				
Dutch guilder bonds	Fl. 10,000	1980	386[3]	204[4]
	Montreal Stock Exchange (Settlement dates: Mar., June, Sept., Dec.)			
Currency				
Canadian dollars	Can.$ 50,000	1982	44	60
Swiss francs	US$ 100,000	1985	-	-
Deutsche Mark	US$ 100,000	1984	-	-
Pounds sterling	£ 100,000	1984	58	11
Interest rate				
Canadian Government bonds	Can.$ 25,000	1982	286	412

	Amount	Introduction	Open interest[1]	Turnover[2]
			in millions of US dollars	
	Chicago Board of Trade (Settlement dates: Mar., June, Sept., Dec.)			
US Treasury note[4]	US$ 100,000	1985	3,575	4,015
US Treasury bond[4]	US$ 100,000	1982	56,096	174,825
	Chicago Board Options Exchange (Settlement dates: Mar., June, Sept., Dec.)			
Currency				
Pounds sterling	£ 25,000	1985	-	-
Canadian dollars	Can.$ 100,000	1985	-	-
Deutsche Mark	DM 125,000	1985	-	-
Japanese yen	Yen 12,500,000	1985	-	-
Swiss francs	Sw.fr. 125,000	1985	-	-
French francs	Fr.fr. 250,000	1985	-	-
Interest rate				
US Treasury bond	US$ 100,000	1982	3,320	2,725
US Treasury note	US$ 100,000	1985	581	260
	American Stock Exchange (Settlement dates: Feb., May, Aug., Nov.)			
US Treasury note	US$ 100,000	1982	33	90
	London International Financial Futures Exchange (Settlement dates: Mar., June, Sept., Dec.)			
Currency				
Pounds sterling	US$ 25,000	1985	319[3,7]	412[4,7]
Deutsche Mark[5]	US$ 50,000	1986		
Interest rate				
3-month Euro-dollar[6]	US$ 1,000,000	1985	3,989[3]	2,486[4]
	London Stock Exchange (Settlement dates: Mar., June, Sept., Dec.)			
Currency				
Pounds sterling	£ 12,500	1985	) 260[3,7]	n.a.
Deutsche Mark	DM 62,500	1985	)	n.a.
	(Settlement dates: Feb., May, Aug., Nov.)			
Interest rate				
British Government gilts[5]	£ 50,000	1985	308[3,7]	368[4,7]

1 As of 31st January 1986.
2 Turnover for the month of January 1986.
3 As of 31st December 1985.
4 Turnover for the month of December 1985.
5 Contract introduced on 31st January 1986.
6 Options on futures contracts.
7 In pounds sterling.

n.a. = not applicable

Appendix D

Implications of large unexpected price movements for option trading

There is a wide variety of current and possible users (buyers) of options, but at this time only comparatively few institutions and traders are both capable and willing to write the instrument. Thus the writing of options is concentrated among a few prominent market-makers which, significantly, results in a concentration of market and credit risk. The nature of this risk concentration is probably the main feature of options which will condition how the effects of various types of large unexpected price movements might be distributed through the financial system. Substantive changes in the character of the writing institutions or the underlying could have severe repercussions on financial markets.

Generally, purchasers of option contracts have seemingly secured protection against adverse price movements on the underlying. However, these purchasers are now exposed to the default risk of the writer since any assumed market protection from buying an option is contingent on the writer's ability to fulfil the terms of the contract. A series of defaults in a bank's loan portfolio or a default by a clearing agent, for example, resulting in the bankruptcy of a major option writer, could adversely affect the financial soundness of numerous counterparties.

More precisely, the bankruptcy of a major option writer would primarily affect two parties; those who purchased options (commercial banks and other option writers) from the writer and those who have spot, forward and/or future agreements with the bankrupt writer related to options positions. Buyers who purchased the option contracts as a hedge for a pending or contingent liability (or to offset a short option position) are again confronted with their original exposure. However, their willingness and ability to rehedge are dependent on the cost of recovering and whether the original exposure has become favourable or unfavourable.

The premiums paid for the original options are now a sunk cost with zero probability of a return on the investment. A firm or bank may be reluctant or unable to commit additional resources to cover the position with another option or in the spot or forward/futures market. Furthermore, the decision if and when to rehedge will also be influenced by the price and volatility movements of the underlying since the original option contract was conceived. If the purchased option was out-of-the-money, the firm may be slower or less likely to rehedge since the market has moved in favour of its underlying position. On the other hand, if the option was in-the-money at the time of the bankruptcy then the firm should be compelled to rehedge since the market has moved against its underlying position. If a number of firms or banks are caught in this position, a sudden rush to the market for cover in the underlying could easily result in conditions distorting the pricing process and orderly trading.

Other broad developments such as drastic shifts in critical commodity prices or political upheavals in countries with substantial foreign debt could also have serious consequences. The effect of such developments would be reflected in drastic changes in the prices and volatility of the underlying. For the major option writers with sizable, short options positions,

a quick sudden move may prove disastrous. If the option writer is "properly" hedged, either options against options or delta-hedged, then an isolated price move may be a manageable situation. However, it is not uncommon for option writers to leave deeply out-of-the-money options uncovered. A sudden price move which brings these options into or nearer-the-money quickly would adversely affect the writers' position. Still, it is more than likely that such events will also have the effect of altering volatility.

A short options position is effectively a short volatility position. When an option is sold, an increase in volatility, often irrespective of price movement, increases the value of the option, which places the short position at a loss. Options hedged with other options are relatively safe from adverse volatility movement; however, options hedged under a delta scheme are subject to large losses. A delta-hedged portfolio is hedged against price changes, not volatility changes. The higher the volatility, the lower will be the delta and vice versa. Consequently, a position which is assumed to be delta-neutral may actually be delta-long or delta-short. Given the substantial delta-hedged and uncovered position of the surveyed institutions, a major market event, which has the effect of increasing volatility in foreign exchange rates, could easily promulgate disorderly market conditions as traders come into the market to cover the short volatility position.

Appendix E

Option pricing and hedge ratios

This section presents several formulae commonly used for computing (1) the market price of an option; and (2) the proportion of underlying securities or currency needed to hedge an option that has been written. Also examined are the sensitivities of these values to changes in various factors.

Three models are presented. The Black-Scholes model (1973) is the industry standard, widely used with or without modifications by many traders to guide their trading decisions. It was the first exact option pricing formula to be derived. It is based on an arbitrage argument, namely that the market price of an option must be such that no risk-free profits can be made by any combination of trading in options and the underlying securities. The formula is therefore obtained by construction of a riskless hedge using the option and its underlying securities and then solving the resulting equation for either the option price or the hedge ratio. The derivation is carried out under a number of special assumptions, as follows:

(i) the underlying security pays no dividends;

(ii) the option cannot be exercised prior to the expiration date (This assumption is true of European options. For American options, early exercise is not rational if the underlying security pays no dividends.);

(iii) there are no margin requirements, taxes or transaction costs (such as commissions or bid/ask spreads);

(iv) the interest rate is constant;

(v) the price volatility of the underlying security is constant, and proportional stock price changes are log-normally distributed;

(vi) only very small changes in the stock price can occur over a very short period of time.

The resulting equations are shown in Table 3.A.1. Only call options are computed, as put options are directly analogous.

The second model, by Garman and Kohlhagen (1983), applies to foreign exchange options. It is a modification of the Black-Scholes model which takes into account the fact that interest rates may vary across currencies. The basic assumptions are those listed above, with "underlying currency" substituted for "underlying security" or "stock". The formulae are displayed in Table 3.A.2.

A third model is by Leland (1984) and represents a modification of the Black-Scholes formula to take account of transaction costs. This formula allows direct comparison of the effects of changes in transaction costs or in the "revision interval" (i.e. the frequency with which the position is rehedged). One of the peculiarities of option management is that a hedged portfolio of options and stocks (or currencies) must be rehedged every time the

stock price (or exchange rate) changes. In the Black-Scholes model, rehedging is assumed to be continuous. However, transaction costs make such a strategy too expensive in practice. Traders generally rehedge their positions only at certain fixed intervals or when the hedge becomes sufficiently imperfect. In that case, the Leland formulas shown in Table 3.A.3 are more accurate.*

Transaction costs and fixed rehedging or revision intervals have the same effect as a modified stock price volatility, as shown in Table 3.A.3. The call price shown is actually an upper bound. Leland also computes the range between upper and lower bounds, and the sensitivity of this range or "bound" is also shown in Table 3.A.3.

Figures 3.E.1 to 3.E.28, beginning on page 107, contain graphs of the important relationships among pairs of variables within the option pricing formulae. Most of these relationships are carefully monitored by market participants in managing options portfolios. In general, these charts plot either options value or hedge ratio on the vertical axis against price of the underlying, volatility, time to expiration, or interest rates on the horizontal axis. The main purpose of the charts is to show the complexity, and particularly the non-linearity, of these relationships.

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* Even in this case, however, the Black-Scholes formula gives the exact subjective valuation if traders have logarithmic utility functions; see Cox and Rubinstein (1985), pp. 213-215.

Table 3.A.1

The Black-Scholes option-pricing model

Variables

S = spot price

K = strike price

r = interest rate

σ = spot price volatility

T = remaining time to expiration

N (x) = cumulative normal distribution

Call price (Cox and Rubinstein, pp. 205, 221)

$$C = SN(x) - Kr^{-T}N(x - \sigma\sqrt{T})$$

where

$$x = \frac{\ln (S/Kr^{-T}) + 1/2\ \sigma\sqrt{T}}{\sigma\sqrt{T}}$$

Sensitivity to other variables (See Figs. 3.E.1-4)

$\partial C/\partial S = N(x) > 0$ (the hedge ratio δ)

$\partial C/\partial K = -r^{-T}N(x - \sigma\sqrt{T}) < 0$

$\partial C/\partial \sigma = S\sqrt{T}\,N'(x) > 0$

$\partial C/\partial T = (S\ \sigma/2\sqrt{T})N'(x) + Kr^{-T}(\ln r)N(x - \sigma\sqrt{T}) > 0$

$\partial C/\partial r = TKr^{-(T+1)}N(x - \sigma\sqrt{T}) > 0$

Hedge ratio sensitivity to other variables (See Figs. 3.E.5-8)

$\partial \delta/\partial S = N'(x)/S\sigma\sqrt{T} > 0$

$\partial \delta/\partial r = N'(x)(-x/\sigma + \sqrt{T}) \lesseqgtr 0$

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

$\partial \delta/\partial T = N'(x)\ [-x/2T + \sigma/4\sqrt{T} + \ln r/\sigma\sqrt{T}] \lesseqgtr 0$

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

$\partial \delta/\partial r = N'(x)\ (\sqrt{T}/r\ \sigma) > 0$

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)

$\partial\delta/\partial S = e^{-FT}N'(x + \sigma\sqrt{T})/(S\sigma\sqrt{T}) > 0$

$\partial\delta/\partial\sigma = -xe^{-FT}N'(x + \sigma\sqrt{T})/\sigma \lessgtr 0$

$\partial\delta/\partial D = e^{-FT}N'(x + \sigma\sqrt{T})\sqrt{T}/\sigma > 0$

$\partial\delta/\partial F = -e^{-FT}N'(x + \sigma\sqrt{T})\sqrt{T}/\sigma - Te^{-FT}N(x + \sigma\sqrt{T}) < 0$

$\partial\delta/\partial T = e^{-FT}N'(x + \sigma\sqrt{T})[-x/2T + (D-F)/\sigma\sqrt{T}] \lessgtr 0$

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

Δ t = 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)

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

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

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

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

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

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

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

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

$$\text{Bound} = B = 2kS_o N'(d_1)\sqrt{T}/\sqrt{2\pi\Delta t}$$

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

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

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

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

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

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

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

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

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

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

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

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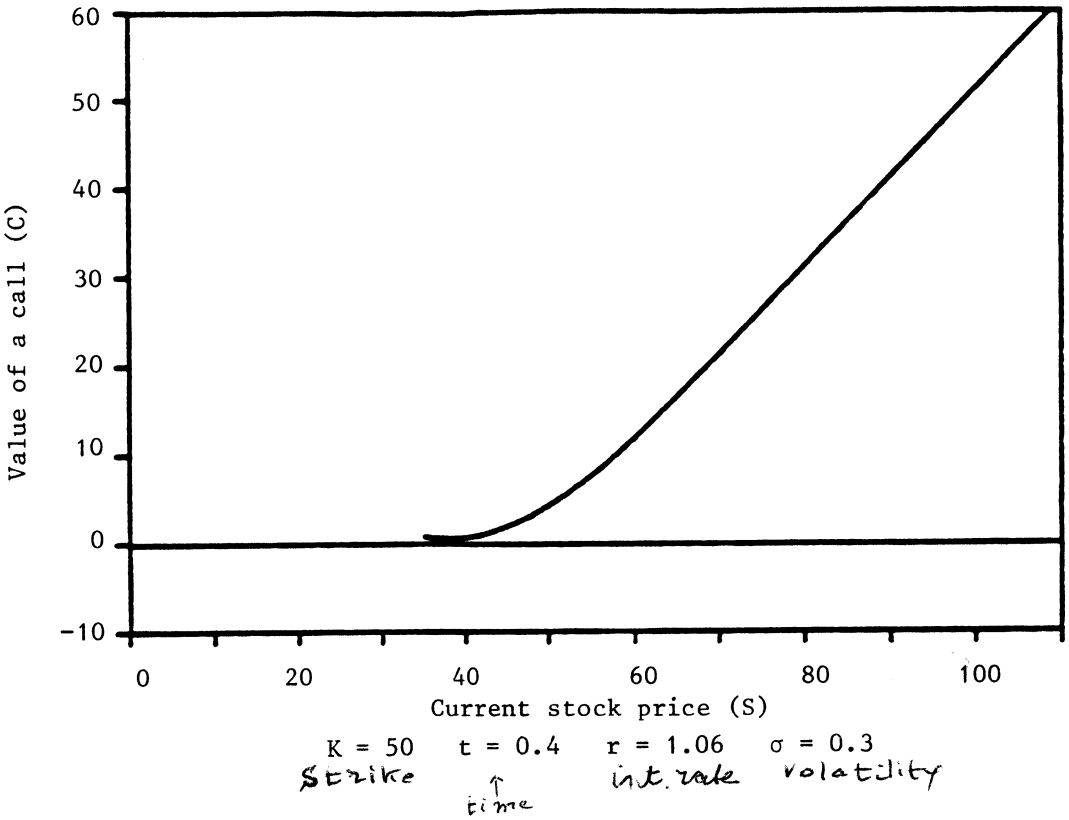
Leland, Hayne E., (1984), "Option Pricing and Replication with Transactions Costs", Working Paper No. 144, Institute of Business and Economic Research, University of California, Berkeley.

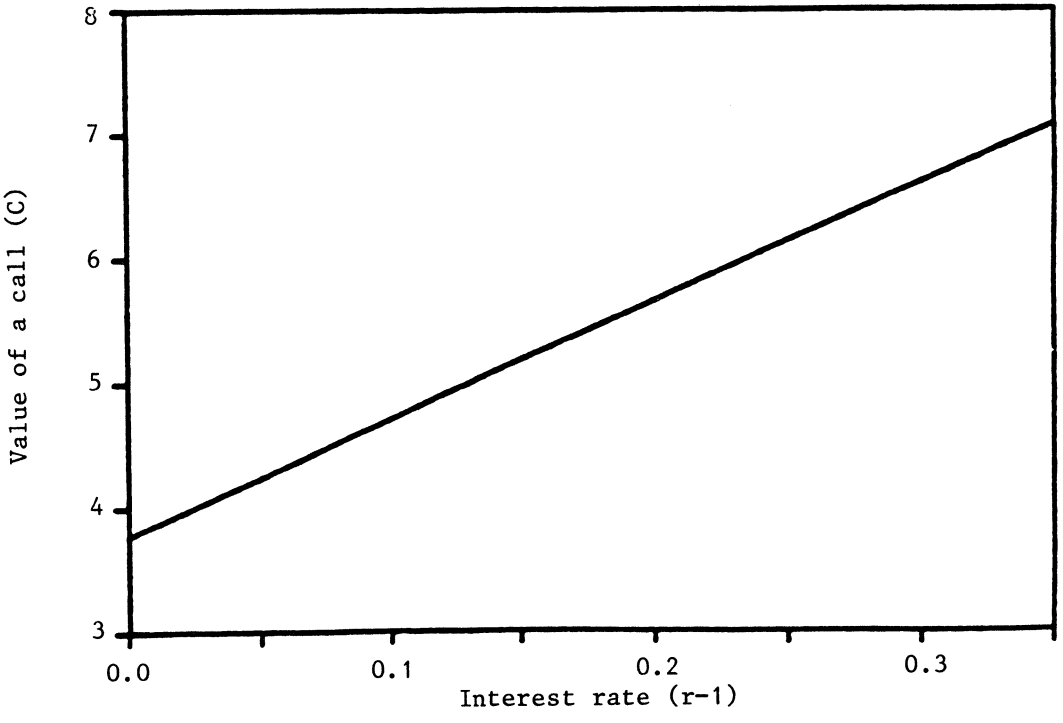
Fig. 3.E.1: Call price as a function of stock price



K = 50 t = 0.4 r = 1.06 σ = 0.3

Strike time int. rate volatility

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



S = 50 K = 50 t = 0.4 σ = 0.3

Spot

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

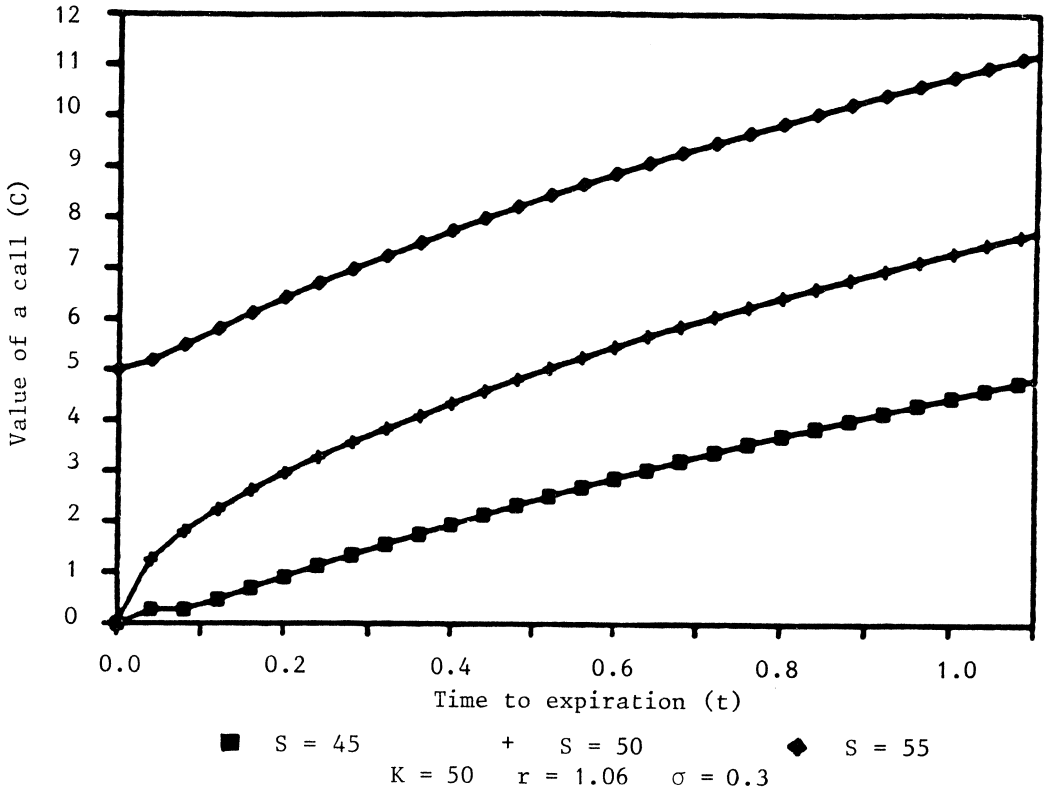


Fig. 3.E.4: Call price as a function of volatility

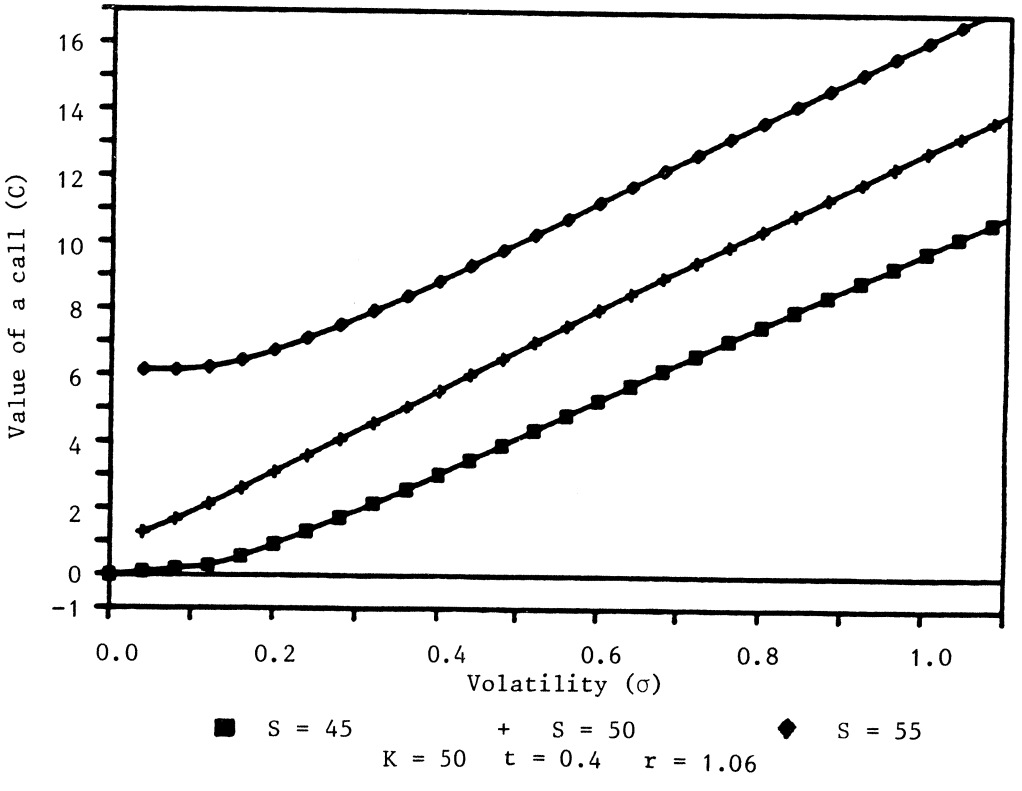
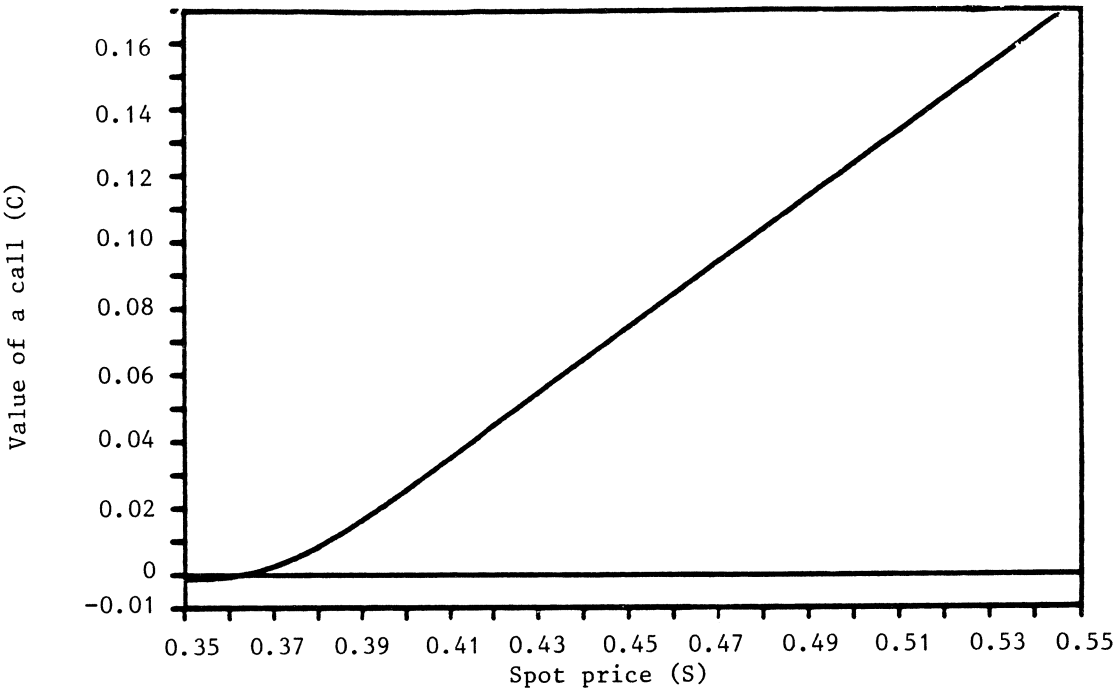
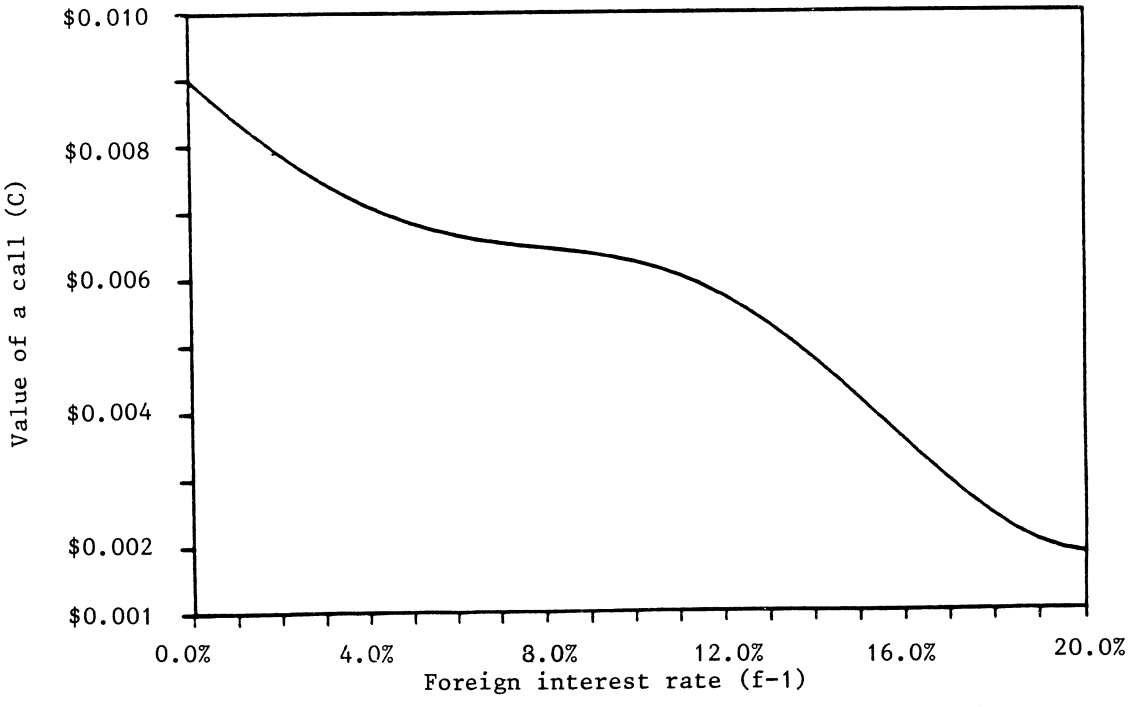


Fig. 3.E.9: Foreign currency call price as a function of exchange rate



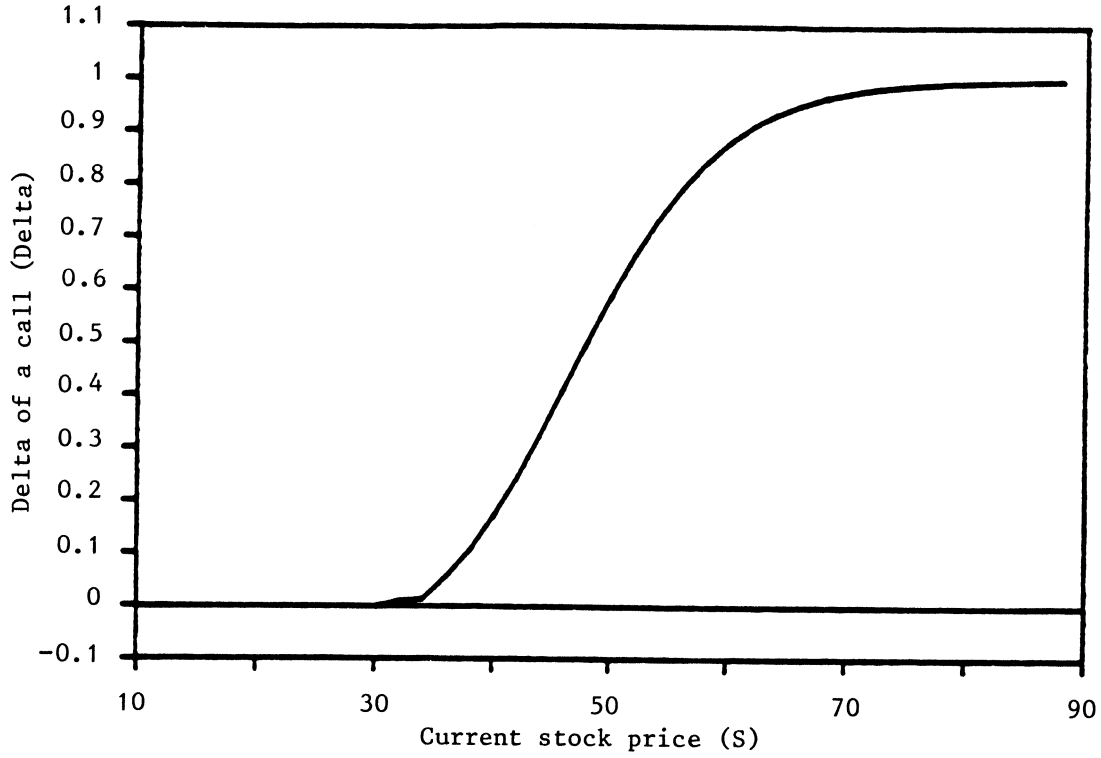
K = 0.38 t = 0.25 σ = 0.10 r = 0.12 f = 0.06

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



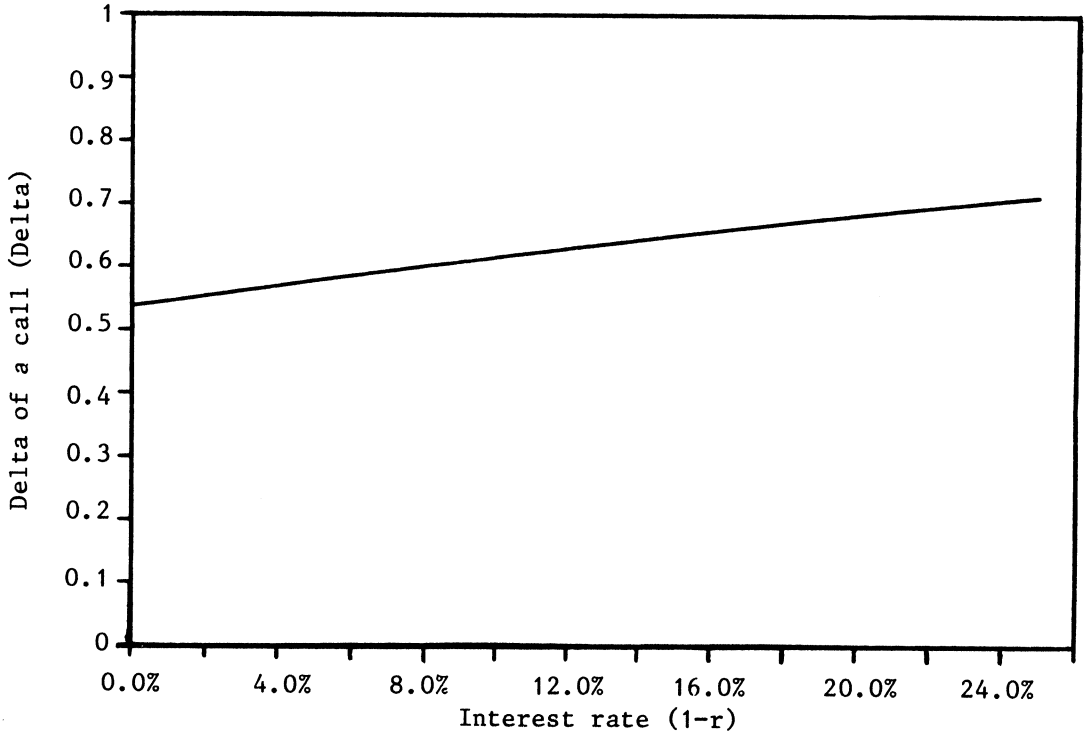
S = 0.38 K = 0.38 t = 0.25 σ = 0.1 r = 1.12 (12%)

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



K = 50 t = 0.4 r = 1.06 σ = 0.3

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



S = 50 K = 50 t = 0.4 σ = 0.3

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

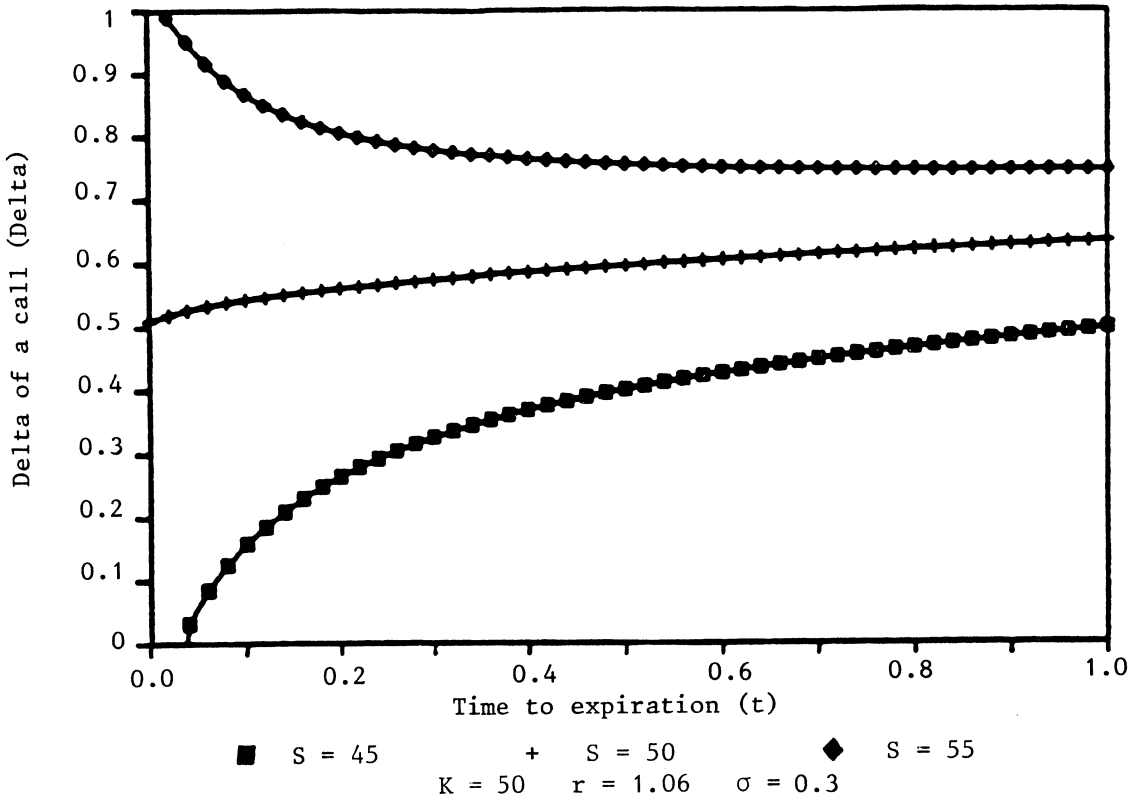


Fig. 3.E.8: Hedge ratio as a function of volatility

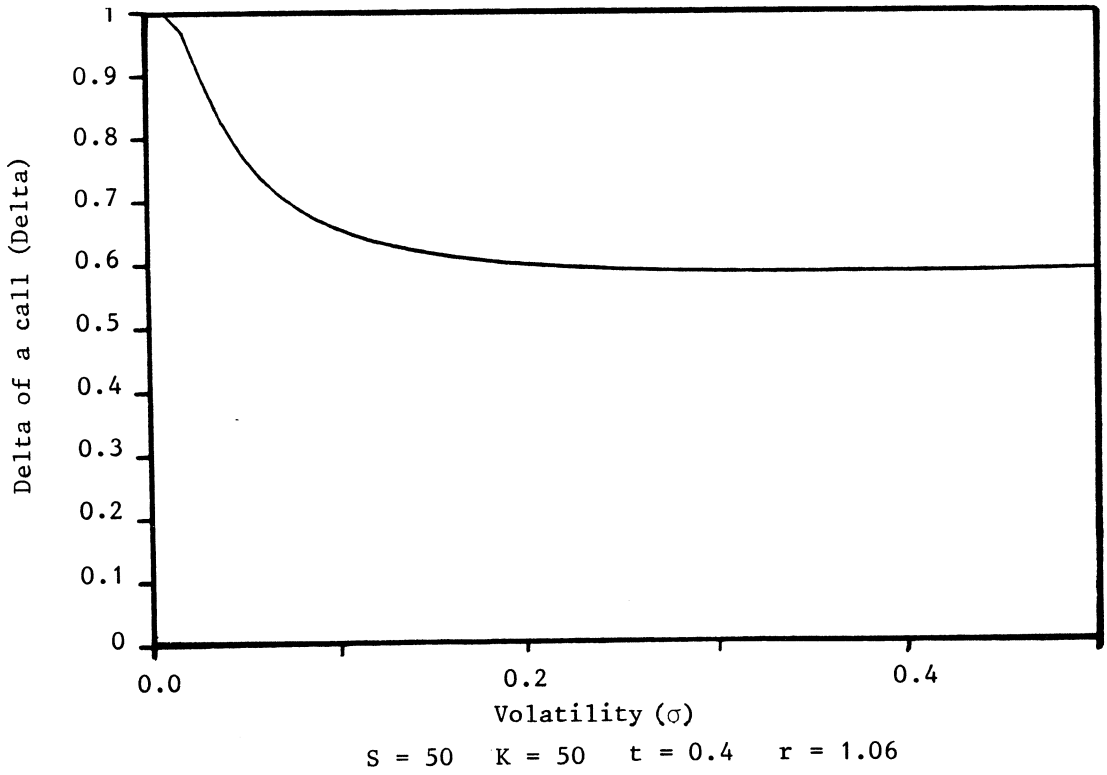
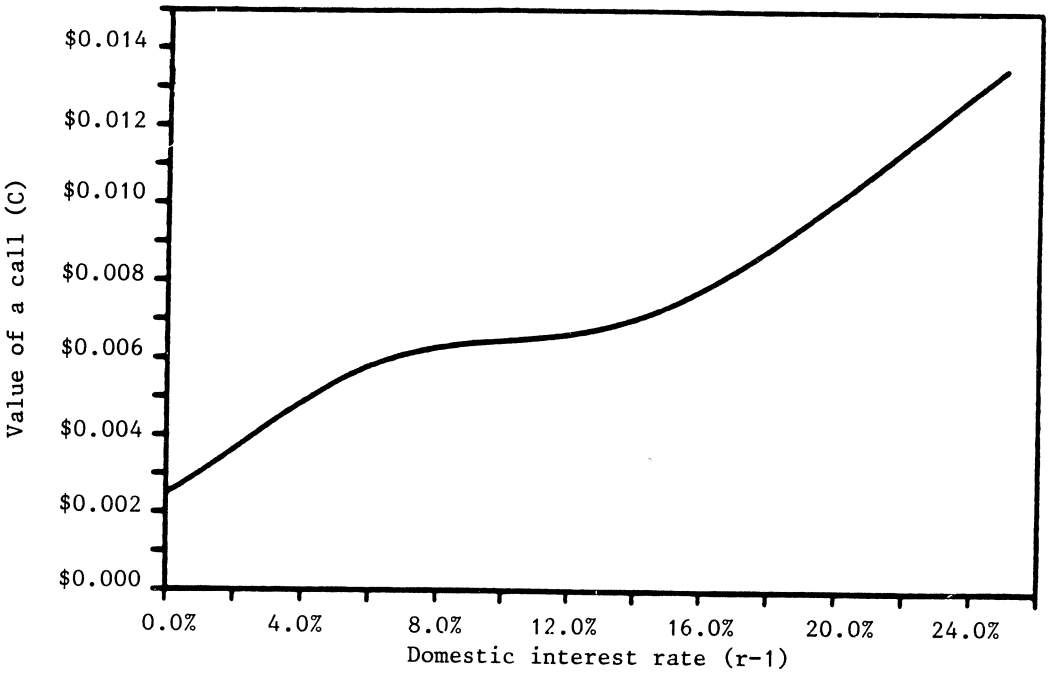
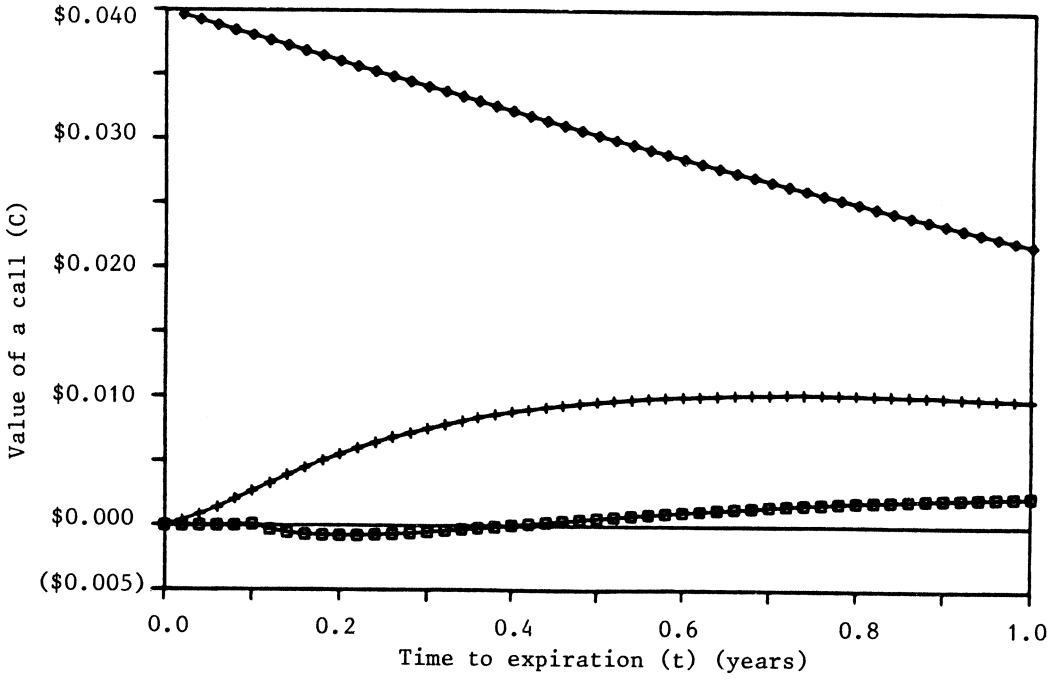


Fig. 3.E.11: Foreign currency call price as a function of domestic interest rate



S = 0.38 K = 0.38 t = 0.25 σ = 0.1 f = 1.06 (6%)

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



□ S = 0.34 + S = 0.38 ◆ S = 0.42
K = 0.38 t = 0.25 σ = 0.10 r = 1.12 f = 1.06

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

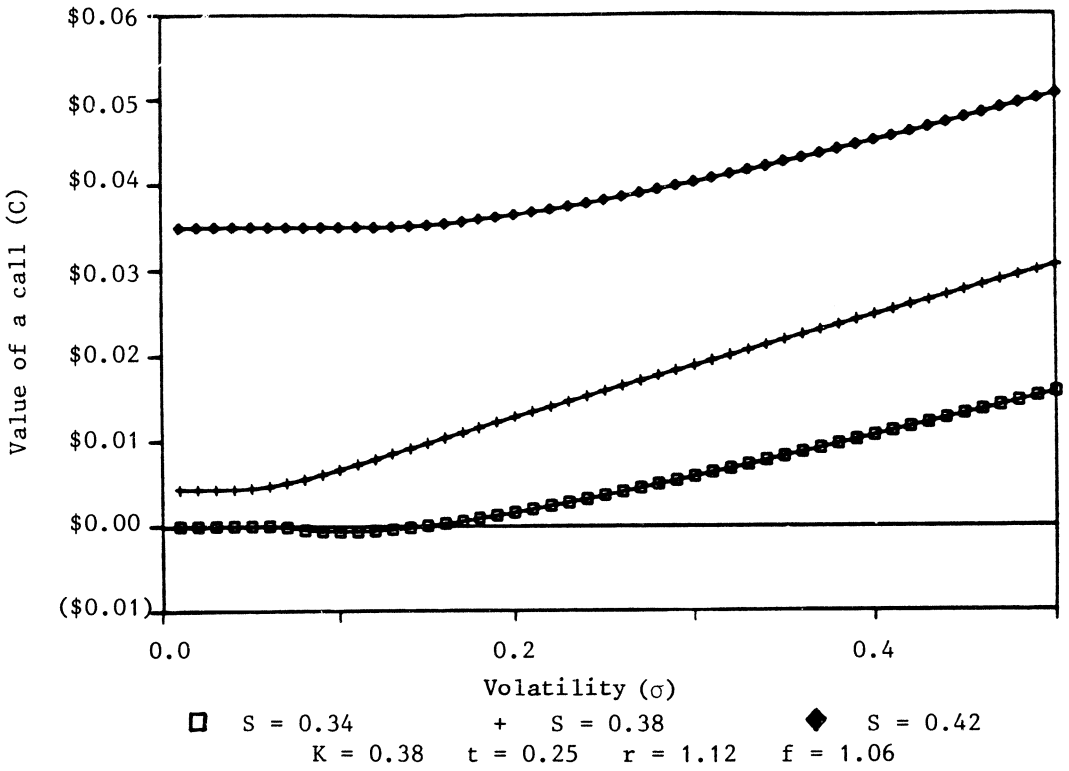


Fig. 3.E.14: Foreign currency hedge ratio as a function of exchange rate

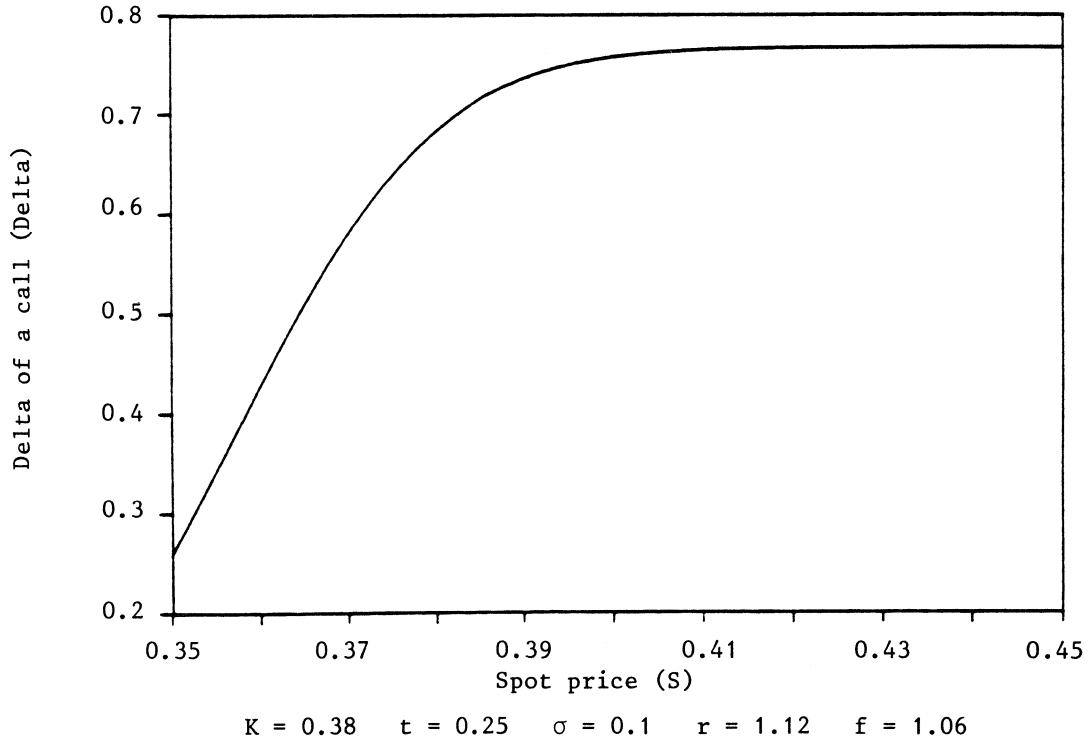
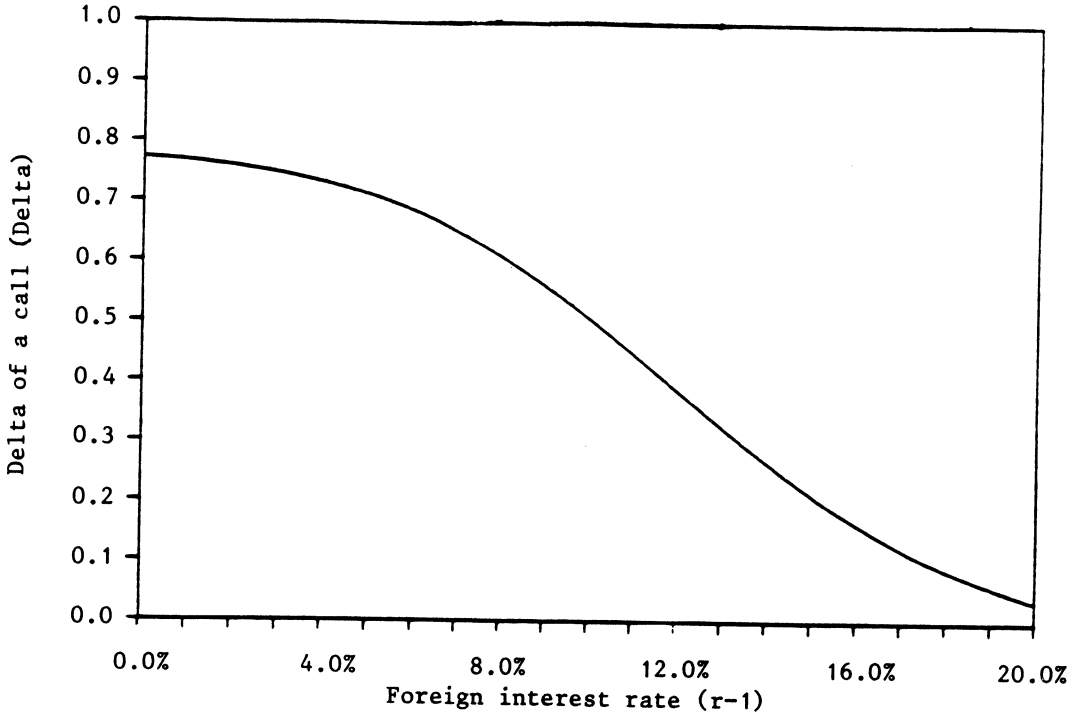
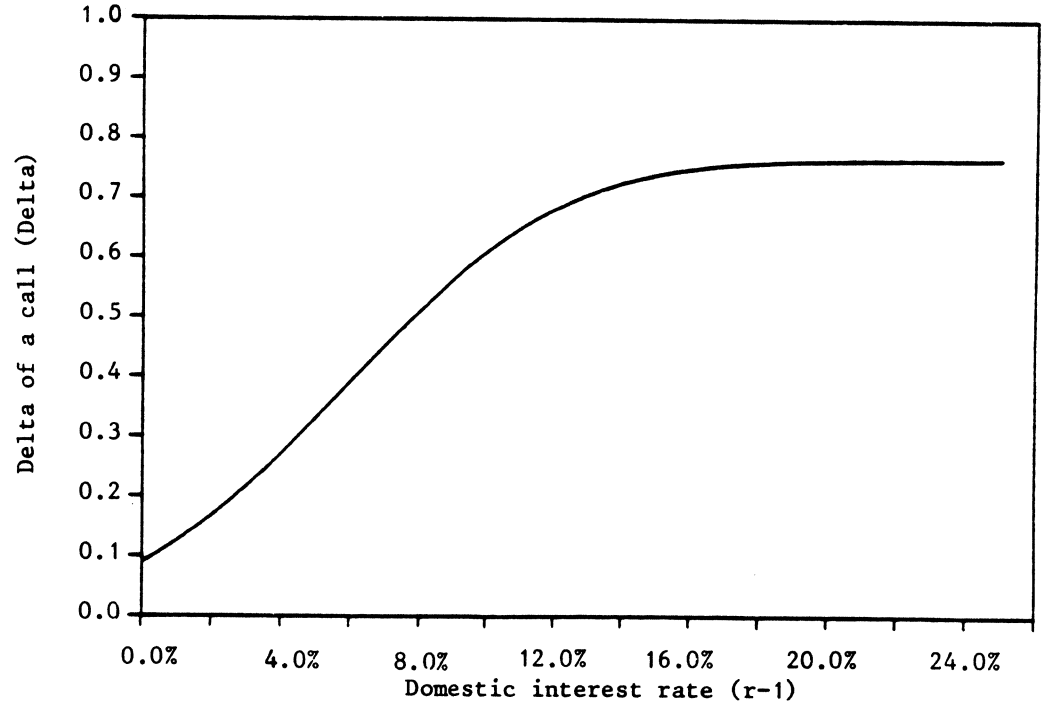


Fig. 3.E.15: Foreign currency hedge ratio as a function of foreign interest rate



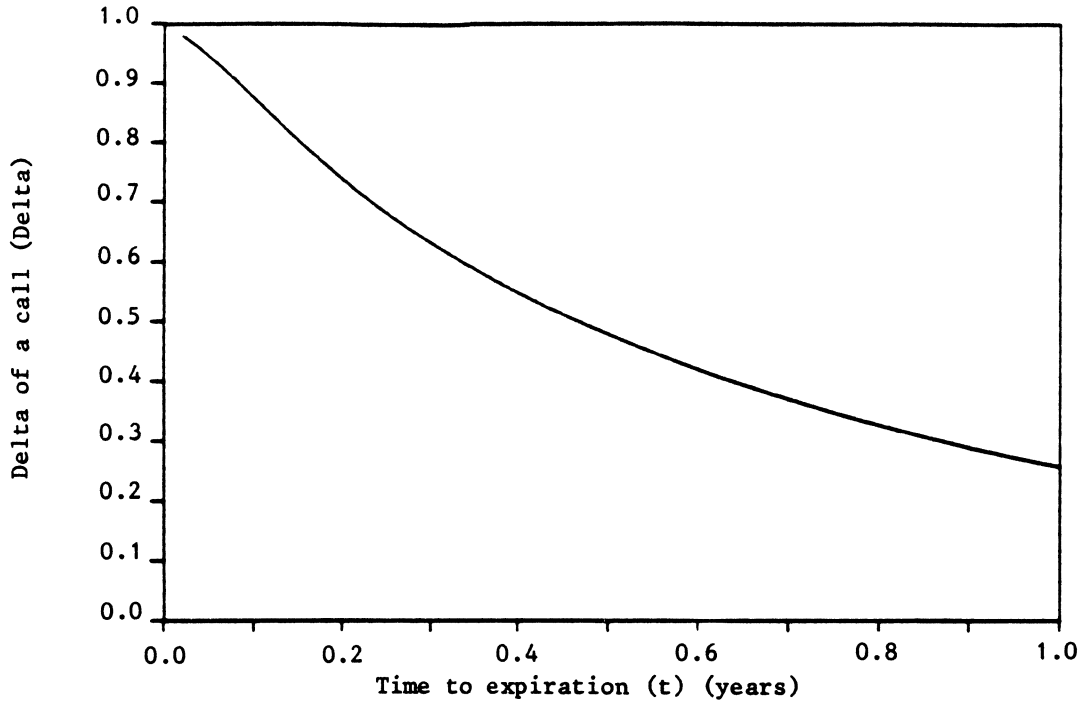
K = 0.38 S = 0.38 t = 0.25 σ = 0.1 r = 1.12

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



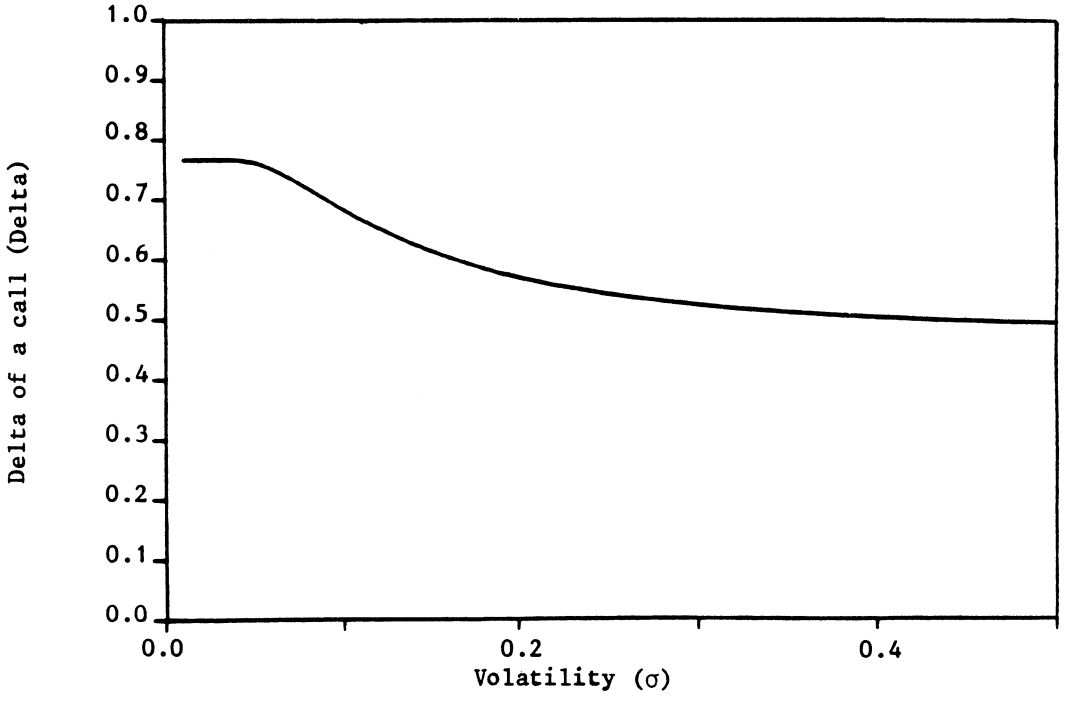
K = 0.38 S = 0.38 t = 0.25 σ = 0.1 f = 1.06

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



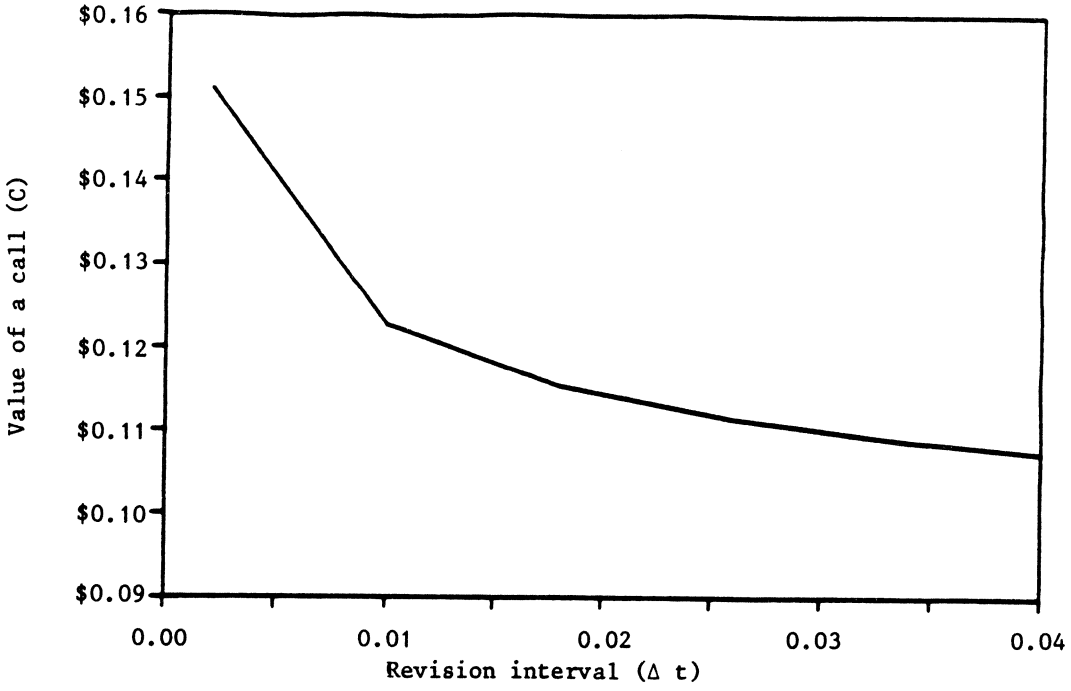
K = 0.38 S = 0.38 σ = 0.1 r = 1.12 f = 1.06

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



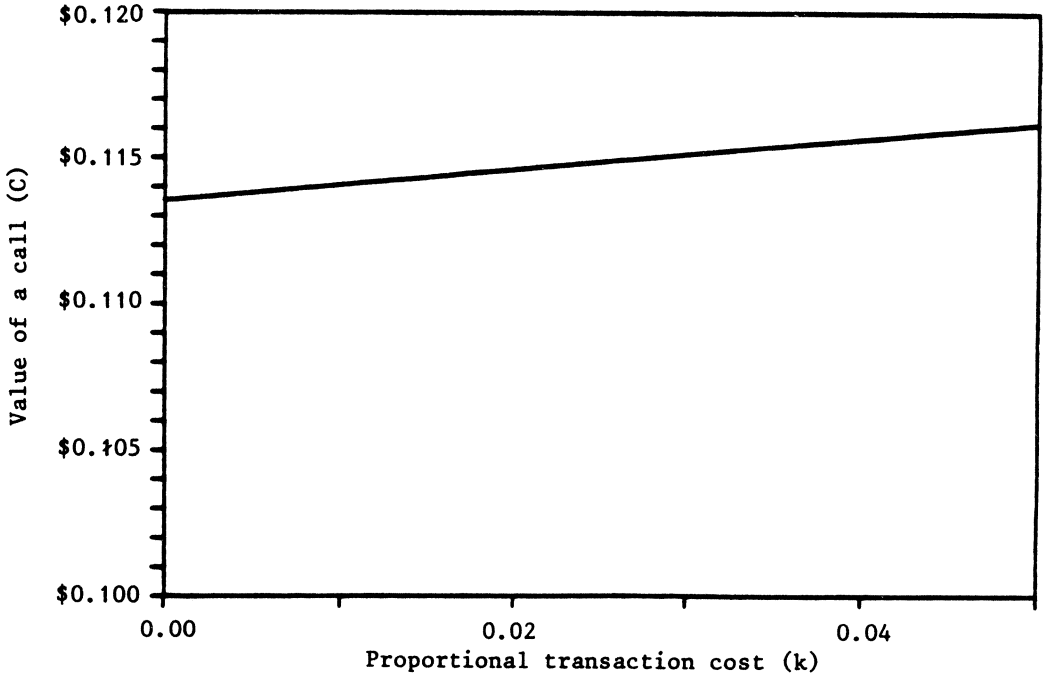
K = 0.38 S = 0.38 t = 0.25 r = 1.12 f = 1.06

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



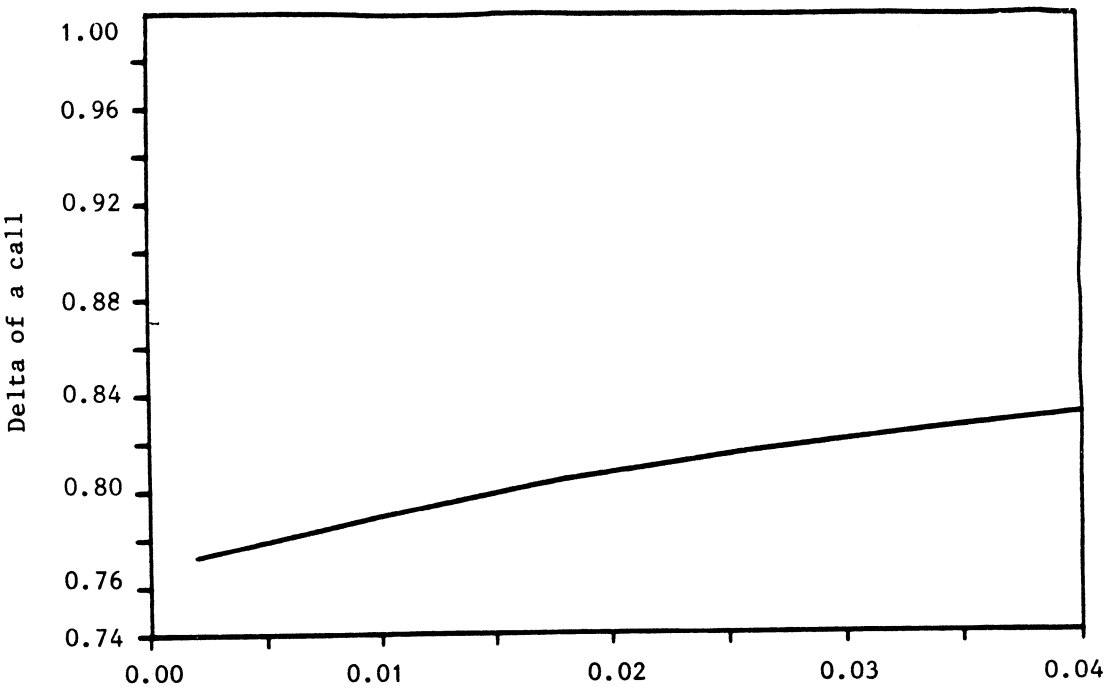
S = 0.38 k = 0.01
K = 0.38 t = 0.25 σ = 0.1 r = 1.12

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



S = 0.38 Δ t = 0.02
K = 0.38 t = 0.25 σ = 0.1 r = 1.12

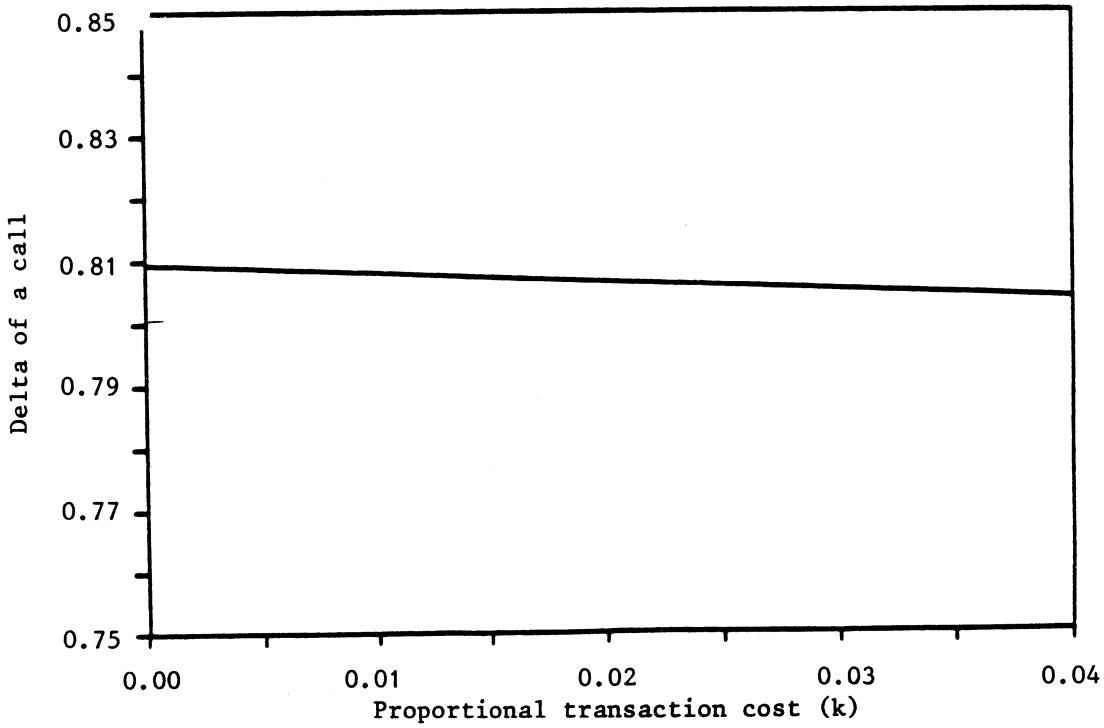
Fig. 3.E.21: Hedge ratio as a function of revision interval
(with transaction costs)



S = 0.38 k = 0.01

K = 0.38 t = 0.25 σ = 0.1 r = 1.12

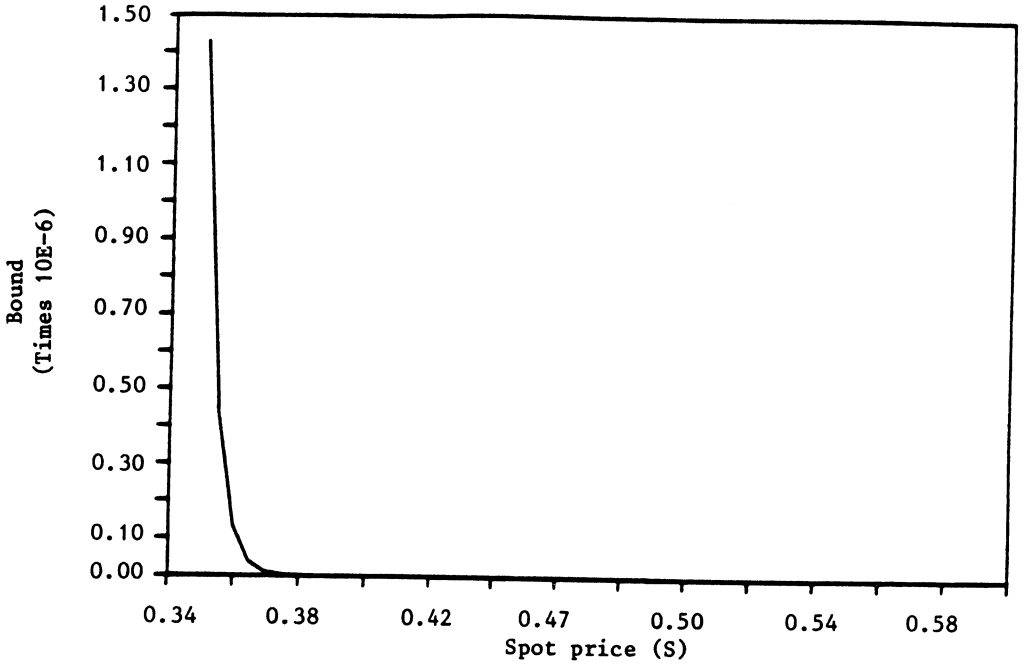
Fig. 3.E.22: Hedge ratio as a function of transaction cost



S = 0.38 Δ t = 0.02

K = 0.38 t = 0.25 σ = 0.1 r = 1.12

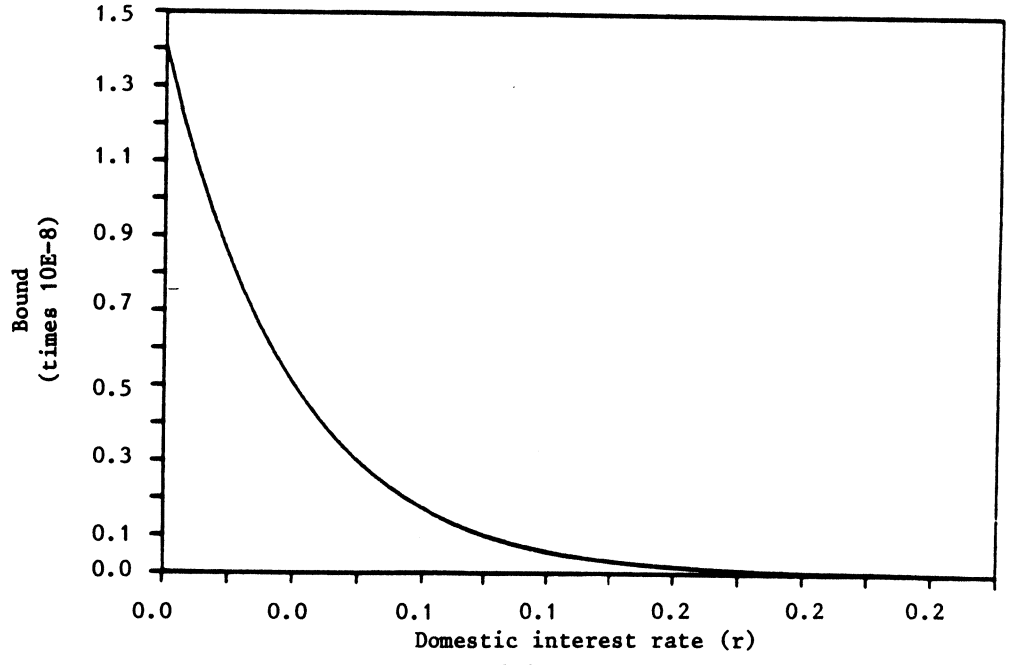
Fig. 3.E.23: Range of call prices as a function of stock price
(with transaction costs and weekly revision)



k = 0.01 Δ t = 0.02

K = 0.38 t = 0.25 σ = 0.1 r = 1.12

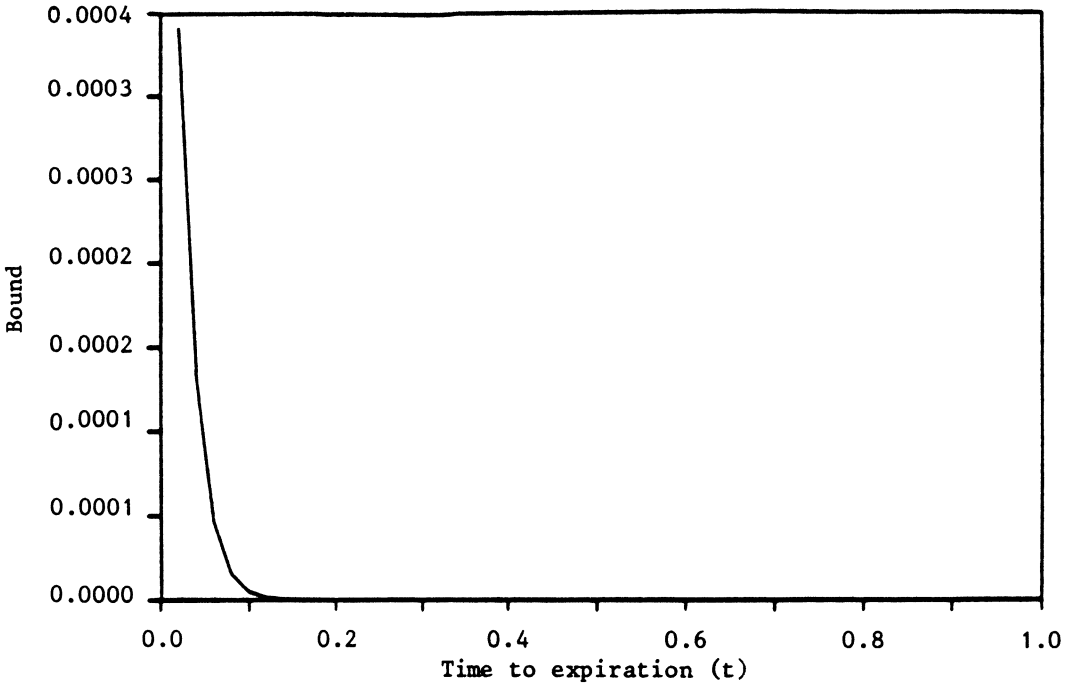
Fig. 3.E.24: Range of call prices as a function of interest rate
(with transaction costs and weekly revision)



k = 0.01 Δ t = 0.02

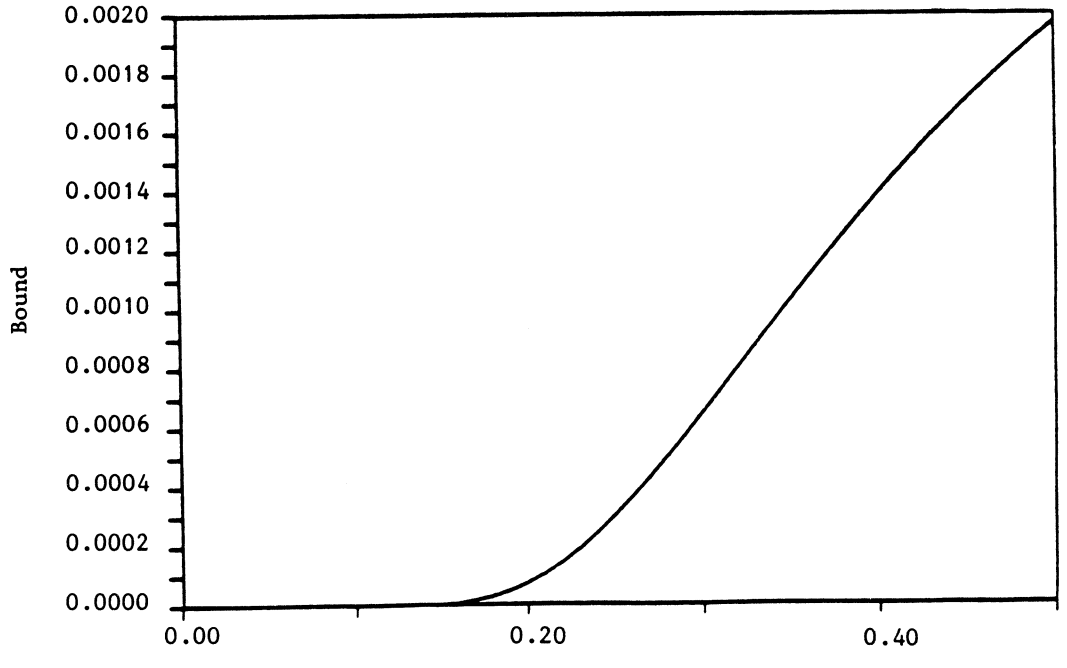
K = 0.38 S = 0.38 t = 0.25 σ = 0.1

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



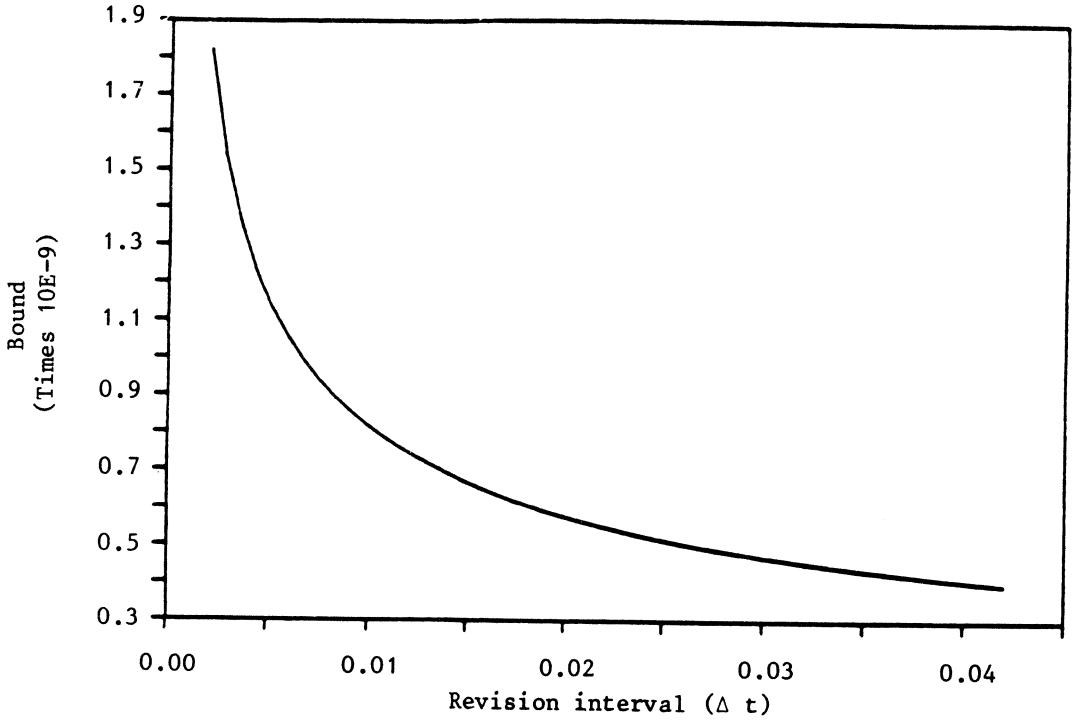
k = 0.01 Δ t = 0.02
K = 0.38 S = 0.38 σ = 0.1 r = 1.12

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



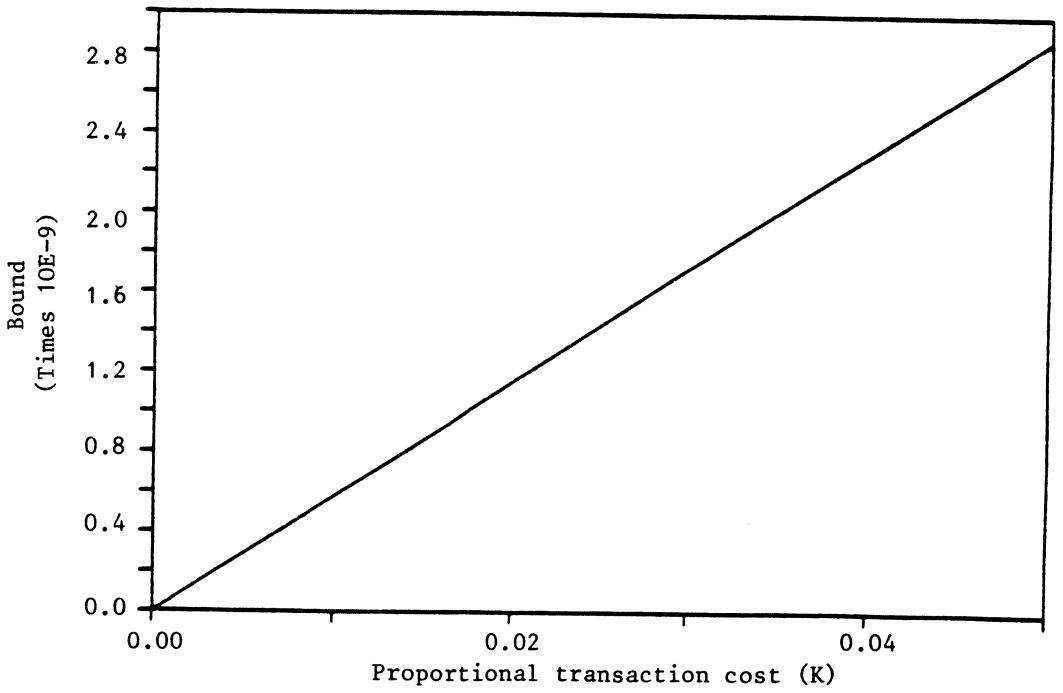
k = 0.01 Δ t = 0.02
K = 0.38 S = 0.38 t = 0.25 r = 1.12

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



K = 0.01 r = 1.12
K = 0.38 S = 0.38 t = 0.25 σ = 0.1

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



Δ t = 0.02 r = 1.12
K = 0.38 S = 0.38 t = 0.25 σ = 0.1

Chapter 4

Forward rate agreements

A. The instrument

A forward rate agreement[1] (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

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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 x 8.375% x 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.

First three months = $10,000,000 x 8.0625% x 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
plus interest paid after the first three months	201,562.50
minus the amount received under the FRA	(48,721.07)
	$10,152,841.43

The interest paid for the second three months is:

$10,152,841.43 x 10 1/2% x 0.25 = $266,512.10

Total outlays are:	201,562.50
	266,512.10
	(48,721.07)
	$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
of which: floating rate notes	*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
of which: managed loans[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
Memorandum items:								
Cross-border interbank claims within the reporting area	*126.7*	*135.6*	*160.7*	*107.7*	*67.1*	*90.0*	*77.3*	*1,378.7*
Claims on banks outside the reporting area *	*24.3*	*36.5*	*23.1*	*17.1*	*5.2*	*3.0*	*9.6*	*249.0*

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.

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. of which: to US residents	*20.0*	*9.8*	*35.3*	*17.7*	*16.7*	*- 5.9*	*- 1.7*	*158.3*
*3. other	*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
Memorandum items:								
*Cross-border interbank liabilities within the reporting area	*152.8*	*161.4*	*155.2*	*97.6*	*80.4*	*104.6*	*88.7*	*1,538.0*
Liabilities to banks outside the reporting area	*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 securities[1]

	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]
of which:					
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		all others	commercial banks		all others
		US-based	non-US-based		US-based	non-US-based	
	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
	in percentages						
Share of Euro-dollar in total contracts:							
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 relocalisation 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 particulary 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 rate[1] bond issues, 1981-85

Currency	1981	1982	1983	1984	1985 first half	1985 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]
Total (in billions of US dollars) ..	*36.2*	*59.1*	*56.8*	*74.0*	*49.3*	*58.3*

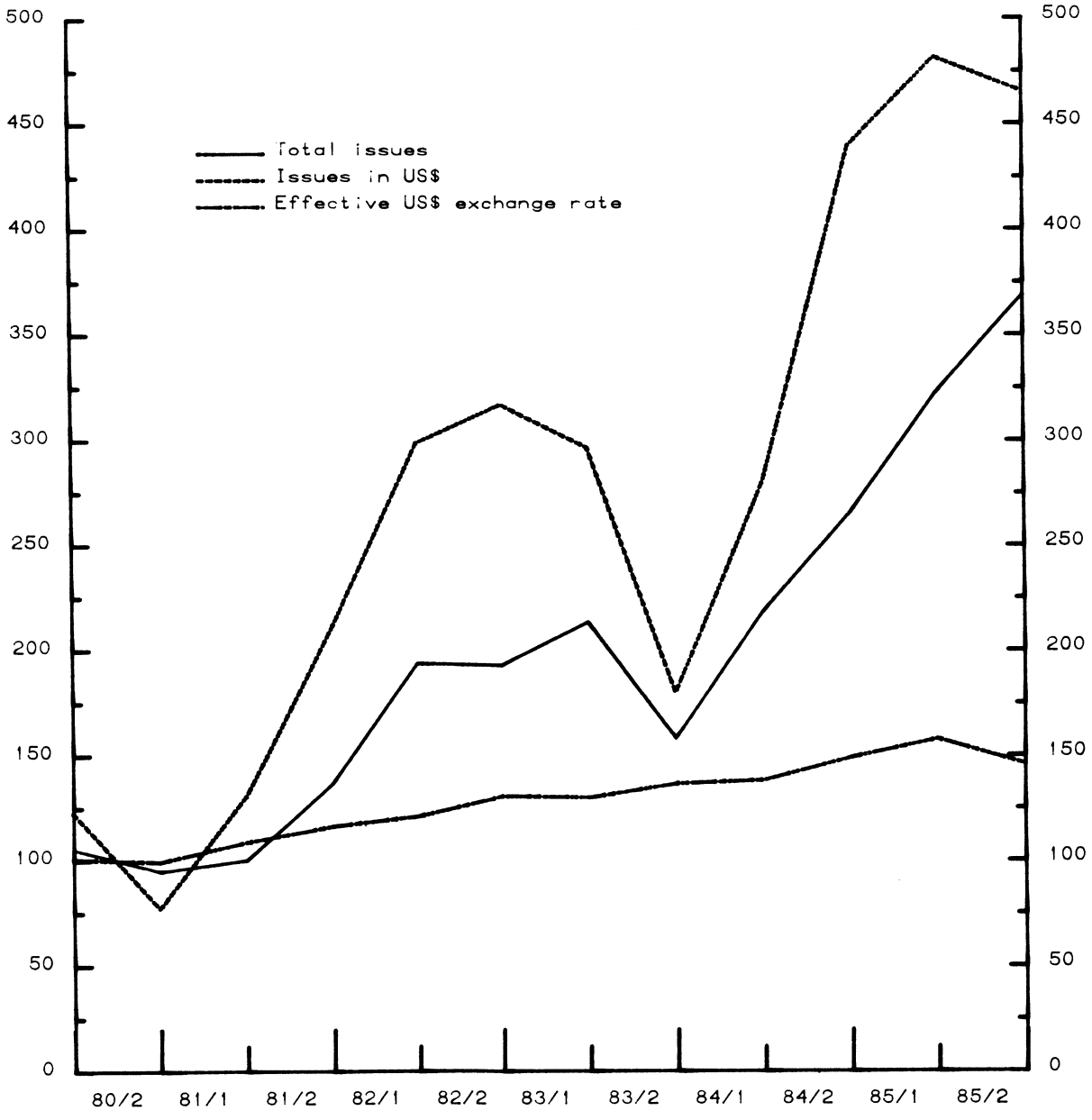
1 Including convertible bonds, warrants and zero coupons.
2 Including 4 per cent. in Australian dollars.

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 banks[1]

(excluding exchange rate effects)

Currency	*Percentage shares of assets outstanding at end-1980*	1981	1982	1983	1984	1985 first nine months	*Percentage shares of assets outstanding 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 innnovations 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	1985 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
Total (in billions of US dollars)	*4.71*	*7.88*	*12.57*	*15.28*	*34.06*	*31.27*	*24.04*

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 Euro-yen 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
Total (in billions of US dollars) ..	*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

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* 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

	Function				
Innovation	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 developement 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.

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* Such concerns are not exactly unknown already. In August 1980 Merril Lynch filed for a patent on its Cash Management Account. In the summer of 1982, Merril 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 risks[1]

(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 swaps[2]

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.

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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

Instrument	Credit risk	Market risk	Settlement risk	Market liquidity risk
Currency options	Writer for premium amount until paid, buyer for cost of replacement until exercised.	Limited for buyer, unlimited for writer.	Premium amount on payment date, principal amount for both parties if exercised. (One party pays currency A, one pays currency B.)	Exchange and OTC options new, liquidity of markets untested under stress. Liquidity of exchanges superior to OTC markets, also partially dependent on liquidity of market for underlying.
Interest rate options	Same as above.	Same as above.	Same as above except one party delivers cash, the other securities, if exercised. (Could be net amount if cash settled.)	Same as above.
Currency swaps	Default cancels future obligations. Risk limited to replacement cost. May be principal risk if agreed in original contract.	Equal to rate change on principal and interest amount.	Contractual amount on successive payment dates.	All OTC contracts: limited liquidity.
Interest rate swaps	Default cancels future obligations, risk limited to replacement cost. No principal risk.	Complex: equivalent to bond of equal maturity on fixed side. Risk to fixed payer in swap if rates have fallen, to fixed receiver if rates rise. Small on basis swap. No market risk on principal amount.	Interest payment amount only on successive payment dates.	All OTC contracts: limited liquidity.

Table 10.1 (contd.)

Instrument	Credit risk	Market risk	Settlement risk	Market liquidity risk
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 arbitraged 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	0	S	S
Capital-market currency swaps	W	S	W	W
Interest rate swaps ...	S	0	W	W
Currency options	0	S	W/0*	W
Interest rate options..	S	0	W/0*	W
Forward rate agreements	S	0	W	W
Securitised assets	S	0	S	S

S = strong; W = weak; 0 = 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 insitutions 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 implicity 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 theaten 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

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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.

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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.

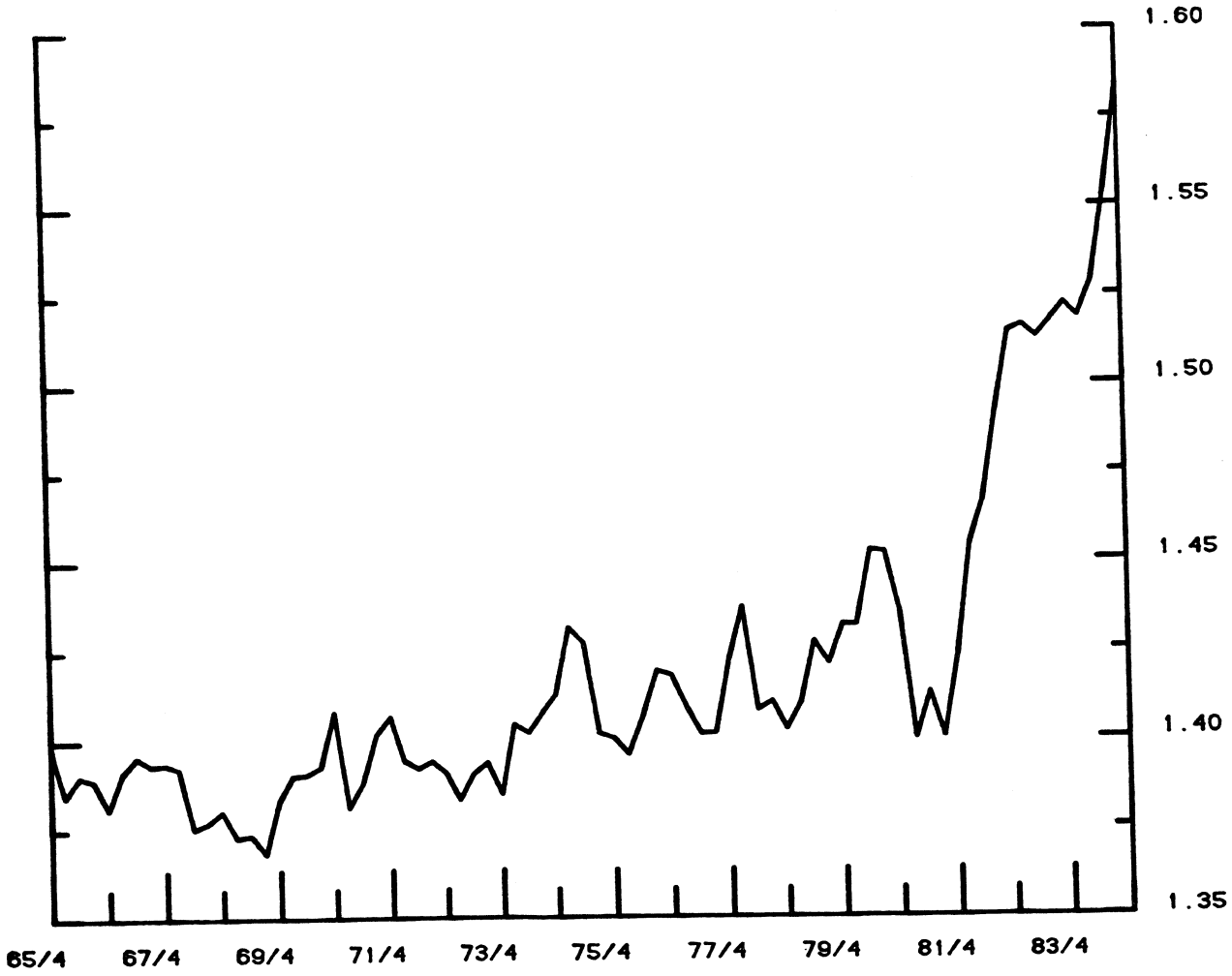
It may be added that even to the extent that innovation adds to credit growth, this would not necessarily have to be reflected ex post in a rise of the debt/GNP ratio, since the additional expenditure associated with this credit growth will also lead to faster growth of nominal GNP. In the event that 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.

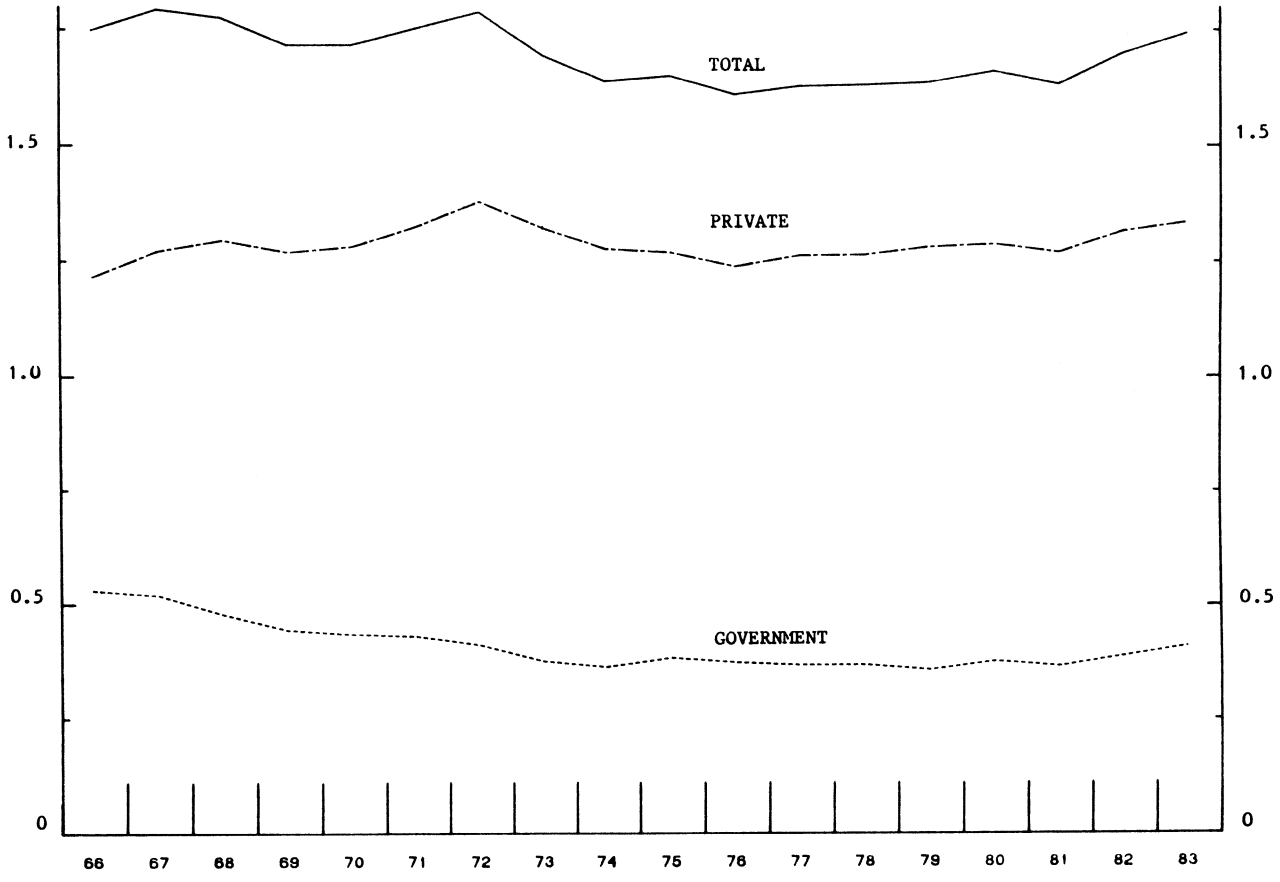
3. Sectoral measures of debt

(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*



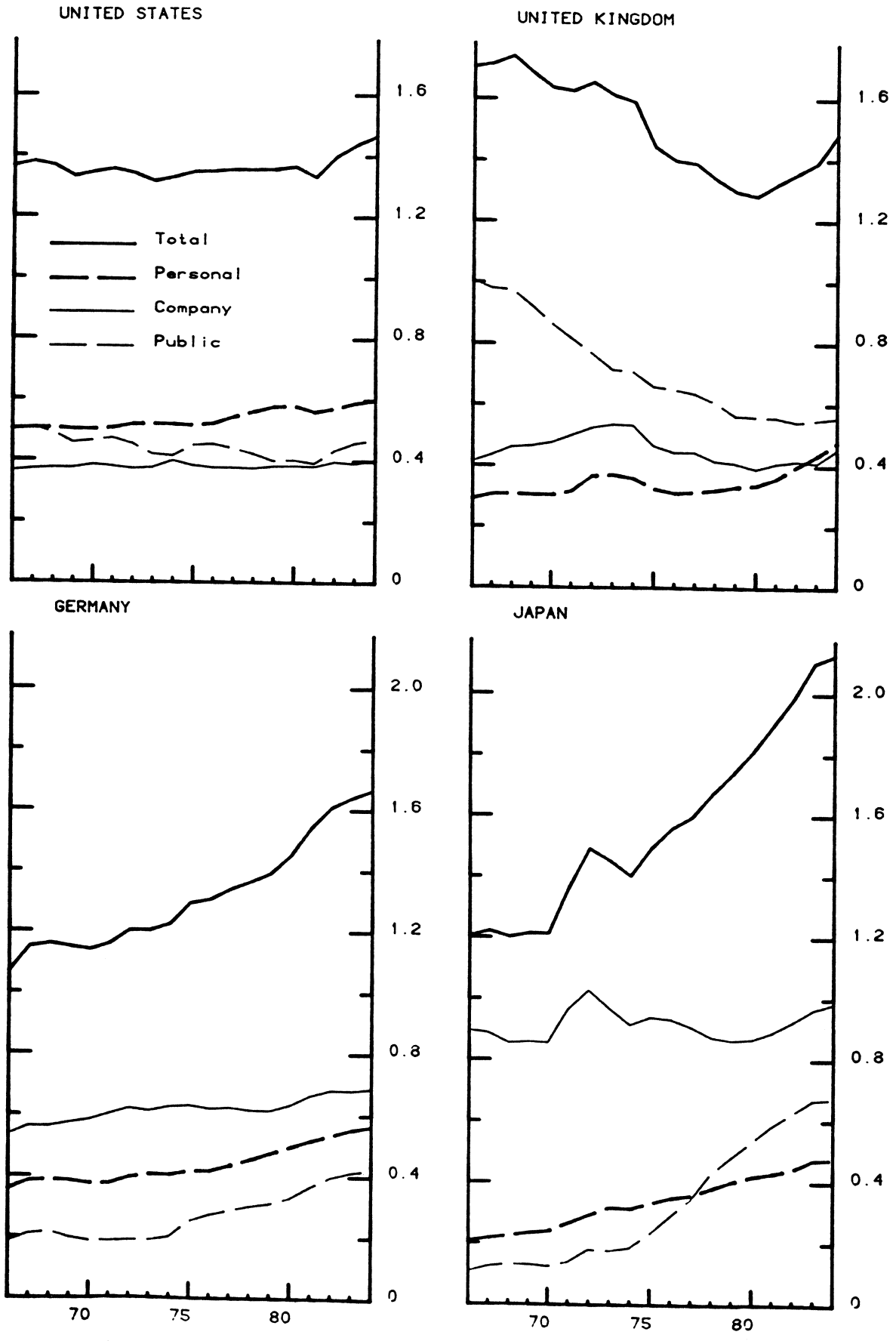
Aggregate ratio for the following countries: United States, Canada, Germany, Japan and the United Kingdom.

* 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

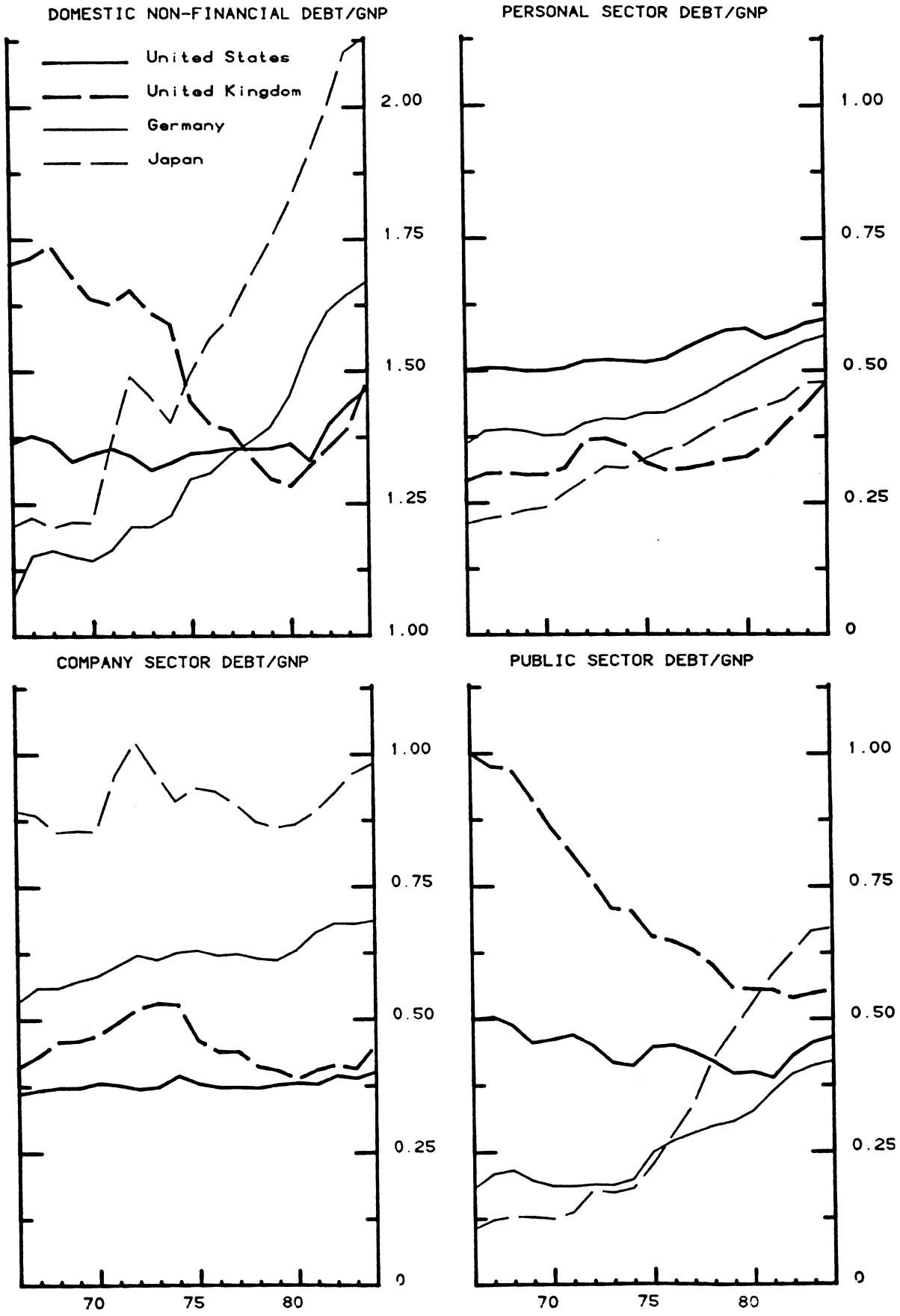
Debt/GNP ratios by country*



* 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

an enhanced rôle in credit creation to institutions, such as securities houses, which are outside the current reporting system; and by making assets more widely negotiable so that it is more difficult to keep track of their ownership. As a result, changes in reporting banks' assets do not necessarily represent changes in borrowers' liabilities.

The growth of off-balance-sheet business tends to impair the usefulness of those data, which are based largely on the analysis of items appearing on the face of banks' balance sheets. Off-balance-sheet business may transform reported exposures or supplement them with unreported exposures. For example, a currency swap may transform a reported liability in one currency into a liability in a different currency, or the underwriting commitment on a NIF may give rise to a potential credit exposure which has no counterpart on the face of the balance sheet. In addition, off-balance-sheet transactions are frequently highly complex, so that it would be necessary to collect fairly detailed data in order to perform the kind of analysis that is possible with much less detailed information on traditional assets.

The following two sections discuss in detail the extent to which the significance of the existing BIS international banking statistics is affected by the present innovatory trends.

2. Growing importance of international bond markets

As illustrated in Chapter 5, the displacement of activity from syndicated bank loans to the international bond markets has sharply reduced the share of the international banking sector in the intermediation of international credit flows. Such a shift of activity gives rise to a number of statistical monitoring problems. Whereas detailed information on bank credit flows and indebtedness is available from the BIS quarterly and semi-annual international banking statistics, the information on actual credit flows channelled through the international bond markets is more difficult to come by. As regards the use of the funds, figures on the nationality of issuers in the international bond market are readily available. What are, however, much more difficult to obtain are reliable data on net new borrowing (i.e. issues minus redemptions and repurchases) and the outstanding amounts of individual countries' external bonded debt. The situation is worse on the sources side of the international bond markets, where even for gross purchases a nationality breakdown of the buyers is not feasible. A shift from bank credit to the bond markets therefore tends to reduce the statistical transparency of the geographic pattern of international capital flows.

This statistical problem is mitigated to the extent that the banks covered by the BIS reporting system are themselves buyers of international bonds and at the same time their acquisitions of capital-market assets are included in the BIS data. Hence, if a country refinances banking debt through an issue of floating rate notes, this would not affect the BIS statistics to the extent that the banks themselves were the buyers of this paper. Unfortunately, at present the statistical treatment of banks' longer-term bond holdings is not uniform within the BIS reporting system, as the figures collected by some important reporting countries do not yet include such holdings. There is, however, hope that within the next few years the banks' bond holdings will be included in the data supplied to the BIS by all reporting countries. For the banks in the United Kingdom, for example, this information will be available as from the end of 1985.

In order to avoid a further enlargement of the statistical format, the data on banks' bond holdings are not collected separately in the BIS statistics, but are included in banks' overall claims on individual countries. From the point of view of monitoring total international capital flows, this might give rise to problems of double-counting when data on countries' bonded indebtedness are obtained from capital-market statistics. Adding these estimates on indebtedness in the international bond markets to BIS banking data might in this case give rise to double-counting of individual countries' total indebtedness to the international financial markets.

Problems also arise in connection with the banks' rôle as borrowers (issuers) in the Euro-bond market, since very little is known about the holders of these bonds. When, for example, a bank funds its international lending through issues of floating rate notes, it is not possible to identify the nationality structure of the buyers of the bonds or to distinguish by type of institution, such as banks, official monetary institutions and non-banks. Even a reasonably accurate distinction between domestic and foreign holders is not possible, although for purposes of the BIS statistics a simple working assumption has to be adopted. Of course, similar problems have arisen in the past for funds channelled to the international banking system via trustee accounts of Swiss banks, where only very limited information on the ultimate owners of these funds is available.

3. Euro-notes and Euro-commercial paper

Paper issued under back-up facilities, such as NIFs, or in the form of Euro-commercial paper in some respects gives rise to the same type of statistical difficulties as bond issues. If there is a shift in financing from syndicated loans to the issue of short-term money-market paper under (or without) back-up facilities by the banks, the share of international capital flows covered by the BIS international banking statistics will decline, except to the extent that the banks are themselves buyers of such paper. Fortunately, a full geographical breakdown of banks' holdings of such short-term paper is already included (although not separately identified) in the banking data supplied to the BIS by the reporting countries. On the other hand, while the figures on the total outstanding stock of such back-up facilities are being collected by the Bank of England and the OECD, the information on the extent to which the facilities have actually been drawn upon and to which the paper is held outside the banks is not available either in the aggregate or for individual transactions. International credit in the form of Euro-notes and Euro-commercial-paper holdings by non-bank entities would therefore not be reflected in the international indebtedness statistics.

There can therefore be little doubt that the growing quantitative importance of paper issued under back-up facilities or in the form of Euro-commercial paper tends to increase the blank areas on the map of international capital flows. This could, in particular, give rise to problems of statistical interpretation if there are changes in the share of Euro-notes and Euro-commercial paper held by the non-bank sector. For example, it appears that so far the major proportion of the paper issued under back-up facilities has been acquired by banks. If this paper was subsequently gradually unloaded to the non-bank sector, the BIS statistics, covering solely the banking data, would wrongly suggest an underlying slowdown in the trend of international lending.

Special problems with regard to the treatment of NIFs arise in connection with the BIS semi-annual statistics on the maturity structure of international bank lending. Whereas syndicated credits are classified in general according to the life of the contract, banks' holdings of Euro-notes would be reported as short-term. When there is a shift from syndicated loans to financing under back-up facilities, the semi-annual statistics would therefore suggest a shortening in the maturity structure of international lending, an impression which, at least in macro-economic terms, might be somewhat misleading. It could be argued, moreover, that, at times, the paper absorbed by the banks in fulfilment of their back-up commitments may need to be treated differently (i.e. as long-term) from Euro-notes acquired spontaneously by banks for their portfolio purposes.

Another question concerns the treatment of back-up facilities in connection with the item "undisbursed credit commitments" reported in the BIS semi-annual international banking statistics. Inclusion of back-up facilities under this item would give rise to double-counting, when paper issued under these facilities was subsequently acquired for portfolio purposes by non-underwriting banks. In that case the statistics would record both an actual claim and an undisbursed credit commitment vis-à-vis the country in question. On the other hand, since at present only a limited amount of paper has been issued under these facilities and only part of it is held by other reporting banks, omission of these back-ups from the figures for undisbursed credit facilities would clearly tend to understate the banks' commitments vis-à-vis the countries concerned. At the meeting of Central-Bank Statisticians in March 1985 no consensus as to the statistical treatment of these back-up facilities was reached. From a macro-economic point of view, the correct solution would probably be to include these back-ups under undisbursed credit commitments vis-à-vis individual countries but to subtract from these figures the reporting banks' own holdings of Euro-notes, although such a procedure might not meet prudential reporting requirements. At present there is no prospect that the data on banks' holdings of such paper will be available with a breakdown by debtor country.

Fortunately, the problems raised by back-up facilities in connection with the BIS semi-annual statistics are so far only of limited quantitative significance since these semi-annual data encompass only lending to countries outside the reporting area, most of which have so far been able to make only moderate use of such borrowing facilities.

4. Residents' holdings of offshore deposits

Finally, mention should be made of a problem which arises in connection with the fact that some countries, such as the United States, include part of residents' holdings of deposits with banks in the Euro-currency market in their domestic monetary aggregates. Shifts in international credit flows between the international banking sector and the international securities markets may influence the behaviour of these aggregates without themselves having any major monetary significance. For example, the trend towards securitisation by reducing the rôle of the international banking sector as a deposit outlet might somewhat understate the underlying growth of the relevant US monetary aggregates to the extent that such securitised asset holdings have similar monetary attributes.

So far, however, this problem seems to have been of only minor importance. Firstly, the share of the Euro-market component in the domestic monetary aggregates has continued to be in most cases a rather modest one. Secondly, as pointed out in Chapter 5, the growth of non-bank deposits in the Euro-market by residents of the reporting area slowed down much less than non-bank borrowing within the reporting area, so that in this respect the impact of financial innovations does not seem to have been a very dramatic one. In fact, in 1984 new Euro-deposits by reporting-area non-bank entities other than US residents actually accelerated sharply despite the boom of the Euro-bond market and the rise of the NIFs and Euro-commercial paper, although there was subsequently a sharp drop-off in the first half of 1985. Only Euro-deposits by US non-bank entities showed a decline last year, which continued into the first half of 1985, but this was to a large extent due to a repatriation of the funds to the domestic market rather than to transfers into international securities.

5. Need for additional international financial statistics

From the preceding sections it is clear that, in order to enable the central banks to continue to monitor international capital flows, the resultant claim and debt structures and potential threats to the stability of the system, improvements are needed in the coverage and content of the present reporting systems.

While for practical reasons it is not possible to aim at covering all international assets and liabilities, capturing innovation wherever it occurs and expanding the central banks' reporting population materially beyond deposit-taking institutions, consideration should be given to broadening coverage in the following areas:

- fuller and more detailed information on banks' involvement in the securities market;

- information on the arrangements and use of NIFS and other back-up facilities;

- information from outside the banking sector on outstanding bond indebtedness and short-term securities, using where possible data from trade associations and other sources;

- information on banks' off-balance-sheet business, arranging where possible for data to be collected by supervisory authorities in a manner useful for macro-analysis.

The Study Group, recognising the need to avoid excessive reporting requirements, believes that the following improvements should be examined:

(i) In the BIS international banking statistics, on the assets side of the banks' balance sheets, there should be full inclusion of banks' international security holdings, namely all paper issued by non-residents, whether in domestic or foreign currency, and the paper issued in foreign currency by residents;

(ii) In addition to inclusion of the above items in the overall claims figures reported by banks, it might be useful to have separate data on banks' security holdings with the following types of breakdown:

(a) securities issued by banks and non-banks;

(b) longer-term bonds and notes with fixed interest rates and with floating interest rates, Euro-notes, Euro-commercial paper and other short-term securities;

(c) the country of residence of the issuers.

Breakdowns (a) and (b) would be especially useful for macro-economic and macro-prudential monitoring purposes. Breakdown (c) would be of interest especially in connection with monitoring international capital flows and country indebtedness. In particular, breakdown (c) would make it possible to include securities holdings for the purpose of measuring banks' exposure vis-à-vis individual debtor countries, and to exclude security holdings for purposes of avoiding double-counting when estimating individual countries' total external indebtedness (both vis-à-vis banks and other external entities) where the information on the country's total securitised debt is usually available from other sources;

(iii) On the sources side of the banks' balance sheets the quarterly international banking statistics should include international securities issued by the banks. Here again, "international" would encompass all securities issued in foreign currency plus issues in domestic currency abroad. The merit of separate information on the type of paper issued by the banks along the lines suggested above (i.e. by maturity and interest rate terms) would, however, be less clear since interest and currency swaps might significantly affect the actual commitments to which banks had agreed. Moreover, it would not be possible to obtain data on the lenders (i.e. on the holders of these bonds) since this information is in large measure not available to the banks themselves;

(iv) It would probably be sufficient to collect the separate information on banks' security holdings in the framework of the quarterly BIS international banking statistics. For the purpose of the semi-annual statistics the data on banks' security holdings would be part of their overall claims on individual countries. It could also be argued that the figures given in the semi-annual statistics for undisbursed credit commitments should include the underwritten back-up lines of credits such as the NIFs, of course only to the extent that these back-ups had not been drawn upon. However, this treatment of NIFs, as explained in Section (2) above, might give rise to double-counting to the extent that paper issued under NIFs was held by banks other than those providing the back-ups;

(v) In addition to the BIS quarterly and semi-annual statistics, it might perhaps be suggested that banks in individual countries report separately the outstanding international credit back-ups (such as NIFs) granted by them to broad groups of borrowers such as banks and public-sector and other non-bank entities. For that specific purpose it should be explored whether the circle of reporting institutions could be widened beyond those participating in the BIS international banking statistics so as to include other types of financial institutions as well, such as those engaged in the arrangement and underwriting of NIFs, and those distributing the paper issued under such facilities. Moreover, it should be explored whether it would be possible to collect from this wider circle of reporting institutions periodic information on the extent and manner in which the facilities have actually been drawn. Information on the

total amount of credit obtained in the framework of NIFs, together with data on banks' own holdings of paper issued under such facilities, would moreover permit estimates of the aggregate amount of Euro-notes placed outside the commercial-banking sector.

Similar information should also be collected on the amount of non-underwritten securities (i.e. Euro-commercial paper) placed in the markets;

(vi) In order to avoid an undue increase in reporting burdens, it is not suggested that separate new data collection systems should be set up with regard to off-balance-sheet items such as swaps, forward rate agreements and other hedging types of instruments. Nevertheless, it could be desirable to have more information on the size of the markets in these instruments, on the rôle of individual nationality groups of banks in these markets, and on the extent to which these instruments might potentially perform as substitutes for interbank operations. It should therefore be explored whether the information collected or to be collected by supervisors for prudential purposes on banks' off-balance-sheet activities could be usefully aggregated for macro-analysis;

(vii) As regards the longer-term end of the securities markets, detailed information on issuing activity in the primary market is already available from a number of official sources such as the OECD and the Bank of England. These statistics, which are largely compiled from published information on individual deals, provide breakdowns by borrowers, by instruments and by currency and are useful for monitoring the current state of the market. They do not, however, provide direct information on the actual amount of net borrowing (i.e. new issues minus repurchases and redemptions) and therefore on the actual amount of bonded debt outstanding. This kind of information on individual bonds outstanding (net of redemptions) is at present compiled by the Association of International Bond Dealers (AIBD). The data are grouped according to nationality of borrower, currency of denomination and types of instrument, and are quite similar in character to the stock data the BIS collects in the field of international bank lending. It might be considered whether the BIS should use this or any similar data base to broaden its international indebtedness statistics and to derive exchange rate adjusted net capital flows through the bond markets.

B. Issues for financial reporting

The function of financial accounting is to provide managers of firms and external users of published financial statistics with accurate and up-to-date information necessary for decision-making. There can be little doubt that many of the financial innovations examined in this Report have rendered internal managerial accounting more difficult and the existing disclosure practices misleading. In view of the rapid changes under way, these accounting questions are all the more acute because the absence of clearly established guidelines has accentuated the inconsistencies in accounting procedures across institutions. This is particularly true for those positions or commitments which are carried off-balance-sheet and on which information is frequently not even reported.

The accounting problems arising from these new instruments are best examined from two points of view. The first concerns the most appropriate manner in which specific instruments should be reported in financial statements

and how they should be related to other positions, most importantly those existing on the balance sheet. This set of issues also concerns how and when gains and losses should be recognised and shown in the income statement.

The second way in which accounting questions can be examined is from the point of view of the users. On the one hand, for management and supervisors these innovations affect their appraisal of organisational control systems and of performance, since the monitoring of exposures is rendered more complex. On the other hand, for external users of accounts - shareholders and creditors, and the tax authorities - inadequate accounting hampers the evaluation of risk and return relationships. The second part of this section discusses the implications of the ambiguities of treatment for the transparency of bank exposures and the risk-taking behaviour of banks more generally.

1. Examples of "off-balance-sheet" accounting problems

(a) Futures markets

One possible set of accounting problems arising from off-balance-sheet transactions is best illustrated by interest rate futures, although many of the same issues apply equally to options contracts or more generally to any position implying a forward commitment. As we have seen in Chapter 7, banks commonly employ interest rate futures, such as the Euro-deposit contract, as a tool of their asset/liability management. When futures are used to hedge interest rate risks this allows banks to reduce their interbank lines, lower their credit exposures and improve their gearing ratios.

Most of the problems arising with respect to the accounting treatment of futures positions concern the timing for recognition of gains and losses. On the exchanges, futures contracts are marked to market daily, which means that positions are effectively closed every day, thus favouring current recognition of daily gains and losses in the income statement. As a result, if the gains and losses on a position being hedged by futures are deferred for accounting purposes, employing futures may give rise to spurious changes in the profit and loss account throughout the period in which the hedge is in place.

The proper treatment of interest rate futures in these circumstances has given rise to considerable debate within the accounting profession. In the United States the Financial Accounting Standards Board (FASB) has set up standards designed to differentiate between futures positions used to hedge a particular instrument from those regarded as speculative. According to these accounting standards, if the position is regarded as a hedge the changes in value could be deferred or amortised over the life of the item being hedged. However, this poses the problem of defining precisely when a futures position constitutes a hedge for another position and at present there does not appear to be a consensus with regard to the best manner of making such as assessment. It also means that positions in futures may be carried in a bank's accounts under two different accounting principles - deferred accounting and marking to market.

While the interest of accountants has centred on the best manner to account for specific positions being hedged via futures, the supervisory authorities have been particularly concerned about possible mismanagement arising from the failure to assess the impact of a futures position on the interest rate exposure of a bank's overall portfolio. Supervisors have

correctly pointed out that a futures position that reduces the interest rate exposure on a specific transaction may increase the interest rate exposure for the entire balance sheet. Banks, however, fear that there are practical difficulties in measuring such a macro-exposure effectively, since there is no widespread agreement on how to assess interest rate risks for an entire portfolio.

As a result of these diverse possible opinions regarding the proper accounting of a bank's positions in futures, varying practices are followed by different institutions. This renders the interpretation of actual and potential exposures quite difficult and sometimes not comparable across institutions.

(b) Swaps

The accounting issues associated with swaps were described in detail in Chapter 2. As in the case of futures, the central issue is whether to view all swap contracts as trading positions or to treat them as hedges of underlying assets and liabilities. Trading positions are generally marked to market daily, while on-balance-sheet assets and liabilities are usually valued at cost or at whichever is lower, cost or market.

Current accounting practices for swaps are very flexible. Swaps that hedge commitments valued at cost usually receive the accounting treatment applied to other long-term assets or liabilities. Swaps which involve an open position on exchange rates are valued at market prices. Swaps which take interest rate positions are generally either marked to market or valued at whichever is lower, cost or market. In both cases this is consistent with the treatment of other speculative on or off-balance-sheet positions. Swaps which hedge other swaps or which hedge or are hedged by trading positions do not have general accounting rules that apply to them and treatment varies considerably across institutions. These positions are generally only partially hedged. Many dealers mark the unmatched swaps to market on a daily, weekly or monthly basis to reflect the liquidation value of the position.

The basic problem with marking swaps to market is that the market value is not well defined. The prices used in the procedure are somewhat subjective as in most over-the-counter transactions, since there are often no readily available quotes in thinly traded markets. Another problem with valuing some swaps at cost and others at market prices is that under different circumstances traders face incentives to move swaps from one book to another in order to realise short-term gains.

Assuming a swap has a material effect on the financial condition of the firm, the existence of the swap and its terms should in principle be disclosed in the footnotes to the financial statements. At this juncture, however, most accountants in the United States apparently consider swaps not to have a material effect on the financial condition of the firm and in any case few appear in public financial statements. This significantly lessens the usefulness of company accounts.

(c) The "sale-leaseback"

The accounting implications of "off-balance-sheet" business are also illustrated by the "sale-leaseback", a transaction not discussed elsewhere in

this Report, but which has been increasingly used by many banks. In such a transaction, the owner of a particular property sells the property and simultaneously leases it back from the new owner. The immediate effect of the "sale-leaseback" is to generate more liquidity on the balance sheet. In addition, if the asset that was sold had previously been undervalued in the balance sheet because of historic cost accounting, or for other reasons, the sale-leaseback would improve the capital-standing of the firm. In the case of banks, it may also strengthen capital ratios for supervisory purposes if the asset which is sold carries a higher weight in the risk asset ratio than the instrument received in exchange or if the asset had been excluded altogether from the measurement of capital. In the extreme case in which the accounting treatment for sale-leasebacks requires that only the cash payment be reported, the firm will have improved its measured liquidity, strengthened its capital ratios and possibly increased its net equity.

Under these circumstances, the increased leverage undertaken by means of the sale-leaseback will go largely unrecorded. There can be no doubt that this represents a misleading picture of the actual transaction undertaken by the lessee, since the lease has engendered a stream of future liabilities to be paid to the new owner and lessor during the life of the lease. One possible way of overcoming this drawback is to capitalise the stream of lease payments and carry this capitalised value on the balance sheet as a liability against the use of the asset. This will give a more accurate picture of the health of the firm since the firm has raised its future liabilities to the full extent of this stream of lease payments. On this matter accounting conventions vary across countries. In some only the cash payment is carried in the books while in others the liability incurred through the lease appears as well.

The three examples discussed above illustrate the types of specific problems raised by off-balance-sheet business. It is not difficult to find analogous problems arising from positions in options, the provisions of guarantees and virtually all other types of off-balance-sheet business. These problems raise two general types of concern. The first regards the transparency of reporting of positions and the second the risk-taking behaviour of banks.

2. Transparency

One effect of off-balance-sheet business is to render the interpretation of banks' exposure to particular risks less clear. Off-balance-sheet business, however, is not a new phenomenon, since banks have always been involved in forward markets and granted standby lines of credit. In this respect the issue of transparency is one deriving from the increasing volume of off-balance-sheet transactions and from the complexity of some of the specific instruments employed. These two developments raise different questions for the various users of the accounts.

For management, the question of transparency concerns the best way of monitoring the general and specific exposures of the bank. With respect to managerial accounting practices the issue is really one regarding the best way to fold in the off-balance-sheet activities with the remaining bank exposures. In the case of currency options, for example, management must decide whether the foreign exchange exposure should be valued according to a marking to market on the basis of "delta" or whether to follow another procedure, such as that of accounting on the basis of the face value of the contract. Similarly, management must establish guidelines on the basis of which the nominal

commitments of standbys granted under NIFs can be related to the credit limits of specific borrowers. Since the degree to which banks are committed under these standbys is not clear (see Chapter 1), the manner in which this folding-in takes place is to some extent arbitrary. Accounting for credit risks under swaps also appears to be a matter for the judgement of the management of individual banks.

A second set of users of accounts are the banks' counterparties in the interbank markets, the non-bank depositors and ultimate shareholders. Despite public disclosure of banks' positions being far from complete in most countries, over time credit assessments have nevertheless been made on the basis of periodic publications of financial statements. The effect of off-balance-sheet business is to cloud even further the meaning of these published reports and to render relative credit assessments more difficult. Although there is evidence to suggest that markets can often pierce through the veil of accounting changes explicitly designed to inflate earnings artificially,* the effects of under-reporting or non-reporting of positions have not been the subject of serious examination and would appear to be less easily recognised.

Finally, supervisory and regulatory exposure assessments may be significantly affected by the growth of off-balance-sheet transactions. The principal issue for regulators is one of measurement analogous to that which is faced by management. Bank regulators must decide to what extent the overall and specific exposures undertaken through off-balance-sheet business are related to those which are on the balance sheet. They must decide on appropriate criteria for making such comparisons, for deriving necessary capital ratios and specific loan concentration limits, and finally for assessing the overall health of banks.

3. Risk taking

The absence of widely accepted and recognised accounting practices in general, and specifically with respect to off-balance-sheet items, as well as the lack of information in published financial statements, raises the issue of whether firms have been willing to assume more risks than if their positions were disclosed and understood by the market. In particular, firms may have increased their implicit leverage and undertaken a greater concentration of exposures than would have been possible otherwise. Historical experience with specific banking problems arising from off-balance-sheet commitments suggests that this outcome has often occurred in the past. In assessing the likelihood of this increase in risk taking resulting from that widespread use of these innovations, it is essential to bear in mind three factors.

Firstly, it is important to recognise that off-balance-sheet transactions generally tend to alter the nature of risks. For example, when futures markets are used as a substitute for interbank business, the credit risk faced by a bank is significantly reduced and this explains the improvement in the measured capital ratios for supervisory purposes which takes place in these circumstances. At the same time, however, if changes in the value of the position in the futures markets do not match those of the position being hedged, the bank is open to a new, though lesser, risk, namely that arising from changes in the "basis" - the spread between the price of the futures contract and that of the position being hedged. These new risks may need to be accounted for in the measurement of risk exposures and require a different type of management and supervisory treatment than a perfect hedge.

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* For example, share prices appear immune to changes in the method of computing depreciation allowances.

Secondly, depending on circumstances, off-balance-sheet transactions may either under or overstate the nature of the risks undertaken by banks depending on the manner in which they are recorded. For example, if foreign currency options do not enter into the computation of the net foreign currency exposure of banks and if these options are covered by transactions which are recorded for this purpose, the banks' exposure may be overestimated. Conversely, if an open position taken through the writing of options were unrecorded, the bank might appear to have a flat position in foreign currency.

Finally, these difficulties in risk assessment and the problems arising from the interpretation of positions may have led banks to make less use of particular off-balance-sheet transactions which might otherwise have reduced their overall risk exposure. In the previous example taken from the options market, if the positions in options cannot be offset against other exposures, this may mean that firms will abstain from using these instruments and possibly assume greater risks than would be warranted.

In the light of these observations, it is difficult to say whether, taken in isolation, the effect of accounting rules for particular financial innovation may have encouraged risk-taking behaviour or discouraged hedging activity. Nevertheless it appears that as a result of several innovations which require a daily assessment of risks, difficulties of measurement may have rendered the monitoring of positions by banks' management more complex and difficult. This may mean, particularly in the short run, that the overall positions of banks may become more unbalanced and risky, and, as a consequence, that the managerial monitoring of performance is not as tight as it probably has been in the past.

Chapter 12

Issues for macro-prudential policy

We turn now to some of the macro-prudential policy implications of the developments described in Parts II and III of this Report, that is, their implications for the overall stability and structure of the financial system and for central banks' responsibilities for that system. Issues relating to the prudential supervision of individual financial institutions are not examined in detail here, although the innovations considered in this Report have important implications for supervisors - not least in ensuring that individual institutions recognise, report and control the various risks they are undertaking. However, insofar as these issues relate to the supervision of banks they are being considered separately by the Basle Supervisors' Committee.[1] The aim here is to consider how the innovations which are taking place, and the forces shaping them, may be changing not only the risks undertaken by various parts of the financial system, but also the potential for systemic risks arising from them and the changing structure of the financial system.

Although banks from all Group of Ten countries are making use of most or all of the new instruments on which the Report focuses, banks from a number of these countries engage in these activities only through overseas branches or subsidiaries. Consolidated supervision should require the supervisors of the parent bank to take the same account of the transactions wherever they take place, and in this respect all banking supervisors face similar problems. But important differences in the existing structures of the banking systems of the various countries mean that some of the broader issues discussed below, regarding the changing rôle of banks, have rather different implications from one country to another. For example, the trend towards banks' greater involvement in international securities raises fewer new questions for those European countries with "universal banks", which have traditionally held and underwritten securities, than it does in the United States and other countries where banks and securities houses are distinct. The possibility that the rôle of banks in financial intermediation may become relatively less important than in the past is obviously greater in these latter countries, and in some of them questions will arise regarding prudential responsibility for the securities houses which are becoming an increasingly important part of the financial structure. Further differences between countries arise according to whether or not the central bank is also the banking supervisor and more generally according to the traditional or statutory scope of and limitations on the rôle of the central bank.

The number of combinations of these differences existing in national financial structures, the scope of banking supervision, the responsibilities of the central bank, and indeed the mix of international assets already held by different nationalities of banks, makes it impracticable to reach general conclusions about the implications of innovation for macro-prudential policy. Some countries are undoubtedly more affected than others by the trends discussed in the remainder of this chapter, though it seems unlikely that any country will be wholly immune. Even if the macro-prudential implications of

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1 See Committee on Banking Regulations and Supervisory Practices, The management of banks' off-balance-sheet exposures - a supervisory perspective, Basle, March 1986.

innovation have to be resolved differently in each country, the degree of global integration being observed means that some co-ordination of national responses will be very desirable.

A. The desirability of innovation

The international financial system has entered a period of fierce competition and rapid innovation. In many of our nations this carries over to developments within domestic banking and financial markets. On the face of it, this must have improved the responsiveness of the system from the perspective of its customers. It is they who benefit from a narrowing of bid/offer spreads and lending margins and from the availability of a vast array of new products that have filled many of the gaps in the spectrum of financial services. These new products will have helped many firms, and also individuals, to cope with the financial stresses of the last few years. At the same time, the resources devoted to the financial services industry have grown, both intellectual resources, with the need to develop new products, and financial resources, with the increasing investment by non-financial firms in the financial sector. The changes have been accompanied by an increased emphasis on opportunities for trading profits and gains from the origination, underwriting and distribution of financial assets. One sense in which innovative techniques might be said to increase the efficiency of the financial system would be by reducing the cost to customers of using hedging or intermediation services. Where this is so, there is a prima facie case for permitting markets to innovate in ways which are expected to be profitable, leaving central banks and supervisors to adjust their own techniques to take account of the innovation. Indeed, this has been the thinking behind many of the deregulatory moves taken by the authorities in various countries, which have encouraged financial innovation.

There are, however, other senses in which innovation might add to the efficiency of the financial system, for example by accelerating the speed of response of prices to new information. To assume that this is desirable begs a number of questions. In a world with many imperfections in various markets, the possibility certainly exists that financial innovations - even if they appear to increase the efficiency of the financial system - may fail to improve economic welfare overall. In particular, the benefits of what appears to be competitive pricing may be offset if in fact it turns out to have been mispricing, which weakens the stability of the financial system; rigidities in labour and product markets may lead to "overshooting" of exchange rates and interest rates; and general attempts to hedge in the face of volatility may be self-defeating if they result in increased volatility.

What we can recognise is that many innovations have arisen from profit opportunities available to those able to exploit existing imperfections within the financial sector. In many cases, it may well be that arbitraging away such imperfections will be socially beneficial. But some of the "imperfections" which the innovators are manoeuvering their way around represent official measures, such as capital adequacy requirements, which had been imposed earlier in the interest of the safety and soundness of the financial system or to try to combat externalities and other forms of "market failure". Others constitute regulations designed to serve the needs of domestic monetary and credit policy objectives, and still others are meant to serve investor protection needs. Where innovations have been primarily a means of circumventing regulation, the easiest response might seem to be to extend the

scope of the regulations to cover the new technique. In some cases, this will be the preferred response. But the retention of regulations for social ends will keep open the opportunity to earn above normal private returns for those able to exploit these imperfections, so continuing to attract resources into the financial sector. The amount of innovation now occurring might in fact be a signal that the external environment is changing too extensively to rely upon modest responses, and it may be necessary to consider a much broader policy response to the new circumstances.

It is, therefore, desirable to pay attention to the forces which have been shaping financial markets in recent years and, in particular, to whether they are likely to be temporary or permanent. Some of the forces identified in Part III, such as the large shifts in the distribution of the current-account surpluses and the rapid shifts from inflationary to disinflationary policies, may be reversible, particularly if a more stable economic environment can be sustained. To this extent, these forces are less likely to give rise to a need for fundamental changes in regulatory and other official techniques. But where the financial system is changing in response to more durable forces, such as technological developments, then policy responses may need to be more fundamental. Particular attention will need to be paid to the speed and form of deregulation. It is not possible to generalise as to whether deregulation should proceed quickly or slowly, for the attraction of a cautious, step-by-step approach which enables the effects of each step to be observed can easily be lost if the elimination of some restrictions before others introduces new incentives and opportunities leading to potentially destabilising flows. We may also have to recognise that the rate of innovation, and therefore the need for policy-makers and regulators to be able to respond quickly and flexibly, may have been given further impetus by the establishment of "market development" (i.e. R and D) groups within financial institutions.

B. Implications for the rôle of banks

There is growing sentiment expressed by many bankers and market analysts that innovation, global market integration and the increased flow of savings through institutionally managed funds are combining to lessen the importance of banks as a channel for direct credit intermediation with prime borrowers. To this list of factors may be added the burden of domestic monetary (reserve requirement) and prudential (capital adequacy) controls and the lowered credit ratings of some banks.[2] Those banking organisations which are particularly exposed to these pressures have tended to respond with a mix of actions, including shifts to off-balance-sheet alternatives to direct credit intermediation and liquidity support functions for their large business customers' increased direct lending to what is, on average, a different and possibly lower quality tier of customers; greatly increased emphasis on investment banking and capital-market services, within the limits permitted under national law; and, in some cases, a strategic refocusing on serving the consumer and smaller corporate sectors.

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2 It is sometimes difficult to reconcile the concern over poor rates of return and future profit prospects with the strength of current reported earnings at several of the largest international banks, including some with a particular wholesale focus. To some extent, the greater variability of earnings performance among large banks is consistent with what one would expect in a more competitive, less regulated environment. Also, it may be that large banks are earning less from traditional activities, and that high profits on innovative business explain strong earnings in some institutions.

Some of these responses - especially those which take business off banks' balance sheets - can be viewed narrowly as devices to avoid capital adequacy and reserve requirements and to show a higher reported return on assets. In those cases, the appropriate policy response may well be to extend the ambit of those requirements. But consideration of why banks are seeking to avoid these requirements suggests that a more comprehensive response may be needed.

It is now widely recognised that international banking grew very quickly in the 1970s on the basis of macro-economic and other assumptions which in the event proved invalid. With the development of syndicated credits, large borrowers made greater use of banks to intermediate credit than they had done previously. This encouraged banks to commit capital resources and recruit staff in the expectation of high rates of return and continuing growth, which proved to be disappointed. They were left with sizable amounts of loans which, in the light of subsequent events, turned out to have been underpriced. At the same time, disinflation and other developments in the 1980s also brought other categories of domestic assets under pressure in many countries. Supervisory authorities in most countries reacted by raising their capital requirements for banks and encouraging strengthened provisions for banks whose capital positions had not kept pace with asset growth in the 1970s and/or encouraging strengthened provisions for banks whose provisions had not kept pace with the potential write-offs against problem credits.

At the same time, however, the factors described in Chapter 5 led to the securitisation of international credit flows, perhaps representing a return to what would have been regarded as normal before the 1970s. Where banks now hold more international securities, the result has simply been to change the form of their lending; but some of the flows now by-pass banks completely. A consequence of this has been to attract a new group of institutions free of the legacy of lending in the 1970s - the securities houses - to types of international intermediation which had previously been dominated by commercial banks. The combination of capital constraints on banks and the addition of a new group of competitors left some commercial banks simultaneously facing a shortgage of capital and overcapacity in the market.

Many smaller international banks, but also some larger ones, have reacted to this state of affairs by reducing their international activity, especially in syndicated lending, and shedding excess resources, including staff. Other banks have chosen to stay in international business, despite currently depressed rates of return. Aggressive competition among these banks has been one of the forces behind innovation as they have tried to preserve their market shares, some by concentrating on managing securities issues, others by becoming market-makers in currency options, and others by developing specialised skills in swaps. Some large banks have shed their retail operations to concentrate on institutional and investment banking.

Competition of this nature is bound to raise prudential concerns. How acute these concerns should be must depend in part on whether a gradual recovery in the demand for international banking services can be expected to make use of any present excess capacity in the industry. In any case, the fact that there appears to be increasing tiering among banks, with large and small banks pursuing different policies, raises the question of whether supervisory policies fashioned around traditional banking activities continue to be appropriate.

It is true that the particular innovations discussed in this Report may significantly affect one sector of banking business: large, particularly international, institutional business. Smaller corporate business and personal banking have thus far been scarcely touched by these particular innovations. But many of the same general forces that have given rise to these innovations have, at least in some countries, brought on very significant changes in these segments of the domestic market. In the United States, for example, there has been a significant move by large domestic corporations to meet short-term borrowing needs in direct markets rather than from banks, and there is growing evidence to suggest that the smaller corporate and personal banking sectors are the target for the next wave of vigorous competitive efforts at market penetration by large banks. Elsewhere private-sector domestic borrowing is still intermediated largely through banks, though in several countries greater competition from outside the banking system is requiring banks to pay higher interest rates on smaller deposits.

It is not clear whether or to what extent there has been a permanent shift of large corporate business away from banks, perhaps as a result of the wider and faster availability to non-banks of the information which previously helped give banks some of their advantages in credit assessment and in market-making. To some extent, the disintermediation also results from changes in lenders' perceptions - these changes have enabled large corporations and prime sovereign borrowers to obtain funds on terms as fine as or finer than those available to banks, given that banks are subject to capital regulations. To the extent that this is just cyclical, the process is likely to be reversed as banks recover their standing. But there are also indications that in a number of countries there may have been structural shifts in the banking industry, which will be less easily reversed. Nor does the trend towards greater direct capital-market intermediation via investment banks and institutional investors seem likely to be easily reversed, in the absence of a major structural change in the capital markets, as corporate borrowers have become more sophisticated and have developed in-house banks.

Perhaps many banks will find that they are unable to retain prime corporate business except of the most operational kind, such as money transmission services. Those banks which do succeed in retaining the higher-quality customers as borrowers will require special qualities of innovativeness and the financial size to be able to take large positions quickly in response to their customers' needs. The need for size probably means that a smaller number of institutions will emerge with a presence in the market. It may be difficult for many banks to operate across the full range of business sectors from personal to large corporate, since the culture and management skills required for a quick-footed trading operation will be quite different from those required in more traditional, credit-oriented banking operations. However, some major institutions are successfully competing across the full spectrum.

If there were to be a permanent shift in comparative advantage in favour of direct capital-market intermediation, then policy would have to adapt to a different, perhaps smaller, rôle for banks in the future with respect to their deposit-based lending. This would raise a number of issues. Many countries limit the extent to which banks can diversify into other lines of business, and regulations often make it impossible for banks to leave the banking industry, except by merger. Even in cases where banks fail, restructurings sometimes mean that the banking population is not reduced.

If reducing capacity in banking should prove less difficult in the future than it has been in the past, there might still be various systemic risks as large banks adapt to this changing rôle. These relate to the question of the future ability and capacity of large banks to play the rôle of lenders of next to last resort in support of large financial and non-financial firms and financial markets generally. There are several dimensions to this issue.

That banks continue to be viewed by the market and themselves as playing this rôle tends to be borne out by the extent to which bank-originated credit and liquidity-enhancing devices support direct capital-market funding instruments. However, if the size of large banks' funding and capital capacity continued to shrink relative to the degree of direct capital-market intermediation, questions would arise about the capacity of banks to fill this rôle. In particular, eventually risks could arise if the banks were suddenly called upon in the face of adverse market conditions to advance large amounts of funds against their various back-stop facilities.

Another dimension of this issue is whether institutional investors in the capital markets are likely to be more susceptible than banks to rush to sell assets in the event of a significant credit failure. Past reactions of investors in markets such as those for US certificates of deposit and commercial paper suggest this may well be so. One reason is related to the special fiduciary rôle many of these investors see for themselves. Another is that they tend to regard their holdings as short-term low-risk liquid assets. A third reason is the likelihood that they would have both less detailed information than would a bank on which to base a credit decision and less of a business-relationship reason to continue to support a particular borrower or to work to keep a particular market functioning. Problems in the securities markets could face banks with sudden large funding demands. In addition, deterioration in the value of security holdings could pose problems for banks, especially in countries where they are required to mark their holdings of securities to market prices.

The process of innovation is also having important implications for the structure of the banking and financial industry. Some countries have long taken the view that various financial activities should be conducted by separate institutions, others require different activities conducted within the same corporate group to be separately capitalised. The Glass-Steagall and Banking Holding Company Acts in the United States are perhaps the most frequently cited examples of such restrictions. Similar restrictions are imposed in Japan, where there is also segmentation within the banking system. Italy, too, separates different types of banking institution. While these types of restrictions were initially established to serve a mix of policy goals, including prudential considerations, it is becoming increasingly difficult to sustain them in the face of the forces and the types of innovations described above.

The forces for change appear strongest in those countries with the sharpest division between investment and commercial banking. But the distinctions between types of institution are becoming blurred elsewhere, too, as commercial banks place more emphasis on generating fee and trading income and investment banks (especially from the United States) expand their international activities in competition with commercial banks.

Given this, and assuming that policy considerations continue to favour viewing banks as playing a special rôle in the financial system, then it would seem important to reconsider the need for domestic restrictions on banks' ability to grow and diversify into closely related financial activities. At the same time, the context for any such reassessment would seem to require a balancing of these considerations against public policy concerns over risk aspects of new activities, as well as questions of public (investor and depositor) protection. It may well be that permitting greater diversification of banks' activities is desirable, though the question has arisen whether it should take the form of retention of separately capitalised functional entities operating under common management and ownership of a banking group (or bank holding company, in the US parlance). To this extent, diversification efforts by banking organisations would tend, over time, to promote the further development of diversified financial services conglomerates. The present trend in that direction seems both clear and powerful, although there remain many unanswered questions as to whether such firms will in fact enjoy economic gains that make them more effective competitors than large banking organisations or securities firms which do not so diversify. It is also clear that this trend will make it increasingly difficult to sustain regulatory and supervisory distinctions among financial institutions based on the form of the institution, rather than the functions being performed.

C. Implications for the scope of prudential supervision

A notable feature of many of the recent innovations, particularly in swaps and NIFs and more generally through securitisation, has been their active promotion by financial intermediaries other than commercial banks. The US investment banks have been prominent in this respect, and it seems likely that they have been helped by all of the factors mentioned earlier - a shift in comparative advantage away from commercial banks resulting mainly from technological developments, the institutionalisation of savings via non-bank investors, a weakening of commercial banks' position relative to certain other institutions, and investment banks' regulatory advantages compared with commercial banks (in particular those whose off-balance-sheet risks are taken into account in capital adequacy tests).

Related features of the forces giving rise to these innovations are greatly increased levels of investment-banking-type activities within banking organisations. Within those countries with Glass-Steagall-like restrictions, there are pressures to break down regulatory barriers to further bank participation in securities underwriting and investment advisory services. To the extent that those restrictions are relaxed, or successfully overcome, there will be even more direct competition between commercial banks and investment banks, but perhaps under separate regulatory and prudential structures. Similar pressures are present in countries like the United Kingdom where, even though there is no legal distinction between commercial and investment banks, institutions have nevertheless tended to specialise in one field or the other. Even in continental European countries with universal banking systems, the attitude of the authorities and the behaviour of the banks themselves seem to align the large banks more with commercial than with investment banking.

It is almost too easy to conclude from the above that steps should be taken to remove all the restrictions on commercial banks or to impose equivalent limitations on non-bank financial firms, such as the investment

banks. The case for regulating the latter group more closely would be reinforced if there were likely to be some permanent shift of banking business to these institutions. One difficulty with this argument is that it is hard to know where to stop, for following this approach could lead to an ever-widening net which sought to bring within it those institutions which at each stage were just outside the scope of banking regulation and supervision.

A more practical problem is that it is not a simple matter of investment banks assuming a greater share of the banking business of funding credit from deposit-like sources. Rather, it is a case of investment banks and others using new market instruments and unbundled products to bring large borrowers directly to the market-place in order to raise credit. Thus, it would be awkward at best to promote a simple extension of banking-like regulatory and supervisory standards to non-bank competitors.

If the prime purposes of banking supervision are viewed narrowly to be the protection of depositors and of the payment system, then only those institutions which take deposits from the public, including those which make up the payment system, should be covered. Taken to its logical extreme, this view has led some in the United States to propose that "banks" should be confined to the narrowest of rôles as holders of safe deposits and transactions balances which would support portfolios of near riskless highly liquid assets. All other financial and non-financial firms would be free to operate in whatever financial markets they chose, taking on whatever risks those markets would permit them to bear, provided they remained separate from banks. Even if this radical change were judged desirable by a particular country, it seems improbable that such a structure could ever be achieved, given the configuration of integrated global banking and financial markets, and the present rôle played by large banks in those markets.

More importantly, a broader view of the rôle of banks and of banking supervision would lead to a very different view, which sees the special rôle of banks being based not only on their deposit-taking and payment activities, but also on their rôle as a backstop source of liquidity and as channels through which monetary and credit policy are conducted. Consistent with this latter view, the broader purposes of banking supervision are seen as including not only the protection of depositors and the payment system, but also assurance of the strength of the banking system and, through that, the financial system more generally. These purposes include protection against development of systemic risks and limiting the degree of moral-hazard risks to central banks arising from the safety nets which support banks and their depositors.

Abstracting from these more general thoughts, and returning to the present environment, banking supervisors seek to protect depositors and the payment and financial systems by supervising institutions within the banking system, although as noted earlier the scope of their responsibilities varies significantly between countries. But the financial and payment system and the liquidity of deposits can also be threatened by losses in particular industries or major companies. Banks themselves are often able prudently to marshall and lend the funds needed to prevent unnecessary damage to the financial system; in cases where this is not possible, such problems may be addressed by lending by central banks to meet the liquidity needs of otherwise solvent institutions. This is typically done through the intermediation of the banking system.

This approach may be satisfactory in respect of potential failures originating outside the financial system. But where - as with the new instruments - near-banks are conducting similar business to banks, and there is a greater likelihood that their failure could damage the financial system, a more preventative strategy seems to be called for. Specifically, a case can be made for reducing the risk posed by the potential failure of large non-bank financial firms by extending bank-like regulation and supervision to them, even though they do not themselves take deposits from the public and would not fit neatly under the particular supervisory standards applicable to banks. Thus, one of the more complex emerging prudential policy issues is whether it is not or will not soon be necessary to ensure that every major financial-services firm is subject to some form of prudential supervision over its consolidated worldwide operations. Extension of supervisory responsibilities, however, would run the risk of suggesting that similar central-bank liquidity support was available to such institutions as is currently available to banks in the countries concerned.

D. Implications for risk assessment

The current trends toward disintermediation of the international business of large banks suggest that banks may be less likely to be in a position to accommodate a sudden increase in demand for liquidity. The question that arises then is to what extent are the types of off-balance-sheet innovations covered in this study contributing to this situation.

An important characteristic of some of the new instruments is their ability to transfer interest or exchange rate exposure from one agent to another (e.g. options, swaps, FRAs, futures). To a large extent, these transfers of exposure are being used to hedge previously unmatched positions, and so an overall reduction in the sum of risks faced by individual economic agents may be resulting. But sometimes the consequence may be that exposures become concentrated on a small number of agents; this tendency is seen most clearly in the case of options - possibly because they require a high degree of technical expertise. As banks hedge their own options books through buying options on exchanges written by a concentrated group of firms, they and their supervisors need to satisfy themselves that these firms, the exchanges and their clearing houses are between them in a position to bear the risk. Closer co-operation may be needed between banking supervisors and those responsible for the supervision of futures and options exchanges.

It is also possible that the existence of easy hedging opportunities would encourage some agents to take on more exposure than would otherwise have been the case, in the expectation that it could easily be hedged if circumstances changed. A growing volume of unhedged exposures may at times result in wider interest and exchange rate swings if many market participants move simultaneously, first as the exposures are taken and then as they attempt to hedge them. In the case of currency options, there are reasons to believe that hedging techniques may result in greater exchange rate volatility at times.

There are two ways in which the new instruments can give rise to increased credit exposures. The first is that each of the risk-spreading instruments involves an actual or potential credit exposure for one or both of the parties. Although individually the risks may be small (e.g. in exchange-

traded futures), the enormous growth in turnover can result in aggregate in a substantial addition to banks' credit exposure. This credit exposure is particularly difficult to measure because in many cases it is conceptually and technically complicated (e.g. swaps and options) and because unlike conventional loans it is not evenly spread over time. For example, the exposure on a swap can fluctuate from positive to negative. Most instruments give rise to a sharp peak of exposure for a matter of days or hours at settlement, which, at times of high turnover, can become very large relative to an institution's total assets. Given the difficulty of measuring these exposures, should attempts be made to reduce them by establishing - as some investment banks have suggested - more clearing-house meachanisms along the lines of futures exchanges? The main object would be to reduce the potential domino effect of one institution's failure being transmitted to others.

The other way in which new instruments can add to credit exposures is by facilitating borrowing. Some innovations have been designed to overcome what might otherwise have been constraints on borrowers' access to credit: NIFs and the securitisation of lending in general have reduced the importance of capital adequacy requirements as a constraint on banks' ability to intermediate credit flows; and swaps have enabled borrowers to continue to raise funds from markets which might otherwise have started to discriminate against them. This raises the potentially troublesome possibility that the lowest credit-quality spreads and standards prevailing in any major capital market could become the general standard. Moreover, as was discussed in Chapter 11, the trend towards securitisation, and especially the shift from bank credit to the security markets, is making it harder to monitor international capital flows. The various statistical problems, together with the increasing importance of off-balance-sheet commitments, will tend to render it more difficult to monitor developments in the field of country indebtedness and of related risk concentrations. A reduction in the comprehensiveness of aggregate bank lending statistics and the data held by "centrales des risques" may enable borrowers to borrow more than would have been the case if the full extent of their debt had been known.

So far, however, there is little evidence that such considerations have led to additional credit being created (as distinct from credit being provided through different routes). Only in the United States has a rapid acceleration in total credit been observed, and this may or may not owe something to the type of innovatory developments discussed in this Report.

The process of securitisation and its emphasis on trading assets may also lead to a shorter-term view being taken: assets may be bought because of the prospect of gains in the immediate future, with the underlying credit quality overlooked. The capital markets have seen a series of instruments such as mismatch FRNs and bonds with warrants or conversion options which are designed to take advantage of short-term trading opportunities but give rise to long-term - in some cases perpetual - credit obligations. It is not clear that all investors properly assess the short-term prospects or the long-term credit quality.

There is indeed some danger that the new instruments possess greater risks than their users realise. In view of the inevitable lack of experience with the new instruments, assessment of the risks attaching to them is not always easy. Even though many of the instruments fall outside existing supervisory restraints, banks have by and large made efforts to assess the risk

attaching to them. There is widespread understanding amongst the major users of the innovations of, for example, the credit risks attaching to swaps, and of the sizable losses that can be suffered on writing options if volatility is underestimated. But this understanding does not always extend to all banks involved, nor - in a very competitive environment characterised by low profitability - is it always reflected in pricing. Inadequate account may be taken of correlations between various risks, such as the effects which might be felt over a wide range of a bank's business from a sudden shock such as a sharp exchange rate change. As noted above, some forms of securitisation, such as transferable loan facilities and sub-participations, may also lead to inadequate credit assessment.

These shortcomings are being studied by the banking supervisors, and improved reporting and control requirements for individual banks should address most of their problems. Further consideration perhaps needs to be given to how non-banks might be encouraged to ensure they have adequate internal control over their use of new instruments. Some large corporations in both private and public sectors are, for example, said to be actively trading swap portfolios. To what extent those responsible for these corporations have been able to assure themselves that only reasonable risks are being taken, we do not know. But it would in any event seem necessary, if individual institutions are to be able to make proper credit assessments of their counterparties, for off-balance-sheet risks to be set out in public accounts. Virtually no such information is currently available in respect of banks or other companies. It is particularly important that banks should have such knowledge in respect of other banks and near-banks with which they are considering undertaking exposures.

A further risk attaching to the innovations is that there are legal doubts about some aspects of them, especially where different national jurisdictions impinge. Banks' ability to offset swap contracts with a failed counterparty is a particularly grey area; and in some countries gaming laws could render FRAs, futures, options or swap contracts unenforceable in certain circumstances.

E. Conclusions

The two main themes of this chapter have been the need for central banks and banking supervisors to concern themselves more with: (a) the implications of the changes taking place in the financial system for the ability of large international banks to play their traditional rôle in credit intermediation, and in particular to serve as intermediate sources of liquidity in times of financial-market stress; and (b) the blurring of distinctions between banks and other financial institutions that operate outside the traditional banking system in some countries.

Both lead to questions about the scope of the central banks' rôle in providing the ultimate support to the financial system and the inter-relationship between that rôle and prudential supervision. The tentative conclusions one might draw from this analysis can be summarised as follows:

(i) while some of the driving forces behind the development of particular innovations may be temporary and reversible, much of what is occurring may be leading to lasting changes in financial-market practices and the institutional structure of those markets;

(ii) both the general process of financial innovation, and the particular forms considered here, offer obvious potential benefits in terms of improving efficiency;

(iii) however, some of the techniques used to increase efficiency, particularly the reliance on advanced computing and communications technology, make the system vulnerable to serious problems in the event of technical failure;

(iv) at the same time, there are a number of important macro-prudential policy issues posed by these developments, related mainly to the degree to which the changing structure of the international financial system will have the resilience needed to withstand stress and permit the conduct of strong anti-inflationary policies, when needed;

(v) among these concerns is the risk that the process of greater direct capital-market intermediation will lessen the ability of large banks to serve as liquidity buffers to the financial system, while at the same time increasing the risk arising from possible disruptions in markets for "securitised" assets;

(vi) the changes in institutional structure which are being brought about by these innovations are likely to make it more difficult to sustain sharp regulatory and supervisory distinctions based on the form of the financial institution, rather than the functions which are being performed. There can be considerable potential for awkward regulatory and supervisory overlaps in such a structure, given the diversity of regulatory responsibilities both within and between countries for banks, securities houses, insurance companies and savings institutions;

(vii) at the same time, the financial system - in some countries more than others - may be becoming increasingly exposed to the risks of gaps in prudential oversight over the consolidated international operations of non-bank financial conglomerates. This is made particularly important by the dependence of banks on non-banks, for example, in hedging their exposure on options they have written. As these firms rarely, if ever, fit neatly into the oversight domain of a particular type of regulator (e.g. insurance, securities, bank), central banks may find themselves increasingly expected to assume some form of residual responsibility for these types of firms.

Chapter 13

Consequences for the conduct and effectiveness of monetary policy

This chapter examines the implications of innovation, deregulation and structural change in international financial markets for the relationship between monetary policy and the domestic macro-economy. Four principal effects are identified. Firstly and foremost, the international mobility of capital has risen, with the result that the exchange rate has become increasingly important as a channel of monetary policy. Secondly, the scope for monetary policy to operate via changes in the availability of credit has been reduced, and the importance of the price channel (i.e. interest rates and exchange rates) has risen. Thirdly, the effect on the economy of a given change in monetary policy - in terms of its timing, incidence and ultimate effect - has become more difficult to predict. And fourthly, in many countries the meaning and usefulness of some indicators of monetary policy, such as the monetary and credit aggregates, are changing and have at times tended to erode. The consequences of these effects for the conduct of monetary policy are also described.

The causes of change in the relationship between monetary policy and the macro-economy can be seen as the outcome of some of the broad trends identified in earlier chapters of this Report. One of these is the systematic breaking down of market segmentation in certain national markets, which has been driven by deregulation and increased competition, but also by the introduction of new products (e.g. the interest rate swap). The second broad trend is the global integration of financial markets, which has contributed to a further increase in international capital mobility. In addition, the relationship between monetary policy and the macro-economy has been influenced by the increasingly widespread use of variable rate financing techniques and by the development and progressive refining of specialised financial instruments which "unbundle" and facilitate the transfer of market and credit risks inherent in traditional financial instruments. The latter two developments may tend to obscure and shift the incidence of monetary policy, and perhaps also to reduce its ultimate effect.

In the discussion that follows the primary concern is with the implications of the cumulative effects of the broad process of innovation and structural change. It is possible to be more certain about its implications for monetary policy than about the effects of any particular innovation taken in isolation. Individually, particular innovations are probably best seen as contributing at the margin to the broad trends which are influencing the conduct of monetary policy, and as facilitating a process which in some countries has been under way for some time and is already far advanced.

It is worth noting, too, that the ensuing analysis cannot be taken as describing the experiences of all countries as being homogeneous or uniform. The consequences of the broad process of innovation and structural change vary considerably from country to country, in part because the domestic environment in which innovation is occurring also varies. In some countries, certain key elements of deregulation such as interest rate decontrol were implemented long before the present wave of innovation began, while in other countries the

recent pace of innovation has been more intense. Similarly, the differences in the inflationary environment among countries seem to have been important. For example, in the low inflation countries, there has been less encouragement to the widespread adoption of floating rate instruments. In general, in countries where the environment has been the most stable, there has been less inducement and the degree of innovation has been less.

A. Capital mobility and the rôle of the exchange rate as a transmission mechanism for monetary policy

One important consequence of the innovations and structural changes which are considered in this study is that capital flows between national markets have become increasingly sensitive to variations in interest rate differentials and exchange rates. The progressive elimination of capital controls and other deregulatory moves initially gave strong impetus to this trend. But the increasingly widespread use of new instruments such as the currency swap and the (multiple-component) note issuance facility has also contributed, as borrowers and lenders have gained progressively easier access to a wide range of close substitute forms of credit. The result has been that the international mobility of capital, which was already high, has risen further. National financial markets have become more closely tied together, with the consequence that disturbances in any one national financial market are more rapidly transmitted to other markets.

There is a vast range of literature on the implications for monetary policy of a high degree of substitutability among international assets.[1] Subject to certain simplifying assumptions, it has been possible to derive some fairly straightforward theoretical results for the case of floating exchange rates: (a) when capital is immobile, changes in monetary policy are transmitted to the economy primarily through changes in interest rates; (b) when capital is mobile internationally, changes in monetary policy have their effect on the economy through induced changes in interest rates and the exchange rate; (c) the relative importance of the exchange rate channel is enhanced (at the expense of the interest rate channel) as the degree of international capital mobility rises.

Practical experience in some countries as well as more recent theoretical work has shown, however, that the implications for monetary policy of a high degree of capital mobility are less straightforward than the conclusions drawn from simple theoretical models would suggest. These conclusions depend crucially on key assumptions about other aspects of the economy in addition to the degree of capital mobility, for example the degree of aggregate flexibility of prices and wages in the short run, how expectations about the future path of the exchange rate are formed, and how firmly these expectations are held.

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1 See, for example, Chapters 3 and 4 of Boothe, Clinton, Coté and Longworth, International Asset Substitutability, Theory and Evidence for Canada, Bank of Canada, February 1985.

The assumptions concerning the formation of exchange rate expectations are particularly important because they can affect the dynamic path of adjustment which the exchange rate will follow. Assuming that the majority of exchange-market participants can predict with some degree of accuracy the ultimate effect on the exchange rate which a change in monetary policy will have, then a change in monetary policy can cause the exchange rate initially to overshoot its new long-run value. This occurs because changed expectations in the exchange market induce adjustments in the spot exchange rate which occur more rapidly than the pace at which the real economy can adjust to the change. As a result, when capital mobility is high large short-run swings in the exchange rate can be expected to occur in response to changes in domestic or foreign monetary policy.[2] The potential magnitude of these swings and their consequences for economic activity and inflation may provide an important constraint on the willingness of the authorities to engage in discretionary policy.

A further complication to be considered - suggested by recent experience - is the possibility of unstable exchange rates. In the foregoing case the exchange rate can be volatile in the short run, but there is a presumption that it will move eventually to a new equilibrium level. It is interesting to consider also the implication when exchange rate expectations are not well focused in the sense that market participants are unable to assess correctly in advance the new equilibrium level of the exchange rate. In these circumstances an initial change of monetary policy (say, an easing) would lead to some depreciation in the exchange rate, and there would be a tendency for the rate to "overshoot". But unless expectations regarding the equilibrium level of the exchange rate were firmly held, overshooting could conceivably develop into a cumulative process. This might happen, for example, in a bandwagon-type of situation, if the initial estimates of the future level of the rate were subsequently revised in response to movements in the exchange rate. In this case, any attempt on the part of a central bank to reduce the domestic interest rate independently by monetary expansion would generate an exchange rate depreciation which would tend to feed on itself. In addition, if inflationary expectations were closely tied to movements in the exchange rate or exchange rate changes were incorporated quickly and fully into domestic prices, then an easing of monetary policy could risk touching off an inflationary spiral which, ultimately, might be brought to an end only by reversing the initial change in policy. When exchange rates are prone to overshooting, and expectations are unstable, the consequences of changing monetary policy may be sufficiently risky to inhibit its active use. Because of this it is possible that the scope for discretionary monetary policy may actually be diminished by a high degree of capital mobility.

A related point is that foreign monetary shocks can be transmitted rapidly to the domestic economy. Not only is it theoretically possible for discretionary domestic policy to be destabilising when the degree of capital mobility is high, but it is conceivable, too, that a foreign monetary shock, about which there were unstable expectations, could set off a cumulative movement in the exchange rate with substantial inflationary implications. The domestic central bank might then be constrained to "import" or match the change in foreign monetary policy. Thus a high degree of capital mobility may make it extremely difficult for a country, particularly if it is "small" and "open", to follow a policy that is independent of those being followed abroad.

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2 The phenomenon of overshooting exchange rates is not of course uniquely associated with changes in monetary policy. Other events which induce changes in exchange rate expectations (e.g. natural disasters, announced changes in fiscal policy) can also cause exchange rates to overshoot.

Just how relevant these last two theoretical possibilities are for the world in which central banks are required to operate depends on the way in which expectations are formed and on the degree of capital mobility that actually exists. On the first point there is some evidence to suggest that exchange rate expectations are not always tied to a rational assessment of the consequences of changes in underlying economic fundamentals. The Group of Seven Report on exchange-market intervention, for example, acknowledged that there may have been periods when bandwagons dominated movements in exchange rates. Presumably these situations could re-emerge at some point in the future.

Regarding capital mobility, the evidence examined by this Study Group indicated that it is indeed high, but that actual experience varies to some extent from country to country. Capital mobility and financial-market interdependence rose dramatically through the 1970s, spurred on by the progressive removal of capital controls in some large industrial countries. Moreover, it is the Study Group's view that the process of deregulation which began in some large domestic financial markets early in the 1980s has augmented the degree of international capital mobility, as have the processes of international competition and global integration, which are at the root of this Report. The progressive securitisation of international credit flows is symptomatic of a high degree of international capital mobility. Some financial innovations, such as the currency interest rate swap and the multiple-component note issuance facility, are also contributing to further increases in the degree of international capital mobility. As a result capital flows in response to variations in yield in domestic financial markets have become large, and there is a tendency for changes in interest rates in any one national market to be transmitted rapidly and in increasing degree to other financial markets. It appears that innovations are occurring in response to opportunities provided by a high level of international capital mobility, and in turn are contributing to that mobility. Nevertheless, the point has by no means been reached where either nominal or real yields in all domestic financial markets are equalised.

The practical significance of concluding that capital mobility is high and rising, but far from perfect, is that the more extreme situations noted above that are theoretically possible when exchange rate expectations are highly volatile are not generally applicable in today's world, although they can be relevant from time to time for particular countries. At best they should be seen as describing tendencies and a limiting position towards which the industrial countries are progressing. Thus it is most useful to think of a spectrum of possible implications for the conduct of monetary policy, with the point in the spectrum occupied at a particular time by any individual country being dependent on its own circumstances.

Some countries, including the smaller EMS countries which maintain a system of fixed exchange parities, have long recognised the importance of orienting monetary policy towards foreign exchange rate objectives, and the need for partners to harmonise their monetary policies. What may be changing for these countries as capital becomes more mobile internationally is more a matter of degree rather than the appearance of some new operating constraint.

For other countries which allow their exchange rate to be determined more freely by market forces or permit the exchange rate to fluctuate within relatively wide margins, the implication of a rising degree of international capital mobility is that the external sector has become a more important constraint on the conduct of an independent monetary policy.

This means that, in some circumstances, the costs of conducting an independent policy will be higher while the benefits are likely to be lower. In practice the freedom to conduct an independent policy has declined, particularly where and when expectations about prices and exchange rates are highly volatile. More generally, small open economies can find themselves constrained to react to changes in policy elsewhere, sometimes to the point where the need to offset external disturbances can become the principal determinant of domestic monetary policy. Similarly, policy-makers in the larger economies increasingly have to consider the effects on output and price of a change in the exchange rate when estimating the possible effects of a change in their own monetary policy, as well as the feedback effects of counterbalancing changes in monetary policies abroad.

Rising international capital mobility has also meant that the incidence of monetary policy has increasingly fallen on the external sector of the economy. When capital is highly mobile internationally, monetary policy actions which seek to raise or lower domestic interest rates are likely to induce large capital inflows or outflows. These capital flows limit the amount of the change in domestic interest rates which otherwise could be achieved, and induce movements in the exchange rate which in turn affect profitability and output in the external sector of the economy. Moreover, this impact on the external sector has been exacerbated in the major economies by their increased openness, which has occurred more or less contemporaneously with the rise in international capital mobility.

It is not clear whether the exchange rate has become the principal channel of monetary policy in more than a limited number of countries. Again the significance of the change has been one of degree, with some countries being more affected than others. In the largest countries interest rates remain the most important channel through which monetary policy has its effects on the real economy, but recognition of the importance of the exchange rate channel has begun to rise markedly in some countries such as the United States and Japan. In smaller, more open economies such as Canada, the exchange rate may have become the dominant channel of policy.

Another consequence of a high degree of international capital mobility is that countries appear to experience less difficulty in financing current-account and government fiscal imbalances for extended periods of time. This means for one thing that governments can choose to delay implementing needed policy adjustments for longer periods than might otherwise be possible. On the other hand, the increased availability of financing can have the advantage of permitting the necessary time for needed policy adjustments, once taken, to have their beneficial effects on the economy.

Both the magnitude of the present fiscal and current-account imbalances between the United States and other large industrial countries, and the extended period of time for which they have persisted, seem to provide an example of the ease with which imbalances can be financed when capital is highly mobile internationally. There is, however, no guarantee that these financial flows will coincide with the macro-economic policy objectives of all governments concerned.

A final implication of a high degree of capital mobility is that, because it implies a rising degree of economic interdependence, a good case can be made for strengthening existing mechanisms for multilateral surveillance.

Domestic macro-economic policies - both monetary and fiscal - are likely to achieve their maximum desired effect when there is a reasonable degree of co-ordination in the policies of the major industrial nations. Indeed, the principle is already explicit in the EMS arrangement, in the generally recognised practical limitations on the scope of any member nation to select a particular mix of fiscal and monetary policies or to follow a broad policy thrust significantly different from its partner countries for any length of time. Where countries in addition to EMS members are involved, a strengthened surveillance mechanism could be expected to promote more effective policy co-ordination, particularly if it were to involve the more active rôle for the International Monetary Fund outlined in the recent Group of Ten Deputies' report on the international monetary system.

B. The rôle of the interest rate as a transmission mechanism for monetary policy

The changes in the financial system which have occurred and are now occurring have enhanced the rôle of interest rates relative to direct credit allocation techniques in transmitting monetary policy effects to the economy. Previous deregulatory measures (e.g. the elimination of interest rate ceilings in some countries at an early date), more recent deregulatory initiatives in other countries and financial innovation have contributed to this process. Examples of key financial innovations include the increased use of variable rate lending, the trend towards securitisation which is leading to greater amounts of credit being intermediated using marketable instruments, the development of markets for new financial instruments, the deepening of markets for existing instruments, and the development of secondary markets. One effect of this process has been to ensure that an increasing range of financial instruments has become exposed to price risk or to variations in interest rates. Moreover, the range of close substitutes for particular forms of credit has been greatly enhanced. The upshot has been that, increasingly, changes in the general level of market interest rates are being transmitted more rapidly and more pervasively to all sectors of the economy.

In some countries the impact of a change in monetary policy has historically been transmitted to the economy partly through changes in interest rates and partly through changes in the availability of credit. The availability of credit has been regulated both directly, through quantitative limits on particular forms of credit, and indirectly, through the imposition of interest rate ceilings. Although such credit-rationing techniques have disappeared in many countries as an effective channel of monetary policy, they remain a relatively important channel in other countries. The importance of credit availability effects seems likely to diminish in these countries, however, as a consequence of the innovations and structural changes which are now occurring, since they provide a means for frustrating the intended effects of interest rate ceilings and the imposition of quantitative restrictions on credit growth. Many sectors of the economy, to which only a limited range of sources and types of credit were once available, are now gaining access at low opportunity cost to an ever-expanding range of close substitutes available from domestic or international markets. Attempts to constrain growth of the aggregate supply of credit by imposing restrictions on the balance sheets of particular domestic financial institutions (e.g. banks) have become susceptible to being offset through the expansion of the balance sheets of unconstrained domestic financial institutions, a consequence of the phenomenon

of "market interpenetration", or by direct access to international capital markets. In addition, these traditional forms of constraints are becoming increasingly irrelevant as the importance of off-balance-sheet business continues to expand.

What are the consequences for the conduct of monetary policy? One school of thought argues that the effectiveness of monetary policy as a stabilisation policy tool is reduced. There are two reasons for this. Firstly, there will be a degree of reluctance on the part of the authorities, which was not previously present, to use monetary policy to influence the economy. This will occur because the interest elasticity of the demand for the various components of output, while rising, is still low, i.e. the cutting edge of policy is not well honed. As a result larger increases in interest rates will be required in order to achieve a given impact on final spending which otherwise could have been achieved through credit restraint and much less variation in interest rates. These changes risk pushing the level of rates to unacceptably high levels. Secondly, it has become increasingly difficult for the authorities to have an influence on relative rates of interest and, therefore, on the relative supplies of particular forms of credit and deposits. This is due to the process of competition, innovation and structural change, which has led to the rates of interest on competing forms of credit and deposits being closely tied to changes in the general level of market interest rates. When the central bank takes action to change the general level of interest rates, other market-related rates of interest also change. It is argued that, if particular sectors and financial instruments can no longer be the principal target of discretionary changes in monetary policy, then policy becomes such a broad spectrum or blunt instrument that the willingness to use it will be substantially reduced.

A second point of view is that it can as easily be argued that to the extent that the incidence of monetary policy becomes less sector-specific and more generalised, it is therefore more equitable and its attractiveness as a tool of stabilisation policy is enhanced.

A final group observes that the importance of the exchange rate as a channel of policy has also tended to increase along with the importance of the general level of interest rates. As discussed above, the more the effect of a change in policy is transmitted through variations in the exchange rate, the more its effects are borne by the external sectors of the economy, with the incidence of monetary policy falling on the export and import competing industries and the tourist industry. Considerations of equity and pressures for protection in this case, too, may tend to reduce the attractiveness of discretionary changes in monetary policy.

The conclusion to be drawn from the foregoing arguments is that the thrust of monetary policy will change along with the relative importance of the different channels of policy. With the exception of the tradable goods and services sector, the effects will be widespread rather than concentrated on particular sectors of the economy as in the past.

C. Other effects on the timing and effectiveness of monetary policy

Is the timing and effectiveness of monetary policy altered by the process of financial innovation and technical change? It is difficult to reach a precise answer to this question, particularly since relevant empirical work has not been undertaken.

One broad trend which is likely to have influenced the effectiveness of monetary policy is the increasingly widespread use of variable interest rate instruments and interest rate hedging techniques, particularly in countries which experience high rates of inflation. Variable rate financing differs from fixed rate financing in terms of the effect on the economy in three ways. Firstly, it provides borrowers with a vehicle to avoid being locked permanently into high debt service costs should they undertake new investment projects during periods of high interest rates. Secondly, it ensures that debt servicing costs rise on all outstanding debts when interest rates rise, and it transfers the higher debt service payments to creditors in the form of increased interest income. Thirdly, it creates a solvency risk for any debtors who were approaching the limit of their debt servicing capacity prior to an increase in interest rates.

The first of these effects is the easiest to analyse in terms of its impact on the effectiveness of monetary policy. It is generally agreed that a tightening of monetary policy has its effect on the economy by inducing corporations and consumers to postpone spending decisions. Once the fear of being locked permanently into higher interest rates is removed, the incentive to delay spending is reduced, particularly when tighter monetary policy is thought to be a temporary or shortlived phenomenon. The impact of a given interest rate move is reduced as a result.[3] It is less clear whether the second effect has any net impact on monetary policy, even though the entire outstanding stock of indebtedness is affected: the effects on debtors may be largely offset by the effects on creditors. While higher debt service costs provide an incentive to debtors to reduce their aggregate spending, the higher interest income will stimulate creditors to increase aggregate spending. The net effect, which in any case is likely to be small, will depend on such factors as the two groups' relative propensities to spend and save, and on whether interest expense and interest income are treated in a symmetrical fashion under prevailing income tax law. The third effect (increasing the solvency risk) tends to increase the impact of a given change in interest rates and may assume some importance in circumstances where the share of floating rate lending in total lending is relatively large and the rise in the level of interest rates is strong.

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3 If the expected future course of short-term interest rates were accurately reflected in the term structure, and the long-term (fixed) interest rate, therefore, was in fact equal to a weighted average of the expected level of future short-term interest rates, the shift from fixed rate instruments to floating rate instruments would have no consequences for the impact of monetary policy. The limited empirical evidence which is available, however, is divided on the question of whether long-term interest rates incorporate expectations of future short-term interest rates exclusively. Indeed, some evidence implies that long-term interest rates at times also include a substantial risk premium. We therefore tend to discount the possibility that the increasing popularity of variable rate financing will be neutral with respect to the effectiveness of monetary policy.

Possibilities for shifting the incidence and the timing of the effects of a change in policy may be found in the new instruments like futures and options. Capital gains or losses on financial assets can be hedged, as can the costs of financing new spending decisions. Similarly, new products like swaps and FRAs can be used by financial institutions to adjust and tailor mismatches in the maturity structure of their assets and liabilities. Non-financial corporations can use swaps to transform floating rate debt into long-term fixed rate debt, thereby eliminating their apparent exposure to the risks associated with floating rate financing. Whether these developments have any net impact on the effectiveness of monetary policy is an open question. To the extent that the burden of risk can be redistributed using these instruments to economic agents who are in the strongest position to bear it, it is possible that the effect of a change in policy may be reduced and its impact delayed. However, as argued in Chapter 10, there are concerns that the new financial instruments are actually concentrating risk in institutions which are still in the process of developing mechanisms for assessing, pricing and managing it. Thus the impact of a change in monetary policy could as easily be enhanced and its impact accelerated. A more basic issue is the question of the changes to the transparency of the financial system which have occurred as a result of financial innovation (see Chapter 11). Without accurate data on the off-balance-sheet exposure of both financial and non-financial corporations, it is not possible to predict with any degree of certainty the incidence, timing or effectiveness of a given change in monetary policy.

An additional way in which the effectiveness of monetary policy is affected by financial innovation involves the development of more depth in existing financial markets and the growth of relatively active secondary markets (e.g. the secondary swap market). These developments increase liquidity and may provide individual economic agents with greater opportunities to unwind unfavourable balance-sheet positions rapidly (also at lower costs) in response to changing circumstances, and are thereby likely to serve to blunt the effects of monetary policy in the short run.

D. The implications for monetary aggregates and other indicators of monetary policy

The effects of financial innovation and structural change in domestic financial markets on the monetary aggregates have already been the subject of extensive discussion and debate,[4] and there is little need to do more than list them here. The operational usefulness of targeted aggregates has been adversely affected in several - though not all - countries. The proliferation of financial instruments which combine the liquidity characteristics of traditional transactions-type instruments with a market-related rate of return has required periodic redefinition of the narrower aggregates in Canada, the United Kingdom and the United States. This has been necessary in order to retain a stable statistical relationship between the aggregates and key nominal spending variables. Moreover, the demand for money, however defined, in some countries appears to have become unstable as a consequence of the process of innovation and structural change. Monetary aggregates have been subject to large, unpredictable shifts in countries where innovation is far advanced. As a result of the increased tendency to pay market-related rates of interest on many of the key components of the aggregates, the negative relationship between the demand for the aggregate and the level of interest rates under the direct control of the central bank has

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4 See, for example, Financial Innovation and Monetary Policy, BIS, Basle, March 1984 and Trends in Banking in OECD Countries, OECD, Paris, 1985.

been reduced. In the case of some of the broader aggregates, the measured interest elasticity is close to zero.

The specific types of financial innovation under investigation in this Report have probably had minimal impact on the narrow monetary aggregates. They may eventually have an impact on some of the more broadly based monetary aggregates, particularly when the broadest monetary aggregates are defined to include deposits which support the international business of the banks. Contributing factors would include: the broad processes of deregulation in national financial markets (permitting non-banks to compete more effectively with banks) and securitisation (including developments such as the floating rate note), which appear to be stripping away business which traditionally was intermediated through the banking system; and the proliferation of off-balance-sheet business, which requires no supporting deposit base. Each of these developments has the effect of shifting relationships between the volume of bank assets (or their associated deposit base) and any given level of economic activity or nominal spending. In addition, the process of global integration of financial markets carries with it the implication that investors are freer and more likely to transfer their holdings of certificates of deposit and other interest-bearing deposit balances between currencies and national banking systems. This further increases the likelihood of an unstable relationship between national monetary aggregates - especially the broadest aggregates - and measures of nominal spending. Moreover, the problem is compounded when national statistical reporting systems are unable to distinguish between resident and non-resident holdings of deposit balances.[5]

The innovations which we consider in this Report may also have important implications for the growth and stability of some of the more broadly based credit measures. This would depend in part on whether or not particular credit aggregates were defined to include the newer international financial instruments in addition to the more traditional forms of credit which they are progressively displacing. Suppose, for example, that statistics on the newer forms of credit such as FRNs, NIFs and RUFs cannot be collected systematically, and that these instruments are therefore omitted from the definition of the broader domestic credit aggregates. If the growing use of new credit instruments occurs at the expense of the more traditional domestic credit instruments, the traditionally defined credit measures must give a misleading picture of the extent of overall credit growth. But the broadly based credit measures could also become less reliable if the development of new financial instruments were contributing to a rapid growth of credit - at least during any transitional period until a new relationship is established. This could trigger significant shifts in the estimated relations between domestic credit measures and the nominal spending aggregates such as GNP or its principal components. As noted elsewhere in this Report, there has been rapid growth in credit in the United States which appears to be due in part to financial innovation and deregulation.

The process of financial innovation and structural change appears to have complicated considerably the "information extraction" problem faced by central banks. In countries where the narrower monetary aggregates have become increasingly difficult to interpret as guides to monetary policy, there has been an attempt to supplement the information inherent in the narrow aggregates with information obtained from other indicators of economic conditions. Unfortunately the thrust of the argument in this section is that some other potential sources of information, such as broad monetary and credit aggregates, are also affected by the process of innovation and structural change.

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5 This has been a particular problem recently in the Netherlands.

Glossary of terms

AIBD: Association of International Bond Dealers.

American-Style Option (also American Option): an option which may be exercised at any time up to and including the expiration date.

Arbitrage: trading strategies designed to profit from price differences for the same or similar goods in different markets. Historically the term implied little or no risk in the trade, but more recently it has come to suggest some risk of loss or uncertainty about total profits. (For two arbitrage strategies in options see Conversion and Reverse Conversion.)

Assignment (Swap Market): the sale of a swap contract by one party to another, usually for a lump-sum payment. Swap assignments are cumbersome because they require the approval of the remaining original party.

At-The-Money: an option is at the money when the price of the underlying instrument is very close or equal to the option's exercise price.

Back-To-Back Loans: two parties in different countries make loans to one another, of equal value, each loan denominated in the currency of the lender and each maturing on the same date. The payment flows are identical to those of spot and forward currency transactions. Currency swaps have a similar structure except that there is not necessarily any "loan" on the balance sheet.

Basis: the spread or difference between two market prices or two interest rates. For example, the spread between commercial paper and Eurodollar rates or the spread between a futures price and the price of the underlying asset.

Basis Point: one one-hundredth of one percentage point, most often used in quotation of spreads between interest rates or to describe changes in yields on securities.

Biased View: see Uncovered Writing.

Black-Scholes (also Black-Scholes Model): a widely used option pricing equation developed in 1973 by Fischer Black and Myron Scholes. Used to price OTC options, value option portfolios, or evaluate option trading on exchanges.

Break-Even Point: the price of the underlying instrument at which an option buyer just recovers the initial outlay or premium. For a call option, the break-even point is the exercise price plus the premium; a put option's break-even point is the exercise price minus the premium.

Butterfly Call Spread: an options strategy designed to profit from stable or decreasing volatility. The spread involves trades in four call options, all with the same expiration date: the purchase of an option with a low exercise price; the sale of two calls with an intermediate exercise price; the purchase of a call with high exercise price.

Profit is generated when the price of the underlying remains within an established range. Loss is limited to the net premiums paid to set up the position.

Calendar Call Spread (also Time Call Spread or Horizontal Spread): an options strategy designed to profit from the rapid decline in time value as options approach expiration. The position involves the sale of a near-term call option and the purchase of a call option with a more distant expiration date. Barring an increase in volatility, the time value on the nearby option will erode more quickly (as its maturity approaches) than will the time value on the more distant option. The trader expects that the cost of unwinding the position will be less than the net premiums received when it was established.

Call Option: see Options.

Capped Floating Rate Notes: a type of floating rate note (see FRN), which sets an upper limit on the borrower's interest rate. The lender forgoes the possibility of obtaining a return above the cap rate, should market interest rates exceed the cap rate, but in return receives higher-than-usual spreads over LIBOR. In essence, the note issuer obtains an interest rate cap - a form of option - from the buyer.

Cash Settlement: the settlement provision on some option and futures contracts which do not require delivery of the underlying instrument. For options, the difference between the settlement price on the underlying and the option's exercise price is paid to the option holder at exercise. For futures contracts, the exchange establishes a settlement price on the final day of trading and all remaining open positions are marked to market at that price. (See Marking to Market.)

CBOE: Chicago Board Options Exchange.

CBT (also CBOT): Chicago Board of Trade.

CD (also Certificate of Deposit): a negotiable certificate issued by a bank as evidence of an interest-bearing time deposit.

Clearing House Interbank Payments System (CHIPS): a computerised network for transfer of international US dollar payments linking over 100 depository institutions which have offices or subsidiaries in New York City. Messages covering payments between the various depository institutions are entered into the CHIPS computer over the business day. At the end of each day, participants' net positions are settled through the Federal Reserve's funds transfer system.

CME: Chicago Mercantile Exchange.

Collateralised Mortgage Obligations (also CMOs): mortgage-backed bonds on which principal is repaid periodically. CMOs generally consist of several tranches or classes with various classes receiving principal repayments in a prescribed order. Principal in the first class is retired before the mortgage amortisation and prepayments are used to pay down the principal in the second class, and so on.

COMEX: the Commodity Exchange. A New York exchange trading futures contracts on gold and silver and option contracts on gold futures.

Commercial Paper: a short-term unsecured promise to repay a fixed amount (representing borrowed funds plus interest) on a certain future date and at a specific place. The note stands on the general creditworthiness of the issuer or on the standing of a third party that is obligated to repay if the original borrower defaults. The most active commercial-paper market is in the United States. (See also Letter of Credit.)

Commodity Futures Trading Commission (CFTC): the Federal agency which regulates futures trading in the United States.

Conventional Mortgage: a residential mortgage made in the United States by a private lender without government-agency guarantee or insurance.

Conversion: an arbitrage strategy in options involving the purchase of the underlying instrument offset by the establishment of a synthetic short position in options on the underlying (the purchase of a put and sale of a call). The overall position is unaffected by price movements in the underlying instrument. This trade would be established when small price discrepancies open up between the long position in the underlying and the synthetic short position in the options. (See Arbitrage, Reverse Conversion, and Synthetic Positions.)

Convertible Bond: bond giving the investor the option to convert the bond into equity at a fixed conversion price.

Country Risk: the risk that most or all economic agents (including the government) in a particular country will for some common reason become unable or unwilling to fulfil international financial obligations.

Coupon-Stripping: the process of producing single-payment (zero coupon) instruments from existing conventional bonds. It can be accomplished either by separating the coupons from the principal or by selling receipts representing the individual coupons and principal on a security held by a trustee.

Covered Writing: generally refers to selling call options "covered" by an equal or larger long position in the security underlying the option. It is a strategy intended to augment overall returns by earning fee income on the options written against securities held for normal investment purposes.

Currency Swap: a transaction in which two counterparties exchange specific amounts of two different currencies at the outset and repay over time according to a predetermined rule which reflects interest payments and possibly amortisation of principal. The payment flows in currency swaps (in which payments are based on fixed interest rates in each currency) are generally like those of spot and forward currency transactions.

Currency Warrants: usually, detachable options included in securities issues giving the holder the right to purchase from the issuer additional securities denominated in a currency different from that of the original issue. The coupon and price of the securities covered by the warrant are fixed at the time of the sale of the original issue. Can also be a currency option in negotiable form.

Deep Discount Bonds: coupon-bearing securities that sell at prices well below par. Generally refers to seasoned bonds whose prices have declined in secondary-market trading because market yields have risen well above the levels prevailing at the time they were issued. Tax consequences discourage new issuance of deep discount bonds in the United States.

Delta: the change in an option's price divided by the change in the price of the underlying instrument. An option whose price changes by $1 for every $2 change in the price of the underlying has a delta of 0.5. At-the-money options have deltas near 0.5. The delta rises toward 1.0 for options that are deep-in-the-money, and approaches 0 for deep-out-of-the-money options. (See At-The-Money, In-The-Money, Out-Of-The-Money, and Delta Hedging.)

Delta Hedging: a method option writers use to hedge risk exposure of written options by purchase or sale of the underlying asset in proportion to the delta. For example, a call option writer who has sold an option with a delta of 0.5 may engage in delta hedging by purchasing an amount of the underlying instrument equal to one-half of the amount of the underlying that must be delivered upon exercise. A delta-neutral position is established when the writer strictly delta-hedges so as to leave the combined financial position in options and underlying instruments unaffected by small changes in the price of the underlying.

Delta-Neutral: see Delta Hedging.

Direct-Pay Letter of Credit: see Letter of Credit.

Dual-Currency Bonds: long-term securities denominated in two currencies. The most common types have been bonds with initial payment and interim coupon payments in a non-dollar currency, say Swiss francs or yen, and a fixed final principal payment in US dollars.

Duration: a measure of a security's maturity which takes into account the periodic coupon payments. Specifically, it is the weighted average maturity of all payments of a security, coupons plus principal, where the weights are the discounted present values of the payments. As such the duration is shorter than the stated term to maturity on all securities except for zero coupon bonds, for which they are equal because the zero coupon bond is a single-payment security.

ECU: European Currency Unit.

End-User (Swap Market): in contrast to a swap-trading institution, a counterparty which engages in a swap to change its interest rate or currency exposure. End-users may be non-financial corporations, financial institutions or governments.

Euro-Commercial Paper (ECP): notes sold in London for same-day settlement in US dollars in New York. The maturities are more tailored to the needs of issuer and investor than the standard Euro-note terms of 1, 3, and 6 months. This is a recent development in the Euro-market.

Euro-Commercial-Paper Facility: facility for issuing short-term notes without a back-up line and generally with flexible maturities.

Euro-Note: a short-term note issued under a NIF or Euro-commercial-paper facility (See Note Issuance Facility and Euro-Commercial-Paper Facility).

European-Style Option (also European Option): an option which may be exercised only on the expiration date. It is an alternative to an American option, which can be exercised on any business day prior to expiration, or on the expiration date.

Exercise Price (also Strike Price): the fixed price at which an option holder has the right to buy, in the case of a call option, or to sell, in the case of a put option, the financial instrument covered by the option.

Expected Volatility: the degree of volatility that option pricing formulae assume will prevail over the remaining life of an option.

Expiration (also Expiration Date, Expiry, and Maturity Date): (1) the date at which a European-style option may be exercised at the choice of the holder; (2) the date before or at which an American-style option may be exercised.

Federal Financial Institution Examination Council: an organisation of regulatory agencies responsible for US depository institutions. It is designed to promote more uniform supervisory and examination policies. The agencies include: Federal Deposit Insurance Corporation; Federal Home Loan Bank Board; Federal Reserve Board; National Credit Union Association; Office of the Comptroller of the Currency.

Federal Funds Market: a market for unsecured loans between depository institutions in the United States in immediately available funds, essentially reserves held at Federal Reserve Banks. Most activity is for next-day maturity. Term Federal funds refers to longer maturities which can be up to several weeks or months.

Federal Home Loan Banks: US Government agencies that regulate and lend to savings and loan associations and savings banks.

Federal Home Loan Mortgage Corporation (also FHLMC and Freddie Mac): a US corporation owned by the nation's twelve Federal Home Loan Banks and designed to help maintain the flow of mortgage money to the residential housing market. FHLMC buys conventional mortgages from thrift institutions and other mortgage lenders and packages them into FHLMC-guaranteed Participation Certificates (PCs) for sale to mortgage buyers. Often, the transaction involves a swap of PCs for mortgages with the mortgage lender.

Federal National Mortgage Association (also FNMA and Fannie Mae): a corporation owned by private shareholders but chartered by the US Government to support the housing market. FNMA holds a large portfolio of mortgages, some of which are federally guaranteed or insured while others are uninsured (so-called "conventional" mortgages). To fund the purchases of mortgages FNMA sells debentures and short-term notes in the credit markets. FNMA also packages pools of mortgages.

Fedwire: the Federal Reserve's electronic funds and securities transfer network.

FHA-Insured Mortgage: a residential mortgage made in the United States by a private lender and insured by the Federal Housing Administration, which operates programmes for mortgage and loan insurance to provide assistance for families who can fulfil the obligations of a mortgage loan but who may not be adequately served by the private market.

Forward Rate Agreement (FRA): an agreement between two parties wishing to protect themselves against a future movement in interest rates. The two parties agree an interest rate for a specified period from a specified future settlement date based on an agreed principal amount. No commitment is made by either party to lend or borrow the principal amount; their exposure is only the interest difference between the agreed and actual rates at settlement.

FRABBA terms: standard terms agreed by the British Bankers' Association for interbank trading of FRAs. (See Forward Rate Agreements.)

FRN: a medium-term security carrying a floating rate of interest which is reset at regular intervals, typically quarterly or half-yearly, in relation to some predetermined reference rate, typically LIBOR. (See LIBOR.)

Futures Contract: an exchange-traded contract generally calling for delivery of a specified amount of a particular grade of commodity or financial instrument at a fixed date in the future. Contracts are highly standardised and traders need only agree on the price and number of contracts traded. Traders' positions are maintained at the exchange's clearing house, which becomes a counterparty to each trader once the trade has been cleared at the end of each day's trading session. Members holding positions at the clearing house must post margin which is marked to market daily. Most trades are unwound before delivery. The interposition of the clearing house facilitates the unwinding since a trader need not find his original counterparty, but may arrange an offsetting position with any trader on the exchange. (See Margin and Marking to Market.)

Gamma: the sensitivity of an option's delta to small unit changes in the price of the underlying. Some option traders attempt to construct "gamma-neutral" positions in options (long and short) such that the delta of the overall position remains unchanged for small changes in the price of the underlying instrument. Using this method writers can produce a fairly constant delta and avoid the transactions costs involved in purchasing and selling the underlying as its price changes.

Government National Mortgage Association (also GNMA and Ginnie Mae): a wholly-owned government corporation in the US Department of Housing and Urban Development which is designed to support the housing market. To help provide secondary-market liquidity, GNMA guarantees privately issued securities backed by pools of federally insured or guaranteed mortgages. In the most common form of GNMA security, monthly interest payments and amortisation and prepayments of principal on mortgages are "passed through" to the holder.

Grantor: see Writer.

Hedge: to reduce risk by taking a position which offsets existing or anticipated exposure to a change in market rates.

Hedge Ratio: the proportion of underlying securities or options needed to hedge a written option. The hedge ratio is determined by the delta. (See Delta and Delta Hedging.)

Implied Volatility: the degree of volatility "implied" by the market price of an option. Since all other variables used in the theoretical option pricing formulae are observable, market participants frequently solve the equation "backwards" to determine the amount of volatility built into the market. Some option traders "trade" volatility, buying options when their implied volatility is low and selling options when their implied volatility is high.

In-The-Money: option contracts are in the money when there is a net financial benefit to be derived from exercising the option immediately. A call option is in the money when the price of the underlying instrument is above the exercise price and a put option is in the money when the price of the underlying is below the exercise price.

Interest Rate Cap: an option-like feature for which the buyer pays a fee or premium to obtain protection against a rise in a particular interest rate above a certain level. For example, an interest rate cap may cover a specified principal amount of a loan over a designated time period such as a calendar quarter. If the covered interest rate rises above the rate ceiling, the seller of the rate cap pays the purchaser an amount of money equal to the average rate differential times the principal amount times one-quarter.

Interest Rate Mismatch (also Interest Rate Gap or Gap): the risk/opportunity banks face that a shift in interest rates will reduce/increase interest income. The mismatch arises out of the repricing schedule of assets and liabilities. The banks' traditional interest rate mismatch, lending long-term and borrowing in short-term markets, exposes them, for example, to the risk that rates will rise: as interest rates rise, low-yielding short-term liabilities will be replaced and repriced more rapidly than assets. Some money-centre banks manage their interest rate mismatches actively in the hopes of taking advantage of anticipated interest rate changes.

Interest Rate Swap: a transaction in which two counterparties exchange interest payment streams of differing character based on an underlying notional principal amount. The three main types are

coupon swaps (fixed rate to floating rate in the same currency), basis swaps (one floating rate index to another floating rate index in the same currency), and cross-currency interest rate swaps (fixed rate in one currency to floating rate in another).

Intermediary (Swap Market): a counterparty who enters into a swap in order to earn fees or trading profits. Most intermediaries, or swap dealers, are major US money-centre banks, major US and UK investment and merchant banks and major Japanese securities companies.

International Banking Facilities (also IBFs): a means by which US banks may use their domestic offices to offer foreign customers deposit and loan services free of Federal Reserve reserve requirements and interest rate regulations.

Intrinsic Value: the net benefit to be derived from exercising an option contract immediately. It is the difference between the price of the underlying and the option's exercise price. An option generally sells for at least its intrinsic value.

Irrevocable Revolving Credit Agreement: a binding commitment by a bank to lend to a customer. (See Revolving Credit Agreement.)

ISDA: International Swap Dealers Association.

Junk Bonds: high-yielding bonds that are below investment grade and are at times used in corporate take-overs and buy-outs. Investment-grade securities are generally those rated at or above Baa by Moody's Investors Services or BBB by Standard & Poor's Corporation.

LDC Loan Swaps: the exchange by one lender of some or all of its exposure to a particular borrower in an LDC with a second lender for its exposure to a borrower in the same or a different LDC. In some transactions loans are sold for cash or swapped for equity.

Letter of Credit (also Standby Letter of Credit): the most common form is an obligation on the part of a bank to a third party to redeem a customer's maturing security if the bank's customer cannot perform. Banks in North America often extend letters of credit to back securities issued by tax-exempt borrowers or to back commercial paper. Standby letters of credit call upon the bank to redeem issues upon the default of the borrower. Under direct-pay letter of credit, the bank pays off all maturing obligations and obtains reimbursement from the borrower.

Leveraged Buy-outs: corporate acquisitions through stock purchases financed by the issuance of debt (which may include Junk Bonds).

LIBID: London Interbank Bid Rate. The rate which a bank is willing to pay for funds in the international interbank market.

LIBOR: London Interbank Offered Rate. The rate at which banks offer to lend funds in the international interbank market.

LIFFE: the London International Financial Futures Exchange.

LIMEAN: the mean of LIBID and LIBOR.

Loan Sale: the sale, transfer or assignment of a loan or a loan participation to a third party with or without the knowledge of the borrower.

Log-Normal Distribution: a normal probability distribution of a variable expressed in logarithmic form. This distribution is often used for prices of assets or commodities because it implies that the price can rise to infinity but cannot fall below zero. (See Normal Distribution.)

Long Option Position: the position of a trader who has purchased an option regardless of whether it is a put or a call. A participant with a long call option position can profit from a rise in the price of the underlying while a trader with a long put option can profit from a fall in the price of the underlying instrument.

Macro-Prudential Policy: activities of central banks and other national authorities designed to promote the safety and soundness of the overall banking system as well as the orderly growth and efficiency of the financial system. In part, macro-prudential activities such as the lender-of-last-resort rôle and deposit insurance are intended to assure the resiliency of the overall system so as to withstand major shocks to confidence.

Margin: funds or collateral posted as a good-faith performance guarantee. In repurchase agreements lenders of funds often make borrowers post margin by requiring them to deliver securities in excess of the amount of money borrowed. Futures and options exchanges often require traders to post initial margin when they enter into new contracts. Margin accounts are debited or credited to reflect changes in the current market prices on the positions held. Members must replenish the margin account if margin falls below a minimum. In similar fashion, customers must post margin on positions held for them at the exchange clearing house by member firms. (See Marking to Market.)

Market Liquidity Risk: the possibility that a financial instrument cannot be sold quickly and at full market value.

Marking to Market: the process of recalculating the exposure in a trading position in securities, option contracts, or futures contracts. In exchange-traded contracts, the exchange clearing house marks members' positions to market each day using closing market prices. Members must maintain a certain minimum level of margin at the exchange clearing house and must post additional margin if the marking-to-market process reduces margin below the minimum. (see Margin.)

Mean: the "average" of all observations. Specifically, the mean ($\overline{X}$) is equal to the sum of all observations (X_i) divided by the number of observations (n). $\overline{X} = 1/n\Sigma(X_i)$.

Mirror Swap: a reverse swap written with the original counterparty.

Mortgage-Backed Bonds: bonds traded mainly in the United States which pay interest semi-annually and repay principal either periodically or at maturity, and where underlying collateral is a pool of mortgages. (See Collateralised Mortgage Obligations and Pay-Through Bonds.)

Multiple-Component Facility: facility under which several different options for drawing funds are available to the borrower. These may include issuing notes, drawing on short-term or medium-term credits or swinglines. (See NIF and Swingline.)

Net-Writers: options-market-makers and traders who have written or sold more options than they have purchased.

Normal Distribution (also Normal Probability Distribution): "bell-shaped" curve depicting a symmetric probability distribution of a continuous random variable. The distribution is defined by the mean and standard deviation, such that approximately two-thirds of all observations will fall within one standard deviation above and below the mean, about 95 per cent. will fall within two standard deviations above and below the mean, and so on.

Note Issuance Facility (NIF): a medium-term arrangement enabling borrowers to issue short-term paper, typically of three or six months' maturity, in their own names. Usually a group of underwriting banks guarantees the availability of funds to the borrower by purchasing any unsold notes at each roll-over date, or by providing a standby credit. Facilities produced by competing banks are called, variously, revolving underwriting facilities, note purchase facilities, and Euro-note facilities.

Notional Principal: a hypothetical amount on which swap payments are based. The notional principal in an interest rate swap is never paid or received.

OECD: Organisation for Economic Co-operation and Development. Its members are Australia, Austria, Belgium, Canada, Denmark, Finland, France, West Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. Yugoslavia takes part in certain work of the OECD and is included in statistics relating to OECD countries in this report.

Off-Balance-Sheet Activities: banks' business, often fee-based, that does not generally involve booking assets and taking deposits. Examples are trading of swaps, options, foreign exchange forwards, standby commitments and letters of credit.

Option: the contractual right, but not the obligation, to buy or sell a specified amount of a given financial instrument at a fixed price before or at a designated future date. A call option confers on the holder the right to buy the financial instrument. A put option involves the right to sell the financial instrument.

Options Book: the aggregation of all written and purchased options held by a market participant.

Options Clearing Corporation (also OCC): the corporation which provides clearing facilities for all option trades on US securities exchanges. Its new Intermarket Clearing Corporation assured clearing operations at the New York Futures Exchange on 11th January 1986.

OTC Market (Over-The-Counter Market): trading in financial instruments transacted off organised exchanges. Generally the parties must negotiate all details of the transactions, or agree to certain simplifying market conventions. In most cases, OTC market transactions are negotiated over the telephone. OTC trading includes transactions among market-makers and between market-makers and their customers. Firms mutually determine their trading partners on a bilateral basis.

Out-Of-The-Money: an option contract is out of the money when there is no benefit to be derived from exercising the option immediately. A call option is out of the money when the price of the underlying is below the option's exercise price. A put option is out of the money when the price of the underlying is above the option's exercise price.

Participation Certificates (PC): (See Federal Home Loan Mortgage.)

Partly-Paid Bonds: securities for which the buyer pays only a portion of the total issue price. The holder is obligated to pay for additional amounts at predetermined dates. So far the practice has been limited primarily to issues denominated in US dollars and pounds sterling.

Pass-Throughs: certificates representing ownership in a pool of mortgages. The monthly interest payments, amortisation, and prepayments of principal are "passed through" to the owners of the certificates by firms servicing the mortgage payments. GNMA-guaranteed pass-through certificates are the most common type.

Pay-Through Bond: a mortgage-backed debt obligation of the issuer. Interest and amortisation are paid periodically, as well as prepayments of principal that occur.

PHLX: Philadelphia Stock Exchange.

Physicals: (also Actuals): an option contract on physicals requires the delivery of an actual financial instrument. By contrast, some options call for cash settlement while others require delivery of a futures contract (which may itself require delivery of an actual financial instrument or require cash settlement).

Plain-Vanilla Swap: a US dollar interest rate swap in which one party makes floating rate payments based on six-month LIBOR and receives fixed rate funds expressed as a spread over the rate on US Treasury securities. The maturity is usually five to seven years and deal size is typically at least $50-100 million.

Premium: the price paid for an option by an option holder to the option writer.

Prepayment: a payment of principal made before the scheduled payment date, usually because the mortgage is refinanced or the house is sold.

Put Option: See Options.

Recourse: a general legal term meaning that the purchaser of a financial asset from an original creditor has a claim on the original creditor in case the debtor defaults. Specific arrangements to provide recourse arise in a variety of innovative transactions, including LDC Loan Swaps and various types of securitised assets. Such arrangements can take many forms, including: an explicit guarantee that credit losses will be reimbursed or the assets replaced by assets of similar quality; an agreement to repurchase assets before maturity; or more indirectly, indemnification by a third-party guarantor for any losses that occur.

Reinvestment Risk: the chance that a security's coupons will be reinvested at yields different from the security's stated yield to maturity.

Repurchase Agreement (RP or repo): a holder of securities sells these securities to an investor with an agreement to repurchase them at a fixed price on a fixed date. The security "buyer" in effect lends the "seller" money for the period of the agreement, and the terms of the agreement are structured to compensate him for this. Dealers use RPs extensively to finance their positions.

Reverse Conversion: an arbitrage trade in options involving the sale of the underlying instrument and the establishment of a synthetic long position in options on the underlying (the purchase of a call and sale of a put). (See Arbitrage, Conversion and Synthetic Position.)

Reverse Swap: one form of activity in the secondary swap market. A reverse swap offsets the interest rate or currency exposure on an existing swap. They can be written with the original counterparty or with a new counterparty. In either case, they are typically executed to realise capital gains.

Revolving Credit Agreement: a commitment by a bank to lend to a customer under predefined terms. The commitments generally contain covenants allowing the bank to refuse to lend if there has been a material adverse change in the borrower's financial condition.

RUF: See Note Issuance Facility.

Securitisation: the term is most often used narrowly to mean the process by which traditional bank or thrift institution assets, mainly loans or mortgages, are converted into negotiable securities which may be purchased either by depository institutions or by non-bank investors. More broadly, the term refers to the development of markets for a variety of new negotiable instruments, such as NIFs and FRNs in the international markets and commercial paper in the United States, which replace bank loans as a means of borrowing. Used in the

latter sense, the term often suggests disintermediation of the banking system, as investors and borrowers bypass banks and transact business directly.

Settlement Price: the price of the financial instrument underlying the option contract at the time the contract is exercised. Where necessary, option contracts specify objective standards for determining the settlement price.

Settlement Risk: the possibility that operational difficulties interrupt delivery of funds even where the counterparty is able to perform.

Shelf Registration: Rule 415 of the US Securities and Exchange Commission which allows major corporations to go directly to the equity and debt markets to sell securities quickly. Previous rules, which had required companies to file registration notices with the SEC and wait at least two days for approval, had favoured the formation of syndicates to sell securities. Rule 415 allows blanket registration of issues over the ensuing two years and encourages direct sale of blocks of securities to individual investment houses.

Short Option Position: the position of a trader who has sold or written an option regardless of whether it is a put or a call. The writer's maximum potential profit is the premium received.

Short Volatility Position: an option position designed to profit from an expected decline in the implied volatility component of the option's price. The position can take different forms. One form is to sell options and use delta-hedging techniques to protect against changes in the price level of the underlying instrument. (Also see Straddle Write for another strategy.)

Single-Purpose Corporation: a US corporation set up to issue short-term paper in order to purchase assets of a certain type or to make loans and advances to a single firm. The stock of such corporations is sometimes donated to charitable institutions. The corporation usually issues commercial paper or preferred stock with a dividend reset at short intervals to reflect market rates. Examples of assets purchased include trade receivables and mortgages.

Standard Deviation: a statistical measure of the dispersion of observations on a variable. Specifically, it is equal to

$$\sqrt{1/n \sum_{i=1}^{n} [X_i - \bar{X}]^2}$$

where X_i are the n individual observations on a variable, $\bar{X}$ is the mean (or average) observation, and n is the total number of observations. (See Mean.)

Standby Letter of Credit: see Letter of Credit.

Straddle: an options position designed to profit from an expected increase in the price volatility of the underlying instrument. A straddle consists of the purchase of a put and a call with the same exercise date and exercise price.

Straddle Write: an options strategy designed to profit from an expected decline in the implied volatility component of prices. The position consists of selling a straddle.

Strap: an options straddle position consisting of the purchase of more calls than puts although all have the same exercise price and exercise date. While the trader expects an increase in price volatility, there is also an expectation that the price of the underlying is more likely to rise than to fall.

Strike Price: an option's exercise price.

Strip: an options straddle position consisting of the purchase of more puts than calls although all have the same exercise date and exercise price. While the trader expects an increase in price volatility, there is also the expectation that the price of the underlying is more likely to fall than to rise.

STRIPS (Separate Trading of Registered Principal of Securities): the US Treasury's acronym for zero coupon instruments derived from selected long-term notes and bonds. At a bondholder's request, the Federal Reserve, as the Treasury's fiscal agent, will separate a designated security into its individual coupon components and corpus or principal payment. The pieces may be traded separately and must be maintained on the Treasury's book-entry system.

Student Loan Marketing Association: a US federally sponsored, publicly owned corporation which grants loans to commercial banks, thrift institutions and state lending agencies for the purpose of maintaining or expanding the size of a lender's student loan portfolio.

Swap: a financial transaction in which two counterparties agree to exchange streams of payments over time according to a predetermined rule. A swap is normally used to transform the market exposure associated with a loan or bond borrowing from one interest rate base (fixed term or floating rate) or currency of denomination to another. (See Currency Swaps and Interest Rate Swaps.)

Sweep Accounts: a service provided by a depository financial institution to invest on an overnight basis all, or a portion, of a customer's idle balances.

Swingline: facility for short-term funds which can be drawn at short notice to cover the period between the offer of notes under a note issuance facility and the receipt of funds. (See NIFs.)

Synthetic Positions: combinations of options or the underlying instrument to produce a desired risk/gain position that cannot be obtained directly. Synthetic positions can be established in the following fashion:

(1) long call: purchase put and purchase the underlying.
(2) long put: purchase call and sell the underlying.
(3) long position in the underlying instrument: purchase call and sell put with same strike price and same exercise date.
(4) short position in the underlying: sell call and purchase put with same strike price and exercise date.

Tender Panel: a method for distributing notes issued under note issuance facilities. A group of financial institutions have the right to bid for the short-term notes issued under the facility on each issue date. (See NIFs.)

Term Federal Funds Market: see Federal Funds Market.

Time Value: the imputed monetary value of an option reflecting the possibility that the price of the underlying will move so that the option will become more valuable. The total value of an option, or its price, is comprised of its intrinsic value and its time value.

Uncovered Writers (also Naked Writers): option sellers who do not attempt to reduce their market risk by taking offsetting positions in the underlying security or other options. This strategy is also called taking a "biased" view in option writing, that is, anticipating that the option will fall in value.

Underlying: the designated financial instruments which must be delivered in completion of an option contract or a futures contract. For example, the underlying may be fixed-income securities, foreign exchange, equities, or futures contracts (in the case of an option on a futures contract).

VA-Guaranteed Mortgage: a residential mortgage in the United States made by a private lender and guaranteed by the Veterans Administration. Eligible mortgage borrowers have had a stipulated period of active military service.

Vertical Bull Call Spread and Vertical Bear Put Spread: limited risk/limited gain options strategies involving the purchase of a call (put) at one exercise price and sale of a call (put) at a higher (lower) strike price.

Volatility: the price "variability" of the instrument underlying an option contract, and defined as the standard deviation in the logarithm of the price of the underlying expressed at an annual rate. Expected volatility is a variable used in pricing options.

Volatility View: options positions established to profit from expected changes in the volatility implied by current option prices. For example, traders may buy options when they feel that the level of volatility implied by option prices is low (and will move higher). Conversely traders may sell options if they feel implied volatility, and therefore option prices, are high (and will move lower). These strategies do not involve an expectation on the direction of the price of the underlying but only on the expected variability in its price. (See also Butterfly Call Spread, Long Volatility Position, Short Volatility Position, Straddle and Straddle Write.)

Voluntary Termination (Swap Market): the cancellation of a swap contract which is agreed to by both counterparties. A voluntary termination usually involves a lump-sum payment from one party to the other.

Warrant: tradable instruments conferring on the holder the right to purchase from, or sell to, the warrant issuer a fixed-income security or equity stock under specified conditions for some period of time. Recently, the most common warrants have been sold in conjunction with Euro-bond offerings and enable the holder to obtain a security identical to the original issue.

Writer (also Grantor): the party that sells an option. The writer is required to carry out the terms of the option at the choice of the holder.

Zero Coupon Bonds: single-payment long-term securities which do not call for periodic interest payments. The bonds are sold at discounts from par and the investor's entire return is realised at maturity.