

BANK FOR INTERNATIONAL SETTLEMENTS

**RECENT DEVELOPMENTS IN
INTERNATIONAL
INTERBANK RELATIONS**

**Report prepared by a Working Group established by the
Central Banks of the Group of Ten countries**

**Basle
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PREFACE

In 1991, the Governors of the central banks of the Group of Ten countries established a working group to study recent developments in international interbank relations. The group was asked to focus on the role and interaction of banks in non-traditional markets, notably the markets for derivative instruments, to examine the linkages among various segments of the interbank markets and among the players active in them, and to consider the macro-prudential concerns to which these aspects might give rise.

The present report summarises some of the findings and conclusions of the working group. The report builds upon information gained from interviews conducted with market participants in G-10 financial centres in December 1991 and early 1992. It also draws upon some of the insights provided by two previous studies prepared for the Governors: "The International Interbank Market: A Descriptive Study", published by the BIS in 1983, and "Recent Innovations in International Banking", published by the BIS in 1986.

The views expressed in this report are those of the working group and do not necessarily reflect those of the G-10 central banks or the BIS.

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I. INTRODUCTION AND SUMMARY

International interbank relations have undergone significant changes in recent years as a result of the development of new financial instruments, advances in computer technology, regulatory developments and changes in financial strategies and trading practices. Most notably, financial operations involving derivative instruments have significantly altered the role of the traditional international interbank deposit markets. Moreover, such operations have strengthened linkages among various sectors of the financial industry, as well as between banks and non-financial firms. Indeed, it is no longer meaningful to consider interbank markets as separate from wholesale markets more generally. At the same time, increasing linkages among markets have blurred the distinction between domestic and international markets. Statistical information on the relative growth and size of various financial markets and on interbank transactions confirm these changes.

Market participants cite several important driving forces behind the changes in interbank and wholesale markets in recent years. These include intensified concerns about the creditworthiness of counterparties; increased competition in financial markets, as a result of deregulation; the Basle Capital Accord, which itself tended to impose higher capital ratios on banks and also acted as a catalyst for market forces that worked in the same direction; the ongoing institutionalisation of savings and the more active management of portfolios, which have greatly increased the volume and size of domestic and cross-border financial transactions; and continued gains in computer technology, which have further enhanced banks' abilities to assess market risks and to meet more diverse customer demands.

These driving forces have had several effects on the nature, relative growth of and relationships among various wholesale markets. First, credit concerns, capital constraints and the advantages of derivative instruments for hedging and position-taking purposes have contributed to a relative, and in some cases, absolute decline in activity in a number of traditional interbank markets. By contrast, since the mid-1980s, the growth of turnover and of volumes outstanding in markets for derivative instruments, including over-the-counter (OTC) markets that offer more customised products, has outpaced the growth of most other financial market activity. Banks have accounted for a large share of that growth, in part in their role as suppliers of derivative products to their clients, but increasingly through transactions on their own behalf for risk management and position-taking purposes. Available statistics suggest that at least 50 percent, and in many cases much more, of banks' exposures in these markets are incurred against other banks.

Second, the heightened concern about credit risk, reflecting both a perception of increased default risk and greater difficulties in assessing counterparties' strength, has led

many banks to reduce the size of interbank credit exposures that can be authorised, to shorten the maturity of the business they are willing to take on, and to limit dealing activities that yield low profits but give rise to large counterparty exposures. As a result, both traditional and new wholesale market business have become increasingly concentrated on a relatively small group of higher rated institutions, primarily banks, on which smaller banks have become more dependent.

Third, the complexity of risks incurred in OTC derivatives markets means that firms that want to participate profitably and safely in them must have at their disposal advanced hardware and software systems and highly skilled individuals. These requirements have contributed further to the concentration of more complex transactions on the books of a small number of players, not all of which are banks.

Fourth, the increased concentration of funds in certain types of institutions that trade actively has increased the ability of some large players individually and collectively to affect market prices. Because of the resulting increase in risks, in many market segments less capital is devoted to the market-making function relative to the overall capital put at risk in them. Market-making has become increasingly concentrated in firms that possess the size and expertise required to handle the risks profitably.

Fifth, linkages between markets have been greatly strengthened by the more rapid dissemination of information, the increased use of derivative products and the more widespread use of complex instruments and strategies that span many market segments. At the same time, the presence of the same small set of key players in most of the wholesale markets has deepened linkages among the participating institutions.

The changing nature of international interbank operations has significantly altered the risk environment facing banks. The participation in wholesale markets by entities subject to few disclosure requirements, as well as the growth of off-balance-sheet activities more generally (adequate details of which are rarely disclosed), has made the assessment of counterparty risks considerably more difficult. The complexity of risks encountered in banks' derivatives operations also presents major challenges. So does the management of the large intra-day credit exposures and settlement positions that have arisen as a result of the increase in wholesale market trading. Cash liquidity and market liquidity risks have also become more problematic for a number of participants. Market risk, by contrast, is said to be more manageable now than in the past, owing to the efforts firms have made in recent years to control these risks through the use of derivative instruments and other techniques. Market risks are also more easily priced than other risks. The pricing of credit risk appears to be problematic in a number of markets, where variations in individual counterparty credit limits (that is, quantity rationing) remain an important alternative means of distinguishing among counterparties of different credit standing.

Participants in interbank and wholesale markets have responded to these changes in their risk environment by upgrading risk management capabilities. Most participants accept the need to devote very considerable resources to evaluating, monitoring, and managing on a global basis the risks incurred across departments, products, and the range of counterparties with which they deal. They are also actively seeking means of reducing those risks, for example, by trying to exploit to an increasing extent the potential benefits of bilateral and multilateral netting arrangements. However, there is no single agreed best practice and, at many firms, significant gaps remain between the desired capabilities of risk management systems and the systems actually in operation, reflecting in most cases the significant costs involved in implementing them. Among the firms interviewed in connection with this report, some are more cognizant of risks than others. There are also differences across institutions with respect to the willingness to take, and ability to manage, risks. Moreover, the participants interviewed are among the institutions most active in these markets, and some others may have less expertise in risk management.

The sensitivity of market participants to the risks involved in their activities and the tendency for participants in well-functioning markets to respond to an increased perception of risk are positive elements in terms of reducing the likelihood that serious disruptions arise. However, a number of the features which have characterised the evolution of wholesale markets in recent years have tended to work the other way, or at least, to exacerbate problems if they do arise. First, the distinction between interbank markets and wholesale markets more broadly has become less clear. Because of increased linkages across markets, a wide range of types of institutions, from a number of countries, can become involved as problems spread. Second, greater sensitivity to credit risk has made banks increasingly reluctant to support troubled counterparties. Third, the complexity of many financial transactions has reduced the transparency of firms' balance sheets and off-balance-sheet activities. This might cause firms to back away from troubled institutions or from institutions perceived to be subject to similar stress. Fourth, the availability of derivative instruments has enabled participants to take complex positions that rely on a presumption of liquidity in a number of markets; that presumption may prove illusory in times of stress, with a consequent impact on other markets. Fifth, positive feedback channels and the increased reaction speed of prices can reduce the time that central banks have to react to an incipient crisis.

To keep pace with the rapidly changing financial environment, market participants, individually and collectively, need to develop further the procedures and infrastructures required to monitor and control risks. In particular, management awareness and understanding, at all levels, of the risks being taken on by their institutions, and of the assumptions and parameters on which these risk exposures are predicated, must be enhanced. Greater attention than in the past should be paid to the ramifications on their own operations

and risk exposures of problems at institutions or in markets on which they rely heavily. Firms must develop contingency plans for dealing with such circumstances.

In addition, consideration of a number of measures to strengthen the institutional underpinnings of wholesale markets, involving roles for market participants, central banks and other entities, should be given high priority.

First, there is scope for enhancing netting schemes. Although there is a need to be realistic as to the possibility that netting arrangements may fail to reduce risks to the extent intended, and may break down in times of stress, properly designed netting arrangements can reduce risks associated with a given level of activity. To ensure such an outcome, a number of issues need to be addressed. These include: (i) a resolution of legal uncertainties involving the enforceability of netting arrangements within countries and, even more difficult, across countries; (ii) the development of methods to ensure, in the case of multilateral arrangements, that the system has the capacity to achieve settlement in the event of the default of one or more participants; (iii) in the context of multilateral clearing house arrangements, elaboration of the best means of encouraging differentiation among counterparties, on the basis of creditworthiness; and (iv) reaching agreement on the appropriate form of supervisory recognition of netting, so that any reduction in capital charges associated with netting is consistent with, and provides incentives for, an actual reduction in risk.

Second, to alleviate problems associated with reduced transparency in financial markets, market participants and central banks should encourage efforts aimed at improving and achieving some harmonisation of accounting and reporting practices with respect to off-balance-sheet instruments. To the extent possible, development of accounting guidelines should be done in an internationally coordinated manner. Ways of making public disclosure of financial positions more meaningful should also be undertaken.

Third, uncertainties with respect to the laws affecting financial markets in individual countries and the application of various laws to international financial activities pose a risk to markets and complicate risk management. Continuing cooperative efforts to resolve these uncertainties should be encouraged.

The rapidly changing environment also presents new challenges to the traditional roles of central banks in fostering financial market stability. The most fundamental responsibility of central banks in that regard is the pursuit of macroeconomic policies that are conducive to monetary, economic and financial market stability. Central banks must also work with other financial authorities to help ensure that banks and other financial institutions are adequately capitalised and have appropriate systems in place for managing and controlling risks.

Beyond this, it is clear that in order to play an effective supporting role in further reducing risks, central banks need to continue to develop further their understanding

of the nature of financial activities and of the risks faced individually and collectively by all participants in financial markets. Achieving greater understanding is a field for active cooperation between central banks and market participants. Both market participants and the working group perceive a strong need for better, more comprehensive and more meaningful statistics concerning derivative markets and the involvement of banks and other financial institutions in them. Although important improvements have taken place in recent years in national reporting systems, and in the statistical material collected and compiled by industry associations and organised derivatives markets, serious gaps remain. Further efforts should be undertaken to develop a better understanding of (i) the concepts relevant to monitoring macro-prudential risks in this context, and (ii) which data could best elucidate those concepts. It should also be considered whether existing or prospective supervisory reporting systems could be used to help generate such data and whether the data could be published in an aggregated form to help market participants assess their own positions in the markets.

To develop their technical expertise with respect to market instruments and market mechanisms, central banks must place high priority on continued monitoring and analysis of developments in wholesale markets. The changes taking place in interbank relations are not yet fully understood, and cannot be fully clarified by better statistical coverage alone. Continued contact with market participants will also be important: modest re-runs of the interviews carried out for the present report, confined to a small number of key institutions in major market centres, should therefore be continued.

II. RECENT DEVELOPMENTS IN INTERNATIONAL INTERBANK RELATIONS

This chapter summarises the information gained from interviews conducted with participants in the major financial markets characterised by active interbank dealings. The interviews were conducted in December 1991 and January 1992 and covered sixty-three institutions (fifty-five banks, seven securities houses, and one insurance company) in G-10 countries. The institutions interviewed were selected on the basis of anecdotal information as to the extent of their involvement in wholesale financial markets, including in particular the markets for derivatives and other off-balance-sheet products. As a consequence, the results should not necessarily be taken to be representative of the behaviour of all participants involved in wholesale markets.

A. Description of principal markets

(i) Funding markets

The principal wholesale funding markets used to varying extents by the banks and securities houses interviewed include the international deposit and certificate of deposit (CD) markets, the commercial paper market, the repo (or securities lending) market, the medium-term note market, bank investment contracts, bank lending facilities and the corporate note and bond markets. These markets vary greatly in terms of size, functions, and participation. The interviews focused mainly on the international interbank deposit market, even though the CD, commercial paper and repo markets are also characterised by active interbank dealing and are used extensively to satisfy financial institutions' short-term funding needs.

Almost all market participants interviewed said that the scale of activity in the interbank deposit market had declined recently, and especially since the autumn of 1990. Banks cited several reasons for this, of which the three most important were: (a) increased concern about counterparty credit risk, which had led to a reduction of credit lines; (b) greater emphasis on the efficient use of capital following the introduction of the Basle capital accord, which had led many banks to scale back on low return interbank deposit dealing; and (c) the increased use of more efficient derivative and other off-balance-sheet instruments to manage and take market risks that had previously been handled in the interbank deposit market. As a result of these developments, the international deposit market is now seen mainly as a funding market.

Both awareness of and concerns about counterparty credit risk have increased greatly in recent years. As a result, interbank placements are increasingly made with highly

rated names. This, combined with the withdrawal of smaller players and the growth in average transaction size, has led to greater concentration in the market.

The explicit linking of credit exposures to capital requirements has resulted in greater selectivity in the taking on of such exposures. Although the risk weight applied to interbank claims is low, the principal amounts involved in interbank deposit dealing activity are large. Many firms consider the resulting absorption of capital too large relative to the return that can be earned.

The capital accord, which reinforced other market forces that have led to increased emphasis on profitability, has also made banks reassess the capital efficiency of various means of hedging or taking market risks. Many have reduced their hedging and position-taking activity in the interbank deposit market and have made greatly increased use of derivative and other off-balance-sheet instruments to manage market risks. In addition to meeting banks' desire to reduce balance sheets, derivatives offer in many cases greater efficiency and scope in the management of market risk than do interbank deposit transactions.

A number of participants have developed other short-term funding alternatives to lessen their dependence on interbank funding, in order to reduce both the cost of funds and their susceptibility to general liquidity crunches or to the risk of liquidity problems in the event of their credit standing being downgraded. These alternatives have included mainly core or retail deposits, medium-term note facilities and longer-dated commercial paper programmes.

A number of North American and continental European banks noted that some segments of the investor base increasingly tapped by banks and securities houses, notably pension funds, insurance companies and money market mutual funds, tended to react sharply to small interest rate changes or to rumours of downgradings. Some institutions made these comments with particular reference to investors in the commercial paper market. This could be ascribed in part to investment guidelines that restrict these investors' exposures to counterparties whose credit standing has been downgraded, but also reflects their more stringent performance criteria and aggressive trading strategies. For this reason, a number of banks said they considered firms that obtained a significant share of their funding from these markets to be susceptible to severe cash liquidity problems in the event of their credit standing becoming subject to doubt. Some banks indicated that they viewed firms with large commercial paper outstandings as potential sources of systemic risk, given the speed with which commercial paper funding could evaporate. US securities houses have reduced their reliance on the commercial paper market in the wake of the Drexel and Salomon affairs.

Concern about the instability of placements from some such sources has led to a renewed interest in cultivating funding relationships with other banks, even though the costs of interbank funds may be somewhat higher. Thus, while several banks noted that the scale of

their dealing activities in the interbank market had declined, concerns about cash liquidity needs meant that they would maintain their presence on both sides of the deposit market to preserve reciprocal relationships with major counterparties.

The banks interviewed cited a number of factors affecting volatility in the interbank funding markets. First, and at least in the short term, both supply and demand in the deposit market have shrunk and the depth of the market has decreased. Moreover, funds are increasingly concentrated in the larger and highly rated banks, and the number of participants ready to take positions and to intermediate funds has declined. Second, non-bank institutions have come to play a larger role in the wholesale funding markets. Their behaviour, combined with the large size of their placements, is of concern to market participants. Third, the greater involvement of banks and, especially, securities houses in derivative products is said to have given rise to sharp increases in cash funding requirements from time to time, reflecting the need to make margin payments, adjust hedges, or close positions in the face of adverse market movements.

(ii) Markets in foreign exchange products

The spot foreign exchange market. Market participants said the volume of spot foreign exchange trading continued to grow, although less vigorously than in the late 1980s. Overall, liquidity in the spot market remains deep, but less evenly distributed across currencies and centres than in the past. Cross-trading of European currencies in London and other European centres was said to have increased, whereas dollar business was said to have shrunk in 1991, notably in Tokyo. Spot market trading has received a boost from increased trading in foreign exchange (FX) options and the need for option writers to hedge their exposures in the cash market.

Several banks noted that the market has become two-tiered. The first tier consists mainly of large banks willing and able to take sizable positions. These banks have decreased in number, but have become more important in terms of turnover. The second tier consists of a large number of banks and other firms, many of whom had previously been very active dealers in the market, whose business was increasingly client-driven.

A reduction in market-making capacity was noted frequently. This was attributed to the increased risk and diminished profitability of market-making, as well as to mergers between some banks. The increase in overall foreign exchange trading volume and in average transaction size relative to the size of market-makers' books has made it more difficult for firms to commit to making a market under all market conditions. Increased reliance on technical analysis as well as the growing presence and weight of managed funds mean that one-way market conditions occur more frequently than in the past.

The forward foreign exchange market. The forward market, including both outright forward and swap activity, is still very large and its liquidity is said to remain deep -- albeit reduced in comparison with earlier years. However, many noted that forwards had been superseded by instruments providing more efficient hedging and position-taking potential. Forward Rate Agreements (FRAs), which have a lower credit conversion factor in the capital accord than do forward foreign exchange contracts, have become a more intensively used instrument for managing the interest rate risk associated with foreign currency funding, while currency options and listed currency futures are increasingly used to manage direct foreign exchange exposures. Synthetic Agreements for Forward Foreign Exchange (SAFEs) are also emerging as a complement to conventional forward transactions.

The currency swap market. The longer-dated currency swap market is said to be expanding, but has until recently been growing more slowly than other segments of the swap market.¹ The involvement of banks is said to respond mainly to underlying customer demand in connection with euro-bond issues, and the market is not characterised by active interbank dealing.

Market participants offered conflicting explanations for the slower growth of this segment of the swap market. Some banks noted that the aims of a currency swap could be accomplished with alternative and more capital-efficient strategies and argued that the capital accord's treatment of currency swaps with a maturity in excess of one year was too onerous relative to the risks involved. Others, however, pointed out that internal capital charges against potential exposures in longer-term currency swaps discouraged trading in such contracts, noting that such charges normally exceeded the minimum requirements called for by the capital accord.

The OTC market for FX options. Participants reported that the OTC market for FX options is the fastest growing segment of the foreign exchange markets. In Tokyo, FX options trading (as reported by brokers) continued to expand rapidly last year (by 33 percent over 1990), despite the contraction in both spot and forward trading. Turnover of FX options as a share of average monthly foreign exchange turnover in Tokyo grew from 5 percent in

¹ The term currency swaps refers to a group of instruments with 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 the amortisation of principal. Normally fixed interest rates are used in both currencies. The International Swap Dealers Association (ISDA) classifies currency swaps as a part of the much larger market in cross-currency interest rate swaps, in which no principal amounts are exchanged.

1989 to 12 percent in 1991.² In London, market participants indicated that both the volume and range of FX options traded had increased significantly in recent years. Market participants in Canada, France, Germany, Italy and the Netherlands also said FX options trading was growing at a rapid pace.

The OTC market for FX options is principally an interbank market, but less so than the spot or forward markets. Transactions between banks were estimated to account for between 50 percent (Japan and the United States) and 80-85 percent (Canada and Germany) of total FX options turnover. Average transactions sizes have increased significantly in recent years: since the mid-1980s standard lot sizes have doubled (from \$5-10 million to about \$10-20 million) and it is no longer rare for OTC FX options to be written on a notional principal amount of \$500 million or \$1 billion.

OTC FX options are said to offer users greater leverage, flexibility and precision than many traditional foreign exchange instruments for managing or taking exchange rate risk. The ability and willingness of banks and securities houses to provide both increasingly standardised OTC FX option contracts as well as tailored contracts to meet the often complex and longer-dated demands of end-users are said to have attracted business away from exchange-traded FX options.

The principal non-bank counterparties in the OTC markets for FX options are institutional investors (European and US) and non-financial corporate customers, each of which accounts for roughly 50 percent of the non-interbank market. The largest writers of options are said to be US commercial banks and securities houses, French, Swiss and Japanese banks and European non-financial corporations.

Securities houses or derivatives units of banking entities appear to play a larger role in the FX options market than in other segments of the foreign exchange market. US securities firms appear to account for a large share of FX options turnover in London, New York and Tokyo.

The FX options market is said to have two segments. One segment is large and is dominated by trading on market volatility in the main currencies: a large number of banks in this segment transact for own and clients' accounts at standard terms and maturities. This portion of the market seems to have matured and spreads have tightened appreciably in recent years. Although market-making is said to confer information benefits, much of this business is brokered. Liquidity in this segment was described in London as comparable to or, for sizable transactions, better than in the spot market; in Tokyo, FX options liquidity was said to be catching up with that in the forward market.

² FX options turnover is measured in terms of the notional amounts of contracts traded. However, not all contracts are exercised, and those which are do not generally give rise to currency transfers in the amount of the notional value of the contracts.

The second segment consists of exotic, customised and often longer-dated FX options offered by a smaller number of banks. Interbank dealings in these instruments are limited and the small number of active institutions tailor their services mainly to non-bank clients' needs. Liquidity in this segment is less deep and resilient and occasional liquidity difficulties have been encountered. Customised and longer-dated FX options have been highly profitable but are acknowledged to be risky.

It is possible that the concentration of market-making capacity in this second segment is related to economies of scale in managing the risks in FX options. A number of participants indicated that their efforts to build large FX options books were motivated by the economies that accrue from the diversity and the potential offsets within their books of strike prices and expiration dates.

(iii) Markets in interest rate products

Markets in OTC and exchange-traded derivative products to hedge and take interest rate risk have grown very rapidly in recent years; banks' usage of them has contributed importantly to the relative decline of the interbank markets which offered more traditional but costlier hedging opportunities. In terms of notional values outstanding, the largest component of the OTC markets for interest rate products appears to be interest rate swaps (IRSs), followed by FRAs. Interest rate options (including caps, collars and floors) and swaptions rank respectively third and a distant fourth. Until recently, markets in exchange-traded interest rate futures and futures options have generally grown in line with OTC markets in interest rate products. Although these markets are not discussed here, in part because the risks involved in them are more limited, the statistical appendix reviews activity levels and banks' involvement in them.

The interest rate swap market. IRSs have become vital instruments in banks' dealing and position-taking activities and account for a very substantial proportion of their outstanding off-balance-sheet exposures. Liquidity in the IRS market, particularly in the short-term segment, is said to be very high. There are many active participants worldwide, and there is said to be little need for, or return to, market-making. Liquidity in the market has generally proved resilient, although less so in longer-dated swaps, which are more sensitive to concerns about credit risk. Partly for the latter reason, but also because IRSs are increasingly used by financial institutions as a risk management tool, the average maturity of IRSs has shortened in recent years. Concerns about credit risk have also made collateral and margin provisions more common in certain market segments.

Banks use short-term IRSs principally to manage interest rate risk in their lending and funding portfolios. IRSs (and FRAs) have significantly enhanced banks' ability to manage interest rate risk. IRSs are also used by higher-rated banks to swap longer-dated fixed

rate interbank deposits into shorter-dated funds to achieve below-market funding costs. For this reason, treasury departments of highly rated banks that are not otherwise active in the market as originators or intermediaries may run a substantial short-term swaps book as a part of their overall funding and hedging operations.

On the non-bank user side, managed funds and insurance companies have become increasingly involved in the IRS market. Their growing involvement is said in part to reflect hedging needs arising from their growing international bond portfolios and, in some countries, an increase in transactions for position-taking purposes.

Participants report that the IRS market in some countries is two-tiered. To a very large extent, this is seen as a consequence of credit risk concerns. For example, at the long end of the market, counterparties pay more attention to credit standing than to the prices offered. This has resulted in a large share of the longer-dated swaps being arranged by a relatively small number of highly rated institutions. The short-term market, by contrast, is largely price-driven and consists of a large number of dealers.

As swap exposures between banks have grown, bilateral netting arrangements, usually based on ISDA's master agreement, have become increasingly common. A number of participants said that the absence of recognition of such netting arrangements in the capital accord acted as a constraint on the growth of the market.

The forward rate agreement market. In centres other than Japan (where FRAs are not currently traded because of legal ambiguities), the FRA market is generally believed to be the second-largest, and in recent years one of the fastest-growing, segments of the OTC interest rate product market.³ Transactions in FRAs are overwhelmingly between banks, and are to a large extent brokered. A large share of business is said to be cross-border.

Like an IRS, an FRA is a highly efficient instrument for managing and taking interest rate risk, allowing banks to adjust interest rate exposure without altering their liquidity profile and with less impact on balance sheet and credit exposures than is involved in use of the interbank deposit market. These features make FRAs especially appealing given current concerns about credit risk and banks' desire to make efficient use of capital.⁴

London participants said that there were large and liquid FRA markets in dollars, sterling and Deutsche Marks, and less liquid and smaller markets in yen, Swiss francs, lire, and ECUs. Most FRAs are short-term contracts of between three and six months, although longer-dated contracts up to two years also occur. Spreads in the FRA markets have

³ Some London banks indicated that the FRA market there might be as large as the IRS market on an outstanding notional principal basis. Growth had been particularly strong in the 1989-91 period, but had since levelled off.

⁴ FRAs are in essence an OTC interest rate futures contract. Compared with listed futures, FRAs overcome the problems of contract specificity, margin calls, fixed forward dates, and the need to set up accounts and clearing facilities at exchanges. However, unlike listed interest rate futures contracts, FRAs are not exempt from capital charges in the capital accord, because they involve credit risk.

declined substantially in recent years, and there are indications that this has entailed a decrease in arbitrage activity.

The OTC market in interest rate options and swaptions. The OTC market in interest rate options has grown less vigorously than those for IRSs and FRAs and is the smallest segment of the interest rate derivative products market. Although OTC options on Japanese government bonds have been traded since 1989, participants in Japan only recently appear to have started offering a richer menu of interest rate options, which could reflect the fact that exchange-traded products have so far met their needs. By contrast, Canadian banks mentioned that activity in OTC options on Canadian interest rates suffered from low turnover in listed interest rate futures and options on futures. Activity in OTC interest rate options products (especially caps and collars) grew quite strongly in the United States in the 1985-88 period on the back of the growth of financing related to merger and acquisition activity, but growth slowed when this activity diminished.

In more recent years, banks and securities houses have begun trading interest rate options on government bonds, notably German and Japanese government bonds and, to a lesser extent, UK, French and Italian bonds. These options are often written for large amounts and for very short maturities. OTC interest rate options are also increasingly embedded in bond issues and in swaps, notably swaptions. However, the banks interviewed gave the impression that swaptions activity is marginal. Activity in London is said to be sporadic, owing to the fact that the complexity of the structures leaves organisers at risk of not being able to put hedges in place before the market has moved; a few publicised losses may also have limited bank activity. In Japan, financial institutions have just recently begun to offer swaptions in response to more complex risk transformation needs of customers.

(iv) Other OTC markets for derivatives

Equity derivatives. There are three principal categories of equity derivatives offered in the OTC market: equity options (on stock indices, on baskets or on individual stocks), equity-linked fixed income instruments (warrant or convertible bonds) and equity swaps. Information on the relative size of these market segments is patchy. In the United States, equity options are said to form a bigger market than equity swaps, and index derivatives a bigger market than derivatives on individual stocks. Worldwide, OTC derivatives on Japanese, US and German equity indices are said to be the most actively traded. The main purchasers of these products are institutional investors.

The initial source of growth of the OTC markets for equity derivatives was the interest, mainly on the part of Japanese corporations, in the issuance of Euro-bonds with equity-linked elements, either convertible bonds or bonds with detachable warrants. However, more recently equity derivatives have increasingly been used by institutional

investors as a means of gaining exposure to foreign markets when investment guidelines hinder direct holdings of foreign equities. Equity derivatives may also make it possible to garner arbitrage profits that it would otherwise be difficult to capture given the difficulties in creating and covering short positions in many markets. In addition, they obviate the need for investors to handle clearing and settlement procedures on overseas exchanges.

Participants in New York said that OTC equity derivatives were often highly customised and markets for them generally illiquid. One participant noted that most banks would be reluctant to make a price for a competitor.

Commodity derivatives. Although OTC gold options have been traded in London and New York for some time, the increased volatility of oil prices associated with the Iraqi invasion of Kuwait in August 1990 triggered more general interest in OTC derivative products in commodities (swaps and options). Trade in such products is said to have continued to grow throughout 1991 and to encompass a widening range of commodities. The largest commodity derivatives sectors are those covering oil and energy-related products (e.g. jet fuel, natural gas, and electricity).

Some market participants consider the growth potential of commodity derivatives to be large. However, the involvement of banks is likely to be largely driven by clients, as banks do not naturally have explicit commodity exposures. Interbank transactions in commodity derivatives are said to be limited. Nevertheless, some trading in oil derivatives took place between financial institutions (mainly securities houses) during the Gulf war.

B. Risks, risk awareness and pricing

Of the various risks faced in interbank markets, the greatest concern attaches to credit risk. However, the increase in the volume and average size of transactions in recent years, the strengthening of linkages among market segments and players, and the increased level of concentration in many market segments have also led to heightened awareness and concern about settlement risk and market liquidity risk.

While the various risks faced in wholesale market activity are conceptually distinct, participants noted that they could not be considered to be independent of one another. For example, credit risk in derivative instruments is largely inseparable from market risk. More generally, market risk is connected with market liquidity risk. Cash liquidity risk can be exacerbated by both market and market liquidity risk as well as by the wider ramifications of any default (i.e. credit risk).

Views differ on the overall level of risk in trading following the growth of activity in non-traditional instruments. Participants who are not central players in the markets but who make active use of non-traditional instruments claim that the increased availability and use of derivatives have enabled them to reduce significantly interest rate and

exchange rate risk. Derivatives have also enabled many banks to separate the management of market risk and funding risk and, by lessening their recourse to the interbank deposit markets for market risk management, have reduced their credit risk exposures.

The views of large bank players, on the other hand, are more differentiated. First, at the level of the international player, the variety, complexity and level of risks incurred have clearly increased. The management of these risks poses considerable challenges to risk control and evaluation procedures, necessitating substantial and continuous investment in people and systems to facilitate information gathering and the implementation of controls. Second, large players seem more aware of and concerned about the degree of concentration in the various market segments, and about the fact that the same firms tend to be leading market-makers in several of them. Problems at any one of these firms were widely agreed to be a potential source of cross-market liquidity problems and of systemic risk.

Credit risk. Banks' concern with counterparty default risk has increased substantially in recent years. Many have responded by reducing credit lines, cutting back on the number of counterparties dealt with and by shortening the average maturity of business they are willing to take on.

Banks reported that their heightened concern could be traced to four developments: (i) the deterioration of the credit standing of many banks worldwide; (ii) enhanced awareness of credit risk following the introduction of the capital accord; (iii) well-publicised defaults in the corporate sector; and (iv) greater difficulties in assessing the credit standing of counterparties as well as credit exposures to counterparties. These latter difficulties reflect deficiencies in information regarding counterparties' off-balance-sheet exposures and the inseparability in many OTC derivative instruments of the size of potential credit exposure and price developments.⁵

Concern about their credit standing has spurred some US securities houses to set up separately capitalised derivatives units, principally for their swaps business. These units are capitalised and organised in a manner which qualifies them for a triple A rating. A triple A (or at least a double A) rating is considered essential to attract the more profitable customised and longer-dated business in swaps and other derivatives, whether vis-à-vis non-bank clients or in the wholesale market. With respect to wholesale market trading, some securities houses with ratings on a par with banks claim that they are at a disadvantage relative to banks because of the latter's access to central bank borrowing facilities and their lower counterparty risk weight in the capital accord. These aspects may at times make it more attractive for banks to transact with banks rather than with such securities houses. In

⁵ In many derivatives transactions, a price or volatility change in the bank's favour increases the market value of the contract. The realisation of that value depends on the counterparty meeting its obligations.

part, these disadvantages can be attenuated by "creating" triple A rated units. However, other securities houses doubt whether the capital costs of such units can be justified by returns.

Clearing and settlement risk. Nearly all the banks interviewed perceived settlement risk to have increased in recent years, in part reflecting the growth in daily trading volumes and settlement positions in both cash and derivatives markets, and in part because of increased dealing with a wider range of financial institutions. Beyond monitoring and attempting to limit their unsettled positions vis-à-vis individual counterparties, there appear to be limits to what individual participants can do to reduce settlement risk, short of scaling back the volume of their operations.

A number of participants noted that settlement problems in non-traditional instruments could arise because of differences in settlement procedures between derivatives and underlying instruments, and because of uncertainty with respect to settlement timing and amounts in some derivatives, notably options. A number of banks also noted that differences in settlement procedures across markets created complexities for back-office staff.

Following the stock market break in October 1987, a number of large financial institutions began to treat clearing corporations like other counterparties and to limit exposure to them by diversifying hedging activities across exchanges whenever possible. Participants also noted that extreme bunching of option strike prices at exchanges could create potential settlement problems, and could have spillover effects on the underlying cash markets.

Market risk. Participants consider market risk to cover the risk of price changes in explicit positions, as well as spread and basis risk in imperfectly hedged positions. Despite continued volatility in asset prices and exchange rates, the richer menu of instruments available for hedging and position-taking, and the greater expertise in using them, both appear to have made market risk much less of a concern than in the past. By contrast, basis or spread risk can be substantial across a firm's derivatives business because it may not be possible (in the short run), desirable (because exposure is intentional) or cost-effective to hedge transactions exactly.

Market liquidity risk. Market participants generally define market liquidity with reference to the extent to which prices move as a result of their own transactions. On this definition, market liquidity in normal times was said not to have diminished in most markets. However, a diminution of market-making capacity relative to total capital at risk in wholesale markets, increased transaction size, and more aggressive short-term trading strategies have meant that market-makers are sometimes swamped by one-way market moves. As a result,

obtaining two-way prices near the market at all times or for large transactions has become more difficult than in the past.

The risk associated with day-to-day variations in market liquidity is seen as distinct from the risk of a sudden erosion of liquidity in a particular market segment. Such a sudden erosion could occur as the result of an unusually sharp price or volatility shock, or because of the withdrawal of a key market-maker. Some banks noted that market liquidity could be equated with the cumulated confidence of participants that "normal" market conditions would continue to prevail; events that damaged this confidence (e.g. particularly disturbing news, evidence of malpractice) could also lead to the erosion of market liquidity.

Some firms in North America and Europe viewed a sudden erosion of liquidity in a wholesale market segment as a source of potentially large problems, as the closer linkages between markets and between the main players in them have increased the potential for a liquidity disruption to spill over into other segments. Other firms, by contrast, claimed that the effects of an erosion of liquidity in one market segment could be alleviated by tapping other market segments.

Cash liquidity/funding risk. The views of participants with respect to the importance of this type of risk vary both between types of institutions (banks versus securities firms) and between similar institutions of different credit standing. By and large, cash liquidity risk appears to be of greater concern the greater is a firm's involvement in derivatives businesses, the greater is its reliance on short-term funding, the lower is its credit standing, and the more restricted is its access to central bank discount or borrowing facilities.

Thus, despite the shrinkage of the deposit market, and despite the increase in their derivatives activities, many banks with access to central bank facilities seemed much less concerned about this risk than institutions not having a direct link to the central bank. However, one very large bank player in the OTC derivatives markets acknowledged the need for a considerably more liquid balance sheet than would be needed in traditional banking operations. Some banks of lower credit standing said that uncertainty with respect to day-to-day cash flow was their most worrying risk.

In contrast to the majority of banks, securities houses find the management of the cash requirements arising from large derivatives portfolios to be a challenging task. This is due in part to changes in the nature of their business and to the traditionally short-term character of their funding. Such cash liquidity requirements can arise suddenly and in large amounts when changes in market conditions or in perceptions of their credit standing necessitate margin payments or the adjustment of hedges and positions. For these reasons, many securities houses have made efforts to diversify their funding sources, in particular by reducing their dependence on "bought funds" such as commercial paper, and to lengthen the maturity of their funding base.

Legal risks. Legal risks or uncertainties complicate both trading and risk management and receive considerably more attention than in the past. Participants indicated that legal ambiguities associated with new products could be substantial, but that they lessened over the product cycle. With respect to such risks, many firms assume that adherence to well-established market conventions provides adequate legal protection. Nonetheless, even with respect to business involving established products, participants have learnt that legal surprises may occur. For example, the ruling concerning the swap transactions of UK local authorities showed that the de jure ability of counterparties to perform cannot be taken for granted, and this aspect now receives more scrutiny than in the past. Participants also noted that legal uncertainties could arise in cross-border trades involving financial products that were not well established or routinely traded in the counterparty's country or when a domestically-traded derivatives contract was based on underlying instruments that were funded and settled abroad.

It was noted too that although bilateral netting agreements were now widely used for some transactions, it could prove difficult to enforce these agreements either because their legal status was not clear in domestic law or, in the case of cross-border transactions, because of differences in bankruptcy laws across countries. Banks in nearly every centre expressed a strong desire for clear, legally acceptable netting arrangements and their recognition for purposes of assessing capital standards.

Other risks. Market participants noted that the complexity of many derivative instruments, and of the transactions involving them, made it difficult to identify and correctly assess their risk properties or to derive prices. At times, pricing models or the assumptions necessary to implement them were found to be inappropriate; at other times, the assessment of the most material risk in a transaction had been wrong (e.g. a complicated swap turned out to be equivalent to an outright loan). At a minimum, the introduction into the market-place of a new product may involve a learning period during which many participants do not fully understand the product's risk properties.

Quite a number of firms noted that their derivatives operations depended greatly on the skills of a few key individuals. Potential problems could also arise from the tendency for risk management systems to lag behind trading strategies and market developments, and for back-office and audit operations to lag behind trading. Finally, the continuing risk of inadequate control procedures or management ignorance of the complex risks being undertaken by traders was emphasised. Management ignorance could be exploited by traders wishing to hide latent losses in positions they carried.

The diminution in the number of acceptable counterparties and the greater volume of transactions between a smaller number of counterparties have resulted in greater interdependence among the key players on both sides of their "balance sheets". Credit lines

are now more frequently exhausted, constraining business opportunities and sometimes resulting in liquidity problems for parties in need of funding.

Systemic risks. Most market participants felt that the growth of activity in derivative instruments had not per se resulted in increased threats to systemic stability, but some noted that because derivatives have strengthened linkages between market segments, disruptions or increased uncertainty in one segment would now more quickly affect other markets.

Participants noted that global information systems disseminated news about problems at a speed that left market participants and central banks very little time to react in the event of a crisis situation. These systems also spread rumours and misunderstandings widely before they could be countered by denials, clarifications or explanations. This could affect liquidity in markets where trust was an important ingredient. For this reason, some participants perceived systemic risk to have increased. The most commonly cited events capable of triggering systemic problems were the default of one of their number and clearing and settlements failures, including exchange shut-downs.

While a few participants regularly consider the ability of their institutions to survive low-probability scenarios (e.g. a run on themselves), they often assume that such scenarios affect their institution in isolation. More generally, there seems to be a certain degree of complacency with respect to systemic risk. This appears to be fostered by a more or less firmly held belief that central banks or public authorities would act to prevent any disruptions from reaching systemic proportions. A number of participants maintained that the confidence with which this conviction is held acted to stabilise markets. However, some participants said that they were fully aware that the policy response of central banks or other public authorities to financial disturbances may not necessarily be homogeneous.

C. Risk management

Regardless of the scale and scope of their activities in the various wholesale market segments, the firms interviewed indicated that efforts to enhance and strengthen risk management procedures had been intensified in recent years.

All the firms interviewed treat risk management as a senior management concern. Many, including most of the key firms active across the range of wholesale markets, accept the need to make very considerable resources available for evaluating, monitoring and managing the risks incurred across offices, products and the range of counterparties with which they deal.

However, the current state of risk management among the key players in the wholesale markets covers a wide range of levels and styles, and significant gaps remain between the desired risk management systems and the systems actually in operation. Banks

that confine their activities to more traditional banking operations and well-established wholesale markets are satisfied that relatively unsophisticated risk monitoring and management systems can handle the risks they confront. With respect to the operational significance of systemic risk, views differ; some firms expressed the view that they could do little themselves to lessen their susceptibility to it.

(i) The determination of risk management policies

The manner in which risk management policies are determined is said to have undergone marked changes in recent years. Whereas in the past such policies and procedures had often been left at the discretion and under the purview of trading units, the main features of most risk management policies are now set by a central risk management unit, often represented at Board level. This unit draws up common risk evaluation strategies and sets limits for the market risks that can be incurred in various product lines. A separate unit frequently decides on credit lines for individual counterparties. Limits on credit and market risk are then allocated across divisions, offices, trading desks and traders, who are generally free to incur exposures within the limits allocated to them.

Nevertheless some firms noted that the difficulty of demonstrating the benefits of large investments in risk control all the time losses were being avoided meant that reluctance to incur further expenditure sometimes could be strong. It was also noted that the implementation of risk management procedures could be difficult if it conflicted with the generation of cash flows. For these reasons, effective risk management required the support of management at senior levels.

(ii) Day-to-day management of risk

There is considerable diversity of opinion as to whether risk should be managed on a centralised or decentralised basis, either within a geographic centre across products or across geographic centres for a given product. This diversity rests on a perceived trade-off between the comprehensiveness and efficiency of a global, cross-product centralisation of risk monitoring and management and the benefit of granting product managers or geographic centres some autonomy on the grounds that they have the best information about their markets. Also, centralised risk management or monitoring on a real-time basis requires large investments in hardware and software. At least in the short run, these systems requirements prevent many firms from considering real-time centralised monitoring as a realistic option.

With respect to the monitoring of compliance with centrally set limits, practices vary widely. A few firms have implemented global position monitoring and evaluation systems capable of giving the firm's risk management unit a continuous view of capital at risk, at least as regards market risk. However, at most firms positions are monitored locally,

often on an instrument-by-instrument basis, and reported to head offices daily (at least for the main trading desks), weekly or monthly.

Most of the firms interviewed have adopted a largely decentralised approach to day-to-day risk management. However, in a number of these firms, a central risk management unit may alter the firm's overall exposures through its own transactions.

The firms interviewed also have different attitudes as to whether all market risk of a given type should be managed by one group. The issue arises when a similar type of risk (e.g. currency or interest rate risk) is incurred across a variety of business areas. On the one hand, in some firms virtually all risk of a given type may be passed to the desk specialising in that risk, irrespective of where it is incurred. On the other hand, individual product centres (e.g. equities) may themselves hedge some of the risks (say, foreign exchange rate risk) which they incur.

Some firms approach market risk management as a portfolio problem and treat the risks incurred in different product or market segments on a portfolio basis. It was argued that the risk properties of a firm's aggregate position could differ significantly from the sum of its parts.⁶ To the extent that there are diversification economies in large risk portfolios, the contribution to aggregate risk and thus the hedging costs associated with taking on additional risk exposure without a balancing trade in place (i.e. to "inventory" risk) can be lower than the risks and hedging costs associated with the exposure on a stand-alone basis. The firms which operate in this manner have global, real-time risk and position monitoring systems at their disposal, and conduct day-to-day risk management centrally.

(iii) Measurement and management of individual risks

Credit risk. Market participants conduct their own credit analysis on the basis of financial data and information provided by rating agencies. In deciding on credit lines, firms also take the nature of their relationship with the counterparty into account.

A number of firms noted that rating agencies were often wise after the event and had therefore reduced their reliance on them. Major counterparties are continuously monitored and evaluated in-house. However, for second-tier counterparties, with whom credit lines are small, firms appear to rely on rating agencies to a greater extent.

All participants noted that the evaluation of credit risk had become increasingly complicated in recent years, owing in part to the lack of specific information on counterparties' exposures to various markets and individual counterparties. Information is also scarce on a number of relatively new major participants in the wholesale markets, such as

⁶ Some large players in the derivatives market exploited what they said was modest risk correlation across national market segments. In interest rate products, for example, these firms found significant offsets of the risks embedded in books in different currencies. The aggregate FX book, including both traditional and new products, contained similar diversification gains across currencies. These firms also exploited risk offsets arising from relationships between exposures in foreign exchange, interest rate and equity markets.

trust and hedge funds, which in many cases are not subject to supervision or to disclosure requirements. International differences in disclosure requirements also make it difficult to assess certain foreign counterparties.

Securities houses noted that their traditional business lines had not involved the taking-on of credit exposures to the same extent as commercial banks. For that reason, their expertise in assessing credit risk was less developed than that of commercial banks. However, their increased participation in the derivatives markets meant that they now took on much larger credit exposures than in the past. This had necessitated the rapid upgrading of credit evaluation expertise.

Many firms noted that credit risks are not fully incorporated in the pricing of interbank products. In part, this was ascribed to the difficulties already mentioned of grading counterparties given the lack of complete information. It was also noted that market pressures in many market segments made it difficult to incorporate in prices a firm's assessment of the credit risk of individual counterparties. This is especially true of markets where brokering is common (to varying extents in the deposit, FX spot, short-term forward and options, and FRA market), and where prices must be taken as given.

The low probability of default appears to have made the pricing of credit risk in short-term derivative contracts a relatively low priority item. In longer-term contracts, both the value of potential losses and the probability of default can increase steeply. However, the explicit pricing of credit risk in longer-dated contracts is said to be conceptually and theoretically difficult, so that counterparty discrimination is based on traditional methods.

Market risk. A common method of assessing potential losses due to market risk is to simulate the effects of historical price developments on the existing portfolio. The length of the historical sample used in such simulations varies widely across firms, from two to ten years of data. A few firms weight recent observations more heavily on the view that the recent past is a better guide to future price movements.

Internal capital allocation against market risk is often, but not universally, determined on the basis of the need to cover exposures arising from a two standard deviation movement of prices from their current values. Although this method discounts extreme price changes, it implies that riskier transactions face a higher capital assessment and must therefore offer greater returns to be justified.

Many firms, but far from all, mark positions to market and examine profit and loss performance daily. If position or stop loss limits are exceeded, the position is adjusted or closed, although not necessarily immediately, as it is recognised that some flexibility can be beneficial. Some participants noted that a lack of consensus on mark-to-market procedures could cause internal control problems, especially when traders were responsible for marking their own contracts to market.

Firms that do not mark their derivatives book to market on a regular basis cited conflicts with the historical cost accounting of other price-sensitive components of the bank's book, and some argued that sharp price changes and market liquidity problems made marking to market an unsuitable basis for risk management. It was also noted that the expense of the necessary computerisation had delayed the adoption of internal mark-to-market procedures.

Cash liquidity risk. A number of the firms interviewed noted that large derivatives portfolios could at times give rise to sizable, unexpected and costly cash liquidity requirements. To assess the cash liquidity requirements arising from such portfolios (or from a given derivatives transaction), some firms forecast cash needs by adding the cash requirements arising from the passage of time (holding prices and volatilities constant) to the cash requirements arising from potential price and volatility changes at each point in time (using historical data). Estimated cash requirements are compared to funding availability and are used to draw up funding plans. Transactions that in other respects seemed attractive might not be undertaken if cash requirements exceeded a certain size.

Some firms run regular liquidation analyses to determine whether the firm can survive a run (e.g. resulting from a sudden downgrading). These simulations assess how fast the firm's assets could be called and liabilities withdrawn in the event that all bank lines or unsecured lending were cut off; these have been undertaken in the light of the experiences of Drexel and Salomon.

Similarly, some firms attempt to estimate the impact on the availability of funds in the event of the institution being placed on a "watch list" for a possible downgrading. Measures, including the lining-up of standby credit arrangements, are then taken to counter the impact of such an event.

Settlement risk. To reduce or avoid cross-currency settlement risk (Herstatt-type risk), banks in a number of countries are considering arrangements under which parties to a transaction deposit funds in a third party escrow account until settlement of the different currency legs is completed.

(iv) Risk reduction through netting and clearing arrangements

Most of the institutions interviewed consider netting arrangements to be an important means of reducing credit and settlement risks. Bilateral netting of interest rate and foreign exchange products has become increasingly common among large institutions. Netting across products, currencies and settlement dates, as well as of longer-dated obligations, was said to be more difficult to implement, but efforts have been made to establish a framework to accommodate such netting. Bilateral netting between counterparties located

in different jurisdictions is perceived to be difficult because of legal uncertainties associated with differences in national bankruptcy laws.

Banks in the United States said netting by novation is not commonly implemented, but it is the legal basis of at least one bilateral netting scheme widely used for foreign exchange dealings. Netting by novation is considered unlikely to be implemented for swaps because it would render individual transactions unassignable.

Nearly all the firms interviewed said netting would be more widely used if it were accepted by supervisory authorities for purposes of assessing capital adequacy. Such recognition would help banks economise on scarce capital and could lessen the constraints on trading implied by limits on gross counterparty exposures.

A number of banks in the United States and some other countries said they would welcome multilateral netting arrangements for OTC instruments. However, they cited a number of obstacles to the setting up of such arrangements. One is the problem of adverse selection. Highly rated banks which benefit from credit differentiation could stand to lose in clearinghouse arrangements in which lesser rated names participate on an equal footing. Unless broader market participation and increased market efficiency and liquidity compensate such banks for the loss of the credit differentiation benefit, they would be unlikely to join such arrangements. Another obstacle is moral hazard. Many players, especially those highly rated, are concerned that clearing house arrangements may encourage less responsible behaviour if losses were shared collectively, and for that reason are reluctant to participate. A final set of obstacles for clearing houses for OTC products is the lack of standardisation of many OTC products, and the lack of consensus on the appropriate way to calculate marked-to-market values.

III. MAJOR FEATURES IN THE EVOLUTION OF INTERNATIONAL INTERBANK RELATIONS

This chapter discusses in greater detail three features which have shaped the evolution of international interbank relations in recent years: the increased linkages domestically and internationally across markets and among market participants, greater sensitivity to credit risk, and greater concentration in wholesale markets. The discussion centres on the factors that have driven these developments, their implications for the structure and functioning of interbank and wholesale markets, and on the implications for systemic risk.¹

A. Increased linkages

Continued financial deregulation, progress in computer technology and the development of financial instruments have led to further significant changes in recent years in the nature and intensity of the linkages among financial markets domestically and internationally. The markets for short-term interest rate futures, swaps, FRAs and interest rate options have emerged to complement and in some cases to substitute for the traditional international interbank deposit and other cash markets. The interbank deposit markets now basically function as funding markets, while hedging and position-taking have, to a considerable extent, shifted to the off-balance-sheet markets. In the foreign exchange market, the emergence of currency options has also provided market participants with additional means for hedging and other activities. The derivatives markets not only interact with the underlying cash market but are also themselves deeply inter-connected. For example, there is active arbitrage between interest rate futures, swaps and FRAs, thereby increasing trading volumes. As banks increasingly provide a wider range of "hybrid" products, linkages among instruments and markets are further strengthened. Securities issues, for example, increasingly incorporate option elements or are swapped into payment flows involving different currencies. Bond issues with a menu of equity-linked elements have also become more common.

The greater choice and interlinkage of markets and instruments have facilitated the use of a wider range of instruments for a wider range of purposes and have

¹ A systemic crisis is a disturbance that severely impairs the working of the financial system and, at the extreme, causes a complete breakdown in it. Systemic risks are those risks that have the potential to cause such a crisis. Systemic crises can originate in a variety of ways, but ultimately they will impair at least one of three key functions of the financial system: credit allocation, payments, and pricing of financial assets. A given financial disturbance may grow into a systemic crisis at one point in time but not another, depending on the financial and economic circumstances prevailing when the shock occurs.

worked to increase the efficiency of financial markets. In this sense, these are favourable developments. In addition, from the perspective of the financial system's resilience to market disturbances, linked markets can act as a safety valve. By offering alternative sources of supply and demand, price changes may be transmitted from one market to others and can thereby help to diffuse disturbances.

However, there are some circumstances in which close linkages can be a source of concern. This would be the case if, as price movements or uncertainties are transmitted from one market to another, they are reinforced rather than dampened. The rapid expansion of options and instruments with option-like features in recent years has reinforced market linkages in a way that at times can increase price volatility. Because these instruments typically are not hedged by an equal or opposite position, they need to be hedged through a continuous sequence of transactions to adjust for market movements. Frequently, the hedging transactions are undertaken in the underlying cash market. This process, commonly referred to as dynamic hedging, creates a close linkage between price movements in derivatives and underlying instruments. In particular, an initial price movement in the cash market can create an exposure in the option market necessitating hedging transactions that can trigger a further price change in the same direction in the cash market. The role of portfolio insurance strategies in steepening the decline in US equity prices in the October 1987 market break was seen by many observers as an example of the destabilising potential of the market linkages associated with dynamic hedging strategies.

There has also been a sharp increase in recent years of financial transactions and strategies which involve simultaneous funding and position-taking in many market segments. Derivative instruments, in particular, have made it possible to create positions that span many market segments, and that would have been considered too expensive, risky or unwieldy if created in cash market instruments. While such transactions enhance arbitrage between markets and thus contribute to market integration, they involve a presumption that liquidity in all linked markets will permit agents to adjust or close positions at a time of their choosing. However, a significant disruption in one market may upset that presumption, exposing the position to market risks that can not easily be hedged, and in the worst case, forcing an abrupt liquidation of contracts in other markets with adverse consequences for market liquidity in them.

Cash liquidity requirements, reflecting in part margin or collateral requirements imposed as a result of credit concerns, have become another important source of linkage between markets. Price movements in instruments that require margin payments have a direct impact on the cash liquidity of a firm that holds a position in them. Even if there is sufficient cash liquidity in the system (in most cases, other participants will after all receive positive margin flows), individual firms may encounter difficulties in meeting their cash requirements. Their behaviour under these circumstances can influence conditions in funding

markets. It can also spread to other markets. Even if a firm is fully hedged from a market risk perspective, cash requirements could force it to liquidate its profitable positions, thus spreading the effects more widely. To the extent that liquidity in some of these markets is insufficient to permit the realisation of these profits, the plight of the firm in need of cash could be further exacerbated. As a result it will have to broaden further its attempts to raise cash, with more markets being affected.

Another aspect of financial integration is that banks and other types of financial intermediaries are increasingly active in the same markets. This means that the extent to which they are directly involved with each other has increased. The result is not just that the distinction between interbank markets and broader wholesale financial markets has become less meaningful, but also that systemic risk cannot be thought of in the context of the banking system in isolation.

Linkages among wholesale markets have been further strengthened by the fact that some firms play key market-making roles in more than one market, as described in the discussion of concentration below.

B. Greater sensitivity to credit risk

The relative importance attached to credit risk has increased in the past few years. To some extent, this is a result of the proliferation of techniques that have enhanced the ability of market participants to manage market risks. These techniques generate credit exposures as by-products. In addition, a variety of other factors have led to increased attention to credit risk.

First, problems associated with the LDC debt crisis, the cessation or reversal of widespread inflation in real estate and other asset prices in the 1980s and weak economic activity in many industrial countries in the past couple of years have created a macroeconomic environment in which credit risk has increased. Confidence in the health of many financial sector firms has declined as losses, forced restructurings and failures have continued into the 1990s.

Second, market participants are placing increased weight on the capital position of their counterparties as a guide to their creditworthiness. While the Basle capital accord helped to focus attention on capital, the market now expects capital well in excess of the minimum, along with other indications of financial strength, if a firm is to be deemed eligible as a counterparty for the most credit-sensitive longer-term transactions. The presumption that only the financially strongest firms are suitable for longer maturity contracts has created incentives for firms to raise capital or to set up highly capitalised, special-purpose vehicles to conduct long-term financial swap transactions. The latter approach has been implemented by some securities firms. At the same time, efforts by individual firms to strengthen their capital positions have induced them to use their capital more efficiently.

Third, the growing complexity and importance of financial derivatives activities has reduced transparency and has made it increasingly difficult for the management of financial firms to assess the implications for risk exposures of possible future financial market movements. They must take into account the consequences not only of rate movements but also of scheduled run-offs of contracts and of the exercise of financial options held and written by the firm. Thus, even a sophisticated outsider, not having access to the internal information systems that support management risk assessments, can, at best, make only an informed guess as to the nature of a firm's risk exposures.

Moreover, some market participants lack the wherewithal to make informed assessments as to the credit risks inherent in transacting with a given counterparty. Even some securities firms which have at their disposal enormous technical expertise in terms of assessing market exposures have not in the past placed much emphasis on developing expertise in assessing longer-term credit risk.

Fourth, the emergence of new relationships between financial and non-financial firms has tended to exacerbate the problem of transparency. Because of the complexity of the operations of many non-bank financial firms and the relative lack of disclosure of their activities, in some countries assessment of their financial positions might be more difficult than assessment of those of banks.

The difficulties involved in a full and independent assessment of credit risk have led a number of market participants to rely more heavily on externally provided credit ratings in their decisions as to which firms are creditworthy counterparties for financial contracting. Indeed, some firms (such as trusts) are compelled to use such ratings in order to satisfy legal or institutional requirements or to ensure public accountability. While public credit ratings provide valuable information, excessive reliance on them alone by market participants can cause problems. Individual analysts are likely to be reluctant to attach a higher rating to a counterparty than is offered by the rating agencies. Thus, a firm whose rating is downgraded by the rating agencies could face a widespread and fairly homogeneous response in the market, with an effect on its overall access to funding sources that is potentially not commensurate with the underlying deterioration in its circumstances.

A greater awareness of, and more thorough approach to, credit risk is fundamentally a healthy development. To the extent that financial market participants evaluate the financial strength of their counterparties more carefully, and adjust their exposures accordingly, some disturbances that might otherwise have had wider implications are likely to be dampened. However, the increased difficulties noted above in assessing a counterparty's financial strength can exacerbate financial disturbances. One element of concern is that improvements in participants' ability to identify, analyse and manage credit risks do not seem to have kept pace with the growth and complexity of their exposures.

The traditional form of financial crisis starts when the sudden failure of a major firm or group of firms leads investors to refuse to deal with other firms thought to have similar vulnerabilities or engaged in markets disrupted by the failure of the firm. An often cited example is the failure of Penn Central Railroad in 1970, which precipitated a crisis of confidence in the US commercial paper market that made it more difficult for other commercial paper issuers to roll over their maturing paper. Similar episodes have more recently occurred in other countries. If the failed firm is a member of one of the many settlement and payment systems, its failure may cause serious disruptions to other firms in the system.

Similarly, a liquidity crisis in a large financial firm could grow into a solvency crisis if uncertainty about the severity of the firm's condition leads counterparties to cut off funding channels or refuse to enter into transactions which the firm needs to undertake to manage its exposures.

At the heart of this type of crisis is the problem of incomplete information in credit relationships. In principle, creditors should be willing to lend to an illiquid, but solvent, institution. In practice, the lending may not occur because creditors cannot determine rapidly enough the true extent of the difficulties and cannot agree among themselves as to how to deal with the problem. Nevertheless, these informational problems can play an important role in the propagation of a financial disturbance.

C. Greater concentration

Over the past few years, a number of wholesale markets have shown clear signs of greater concentration of activity among the financial firms with top credit status. This seems to be particularly true of those highly rated firms that have the capital to take large positions, and possess the technical expertise and the information processing and communication systems needed to manage books globally. There also appears to be a greater tiering among market-makers between firms that can handle the origination of very large transactions and smaller players which focus more on the distribution of instruments to their customers.

To some extent concentration has reflected normal variations in competitive conditions over the product or business cycles, or has been a natural result of the existence of economies of scale. Sources of these scale economies may include the capital and human investment costs associated with the development of complex products, risk management, information requirements and other advanced technological system requirements; synergies across different markets; and the need for a large customer base to benefit from diversification, hedging ability and information about order flows. These scale factors can generate significant barriers to entry and expansion, but do not apply equally in all markets. Other longer-term factors such as greater institutional demand, related increases in the size of

transactions and the need for global operations may also have intensified the forces making for concentration of business.

A greater degree of concentration in the wholesale markets has meant that larger exposures are incurred vis-à-vis a smaller set of key players. These institutions tend to be of high credit standing and the likelihood of their default might be considered to be small. However, the perceived credit standing of a financial institution can deteriorate rapidly. Since the failure of one such key player would entail larger losses to other participants in the markets than if exposures were more dispersed, increased concentration implies that financial market stability could be affected more heavily than in the past by the sudden decline of any such firm.

Concentration can also have potentially significant effects on market liquidity. Increasing concentration, in and of itself, need not imply declining market liquidity if the capital that the remaining participants are willing to devote to the market-making function remains large relative to trading volume in the market. By contrast, liquidity strains with adverse consequences can emerge when market-makers are unwilling to put the capital of their firms at risk. This would be more likely to happen if the risk capital of market-makers is dwarfed by the trading volume in the overall market or if pricing uncertainties are large. In turn, the possibility that the amount of capital devoted to market-making would become inadequate at some point would increase if a single market-maker provides a sizable proportion of the risk capital in a given market or markets. The failure of such a firm could reduce liquidity and increase price volatility as well as diminishing the willingness of the remaining market-makers to react to extreme price movements and to continue their smoothing function.

One distinction emphasised by market participants is between market liquidity in normal times and in times of stress. As noted, even in markets with a relatively small number of large players and few market-makers, liquidity can be high under normal market conditions. This appears to be the case in some derivatives markets, with the notable exception of those for the most highly customised or long-term products.

In times of stress, however, liquidity in a wide range of markets can become inadequate. In such periods, an important determinant of liquidity can be the ability of participants to absorb temporary imbalances between supply and demand. To maintain its status, a market-maker is required to smooth the transition through periods of imbalances when market imperfections (such as incomplete information) prevent the price mechanism from rapidly equilibrating the market.

The degree of concentration in the market-making function and its implications vary among the different segments of the wholesale markets. In specific segments of the more traditional interbank and foreign exchange markets there has, over the last few years, reportedly been a reduction in liquidity and, to varying degrees, increased concentration in

trading and market-making. However, even where the number of players offering continuous commitments to market-making is reported to have declined substantially, the number of significant players remains large, entry barriers are relatively low, and new participants continue to enter and expand activity.² As a result, prices generally continue to be very competitive on standard trades in normal circumstances, with low spreads. Moreover, in some traditional interbank markets, such as the US federal funds market, market-makers do not exist because brokers can supply the required intermediary services. In such markets, brokers match orders and imbalances between supply and demand are met by immediate price changes.

In non-traditional markets, trading conditions are more diverse. In some markets, particularly those with a high volume of transactions and with instruments at the low end of the risk spectrum, the number of players remains very large. Markets in FRAs and short-term interest swaps are notable examples. Indeed, brokers remain active in FRAs and short-term swaps, and also some short-term currency options. The large number of players in these markets may reflect their functional proximity to more traditional markets.

For longer-term swaps (more than three years) and currency options (more than six months), market-making to other wholesale players appears to have become more concentrated than in traditional activity, perhaps reflecting the less continuous trading and higher risks. Even in the markets with high volume, there are only a few players with continuous commitments to make markets to other wholesale players (as opposed to customers). At this long end of the market, the costs of the necessary investment in technology, human skills and global risk control may act as significant deterrents to entry. In addition, the ability to attract business at the long end of the maturity spectrum depends on maintaining the financial strength needed to enjoy the highest credit rating.

For highly customised products, where the number of transactions is low but the value-added is high, a relatively small number of traders dominate activity. In such markets, transactions are too specialised and heterogeneous for market-makers to exist. Indeed, for some customised products, only one or two firms may specialise in particular innovations, having gained "first-in" advantages of scale.

The growing complementarity of approaches to risk taking and management across markets may mean that the implications for competition in each market segment of a rise in concentration could be partially offset by competitive alternatives in other markets. However, to the extent that the largest players are increasingly integrated across markets, the concentration of activity on a small group of players may not be lessened.

In the longer run, markets may adapt to forces for concentration to some extent by reducing or overcoming barriers to entry. In some non-traditional markets, new entrants have appeared over time and smaller players have expanded their activities when profit

² This may not be true of the market for forward foreign exchange.

potential has arisen, particularly as the innovative techniques pioneered by the larger traders have spread through the market. Netting, as noted by market participants, may reduce the pressures on credit limits; awareness of the effects of concentration on funding flows may encourage improvements in liquidity management or alternative funding arrangements; and the use of exchanges or collateral arrangements could expand. Rewards to market-makers could increase sufficiently to encourage more continuous commitments, and credit restrictions on existing firms could attract new top-rated entrants.

Another aspect which has contributed to increased concentration has been the information problems associated with reduced transparency in financial markets. These information problems have encouraged a greater collective reliance on external credit judgements rather than internal assessments, and have tended to reinforce the shift of business to a few highly rated institutions. However, internal techniques for assessing credit are developing; these techniques could either weaken such forces or give a further comparative advantage to the largest players.

Finally, there may be some marginal offsetting forces to increased concentration, such as diseconomies of scale in management: for example, difficulties of control over diverse trading areas, the ease with which information gains and skills can be disseminated or incentives for individual traders. Nevertheless, some further consolidation might be expected. Similar trends have been seen in markets such as Euro-securities and other short-term securities where competition among a relatively small number of traders is now the norm.

IV. CONCLUDING REMARKS

The development of new financial instruments and strategies and their application to a widening range of objectives have provided the financial and non-financial sectors with better opportunities to manage risks and enhance returns. The growth of wholesale markets in these products has made it possible to extend these benefits to a wider clientele without concentrating risks in just a few institutions. This, in turn, holds out the prospect that the financial sector's susceptibility to risks could itself be lessened.

These developments, however, also confront institutions active in wholesale markets with significant new challenges in risk management. With the addition of new areas of business to traditional operations and the development of wholesale market relationships with non-bank counterparties, the volume and complexity of exposures have increased greatly. The extent to which those challenges are successfully handled -- by market participants acting individually and collectively -- will determine the extent to which the full potential of the benefits noted above are realised.

This report has identified several developments that should strengthen the resilience of wholesale markets in the face of market instabilities. These include the increased attention paid to credit risk, and, notably, efforts to upgrade risk management capabilities. However, other aspects have also been noted which, when viewed from a systemic perspective, may become sources of concern for market participants and central banks.

First, the distinction between interbank markets and wholesale markets more broadly has become less clear. Banks interact with non-bank financial institutions -- including investment banks, insurance companies, trusts, and others -- and with non-financial firms in a wide range of markets. Moreover, the role of market maker in some markets has become more concentrated among a smaller number of major players and is provided in some cases by non-banks. Therefore, some problems that have the potential to develop into systemic problems can originate from a wider range of financial firms. A further implication of the increased linkages across markets and among institutions is that, as problems spread, a larger range of types of institutions, from a number of countries, can be affected.

Second, in some countries some of the special roles of banks in the provision of credit has changed over the years, as other institutions have assumed many of the same functions. Superimposed on this structural trend, the more recent greater awareness of, and sensitivity to, credit risk have made banks increasingly reluctant to lend to troubled institutions.

Third, the greater complexity of financial transactions has reduced the transparency of firms' balance sheets, and has made it more difficult to determine the distribution of risks in financial markets. In a crisis situation, a lack of transparency might cause firms to back away from troubled institutions and, perhaps, from other institutions perceived to be subject to similar stress. As a result of this behaviour, which reflects incomplete information, disturbances can spread more quickly and more broadly across firms and markets.

Fourth, the increased availability of derivative instruments has enabled participants to take complex positions that straddle many markets. These strategies rely on a presumption that liquidity in all markets will remain available come fair or foul weather. This presumption may prove illusory in times of stress.

Fifth, new financial instruments and innovations in the technology of communications have increased the reaction speed of asset prices to shocks, and have created positive feedback channels through which already sharp price movements can quickly be amplified. These developments may have significantly reduced the time that central banks would have to react to an incipient crisis.

Lessening these risks, and strengthening safeguards to prevent localised problems from evolving into systemic disruptions, require efforts at three levels. First, risk awareness and risk management at the level of participating institutions must be further strengthened. This is primarily the responsibility of individual firms. Second, the structural and institutional framework underpinning wholesale market activities needs to be reinforced. This is a task for market participants, acting in concert as appropriate, but also involves roles for legal, regulatory and supervisory authorities. Finally, there is a continuing need for communication and cooperation among market participants, central banks and other supervisory and regulatory bodies, to enhance understanding of the individual and collective risks to which rapidly evolving wholesale market activities might give rise, and to contemplate measures which could reduce those risks.

A. Strengthening risk management practices

To keep pace with the rapidly changing financial environment, including the expansion of derivatives activities, market participants, individually and collectively, need to develop further the procedures and infrastructure that will enable them to manage the risks identified in this report. This requires a further strengthening of management awareness and understanding, at all levels, of the nature of the risks taken on and of the assumptions and parameters upon which the carrying and management of those risks is predicated. It also involves committing further financial and managerial resources to the development of risk monitoring systems, and to the strengthening of back-office, accounting and auditing functions.

Firms active in wholesale markets also need to pay greater attention than they might have done in the past to the possible ramifications on their own operations and risk exposures of problems at institutions or in markets on which they rely heavily, and to develop contingency plans for dealing with such ramifications. The development of better methods to measure potential exposures, on the basis of simulation exercises which also take into consideration worst-case scenarios, would sharpen a firm's awareness of its vulnerabilities, and would enhance contingency planning capabilities.

Another aspect of risk management that deserves increased managerial attention is the role and position of risk control units, including internal and external auditors, vis-à-vis the operations they are supposed to control. Unclear demarcations of their roles can constrain the ability of such units to carry out their tasks. To fulfil their function, risk control units must have both the necessary distance to the operations they monitor, and effective authority vis-à-vis those whose operations they assess.

B. Improving the legal and institutional underpinnings of wholesale markets

Adequate risk management and capitalisation at the level of individual firms constitute the primary defence against financial market disruptions. However, acting individually or collectively, wholesale market participants can also help to strengthen the institutional underpinnings of the environment in which they operate. The promulgation of standard practice and contract documentation, the compilation and distribution of market statistics and other educational efforts are past examples of such contributions. The promulgation of commonly agreed methods for marking OTC derivative contracts to market could become another. Agreed methods for marking contracts to market would not only remove a source of friction in dealing relationships, but would increase transparency in derivatives markets. In addition, cooperation among bank regulators and other authorities -- nationally and internationally -- could enhance progress towards more consistent regulation and supervision of various kinds of market participants. The working group welcomed the initiatives of the Basle Committee on Banking Supervision to enhance cooperation and mutual understanding between banking supervisors and securities and insurance regulators.

A number of other improvements could help to reduce further the likelihood that financial disturbances will arise or spread, involving roles for market participants, legal, regulatory and supervisory authorities and central banks.

Enhancing netting schemes. The explosive growth of intra-day credit exposures and settlement flows, associated in part with the proliferation of derivative instruments, is recognised by market participants to represent a potential threat to market stability. The firms interviewed made repeated references to netting arrangements as a means of reducing the risks arising from these obligations and settlement positions. Indeed, banks and other

financial market participants have entered, or are considering setting up, a variety of bilateral and multilateral arrangements that provide for the netting of various categories of financial contracts. The willingness of some banks to rely on netting agreements to guide their credit decisions reflects their positive assessments of the legal enforceability of these arrangements.

However, while participation in a well designed netting arrangement can reduce risks associated with a given level of activity, participation in poorly designed ones can increase them. Moreover, while credit risks to some sets of participants may be reduced, credit risks to firms not participating in the netting arrangement or other kinds of risks can either increase or decrease. In addition, the legal bases of certain types of netting remain largely untested and overconfidence in such arrangements can itself be a source of risk.¹

Multilateral netting systems are susceptible to the problem of moral hazard if their rules provide for loss sharing among all surviving participants irrespective of actual credit exposures to a failed institution, or if a strongly held presumption exists that the central bank will make all parties whole in the event of a default so as to prevent a settlement failure from developing into a crisis. Thus, as recognised in the "Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten Countries", published by the BIS in 1990, a well designed mechanism should ensure that all participants have both the incentives and the capabilities to manage and contain the risks they bear. This would also ensure that participants have the appropriate incentives to enhance their own capital position to make themselves more attractive as counterparties.

The design of a multilateral netting system must also ensure that such systems are capable of the timely completion of daily settlements in the event of an inability to settle by the participant or participants with the largest single net debit position in the system. The capacity to settle in a timely manner can be enhanced by collateral or prefunding arrangements. This issue of cash liquidity is especially critical for any netting systems, including payments systems, that must settle obligations in cash within rigidly defined and relatively short time intervals.

The only form of netting of forward obligations currently recognised under the Basle capital accord is bilateral netting on the basis of novation. To the extent that supervisors were to recognise other forms of netting in the capital accord, banks would benefit from the corresponding adjustment in their capital positions. If individual banks had felt constrained by capital requirements, a relaxation of those constraints through the recognition of netting might tend to increase turnover and gross exposures in interbank and wholesale markets. The enlargement of transaction volume could offset some of the risk reduction that

¹ Given the importance of legal certainty, market participants may prefer to transact with counterparties located in financial centres with developed legal frameworks covering participation in netting agreements. Differences in legal structures can thus influence the location of markets for interbank transactions.

proper netting arrangements might confer, and the existing capital base could end up supporting larger risks.

The capital accord permits a choice between the current and original exposure methods of calculating credit exposures on forward obligations. In calculating capital charges, the current exposure method is based largely on mark-to-market values, whereas the original exposure method uses only notional principal amounts. In the light of its view that notional contract amounts may be misleading indicators of credit exposure in a netting environment, the working group felt that there was an insufficient analytical basis for the recognition under the capital accord of netting of credit exposures calculated on the basis of notional amounts.

Improving accounting and disclosure standards. Reporting and accounting standards and practices with respect to off-balance-sheet instruments currently vary widely across countries. An improvement and some harmonisation of accounting and disclosure practices would be a desirable step towards enhancing transparency in financial markets.

Appropriate mark-to-market accounting, at least for instruments in trading accounts, was felt by the working group to be essential for appropriate risk management by financial institutions, because it measures an institution's exposures at present market rates. Consistent mark-to-market accounting makes portfolios with significant amounts of complex derivative instruments more transparent. The International Accounting Standards Committee is working on developing standards for the accounting treatment of new instruments. The working group felt that such efforts ought to be encouraged by market participants and that national authorities should carefully consider this subject.

There is also scope for making public disclosure of financial positions more meaningful. As is evident in the different treatment of off-balance-sheet exposures in the public reports of firms active in the derivatives markets, there are no commonly accepted standards for what information should be disclosed. Lack of adequate disclosure reduces transparency and makes assessment of the creditworthiness of counterparties more difficult, and may lead to excessive reliance on rating agencies. At times of crisis, this can lead to disruptions in the availability of credit. Efforts by market participants, their industry associations and auditors to enhance and promulgate standards of disclosure should therefore be encouraged.

Resolving legal uncertainties. The interviews with market participants made clear that uncertainties about the laws in individual countries and how they would apply to international activities pose a risk to financial markets and complicate risk management. In that context, the working group noted that in London, significant steps have been taken to address such questions through the work of the Legal Risk Review Committee, which was established in April 1991. Its task was "to identify areas of obscurity and uncertainty in the

law affecting financial markets; to propose solutions wherever possible, and to consider means for the future whereby legal certainty could be achieved and developments in the practices of financial markets... could be regularly reviewed to ensure that potential problems were identified and appropriate remedies proposed in a timely way."² The Legal Risk Review Committee recommended, among other things, that a permanent body of practitioners be set up to serve as a forum for discussing issues of legal uncertainty and, thereby, to provide education and guidance. It is possible that entities like the Legal Risk Review Committee could perform a useful function in other countries as well as internationally.

C. Developing greater understanding of new instruments and activities

At the most fundamental level, it is clear that market participants, central banks and other supervisory and regulatory bodies must have a full understanding of rapidly evolving wholesale financial market activities and of the risks faced individually and collectively by various participants in them. Active cooperation between market participants and central banks is needed to develop such understanding.

The working group emphasised the scope for further development of the existing technical expertise in central banks with respect to market instruments and market mechanisms. There is also a need, perceived by market participants as well, for more comprehensive and meaningful statistical coverage of off-balance-sheet activities. Following the recommendations of the report on "Recent Innovations in International Banking", published by the BIS in 1986, additional data have been collected, as described in some detail in Appendix A. These data are based partly on new reporting by market participants to central banks or supervisory agencies and partly on information collected by exchanges and private organisations, notably the International Swap Dealers Association (ISDA). Nevertheless, serious gaps remain. In efforts to fill those gaps, priority ought to be given to developing a more profound understanding than now exists of which concepts would be of greatest relevance from the macro-prudential perspective and of which data would best measure and elucidate those concepts. The working group felt that further efforts in this direction are necessary. Such efforts should recognise that data on financial transactions are used not just to analyse financial market developments, but also to formulate national income and balance of payments accounts.

The subsequent objective of compiling the appropriate statistics will require cooperation between market participants, central banks and supervisory authorities. Especially important are efforts to clarify and standardise methodologies, so that meaningful data relating to various types of market risk exposures can be aggregated more easily and

² "Reducing Uncertainty - The Way Forward", report of the Legal Risk Review Committee, February 1992.

consistently across markets and across countries without adding to the reporting burden of financial institutions.

Data collected by national and international authorities ought to be made as accessible as possible to market participants. These data could extend existing information available from exchanges or trade associations and might allow participants to gauge more accurately their own share of transactions and positions in various markets. That, in turn, would help to avoid situations in which participants overestimate the liquidity of their own position.

However, even the best and most comprehensive statistical data cannot by themselves be sufficient for understanding rapidly evolving markets and the risks associated with them. Market participants, their self-regulatory bodies and central banks should set a high priority on deepening and broadening collective understanding of these markets. The interviews conducted for the purposes of this report are an example of such joint efforts and should be continued in future.

The rapidly changing environment for international interbank relations presents challenges both to market participants and to financial authorities in terms of risk management. The remarks above have stressed the responses that might be warranted on the part of market participants. However, the developments described also imply responsibilities for central banks through the influence of their operations on the environment within which wholesale markets operate. The most fundamental responsibilities of central banks in this regard remain the traditional ones. First, central banks must pursue policies that are conducive to monetary, economic and financial market stability. Price stability is a key factor in maintaining the stability of financial markets. Second, central banks must work with other financial authorities to help ensure that banks and other financial institutions are adequately capitalised and have appropriate systems in place for managing and controlling risks.

A central theme of this report is that central banks, in fulfilling these traditional roles and in formulating their responses to systemic disturbances, must be knowledgeable about, and sensitive to, changes in the roles and behaviour of firms operating in a framework of interconnected financial markets. Because these changes may affect both the channels of transmission of monetary policy and the dynamics of financial markets, central banks must continue to monitor and analyse ongoing developments.

APPENDIX A: Statistics on Interbank Transactions

This appendix is in three parts. The first section summarises developments in the traditional international interbank deposit markets since 1983, based on data reported by banks in the BIS reporting area. The second section reviews some data collected for supervisory purposes to provide some perspective on the relative importance of on-balance-sheet versus off-balance-sheet interbank business of banks in the G-10 area. These data are as of end-1990. The final section describes the evolution of over-the-counter (OTC) and organised markets for derivative instruments since end-1986, with emphasis on banks' involvement in those markets.

A. The international interbank deposit markets

Between end-1983 and end-1991, the international interbank claims within the BIS reporting area grew at a compound annual average rate of 13.6% at current exchange rates, to stand at \$4.7 trillion at end-1991.¹ Four major developments characterised the evolution of the international interbank deposit markets in this period.

First, the growth of interbank claims was more pronounced than that of final international lending², which grew at an average rate of 12.6%. As a result, the ratio of interbank claims between BIS reporting banks to outstanding final credit rose from 1.14 to 1.31 from end-1983 to end-1991, reaching a peak of 1.47 at end-1989. This increase reflected the redepositing of internationally intermediated funds between a larger number of banks, a buildup of balances between related offices³, and a pronounced increase in interbank flows associated with portfolio investments and trading activities.

Second, the evolution of cross-border interbank activity vis-à-vis Japan differed considerably from that between other centres. Between end-1983 and end-1991, interbank business involving Japan expanded in current dollar terms at an average annual rate of 31.4%, whereas business between other centres expanded at a rate of 10%. The growth of interbank business involving Japan reflected the surge in Japanese banks' international

¹ Cross border interbank claims in all currencies as well as local interbank claims in foreign currency reported by banks in the Group of Ten countries, Luxembourg, Austria, Denmark, Finland, Ireland, Norway, Spain, the Bahamas, Bahrain, the Cayman Islands, Hong Kong, the Netherlands Antilles, Singapore and the branches of US banks in Panama.

² Final or net international bank credit is defined as total cross-border claims less redepositing between reporting banks.

³ Statistics compiled by the BIS on the basis of the nationality of ownership of international bank assets show that the ratio of interbank claims between related offices to claims between non-related banks rose from 0.5 to 0.7 between end-1983 and end-1991.

Table 1

The interbank market within the BIS reporting area

In billions of US dollars

	Average annual changes at constant end-of-quarter exchange rates				Stocks at end-period at current exchange rates		
	1984-86	1987-88	1989-90	1991	1983	1987	1991
Cross-border interbank claims	237.0	410.3	437.0	-142.8	1,194.8	2,770.7	4,155.3
<i>of which:</i>							
<i>between Japan and other inside-area countries</i>	113.5	322.9	156.7	-143.1	162.3	950.5	1,458.8
<i>between the United States and other inside-area countries except Japan</i>	45.7	37.7	83.0	13.6	393.1	622.4	816.0
<i>between European countries</i>	54.4	47.4	150.4	34.1	341.7	754.8	1,387.5
<i>other inside area</i>	23.4	2.3	46.9	-47.4	297.7	443.0	493.0
Local foreign currency interbank claims	44.1	34.9	43.2	-60.4	285.7	551.8	588.6
Total international interbank claims	281.1	445.2	480.2	-203.2	1,480.5	3,322.5	4,744.0
Memorandum item:							
Net international bank credit*	133.3	290.0	437.5	80.0	1,300.0	2,365.0	3,610.0

* Total cross-border claims in all currencies plus local claims in foreign currency less redepositing between reporting banks.

lending activities, the growth of their lending to Japanese non-banks from locations abroad, and their role in facilitating the international diversification of Japanese institutional investors' portfolios in the course of the 1980's. The expansion was accompanied by considerable seasonal volatility attributable in large measure to the "window dressing" operations of Japanese banks at the end of their mid and end-year accounting periods (at end-September and end-March respectively).

Third, and reflecting the above developments, the nationality distribution of banks' exposures in the international interbank deposit markets changed markedly in the course of the 1980s.⁴ Between end-1983 and end-1988, the share of international interbank claims between non-related banks accounted for by Japanese banks rose from 21% to a peak of 34%. Cross-border balances between offices of Japanese banks also rose sharply in this period reflecting the channelling through the international markets of domestic business. As far as other nationalities are concerned, the interbank activity of continental European banks displayed considerable buoyancy in the mid to late-1980s. Among the factors contributing to this growth were the lifting of foreign exchange controls (notably in France, Italy and Sweden) and the expansion of the Euro-markets in these countries' home currencies, the prospect of the

⁴ As measured by statistics on the distribution by nationality of ownership of the international assets of banks located in industrialised countries reporting banking data to the BIS and, in addition, for US banks of positions booked in certain offshore centres.

internal market within the EC and the growth of the private ECU financial markets. By contrast, US and Canadian banks scaled back their involvement in the interbank deposit markets and their combined share of interbank claims between non-related banks fell from 25.1% at end-1983 to 6.3% at end-1991.

Table 2

International bank positions by nationality of bank

Amounts outstanding in billions of US dollars

Parent country of bank	Total positions		Of which vis-à-vis					
			Related offices		Other banks		Non-banks ¹	
	1983	1991 ²	1983	1991 ²	1983	1991 ²	1983	1991 ²
Total assets	2,165.9	6,137.0	502.6	1,755.2	944.8	2,538.7	718.5	1,843.1
Belgium	38.2	135.1	2.0	8.5	18.0	77.8	18.2	48.8
Canada	112.9	110.1	43.5	51.8	32.0	21.3	37.4	37.0
France	191.4	565.4	24.4	119.0	104.9	290.1	62.1	156.3
Germany	144.5	640.4	10.6	126.8	70.7	335.4	63.2	178.2
Italy	80.9	397.5	2.3	42.9	57.7	187.5	20.9	167.1
Japan	456.9	1,935.1	122.1	716.1	198.0	708.4	136.8	510.6
Luxembourg	5.2	46.7	0.1	0.7	3.4	31.8	1.7	14.2
Netherlands	62.5	199.5	5.4	31.1	35.4	99.9	21.7	68.5
Sweden	18.2	128.9	0.9	20.5	5.8	18.0	11.5	90.4
Switzerland	79.9	408.9	14.2	115.8	42.9	204.8	22.8	88.3
United Kingdom	178.8	282.1	19.9	42.3	85.9	138.1	73.0	101.7
United States	605.5	650.7	227.0	363.9	205.0	141.1	173.5	145.7
Other	191.0	636.6	30.2	115.8	85.1	284.5	75.7	236.3
Total liabilities	2,034.1	6,095.8	484.3	1,662.4	936.6	2,473.0	613.2	1,960.4
Belgium	38.6	133.1	2.3	7.1	25.2	84.8	11.1	41.2
Canada	115.2	121.2	28.9	37.8	41.3	28.4	45.0	55.0
France	185.8	630.4	29.0	117.6	122.7	304.0	34.1	208.8
Germany	131.7	489.2	14.1	121.3	82.4	146.5	35.2	221.4
Italy	78.9	427.5	4.7	41.9	65.8	287.2	8.4	98.4
Japan	414.7	1,828.1	115.9	696.1	219.5	870.9	79.3	261.1
Luxembourg	5.0	47.9	-	1.2	1.7	14.4	3.3	32.3
Netherlands	59.8	178.3	4.8	27.1	35.0	77.9	20.0	73.3
Sweden	17.2	126.1	0.7	23.2	13.9	62.0	2.6	40.9
Switzerland	67.7	398.6	25.8	104.0	11.0	57.9	30.9	236.7
United Kingdom	181.6	333.6	22.8	43.5	86.3	98.0	72.5	192.1
United States	544.4	683.1	200.8	328.4	131.7	120.7	211.9	234.0
Other	193.5	698.7	34.5	113.2	100.1	320.3	58.9	265.2

¹ Includes official monetary institutions and on the liabilities side, CDs and other securities.

² Data for 1991 include trustee funds channelled through banks in Switzerland and allocated to respective banking nationalities.

Fourth, since the end of 1990, a marked slowdown in the pace of expansion of interbank deposit activity has taken place. In the first three quarters of 1991, interbank claims showed an absolute decline of \$286 billion. The decline appears to have reflected the weakening of growth in the global economy, heightened concern about counterparty credit risk, the impact of the capital accord, and the increased use of derivative instruments to hedge market risk. Although interbank claims showed a seasonal expansion in the last quarter of 1991, a further contraction took place in early 1992.

B. Interbank activity in off-balance-sheet instruments

Although considerable improvements have been made in recent years in the statistical coverage of banks' off-balance-sheet business, important gaps and differences in national reporting systems remain with respect to banks' uses of, and interaction within, markets for derivative instruments. Efforts to compile aggregate statistics have stumbled on these gaps and a comprehensive picture of the extent of off-balance-sheet interbank business cannot be presented.

However, data collected for supervisory purposes permit an assessment, as of end-1990, of the relative size of the on and off-balance-sheet interbank business of internationally active banks in the G-10 area.⁵ The data also shed some light on the types of derivative instruments in which banks incur exposures to one another. Given the recent availability of these data, they offer little insight into the evolution of off-balance-sheet interbank business over time. However, reasonable inferences can be drawn from time series on volumes outstanding of some of the principal traded derivative contracts. The BIS has collected and compiled such data since 1986 and they are summarised in the following section.

In contrast to the data on the international interbank deposit markets, the data in the following sections do not distinguish between domestic and international interbank business. Moreover, for some of the tables below, it has not always been possible to separate out non-derivatives transactions, such as credit commitments, back-stop guarantees and other performance related contingencies. Such transactions account for a small part of the notional principal amounts of banks' off-balance-sheet exposures, but in terms of capital at risk to counterparty default they tend to be greater than banks' derivatives exposures. Such business tends to be conducted principally with non-banks.

⁵ Data collected for capital adequacy purposes distinguish on and off-balance-sheet claims assigned to different risk weight categories. Interbank claims on banks in the OECD area are assessed a 20% risk weight and this category can be extracted from most national reporting systems. While claims on certain multinational development banks and publicly guaranteed agencies are also assigned a 20% risk weight, they typically represent a very small share of the total claims in this category.

(i) The relative size of on versus off-balance-sheet interbank claims

Table 3 shows the share of interbank claims in the total claims of internationally active banks in various G-10 countries at end-1990. The table also shows to which extent interbank claims arise from on or off-balance-sheet activities respectively. The total claims are the sum of unweighted on-balance-sheet claims and the credit equivalent value of off-balance-sheet claims.⁶

Table 3

On- and off-balance-sheet interbank¹ assets at end-1990

As a percentage of total assets

Banks from	Total interbank claims	On-balance-sheet interbank claims	Off-balance-sheet interbank claims
Belgium ²	11.0	10.2	0.8
Canada ³	10.2	7.5	2.7
France	n.a.	16.7	n.a.
Germany ⁴	9.2	8.3	0.9
Italy	23.5	20.4	3.1
Japan ⁵	20.4	15.0	5.4
Luxembourg	30.0	29.2	0.8
Netherlands ⁶	20.6	18.3	2.3
Sweden	13.3	10.0	3.3
United Kingdom	30.7	21.5	9.2
United States ⁷	7.1	3.8	3.3

¹ As measured by assets and credit equivalent amounts of off-balance-sheet items assigned to the 20% risk category other than claims guaranteed by OECD central governments and claims collateralised by securities issued by government, government-sponsored agencies or cash items in process of collection. Off-balance-sheet assets include loan equivalent claims (e.g. commitments and guarantees) and the credit equivalent values of derivative contracts in a gain.

² Consolidated averages for eighty credit institutions.

³ Figures for the six largest banks at end-October 1990.

⁴ Claims on multilateral agencies are included.

⁵ Figures for twenty-two major banks at end-March 1991.

⁶ Claims on non-bank entities assigned a 20% risk weight included.

⁷ Figures for the lead banks of the fifty largest US banking organisations.

There were fairly large differences across countries in the share of the interbank claims in banks' overall claims as well as in the relative shares of on and

⁶ The credit equivalent value of off-balance-sheet claims cover contracts in a gain position whose uncertain collectibility represents a potential credit risk to banks. A broader measure of the capital at risk associated with a derivatives portfolio would also incorporate the liabilities that arise in contracts that are "out-of-the-money" from banks' perspective. For example, as writers of options, banks' face cash pay-outs on contracts that are "in-the-money" to the purchaser. Banks also face market risk related liabilities in positions taken on exchanges. However, in a balanced derivatives portfolio, hedging contracts may generate the funds required to settle liabilities arising from written contracts.

off-balance-sheet interbank business. Interbank claims accounted for about 30% of the aggregate claims of UK and Luxembourg banks, and for about 20% for Japanese, Italian and Dutch banks. By contrast, such claims represented less than 10% of the overall claims of US and German banks.

US banks' interbank claims were divided equally between on and off-balance-sheet claims. In other G-10 countries, off-balance-sheet interbank claims were generally less than one third of on-balance-sheet interbank claims, and ranged from and less than one percent of overall claims to nearly 10% of aggregate claims in the case of UK banks.

(ii) Overall and interbank exposures in interest and foreign exchange rate-related derivatives

Table 4 presents the overall and interbank components of the notional and credit equivalent values of interest and foreign exchange rate-related derivatives contracts outstanding at internationally active G-10 banks at end-1990. Three features are worth noting. First, while the notional value of contracts outstanding was very large, the credit equivalent value represented on average only 2.0% and 4.0% of the notional value of interest and foreign exchange rate contracts respectively.⁷ Second, exposures arising from foreign exchange contracts tended to be much larger than exposures resulting from interest rate derivatives. Finally, a very substantial portion of banks' exposures in derivative contracts are incurred vis-à-vis other banks. On the basis of notional amounts, more than 85% of the foreign exchange rate-related exposures of German, Italian and Luxembourg banks arose from interbank transactions; in other countries, the interbank proportion averaged 60%. For interest rate-related derivatives exposures, the interbank component exceeded 90% for German and Luxembourg banks, and averaged some 70% for banks in other countries.⁸

(iii) Outstanding interest and foreign exchange rate-related derivatives contracts by type of instrument

Table 5 provides a broad instrument-by-instrument breakdown of the off-balance-sheet interest rate and foreign exchange rate related positions of US, Canadian

⁷ The notional value of banks' derivatives portfolios may confer some, although usually quite imprecise, information about the market risk exposure to which these activities give rise. The imprecision arises from several factors: (i) derivatives exposures often hedge on-balance-sheet market risks; (ii) derivatives portfolios are themselves to a large extent matched or hedged; (iii) notional totals include written contracts such as deeply out-of-the-money options that are unlikely to be exercised and, therefore, have little risk; and (iv) a number of derivatives embody market risk exposures limited to differences between financial market indices or prices, and not to gross market price movements.

⁸ In credit equivalent terms the share of exposures incurred vis-à-vis other banks was often smaller than when measured in the corresponding notional figures. A smaller credit equivalent share probably reflects a greater preponderance of contracts with an original maturity of less than one year and/or the presence of out-of-the-money contracts.

Table 4

Notional and credit equivalent total and interbank interest and exchange rate related derivatives exposures at end-1990*

In billions of US dollars and as a percentage

Banks from	Notional amount		Credit equivalent amount	
	Total	percent vis-à-vis other banks ¹	Total	percent vis-à-vis other banks ¹
Belgium²				
Interest rate related	87.8	75.1	0.4	58.3
Foreign Exchange Related	275.8	47.2	4.7	17.7
Canada³				
Interest rate related	361.5	57.6	5.6	57.6
Foreign Exchange Related	696.2	52.8	24.9	52.8
Germany				
Interest rate related	640.2	90.8	12.3	87.0
Foreign Exchange Related	1,184.7	88.7	49.0	87.8
Italy				
Interest rate related	77.3	72.2	2.0	75.0
Foreign Exchange Related	213.3	85.9	7.1	88.9
Japan⁴				
Interest rate related	1,583.0	n.a.	34.0	79.4
Foreign Exchange Related	4,487.0 ^a	n.a.	193.0	67.4
Luxembourg				
Interest rate related	87.4	92.7	0.3	66.7
Foreign Exchange Related	200.9	87.0	1.7	70.6
Netherlands				
Interest rate related	n.a.	n.a.	2.0	n.a.
Foreign Exchange Related	n.a.	n.a.	11.3	n.a.
Sweden⁵				
Interest rate related	109.3	n.a.	1.1	63.6
Foreign Exchange Related	346.8	n.a.	9.9	54.5
United Kingdom⁶				
Interest rate related	693.6	79.2	8.7	70.0
Foreign Exchange Related	1,092.5 ^a	78.7	39.1	81.3
United States⁷				
Interest rate related	3,122.0	n.a.	n.a.	n.a.
Foreign Exchange Related	3,332.0	n.a.	n.a.	n.a.

* As national reporting systems and reporting dates may differ, cross-country comparisons are not necessarily meaningful. The figures are subject to revision.

¹ As measured by amounts of off-balance-sheet items assigned to the 20% risk category other than claims guaranteed by OECD central governments and claims collateralised by securities issued by government and government-sponsored agencies.

² Consolidated figures for eighty credit institutions.

³ Figures for the six largest banks at end-October 1990.

⁴ Figures for twenty-two major banks at end-March 1991: (a) includes foreign exchange forwards of original maturity of less than 14 days.

⁵ Amounts reported by the five largest banks.

⁶ Figures are for banks registered in the United Kingdom which report off-balance-sheet exposures on a replacement basis: (a) figures exclude exchange-traded futures and exchange rate contracts with maturity of less than 14 days.

⁷ Figures are for the lead banks of the 50 largest US banking organisations at year-end 1990.

and German banks. The breakdowns are not fully consistent across reporting systems and comparisons should be made with caution. The data suggest that interest rate and cross-currency interest rate swaps account for the largest share of these banks' interest rate-related exposures, followed by FRAs and interest rate options. Claims arising from forward foreign exchange transactions accounted for well over two-thirds of outstanding foreign exchange rate-related exposures. Currency swaps and currency options accounted for most of the remainder.

Table 5
Selected features of US, Canadian and German banks' off-balance-sheet positions*

Notional amounts in billions of US dollars

	United States ¹	Canada ²	Germany ³
Interest rate related contracts			
IRs (including cross-currency interest rate swaps)	1,627	245 ⁴	380 ⁵
FRAs	xx ⁶	92	260
IR options (including swaptions, caps, collars and floors)	659	9	206
Other interest related contracts	836 ⁷	15	69
Foreign Exchange related contracts			
Forward foreign exchange contracts	xx ⁶	632	1,129
Currency swaps	284	48 ⁸	88
FX options	490	15	95
Other FX related contracts	2,558 ⁹	1	188 ¹⁰

* Not based on identical reporting schemes.

¹ End-1990 positions of the lead banks of the 50 largest US banking organisations.

² End-October 1990 positions of the six largest Canadian banks.

³ End-September 1991 positions of banks in Germany and the foreign branches of German banks.

⁴ Excludes cross-currency interest rate swaps.

⁵ Positions of domestic banks and their foreign branches.

⁶ Not reported separately.

⁷ Includes futures and forward interest rate contracts.

⁸ Includes cross-currency interest rate swaps.

⁹ Includes spot, forwards outstanding and currency futures.

¹⁰ Claims and obligations arising from spot transactions.

C. The evolution of bank involvement in selected derivatives markets since end-1986

Measures of activity in derivative financial instruments collected from industry associations and exchanges indicate strong growth of most markets since end-1986 (Table 6). The outstanding notional principal value of OTC interest and currency swaps and of related

derivative financial instruments has seen an eightfold increase. The markets for other OTC derivative instruments, such as forward rate agreements and FX options, for which only rough estimates of activity are available, also appear to have expanded markedly in recent years. Open positions in exchange-traded financial futures and options have soared by over 500% and average daily turnover in these contracts has more than doubled over the five-year period.

Table 6
Markets for selected derivative instruments

Notional principal amounts outstanding at end-year, in billions of US dollars equivalent

	1986	1987	1988	1989	1990	1991
Exchange-traded instruments¹	583	725	1,300	1,762	2,284	3,518
Interest rate futures	370	488	895	1,201	1,454	2,159
Interest rate options ²	146	122	279	387	600	1,072
Currency futures	10	14	12	16	16	18
Currency options ²	39	60	48	50	56	59
Stock market index futures	15	18	28	42	70	77
Options on stock market indices ²	3	23	38	66	88	132
Over-the-counter instruments³	500^e	867	1,330	2,402	3,451	4,449
Interest rate swaps ⁴	400 ^e	683	1,010	1,503	2,312	3,065
Currency and cross-currency interest rate swaps ^{4,5}	100 ^e	184	320	449	578	807
Other derivative instruments ^{4,6}	-	-	-	450	561	577
<i>Memorandum item:</i>						
<i>Cross-border plus local foreign currency claims of BIS reporting banks</i>	<i>4,031</i>	<i>5,187</i>	<i>5,540</i>	<i>6,498</i>	<i>7,578</i>	<i>7,497</i>

e = estimate.

¹ Excludes options on individual shares and derivatives involving commodity contracts. ² Calls plus puts. ³ Only data collected by ISDA. Excludes information on contracts such as forward rate agreements, over-the-counter currency options, forward foreign exchange positions, equity swaps and warrants on equity. ⁴ Contracts between ISDA members reported only once. ⁵ Adjusted for reporting of both currencies. ⁶ Caps, collars, floors and swaptions.

Sources: Futures Industry Association (FIA), various futures and options exchanges worldwide; International Swap Dealers Association (ISDA); BIS calculations.

The growth in transactions and notional outstanding positions in derivative instruments has tended to outpace that in other segments of the financial markets. One indication of this is the rise in the identified outstanding notional volume of derivative contracts on interest rates and currencies as a proportion of the international assets of BIS reporting banks from around 25% at end-1986 to more than 100% at end-1991. Activity in the derivatives markets has also grown more sharply than traditional interbank operations. For example, the ratio of open positions in Euro-dollar contracts to the outstanding dollar-denominated interbank assets of BIS reporting banks rose from less than 15% at end-1987 to

40% at end-1991. During this six-year period outstanding dollar-denominated international interbank claims expanded by two-thirds.

(i) Bank involvement in OTC derivatives markets

The principal source of consistent information on banks' involvement in OTC derivatives markets is the data compiled by the International Swap Dealers Association (ISDA) from its members.⁹ The ISDA data provide as from mid-1987 semi-annual statistics on the notional value of new interest rate and currency (including cross-currency interest rate) swaps arranged, and, as from end-1987, annual data on the volume of swaps outstanding. The following breakdowns are available: swaps arranged between ISDA members or with other end-users (financial institutions, corporations, governments); currency composition; maturity distribution (original for new swaps and residual for swaps outstanding); and broad geographical origin. In addition to the data on swaps, ISDA has collected very aggregated data on the notional value of other interest-related instruments such as caps, floors, collars and swaptions since end-1989.

Interest rate swaps. At end-1991, the notional principal value of interest rate swaps outstanding stood at over \$3.0 trillion, or nearly 350% higher than at end-1987 (Table 7). A total of \$1.6 trillion of new swaps were arranged in the course of 1991, an increase of 28% over the value of new swaps arranged in 1990.

Table 7

Main features of the interest rate swap market, 1987-91

Notional principal value, in billions of US dollars

	New swaps arranged					Amounts outstanding	
	1987	1988	1989	1990	1991	at end-1987	at end-1991
End-user	261.9	375.0	515.5	779.7	860.0	476.2	1,722.8
<i>of which: US dollar</i>	192.6	237.9	331.4	415.2	476.4	379.9	831.0
<i>Other currencies</i>	69.3	137.1	184.1	364.5	383.6	96.3	891.8
Interbank (between ISDA members)	125.9	193.1	318.0	484.5	761.8	206.7	1,342.3
<i>of which: US dollar</i>	94.1	128.4	213.8	261.1	450.0	161.6	674.9
<i>Other currencies</i>	31.8	64.7	104.2	223.4	311.8	45.1	667.4
Total	387.8	568.1	833.5	1,264.2	1,621.8	682.9	3,065.1
<i>of which: US dollar</i>	286.7	366.3	545.2	676.3	926.4	541.5	1,506.0
<i>Other currencies</i>	101.1	201.8	288.3	587.9	695.4	141.4	1,559.1

Source: ISDA.

⁹ Although all major intermediaries in the swap markets are members of ISDA, the degree of compliance in submitting returns to ISDA has varied widely between reporting dates. Over time, however, the number of respondents has increased reflecting the growth of membership and greater compliance. Some problems remain in respect of the smaller currency sectors which appear according to other estimates of market size to be underreported.

Several changes have accompanied the expansion of the interest rate swap markets in recent years. Firstly, swaps arranged between interbank (ISDA member) counterparties as a share of total swaps outstanding expanded from 30% at end-1987 to 44% at end-1991. This development reflects the changing use of swaps in recent years. In the mid-1980s the market was heavily dependent on new bond issues and arbitrage activity in the capital markets. Over time, however, as interest rate swaps have become a more general instrument of risk management, especially for financial institutions, they have increasingly come to substitute for more traditional interbank activity. In the dollar sector an indication of this development is the decline in the weighted average original maturity of new swaps, from 4.1 to 2.4 years between the first half of 1987 and the second half of 1991.

Secondly, the share of the US dollar sector in total interest rate swaps outstanding contracted between end-1987 and end-1991 from 79 to 57%. The expansion of non-dollar business was particularly pronounced between 1988 and 1990, but appears to have tapered off in the course of 1991. The yen and pound sterling together accounted for 47% of outstanding non-dollar interest rate swaps at end-1991 (Table 8). Interbank positions

Table 8
Currency composition of non-dollar interest rate swaps, 1987-91

Notional principal value, in billions of US dollars

	New swaps arranged					Amounts outstanding	
	1987	1988	1989	1990	1991	at end-1987	at end-1991
Yen	31.6	42.5	61.8	137.4	193.7	40.5	478.9
Deutsche Mark	22.3	32.9	41.1	106.0	102.6	31.6	263.4
Pound sterling	20.5	45.8	67.8	138.7	118.2	29.7	253.5
Swiss franc	4.9	12.3	24.1	47.2	68.0	5.0	137.6
French franc	4.3	16.4	27.5	34.2	35.6	11.2	115.6
ECU	1.7	8.2	12.2	12.9	32.1	3.2	72.8
Australian dollar	9.6	29.7	35.4	36.9	34.4	10.7	72.3
Canadian dollar	4.7	10.7	13.2	34.9	37.9	6.5	61.3
Other currencies	1.5	3.3	4.9	39.7	36.4	3.0	136.1
Total	101.1	201.8	288.3	587.9	694.5	141.4	1,559.1

Source: ISDA.

represented 55% of yen interest rate swaps, a much higher share than that recorded for most other currencies. End-user business in yen swaps is predominantly with Asian counterparties, primarily corporations; however, over 15% of yen swaps with end-users were with financial intermediaries in Europe. In the case of sterling and the Deutsche Mark about 60% of business was with end-users, largely financial institutions such as building societies in

the United Kingdom. Among other currencies, very strong growth was recorded for interest rate swaps in Swiss francs, ECUs and Italian lire between end-1989 and end-1991.

Thirdly, the expansion of interest rate swaps in non-dollar currencies has coincided with a shift in the geographical and sectoral distribution of end-user business. Between end-1987 and end-1991, the share of European counterparties in total outstanding end-user swaps expanded from 30 to 44% whereas that of US entities contracted from 45 to 26%. Among European end-user counterparties, financial institutions remain by far the most important but very rapid growth has been recorded recently for interest rate swaps with non-financial corporations. In Asia, new interest rate swaps with non-financial corporations have also grown rapidly since 1989.

Currency swaps. The market for currency swaps, including cross-currency interest rate swaps, has also witnessed rapid growth, with outstanding notional principal rising from \$184 to 807 billion between end-1987 and end-1991 (Table 9). During this period a number of changes took place mirroring those in the market for interest rate swaps. For example, the share of interbank business in total currency swaps rose from 19 to 28%; the weighted average maturity of interbank currency swaps shrank from around six to three years; the share of swaps arranged between non-dollar currencies rose from 11 to 28%; the relative importance of US counterparties as end-users contracted from 16 to 11%.

Table 9

Main features of the currency swap market, 1987-91*

Notional principal value, in billions of US dollars

	New swaps arranged					Amounts outstanding	
	1987	1988	1989	1990	1991	at end-1987	at end-1991
End-user	68.6	95.0	127.5	151.5	224.5	148.2	582.3
<i>of which</i>							
<i>US dollar against another currency</i>	59.7	77.9	93.6	95.9	160.0	129.2	410.6
<i>Between other currencies</i>	8.9	17.1	33.9	55.6	64.5	19.0	171.7
Interbank (between ISDA members)	17.9	29.3	50.6	61.3	104.0	55.5	224.9
<i>of which</i>							
<i>US dollar against another currency</i>	17.2	25.9	38.8	35.3	84.3	33.4	173.6
<i>Between other currencies</i>	0.7	3.4	11.8	26.0	19.7	2.1	51.3
Total	86.5	124.3	178.1	212.8	328.3	183.7	807.2
<i>of which</i>							
<i>US dollar against another currency</i>	76.9	103.8	132.4	131.2	244.2	162.6	584.3
<i>Between other currencies</i>	9.6	20.5	45.7	81.6	84.1	21.1	222.9

* Adjusted for the double-counting resulting from the reporting of the notional value in terms of each of the two currencies involved in the swap transaction.

Source: ISDA.

At end-1991, nearly 45% of outstanding currency swaps involved the yen on one side of the transaction (Table 10). Most of these yen swaps were against the US dollar, but swaps against the Australian dollar and the Swiss franc have also been sizable in the past. The linkage with the latter two currencies has reflected the role played in the Australian and Swiss financial markets by Japanese investors and issuers of securities. The Swiss franc currency swap market is also closely linked to sterling and the Deutsche Mark. The recent growth of currency swaps involving the ECU and continental European currencies such as the Italian lire and the Swedish krona has been stimulated by the lifting of capital controls and the growth of the Euro-bond and deposit markets for these currencies.

Table 10
Currency composition of currency swaps, 1987-91

Notional principal value, in billions of US dollars

	New swaps arranged					Amounts outstanding	
	1987	1988	1989	1990	1991	at end-1987	at end-1991
Yen	27.4	46.0	79.7	94.4	110.8	59.7	368.1
<i>of which: against US dollar</i>	23.7	34.7	53.0	47.5	80.0	49.0	234.3
Swiss franc	12.6	20.8	17.2	39.8	65.9	39.9	136.6
<i>of which: against US dollar</i>	9.1	11.5	10.1	13.5	29.7	31.8	68.0
Deutsche Mark	11.6	16.9	18.3	23.2	35.5	21.4	95.2
<i>of which: against US dollar</i>	8.0	11.8	7.7	10.6	18.8	16.4	50.3
Australian dollar	13.9	12.9	39.7	36.7	24.8	20.4	86.5
<i>of which: against US dollar</i>	12.6	11.3	21.7	9.3	11.9	18.2	28.7
Pound sterling	4.2	9.8	15.9	21.7	28.7	10.5	74.8
Canadian dollar	5.6	14.3	12.6	14.2	27.7	13.9	63.7
ECU	8.6	12.3	12.8	15.7	27.4	18.7	61.5
Italian lire	-	-	-	10.1	25.8	-	35.9
Swedish krona	-	-	-	2.8	16.5	-	17.7
Other currencies	12.3	11.7	27.6	35.7	49.5	20.3	98.1
minus: double-counting of currency swaps between non-dollar currencies	-9.7	-20.4	-45.7	-81.5	-84.1	-21.1	-222.9
Total	86.5	124.3	178.1	212.8	328.4	183.7	807.2

Source: ISDA.

Other swap-related markets for derivatives. A range of other swap-related interest rate options -- caps, floors, collars and swaptions -- have grown alongside the swap market. At end-1991 the aggregate notional value of these instruments stood at \$577 billion.

By far the most widely used instrument is the "cap", which allows its purchaser to fix a maximum interest rate on a debt obligation. At end-1991 the notional principal of caps outstanding amounted to \$317 billion, of which about 40% was accounted for by interbank

positions (Table 11). Caps are for the most part sold to end-users by banks. By contrast, in the market for floors, which ensure their purchasers that interest rates will not fall below a certain level, end-users are net sellers of contracts to banks.

Table 11

Main features of markets for swap-related derivative products at end-1991

Amounts outstanding, in billions of US dollars

Counterparty and transaction type	US dollar	Other currencies	Total
Caps			
End-user			
Bought	23.6	12.6	36.2
Sold	110.2	39.6	149.8
Interbank (ISDA member) ¹	91.4	39.6	131.1
Total	225.2	91.8	317.0
Floors			
End-user			
Bought	17.6	21.1	38.7
Sold	26.0	6.9	32.9
Interbank (ISDA member) ¹	29.6	28.0	57.6
Total	73.2	56.0	129.2
Collars and other combinations²			
End-user			
Bought	2.4	1.4	3.9
Sold	7.1	6.3	13.5
Interbank (ISDA member) ¹	3.0	1.7	4.7
Total	12.6	9.5	22.0
Swaptions			
End-user			
Bought	23.7	20.1	43.8
Sold	11.2	10.7	21.8
Interbank (ISDA member) ¹	21.7	21.7	43.3
Total	56.6	52.4	109.0

¹ Adjusted for double-counting by taking only the higher amount of either "bought" or "sold" contracts reported as having an ISDA member counterparty. ² Including participations and options on caps and floors.

Source: ISDA.

These interest rate related derivatives have in the past predominantly been denominated in US dollars. However, the share of contracts in non-dollar currencies expanded from 25% to 36% of the notional values outstanding between end-1990 and end-1991.

(ii) Bank involvement in exchange-traded instruments

Table 12 shows the development of annual turnover in derivative contracts traded on the largest organised exchanges worldwide.¹⁰ Although banks are heavy users of exchange traded contracts, data on their involvement is in general limited.

Table 12

**Annual turnover in derivative financial instruments
traded on organised exchanges worldwide**

	Annual number of contracts traded, in millions					
	1986	1987	1988	1989	1990	1991
Futures on short-term interest rate instruments	16.4	29.4	33.7	70.2	75.8	84.8
<i>of which: three-month Euro-dollar¹</i>	12.4	23.7	25.2	46.8	39.4	41.7
Futures on long-term interest rate instruments	74.6	116.3	122.6	130.8	143.3	149.7
<i>of which: US Treasury bond²</i>	54.6	69.4	73.8	72.8	78.2	69.9
<i>notional French government bond³</i>	1.1	11.9	12.4	15.0	16.0	21.1
<i>ten-year Japanese government bond⁴</i>	9.4	18.4	18.8	19.1	16.4	12.9
<i>German government bond⁵</i>	-	-	0.3	5.3	9.6	12.4
Currency futures	19.7	20.8	22.1	27.5	29.1	29.2
Interest rate options and options on interest rate futures	22.2	29.3	30.5	39.5	52.0	50.8
Currency options and options on currency futures	13.0	18.2	18.2	20.7	18.8	21.5
Total	145.9	214.0	227.1	288.6	319.1	336.0
<i>of which: in the United States</i>	122.9	161.4	165.3	198.1	205.7	199.7
<i>in Europe</i>	9.8	27.2	32.6	49.0	61.0	84.2
<i>in Japan</i>	9.4	18.3	18.8	23.7	33.6	30.0

¹ Traded on the Chicago Mercantile Exchange - International Monetary Market (CME-IMM), Singapore Mercantile Exchange (SIMEX), London International Financial Futures Exchange (LIFFE), Tokyo International Financial Futures Exchange (TIFFE) and Sydney Futures Exchange (SFE). ² Traded on the Chicago Board of Trade (CBOT), LIFFE, Mid-America Commodity Exchange (MIDAM), New York Futures Exchange (NYFE) and Tokyo Stock Exchange (TSE). ³ Traded on the Marché à Terme International de France (MATIF). ⁴ Traded on TSE, LIFFE and CBOT. ⁵ Traded on LIFFE and the Deutsche Terminbörse (DTB).

Sources: FIA, various futures and options exchanges and BIS calculations.

The most comprehensive data come from the "large trade" reports submitted by the clearing houses of individual US exchanges to the US Commodity Futures Trading Commission (CFTC). The data, which cover the activities of over twenty US and seventy-five non-US banks in the CBOT and CME-IMM futures and options on futures markets, provide only a partial picture of banks' involvement because of the very high cut-off point (300 to 500 open positions in a specific contract) required for submitting large position reports. In addition, the number of banks reporting large positions differs markedly according to the

¹⁰ The data reported in this section have been compiled from information provided by the Commodity Futures Trading Commission (CFTC) and the Options Clearing Corporation (OCC) in the United States, the Marché à Terme International de France (MATIF) and various exchanges. Their assistance is gratefully acknowledged.

contract, from five for the pound sterling currency future to eighty-three for the option contracts on Euro-dollar futures.

In terms of open futures positions, the banks reporting to the CFTC are most heavily involved in futures on short-term interest rates (Table 13), especially in the three-month Euro-dollar contract. At end-1991, banks accounted for at least 37% and 34% of long and short open positions respectively in contracts on short-term interest rates. In certain contracts their involvement was much greater: they accounted for 68% of long positions in the one-month LIBOR contract traded on the IMM and for 66% of short positions in the thirty-day interest rate contract traded on the CBOT.

Table 13

Open positions in exchange-traded financial futures contracts in the United States*

In billions of US dollars at end-1991

Type of futures contract	Total face value of open positions	Distribution of open positions					
		Futures purchases (long)			Futures sales (short)		
		Banks		Other	Banks		Other
US	Non-US	US	Non-US				
Short-term interest rate	1,166.4	171.9	253.9	740.6	124.4	273.4	768.6
Long-term interest rate	53.5	6.0	5.6	41.9	3.3	8.9	41.3
Currency	17.1	0.8	1.9	14.4	1.6	1.9	13.6
Stock market index	31.0	6.0	1.3	23.7	4.3	2.0	24.7

* Contracts traded on the CBOT and CME-IMM.

Sources: CFTC and BIS calculations.

Banks' use of currency futures appears to be modest in relation to the volume of their overall foreign exchange trading. The only contract in which banks are known to account for a significant share of open positions is the Canadian dollar contract traded at CME-IMM in which non-US banks hold 50% of long positions. In futures on stock market indices, US banks account for nearly 20% of all long, and 14% of all short, positions. A significant share of these positions appears to involve the trust units of banks.

The CFTC has also provided data on banks' involvement in listed options on financial futures traded in the United States (Table 14). The data suggest that banks are the major participants in options on short-term interest rate futures. In particular, at end-1991, banks had written as much as 78% of all put options on the one-month LIBOR contract.

As far as other options contracts are concerned, non-US banks are active as both purchasers and writers of options on currency futures. In the case of the yen and the Deutsche Mark, they account for about 30% of open positions. On the other hand, banks are not active in the market for options on futures of stock market indices.

Table 14

Open positions in exchange-traded options on futures contracts in the United States*

In billions of US dollars at end-1991

Type of options contract	Total face value of open positions	Distribution of open positions					
		Option purchases			Option sales		
		Banks		Other	Banks		Other
US	Non-US	US	Non-US				
Call options							
Futures on short-term interest rates	263.4	40.5	79.6	143.3	24.5	74.1	164.8
Futures on long-term interest rates	30.2	3.1	5.3	21.9	0.9	5.6	23.7
Futures on currencies	15.0	0.4	4.0	10.6	1.0	4.1	9.8
Futures on stock market indices .	5.6	0	0	5.6	0.1	0.3	5.2
Put options							
Futures on short-term interest rates	364.5	57.7	64.5	242.3	41.7	148.3	174.6
Futures on long-term interest rates	21.6	1.2	2.8	17.6	0.6	5.5	15.5
Futures on currencies	16.6	0.9	4.5	11.1	1.0	4.2	11.4
Futures on stock market indices .	12.2	0.3	0.8	11.0	0.1	0.2	11.9

* Options on futures contracts traded on the CBOT and the CME-IMM.

Sources: CFTC and BIS calculations.

Banks' involvement in the IMM Euro-dollar interest rate contracts. The Euro-dollar futures and options traded on the Chicago IMM are the exchange-traded derivatives most widely employed by banks and it is possible to compile a breakdown of the banks' positions by nationality of ownership (Table 15). At end-1991, US banks held by far the largest long positions in Euro-dollar futures. Japanese banks have also become major users of Euro-dollar futures and their role in the options contracts was comparable with that of US banks. At end-1991, Japanese banks had written nearly 23% of the notional value of put options on Euro-dollar futures. Amongst other nationalities, Swiss banks had sizable positions in options, while French banks made considerable use of futures.

Some information regarding banks' involvement in instruments traded on the Marche à Terme International de France (MATIF) is also available (Table 16). The data cover the open positions of banks and are analogous to those provided by the CFTC with the exception that long and short positions are aggregated together and the cut-off point for the reporting of positions by banks is much lower. The data suggest that banks hold a much larger share of total open positions at the MATIF than at US exchanges.

Table 15

Nationality distribution of open positions in the Euro-dollar futures and options contracts traded on the Chicago CME-IMM exchange

In billions of US dollars at end-1991

Nationality of bank	Euro-dollar futures		Options on Euro-dollar futures			
	purchases (long)	sales (short)	Call		Put	
			purchases (long)	sales (short)	purchases (long)	sales (short)
United States	153.3	104.3	40.0	24.4	57.7	39.9
Japan	93.1	97.3	37.3	28.2	13.7	82.5
France	21.3	23.4	6.1	2.4	4.4	4.8
United Kingdom	18.7	30.5	6.9	14.0	8.9	19.6
Canada	6.5	3.4	2.1	2.2	1.4	0.8
Switzerland	17.3	15.7	19.1	14.2
Other banks	73.6	84.1	8.6	9.5	17.0	25.3
Total identified banks	366.5	343.0	118.3	96.4	122.2	187.1
Other*	656.7	680.2	139.7	161.6	238.7	173.8
Grand total	1,023.2		258.0		36.09	

* Positions of non-banks and of banks below the reporting cut-off point.

Sources: CFTC and BIS calculations.

Table 16

Open positions in futures and options contracts traded on the MATIF

In billions of US dollars at end-1991

Contract type	Total face value of open positions	Distribution of open positions (average of long plus short)		
		Banks		Other
		French	Non-French	
Futures				
CAC-40	1.8	0.2	0.7	0.9
Notional French government bond	11.2	3.7	3.4	4.1
PIBOR	47.0	14.2	16.1	16.8
Options				
Notional French government bond (call plus put)	24.7	10.8	3.1	10.8
PIBOR (call plus put)	96.3	46.8	16.1	33.4

Source: MATIF.

APPENDIX B: Glossary of Terms

Add-ons: term used in the Basle capital accord for the amounts added to the credit equivalent value of derivative contracts to reflect potential credit exposures arising from future price or volatility changes. Add-ons are calculated on the basis of notional principal values, and vary according to the nature of the derivative instrument and its maturity.

Bank Investment Contracts (BICs): an insured bank liability that guarantees a fixed rate of interest for a set period on the money committed by the investor, usually the fiduciary of a defined pension contribution plan. BICs generally have option-like features which permit multiple deposits, withdrawals or loans.

Basis or spread risk: the risk that the relationship between the prices of two similar, but not identical, instruments of comparable maturity will change. The risk is referred to as basis risk when it arises in the context of an imperfect hedge, and as spread risk when the risk is willingly taken on.

Caps: a contract whereby a seller agrees to pay to the purchaser, in return for a one-off premium, the difference between current interest rates and an agreed (strike) rate, times the notional principal, should interest rates rise above the agreed rate.

Cash liquidity/funding risk: the risk that an individual firm will be unable to fund assets or meet (short-term cash settlement) obligations at all times at reasonable cost or at all. Some participants identified the cash requirements that could arise in connection with derivative portfolios following a price or volatility change as a major source of cash liquidity risk.

Clearing system (or clearing house arrangement): a mechanism for calculation of mutual positions within a group of participants with a view to facilitating the settlement of their mutual obligations on a net basis.

Close-out netting: an arrangement to settle all contracted but not yet due liabilities to and claims on a bank by one single payment, immediately upon the occurrence of one of a list of events (such as the default of a counterparty bank or the appointment of a liquidator to that bank).

Collar: the simultaneous purchase of a cap and the sale of a floor with the aim of maintaining interest rates within a defined range. The premium income from the sale of the floor reduces or offsets the cost of buying the cap.

Commodity options: a contract providing the purchaser the right, but not the obligation, to buy or sell a given quantity of a commodity at a strike price, on or before a given date.

Commodity swaps: a swap in which one of the payment streams for a commodity is fixed and the other is floating. Commodity swaps involve swaps of payment streams only and are usually settled in cash. However, physical delivery also occurs. Commodity swaps enable producers and consumers to hedge commodity price risk. Usually, the consumer pays fixed, the producer floating.

Credit equivalent value: amount representing the credit risk exposure in off-balance sheet transactions. In the case of derivatives, credit equivalent value represents the potential cost at current market prices of replacing the contract's cash flows in the case of default by the counterparty.

Credit risk: the risk that a counterparty to a transaction will fail to perform according to the terms and conditions of the contract, thus causing the holder of the claim to suffer a loss.

Cross-currency interest rate swaps: a swap involving the exchange of streams of interest rate payments (but not necessarily principal payments) in different currencies and often on different interest bases (e.g., fixed Deutsche Mark against floating dollar, but also fixed Deutsche Mark against fixed dollar).

Cross-currency settlement risk (or Herstatt risk): risk relating to the settlement of foreign exchange contracts that arises when one of the counterparties to a contract pays out one currency prior to receiving payment of the other. Herstatt risk arises because the hours of operation of domestic interbank fund transfer systems often do not overlap because of time zone differences. In the interval between final settlement of each leg, counterparties are exposed to credit risk and market risk.

Currency swaps: a swap involving the exchange of cashflows and principal in one currency for those in another with an agreement to reverse the principal swap at a future date. Normally, fixed interest rates are used in both currencies.

Current exposure method: the most precise method of assessing credit risk in off-balance sheet transactions, consisting of adding the marked-to-market replacement cost of all contracts with positive value and an add-on amount for potential credit exposure arising from future price or volatility changes

Discount swaps: also called off-market swaps, in which the fixed payments are below market rates. At the end of the swap, the shortfall is made up by one large payment. The larger is the discount applied to interest rates, the greater is the credit risk taken on by the fixed rate recipient (usually the bank).

Embedded option: an option (either tied to an interest rate or an equity or equity index price) embedded in a debt instrument that affects the instrument's redemption. Examples include callable bonds and mortgage backed securities.

Equity options: encompass a class of options giving the purchaser the right, but not the obligation, to buy or sell an individual share, a basket of shares, or an equity index at a predetermined price, on or before a fixed date.

Equity swaps: a transaction that allows an investor to swap the rate of return (or a component thereof) on an equity investment (an individual share, a basket or index) for the rate of return on another non-equity or equity investment.

Floor: a contract whereby the seller agrees to pay to the purchaser, in return for the payment of a premium, the difference between current interest rates and an agreed (strike) rate times the notional amount should interest rates fall below the agreed rate. A floor contract is effectively a string of interest rate guarantees.

Forward rate agreement (FRA): a contract in which two counterparties agree on the interest rate to be paid on a notional deposit of specified maturity at a specific future time. Normally, no principal exchanges are involved, and the difference between the contracted rate and the prevailing rate is settled in cash.

Hedge funds: speculative funds managing investments for private investors (in the US, such funds are unregulated if the number of investors does not exceed one hundred).

Intra-day credit (or daylight credit): credit extended for a period less than one business day; in a credit transfer system with end-of-day final settlement, daylight credit is tacitly extended by the receiving institution if it accepts and acts on a payment order even though it will not receive final funds until the end of the business day.

Market liquidity: measured by participants as the extent to which their own actions (transactions) change the market price of an asset. If deep, the immediate reversal of a transaction does not involve losses (other than fixed transaction costs).

Market Liquidity Risk: the uncertainty associated with the market liquidity of a financial asset. Often considered as the risk that a (negotiable or assignable) financial instrument cannot be sold quickly and at a price close to its fundamental value.

Market risk: the risk of a change in the price of an asset.

Marking-to-market: the process of recalculating the exposure in a trading position or a portfolio (of securities, equities or derivatives) on the basis of current market prices.

Netting (or netting scheme): an agreed offsetting of positions or obligations by trading partners or participants in a system. The netting reduces a larger number of individual positions or obligations to a smaller number of positions. Netting may take several forms which have varying degrees of legal enforceability in the event of default of one of the parties.

Notional value (or notional principal): the face or principal value upon which the performance of a derivative contract is based. In general, notional values are not paid or received.

Novation: satisfaction and discharge of existing contractual obligations by the substitution of new contractual obligations (whose effect, for example, is to replace gross with net payment obligations).

Off-balance sheet activities: banks' business that does not generally involve booking assets or liabilities. Examples include trading in swaps, options, futures, and foreign exchange forwards, and the granting of stand-by commitments and letters of credit.

Original exposure method: simplified method for assessing the credit risk in a derivatives portfolio, consisting of applying a standard set of conversion factors to the notional principal amounts of each instrument according to the nature of the instrument and its maturity.

Position netting: the netting of payment instructions in respect of obligations between two or more parties, but which neither satisfies nor discharges those original obligations (also referred to as payment netting).

Settlement risk: between two counterparties, the risk that a counterparty to whom a firm has made a delivery of assets or money defaults before the amounts due or assets have been received; or the risk that technical difficulties interrupt delivery or settlement even if the counterparties are able to perform. In the latter case, payment is likely to be delayed but recoverable. Settlement risk exposes a no-fault parties to credit, cash liquidity and market risk.

Swaptions: an option to enter (or cancel) a swap.

Synthetic Agreement for Foreign Exchange (SAFE): a synthetic agreement for forward foreign exchange settled by reference to the spot rate as well as the forward premium or discount.

Systemic risk: the risk that a disruption (at a firm, in a market segment, to a settlement system etc.) causes widespread difficulties at other firms, in other market segments or in the financial system as a whole.

Volatility: a measure of the variability of the price of an asset, usually defined as the annualized standard deviation of the natural log of asset prices.

