GROUP OF TEN

International Capital Movements and Foreign Exchange Markets

A Report to the Ministers and Governors
by the Group of Deputies

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Rome, April 23, 1993

LETTER OF TRANSMITTAL

To the Ministers and Governors:

I have the honor to submit the Report of your Deputies prepared in accordance with the mandate, conferred in the attached letter of October 1, 1992 from the Honorable Nicholas F. Brady in his capacity as Chairman of the G-10, to examine the recent developments in international financial markets and their implications for the international monetary system.

During the last six months the Deputies have made an in-depth analysis of those developments by drawing on information they gathered directly from market participants through a series of interviews conducted in each of the G-10 countries, and on research studies prepared by the IMF, the OECD and the BIS, which are annexed to the Report. Further, the Deputies examined the functioning of the foreign exchange markets during recent episodes of turbulence, the sources of those pressures, and the policy responses of the authorities.

The Report contains a full account of the Deputies' deliberations on these subjects and draws attention, as requested, to possible implications of the recent development of financial markets for the working of the international monetary system. While the Report does not contain specific recommendations, the Deputies trust that it will help to update our knowledge of markets and contribute to a better understanding of the policy issues involved.

Lamberto Dini
Chairman, Group of Deputies

THE SECRETARY OF THE TREASURY

WASHINGTON

October 1, 1992

Dear Colleague:

Recent events demonstrate forcefully that the increased size and complexity of international financial markets over the past few years have resulted in a volume of transactions which dwarfs the resources governments can bring to bear in the markets. The latest survey of foreign exchange markets indicates daily turnover approaching $ 1 trillion, which is roughly double the official reserves of our countries. In these circumstances, even small changes in capital flows, let alone the massive speculation we have just witnessed, can have profound effects on our economies.

I believe it is important to get a better understanding of these financial market developments, and their implications for the working of the international monetary system. The Group of 10 (G-10) has been the traditional forum in which the major industrial countries could consider issues relating to the operation of the international financial system. Therefore, I proposed at the IMF/World Bank Annual Meetings a study of international capital markets and the implications of recent trends and developments.

In my capacity as G-10 Chairman, I would like to propose that our Deputies convene in mid-October to develop a plan for the proposed study and to begin work with a view to presenting a final report at our next meeting in late April. I would envisage that such work would be done in close cooperation with the IMF, complementing their efforts in this area. I hope you will agree on the importance of such a study and the proposed approach. David Mulford will be in touch with his colleagues in the near future to arrange a meeting. I am also sending this letter to the other G-10 Ministers and Central Bank Governors.

Sincerely,

/s/

Nicholas F. Brady

TABLE OF CONTENTS

Report of the Deputies

Annexes to the Report

I. Introduction

1. At the suggestion of their Chairman last October, the Ministers and Governors of the Group of Ten Countries agreed that their Deputies should conduct a study of recent trends and developments in international capital and foreign exchange markets and their implications for the working of the international monetary system. The main findings that have emerged from the study are presented in this Report.

2. As part of the study, the Deputies arranged for their representatives to conduct a series of in-depth interviews with market participants on the basis of a common set of questions. A summary of the findings of these interviews is attached to this Report. The IMF Research Department, the OECD, and the BIS contributed papers on relevant subjects which are also attached.

3. The Report is organized as follows. Section II provides a description of recent trends in international capital and foreign exchange markets. Section III discusses developments during 1992 in exchange markets and international capital markets, including the role of so-called convergence trades in the exchange market turbulence. Section IV describes how exchange markets functioned under stress, drawing heavily on the interview findings and other working papers submitted by national authorities. Section V discusses the sources of exchange market pressures. Section VI reviews how policy instruments were used in response to these pressures and evaluates their effectiveness. Section VII discusses prudential concerns. Finally, Section VIII considers the implications for the working of the international monetary system.

II. Recent Trends in International Capital and Foreign Exchange Markets

4. Cross-border portfolio investment has expanded rapidly over the past several years. Total cross-border securities holdings among residents of the United States, Europe, and Japan are estimated to have risen to $ 2.5 trillion in 1991, about evenly split between fixed-income securities and equities. Over the past decade, the volume of international equity transactions increased by an average of around 15 percent per year. In nearly all major countries the percentage of domestic government debt owned by foreigners has increased substantially, and in some cases dramatically. Mainly as a result of those trends, and of more active management of portfolios, the worldwide volume of foreign exchange transactions is estimated to have tripled in the last six years, reaching an estimated US $ 880 billion a day. Growth in certain segments of the foreign exchange market, such as swaps, outright forwards and options, has been even faster.

5. Most of the growth in cross-border portfolio investment has been concentrated among institutional investors – pension funds, insurance companies, mutual funds, trust funds, and hedge funds. Institutional investors in Europe and Japan hold a higher proportion (about 20 percent) of their securities assets in foreign securities than do those in the United States (about 5 to 7 percent), but all of these shares have risen greatly over the past decade.

6. Among several factors that have contributed to the increased globalization of portfolio investment, an important catalyst has been the liberalization and modernization of capital markets in several major countries in Europe and in Japan over the 1980s. This liberalization

included the elimination of exchange/capital controls in countries that previously had such controls in place. In several countries the development of active, liquid capital markets open to non-resident investors was vigorously promoted. Competitive pressure among financial centers was also a force for the development and modernization of national financial markets. In addition, the relaxation in some countries (including Japan and the United States) of limits on the proportions of their portfolios which could be held in foreign assets stimulated increased holdings of foreign assets by various institutional investors. Greater harmonization of accounting standards and disclosure requirements, and an increased global role for credit rating agencies, provided better information on the creditworthiness of international borrowers. Improvements in clearing and settlement systems reduced the costs and uncertainties associated with international securities investment.

7. Technological advances in telecommunications and computers, including risk management software, have contributed importantly to the increased globalization of portfolio investment. These technological advances lowered information and transactions costs for portfolio managers, enabling them to handle larger, more diversified portfolios.

8. The growth of broad, liquid markets in underlying capital market instruments encouraged the development of derivative instruments, such as futures and options, whose use enables fund managers to unbundle risks and more efficiently manage the risk/return profiles of their portfolios. The development of active derivatives markets, in turn, provided a further impetus to globalization of asset holdings.

9. Another major factor contributing to the internationalization of investment has been the increasing role of institutional investors in the management of savings. Total assets of US institutional investors rose from

investment. Growth of foreign exchange turnover slowed in both London and New York, but much more so in Japan, the third largest market, where growth decelerated sharply. In many other financial centers, particularly those which have experienced financial liberalization more recently, growth increased in the latest three-year period. The slowing in overall growth was most pronounced in the spot market. Transactions in this market segment rose by only 15 percent from 1989 to 1992 and now constitute less than half the total volume of transactions. The sharp slowing in the growth of the spot market was apparently accounted for by slower growth in transactions between reporting dealers. This could reflect the decline in the number of traditional commercial bank market makers in recent years – a fact mentioned by many participants interviewed.

15. The decline in the number of traditional market makers can be explained, in part, by the merger of some large banks in recent years, but it seems, also, that some banks have simply found this line of business not sufficiently profitable. This reduced profitability probably reflects, in part, the erosion of market makers' information advantage with the improvement and spread of communications and information technology. The latter development suggests greater market efficiency, and is consistent with observations by several market participants that intra-day volatility of exchange rates has declined and that the frequency of "gapping" (discontinuous rate movements with no trading) has increased as larger, better informed participants instantly react in the same way to the same "news". The reduced profitability also might reflect, to some extent, competitive pressures from other institutions, such as securities firms, that had either the client base or relevant prior experience to play a big role in the newer and more rapidly growing sectors of the market, i.e., derivative instruments. An increase in the average size of transactions, particularly in swaps, outright forwards and options, was also a factor in the exodus of a number of smaller institutions from active market making.

16. Most market participants indicated that liquidity in the exchange markets is generally quite ample, at least for the major international currencies, even with a reduced number of traditional, full-service market makers. One market segment where that is not the case is in longer-term forwards, particularly longer than one year. Several market participants indicated that capital requirements on the credit risk equivalent of forward contracts, per the Basle Capital Accord, were a factor in reducing market-making capacity in this segment of the market. Internal prudential concerns about counterparty credit risk, apart from regulatory considerations, appear also to have limited the willingness of some banks to act as market makers and, in particular, to deal in longer-term forwards. Indeed, counterparty credit concerns were a frequent theme of the interviews. Several market makers will deal with only the highest credit-rated institutions. Conversely, some lower-rated institutions may have trouble finding counterparties who are willing to deal with them on normal market terms.

III. Exchange Market Developments in 1992

17. Rapid growth of cross-border portfolio investment in recent years has contributed to the efficiency of world-wide resource allocation, and has also served to impose a certain discipline on economic policy making. The obverse of this, of course, is that, if some event or development prompts many institutional investors to quickly seek to make even moderate changes in the currency denomination of their assets, the problems posed for exchange rate management may be difficult. This was illustrated in the European exchange market turmoil in the summer and autumn of 1992 and also in the case of the Canadian dollar during September-November of that year.

18. From mid-1989 through early 1991, the US dollar and the Canadian dollar depreciated against European currencies, reflecting shifts in portfolio demands related to the differing cyclical positions of the North American and continental European economies and the associated monetary policy responses of the authorities. The North American economies were ending a long period of expansion, then experiencing recession, while the continental European expansion was receiving a boost from German unification, as well as the prospect of a single European market in 1993. From early 1991 through April 1992, the US dollar and the Canadian dollar fluctuated against European currencies, appreciating on balance. This primarily reflected the shifting prospects for the pace of the North American economic recovery. In late April, however, the North American currencies began to depreciate again, reaching all-time lows against the deutsche mark in early September. The yen also weakened against European currencies toward the end of August 1992 as Japanese interest rates were reduced reflecting the slowdown of economic growth in Japan. In the course of September, the US dollar strengthened; the beginning of an easing trend in German interest rates and renewed prospects for a more vigorous US recovery contributed to the dollar's appreciation. The Canadian dollar, however, did not appreciate along with the US dollar, but weakened in September and, again, in November in response to concerns about the Canadian recovery and the federal and provincial debt levels, and to political uncertainties in connection with the constitutional referendum.

19. The European foreign exchange crisis of 1992 must be seen against the background of the building momentum toward European Monetary Union (EMU) over the previous few years, culminating in the completion of negotiations on the Maastricht Treaty in December 1991. With no general ERM realignment since 1987, even in the face of major events, such as German unification and its associated policy mix, many

investors seemed to assume that the likelihood of further central rate adjustments had become quite small. This spurred large-scale capital inflows into the ERM countries where interest rates were high. Net purchases by foreigners of domestic securities in the United Kingdom, Italy, and Sweden amounted to $ 112 billion in the 10 quarters ended mid-1992; net portfolio investment for Spain amounted to $ 27 billion over that interval. These inflows were mostly predicated on continued, rapid convergence of economic and financial performance among ERM countries.

20. In the United States these "convergence trades" spawned a whole new segment of the mutual fund industry, the short-term global income funds. The amount of money invested in these short-term global income funds is estimated to have grown to perhaps US $ 25-30 billion by mid-1992, from essentially zero at the end of 1989, and most of this was invested through convergence trades in ERM currencies. The idea was to invest dollar funds into high yielding securities denominated in, say, lire, covering the short dollar exchange rate exposure by purchasing dollars forward against sales of marks. The mark was used as a "proxy hedge" because, as the lowest-yielding ERM currency, its forward discount against the dollar was much less than that of the lira. The investor was left with a long lira/short mark position. As long as the lira/mark exchange rate did not change significantly over the term of the investment, the investor could earn the lira-mark interest differential on top of the dollar interest return. These prospective returns looked very attractive to holders of US dollars as dollar interest rates on bank CDs and money market mutual funds plunged to very low levels.

21. Institutional investors in countries other than the United States were undertaking similar investments. Other economic agents seem to have based their own financial arrangements on such convergence assumptions.

Swedish and Italian nonfinancial corporations were very heavy borrowers of marks and ecus to fund their domestic currency needs. Nonfinancial corporations operating in various European countries tended to assume long positions in high-yielding currencies and short positions in low-yielding ERM currencies in managing their payments/receivables exposures.

22. Some market participants, according to comments in the interviews, appeared to ignore the growing cost/price level divergences, large fiscal imbalances, or tensions between external and internal policy requirements among ERM countries, on the assumption that the necessary policy adjustments would be made to maintain the existing structure of exchange rates and that progress was being made towards convergence in the medium term. Other market participants may have recognized the diverging fundamentals, but believed that they could get out of long positions in weak currencies before a devaluation, perhaps with the expectation that central bank intervention would provide sufficient time. In any event, the June 2 rejection of the Maastricht Treaty in the Danish referendum shook market participants' confidence with regard to the certainty of the path toward EMU and, therefore, the stability of existing ERM parities.

23. Some institutional investors and non-financial corporations slowly began to adjust intra-ERM exposures after the Danish referendum; the July increase in the Bundesbank's discount rate, coupled with a decline in the US federal funds rate, prompted further position adjustments. The selling pressure on the Finnish markka which developed in August spilled over onto the Swedish krona and added to the market's anxieties about other European parities, particularly after the markka was floated in early September.

24. The selling pressures that erupted in September were unprecedented in magnitude, to judge from the scale of intervention and the

defensive interest rate reactions of some central banks. Selling pressures were broadly based – from the full range of institutional investors as well as from nonfinancial corporations. Hedge funds were very aggressive and visible in their operations, but their sales were small as a proportion of total sales. Most of the initial selling was apparently in the forward and, to a lesser extent, options markets, but was transmitted to the spot market by market makers' covering sales and by covered interest arbitrage.

25. Many institutional investors initially tried to keep their positions in underlying securities in place, while hedging their foreign exchange exposures. As liquidity in forward and derivatives markets temporarily dried up, or where capital controls prevented hedging operations, underlying cash instruments were sold. Mutual funds also sold underlying instruments to obtain liquidity for anticipated redemptions. Some investors actually increased positions in bond markets and in shares of tradeable-goods-producing firms in countries considered candidates for devaluation, in anticipation of subsequent interest rate declines and increased corporate profits; these positions were hedged against exchange risk, however. It is worth noting that individual investors did not all behave the same way towards the various currencies under pressure. According to certain market participants, some of the more aggressive sellers of sterling were purchasers of French francs and Danish kroner, which were viewed as having sounder fundamentals.

26. Two striking features of the episode were, first, the suddenness with which selling pressure developed momentum and, second, the way that pressures seemed to spread from one currency to another in serial fashion. The suddenness, according to market sources, owed to the specific temporal focus provided by the known, fixed date of the French referendum. In the case of sterling, the suddenness also owed much to news reports of alleged remarks from official sources indicating that further ERM realignment,

after the devaluation of the lira on September 13, was desirable. Some observers have viewed the seriatim spread of pressures as a vicious game of "parity busting" by speculators, fueled by earlier profits. Most analysts, however, viewed the phenomenon as reflecting the fact that a large depreciation of one member currency put further pressure on the already weak competitive position (or economic activity) of the next "weakest" currency. Some market participants pointed to the fact that the suspension of the participation of sterling and the lira in the ERM and the devaluation of the peseta caused many market participants to rush to eliminate long exposures in all but the strongest ERM currencies. Other market participants pointed out that the French franc and the Danish krone were not subject to the same intensely concentrated massive pressures as sterling, the lira, and the Swedish krona because many market participants viewed the former group of currencies as having much stronger underlying economic fundamentals.

27. The turmoil in exchange markets for European currencies appeared to have some spillover effects in generating uncertainties in the Canadian dollar market. The Canadian constitutional referendum set for October bore faint echoes of the French referendum. More fundamentally, the Canadian recovery appeared to be more precarious than that of the United States. Canada's growing current account deficit and the federal and provincial debt levels, which led to a number of downgradings by rating agencies, added to the market's anxieties.

IV. Exchange Market Functioning Under Stress

28. Despite the surge in volume and the one-way nature of much of the trading, foreign exchange markets generally functioned well throughout the summer and autumn of 1992, except for instances of illiquidity,

especially concentrated in forward and options markets. No significant operational problems emerged with payment or settlement systems, risk management systems, or back-office procedures. There were few direct spillovers of exchange market difficulties into other markets – the exception being ecu-denominated capital markets – although bond prices fell in several countries in association with exchange market pressures and authorities' defensive interest rate increases.

29. Market participants reported very large increases in volume – as much as two-three times normal – at the height of the crisis in mid-September. The volume of dollar foreign exchange transactions settled over CHIPS, the large-value dollar payments system, was about 50 percent above normal the week before the French referendum. This probably understates the magnitude of the increase in the volume of foreign exchange transactions: first, CHIPS figures only reflect settlements, and do not capture most forward transactions undertaken during the period; and second, they only include settlements which involve the US dollar. In this episode, direct transactions between ERM currency pairs were probably a much higher proportion of total transactions than normally is the case.

30. Spot foreign exchange markets remained generally liquid, in some cases as a result of massive central bank intervention, although participants reported significant changes in market functioning and occasional difficulties in obtaining liquidity in some currencies. In general, market makers and other market participants tightened discipline in limiting their own foreign currency exposures and monitored credit lines very closely. A number of smaller banks backed away from market making, in effect becoming agents, and during some periods many market makers refused to quote prices to infrequent or small customers. In Japan, banks in some cases requested customers to place their orders for European currencies during the European trading day. Bid-asked spreads for European currencies

widened substantially – to double, triple, or even more relative to normal spreads.

31. Defensive central bank interest rate increases, along with larger uncertainties about future exchange rates and about possible further interest rate increases, contributed to greater interest rate volatility in several domestic money and capital markets. The increased volatility in interest rates went hand-in-hand with increased volatility in the forward (including swap) and options foreign exchange markets, both in the European turmoil and in the case of the Canadian dollar.

32. Market participants reported that forward exchange quotations in certain currencies, particularly sterling and the lira, were at times virtually impossible to obtain. In general, forward spreads were very wide, and rates moved significantly on large transactions. The illiquid and volatile conditions in forward markets resulted in options trading in some currencies coming to a virtual standstill for several days. Problems in over-the-counter markets for forwards and options prompted some shifting of business to organized futures and options exchanges, which performed relatively smoothly with substantial increases in volume.

33. A number of pricing anomalies occurred, reflecting the breakdown of normal arbitrage relationships. Covered interest parity conditions between spot and forward exchange rates and interest differentials apparently did not obtain for a time for certain currencies; in the case of the Swedish krona this persisted for a couple of weeks. Wide differentials developed between domestic and off-shore deposit rates for the French franc and the lira, and there was a difference between futures and cash prices for French government bonds for a period. In some of these cases, quotations probably were not real prices, i.e., prices at which business could be conducted. In other cases, the filling up of credit lines may have hindered normal arbitrage activities.

34. Although market makers monitored credit lines very closely, they generally did not cut lines back. They paid close attention to their own balance, or liquidity, management since maturity gaps between payments and receipts of even a few days could produce difficult and/or very expensive borrowing needs in currencies that were subject to capital controls, or where the monetary authorities had pushed overnight interest rates very high.

35. Options and other derivatives do not appear to have played a special role in the episode. There were some reports that as currencies reached their lower intervention limits within the ERM, automated trading strategies were triggered for the hedging of options portfolios (dynamic hedging), adding to downward pressure; but this was apparently not a major element. Most of the action was in traditional spot, swap, and outright forward instruments, and was the direct result of conscious decisions to alter exposures in currencies viewed as devaluation risks.

36. In the aftermath of the crisis, options pricing formulas were revised to reflect greater volatilities. This has meant higher options prices, in some cases sufficiently high to reduce the use of options significantly. Another consequence has been a further reduction in the number of market makers. In addition, for several weeks or months after the crisis, bid-asked spreads for direct dealing in some ERM currencies remained higher than previously.

V. Sources of Exchange Market Pressures

37. The events of 1992 have vividly illustrated some old lessons, while at the same time prompting questions about the relative role of fundamentals and other factors in determining the direction and intensity of exchange market pressures. The main issues that deserve attention for the

purpose of this Report are: the relationship between currencies belonging to an exchange rate agreement and third currencies; the emergence in some circumstances of strong pressures for real exchange rate adjustment, even in countries with sound fiscal positions and low inflation; and the possibility that large and normally efficient markets may under-react or over-react to changing circumstances, leading to periods of excessive confidence, abruptly followed by massive retrenchment.

38. Depreciations of the US dollar relative to the deutsche mark have often, though not always, been associated with tensions within the ERM. This association occurred again last summer, when the dollar weakened sharply against the deutsche mark, mainly reflecting renewed doubts about the strength of the US recovery and further increases in the already very large differential between German and US short-term interest rates.

39. The often observed temporal coincidence between movements in the dollar/deutsche mark rate and tensions in the ERM has induced many observers and market participants, especially in Europe, to suggest a causal link running from the former to the latter. Analytically, this view relies on the existence of certain asymmetries among European economies. First, trade shares with the United States (and Canada) differ across European countries, being particularly high in the United Kingdom. Accordingly, the United Kingdom is more exposed than other European countries to shocks originating in the United States. Second, even where trade shares with the United States are similar, a slowdown of exports to the United States, whether due to a low value of the dollar or to sluggish activity in the United States, is harder to withstand in those countries where activity is particularly weak or where competitiveness has already been eroded within the ERM. Third, dollar assets are probably closer substitutes for deutsche mark assets than for assets denominated in other European currencies, although this hypothesis seems to be less persuasive today than in the past,

when several European countries still had capital controls or had not yet developed modern, highly liquid domestic financial markets.

40. The significance of movements in the dollar/deutsche mark rate must be evaluated in terms of their underlying causes. In some cases the underlying causes may be developments in the United States; in other cases, developments in Germany or elsewhere. When the cause is a German-specific shock, e.g. an increase in interest rates in Germany, capital can be expected to move into deutsche mark assets both from other European currencies and from the dollar. In such cases, although a positive correlation would be observed between the weakness of the dollar against the deutsche mark and the tensions in the ERM, it would not be warranted to establish a causal relation running from the former to the latter; a change in conditions in Germany is absorbed by movements in the deutsche mark exchange rate against the dollar (and other floating currencies) and may create tensions in the ERM. When, instead, conditions change in the United States, the dollar, in principle, should be expected to rise or fall equally against all ERM currencies, not just the deutsche mark, although in practice the asymmetries referred to above can create tensions within the ERM.

41. In light of these various considerations, it seems fair to say that the weakness of the US recovery, combined with the reductions in US interest rates and the associated depreciation of the dollar through early September, as well as the low growth of activity in most other OECD countries, generated a less favorable environment for the maintenance of exchange rate stability within the ERM. However, the major causes of the recent exchange rate tensions were to be found in developments within ERM countries themselves.

42. The events of 1992 illustrate how downward pressures on a currency can arise when market participants perceive that price and cost

performances have been allowed to diverge significantly and persistently, without appropriate changes in exchange rates. Similarly, pressures on the exchange rate may stem from large public sector imbalances when there is no clear indication that fiscal positions are being corrected.

43. However, pressure on a currency can also arise when a country has been successfully pursuing sound domestic policies. Unexpected changes in the world prices of important commodities such as oil, large shifts in macroeconomic conditions abroad which give rise to divergent cyclical positions, or political uncertainties can all generate pressures for adjustments in real exchange rates. Such pressures are often beyond a country's control, and in that sense the changing fortunes of a currency may not always reflect changing assessments of the rigor and success of domestic policies but rather changing assessments of the external environment in which those policies may be expected to operate in the future. This may have been the case, for example, in the first half of the 1980s, when the yen and the deutsche mark were exceptionally weak relative to the dollar, largely, though not exclusively, because of the macroeconomic policy mix of the United States. Generally, therefore, the relative strength of a currency in the market should not be interpreted as reflecting solely the degree of soundness of domestic policies.

44. The tensions that arose in Europe in 1992 bear some similarities with those between the major currencies in the early 1980s, as they were also related to divergences in the policy mix across countries. Especially towards the end of 1991, largely as a consequence of the fiscal expansion that followed German unification, the policy needs and priorities of Germany tended to diverge significantly from those of other countries. In most European countries except Germany, inflation and capacity utilization were low or falling, while unemployment was high or rising. The weakness in economic activity was exacerbated both by domestic factors, such as the

financial fragility of banks or the nonfinancial sector in some countries, and by international developments, such as the sluggishness of the US recovery and the slowdown in Japan.

45. Against this background, and after confidence in the progress towards EMU was shaken, pressures materialized against all but the strongest currencies in the ERM. In most cases, the pressure arose when markets came to the view that risks were largely one way, because it was perceived that the authorities would aim at lowering interest rates or would not be able to maintain them at a sufficiently high level to resist strong pressure. Market participants were thus essentially faced with only two plausible scenarios: a no-realignment scenario, if pressure did not arise or was successfully subdued, and a devaluation scenario in case of extreme pressure. They were hence induced to close or hedge their long and/or increase their short positions in the currencies that were considered at risk. However, experience has shown that when the no-realignment scenario pursued by the authorities is widely perceived to be supported by strong underlying fundamentals, determined and coordinated action by the authorities can restore stable conditions in the market and prevent the alternative scenario from becoming a "self-fulfilling prophecy".

46. The emergence of exchange market pressure in an adjustable peg system may pose a difficult choice for the authorities: on the one hand, yielding to market pressure would weaken the disciplinary effect of the peg and the credibility of the authorities, possibly inducing anticipations of further realignments; on the other, attempting to hold the parity might require an excessive tightening of domestic monetary conditions and nonetheless turn out to be unsuccessful, thus resulting in an even greater loss of credibility for the authorities.

47. Such a situation can be exacerbated by large uncertainties about whether and when markets are likely to come to the view that an exchange

rate is no longer sustainable. For instance, at the beginning of the 1980s, it would have been difficult to predict that markets would have sustained the US dollar exchange rates of the mid-1980s for as long as they did, given the large external deficits that those rates implied for the United States. Likewise, the increased size and liquidity of securities markets have certainly contributed to attracting capital flows and sustaining exchange rates in several European countries in recent years.

48. In addition, the convergence trading observed prior to the summer of 1992 and its rapid unwinding provide a reminder that, for good or bad reasons, market perceptions about the sustainability of an exchange rate can shift quite abruptly. This is the same lesson that was learned in February 1985, when market sentiment about the dollar shifted dramatically in a matter of days.

49. Experience shows that markets can bring very large pressure against a currency when sentiment changes. In a fixed-but-adjustable exchange rate regime, the challenge for the authorities is either to persuade the markets that the established exchange rate is in fact sustainable and consistent with fundamentals or to ensure that adjustments in policies and/or exchange rates are made in an orderly way. In the case of countries that maintain more flexible exchange arrangements, market pressures can be absorbed in whole or in part by movements in the nominal exchange rate, at least in the short run. However, once movements in the exchange rate become pronounced and go beyond what the authorities consider appropriate, a similar type of challenge arises.

50. The 1980s and early 1990s have witnessed several episodes in which, for a variety of reasons, sometimes involving the policy stance of the authorities, investors seemed to be excessively confident in the prospects for a particular asset, and to pay insufficient attention to the

development of fundamentals. Such episodes, some of which contributed to the events of 1992, were often followed by abrupt and massive retrenchment and crisis. Examples included the excessive bank lending to some developing countries in the 1970s and early 1980s, the dollar overvaluation of late 1984-early 1985, the extraordinary rise in land and equity prices in Japan, and the large increases in asset prices and/or private sector debt ratios in the United States, the United Kingdom, and Sweden prior to the most recent recessions.

51. In 1992, the vulnerabilities of sterling and the Swedish krona were linked to financial pressures, on private sector borrowers in the first case and on financial institutions in the second, which limited the scope for a lasting and credible further tightening of monetary policy in defense of the parities. In Sweden, some financial institutions were provided with liquidity support at lower interest rates in order to soften this constraint. Likewise, the weakness of activity in the United States and elsewhere, which contributed indirectly to last summer's exchange market turbulence, stemmed in part from the painful unwinding of the financial excesses of the 1980s.

52. An important question is whether such episodes are likely to occur more often or to be more damaging as markets grow in size and sophistication. When huge amounts of funds can rapidly move across assets, currencies, and countries, large long or short positions can build up quickly. Their effects are, hence, more likely to be damaging both in the phase of confidence when excesses build, as larger amounts of scarce resources are allocated to relatively inefficient activities, and in the phase when excesses unwind, as economic sectors or entire economies are suddenly put in a condition of extreme financial stress. In addition, the speed with which positions can be closed or covered in markets that are normally highly liquid may obscure the perception of the risks and increase the likelihood of "fallacies of composition", whereby each market

participant believes it can get out of a position before suffering losses from any change in exchange rates or other asset prices. As noted above, such reasoning appears to have stimulated the pre-crisis convergence trades in ERM currencies; in several cases the reasoning was validated when official intervention had the effect of providing liquidity to the market.

53. Large and efficient markets provide substantial benefits by improving the allocation of resources worldwide. Nevertheless, the possibility that they may exhibit periods of excessive confidence and retrenchment points to a number of challenges for the authorities in the fields of both macroeconomic and prudential policies. As concerns exchange rates, a potential for instability may build up if the degree of resistance to exchange rate adjustments is not kept consistent with the degree of convergence of macroeconomic policies and performances, or if market participants are induced to believe that the authorities will defend an exchange rate peg mainly through very large official intervention.

VI. The Use of Policy Instruments

54. As the 1992 events again illustrated, the response of the authorities to extreme exchange market pressures may span a wide spectrum of measures, ranging from budgetary packages and agreements with social partners to interest rate increases, official intervention and exchange controls.

55. Experience has demonstrated that exchange controls may temporarily relieve the pressure on the exchange rate, but are likely to be ineffective and even counterproductive in the medium term as they weaken confidence in the currency. This assessment was widely shared by the market participants that were interviewed; in particular, it was noted that an

institution will be very reluctant to invest in a currency unless it is assured that it can close its position at all times. Furthermore, exchange controls introduce distortions both at the microeconomic level and in the allocation of savings and investment across countries. The reimposition of exchange controls is particularly damaging in economies with large financial sectors that have been operating in an environment free of such controls.

56. The best way to avoid exchange market pressure is through the pursuit of sound medium term policies. Where concern over domestic policy has been a major source of exchange market pressure, policy packages aimed at improving the economic fundamentals of a country are an essential ingredient to defending an exchange rate. In fixed-but-adjustable exchange rate systems, they are essential to restoring confidence after a realignment has occurred.

57. With regard to official intervention, recent events have clearly demonstrated the scale of pressure that can arise when markets hold a firm expectation that a depreciation is warranted. From June through December 1992, total net sales of deutsche marks alone by European central banks (including those of the Nordic countries) reached the very high figure of DM 284 billion, of which DM 188 billion was used to defend ERM currencies. Given the amounts that the authorities can plausibly mobilize out of their own reserves or through borrowing from both private and official sources, it is of the utmost importance that the instrument of intervention be used judiciously.

58. In this connection, the conclusions of the 1983 Report of the Working Group on Exchange Market Intervention can be regarded as supported, in large part, by recent experiences. Intervention can be useful when complementing and supporting other policies, especially in the short run, and under the right circumstances. As some market participants have

put it, the quality of intervention may be more important than its quantity. Intervention is likely to be less effective when it tries to stabilize exchange rates at levels that are widely perceived by the market to be out of line with fundamentals, or when used in isolation for a protracted period of time.

59. Intervention may be used to buy time, both for the authorities to take action in other areas of policy and for the markets to reassess the situation. An example is provided by the case of Sweden in September 1992: between the 16th and the end of the month, besides aggressively raising interest rates, the Riksbank intervened on a very large scale until a "crisis package" was agreed between the government and the opposition, which temporarily improved conditions in the krona market.

60. Intervention can also be effective when it helps to deliver clear signals to the markets about the policy intentions of the authorities and/or their assessment of fundamentals. Its "quality" in this respect can often vary with the degree of international committment or cooperation involved, as well as with the perceived consistency between exchange rates, underlying economic developments, and the stance of macroeconomic policies. In this regard, some of the concerted intervention operations undertaken since 1985 by the major countries to influence dollar exchange rates are viewed by most observers as having been effective on balance. Similarly, the signals sent last September in the concerted intervention of the French and German authorities, in combination with the joint communiqué of September 23 and moderate interest rate adjustments, proved effective in restoring the market's confidence that both countries were committed to defending the existing parity.

61. By contrast, in most of the other ERM intervention episodes of 1992 the parities were generally perceived to be out of line with fundamentals, and the impression that the authorities of different countries

were facing different constraints on policy was never dispelled. In particular, Germany was seen to be exposed to the risk of, at least temporarily, losing control of the growth of domestic monetary aggregates in a situation in which inflationary pressures called for maintaining a tight stance of monetary policy. In other countries, however, in which inflation was already low and falling, a further tightening of policy was not justified on domestic grounds.

62. With regard to the use of interest rates to defend established parities, timely increases may prevent speculation from developing. Once speculation is occurring, the necessary increases have to be much larger. Interesting lessons can be drawn from the experience of 1992, as this instrument had never before been used so vigorously. Sweden utilized it most intensely. In a series of rapid steps from August 21 to the morning of September 16, the marginal lending rate of the Riksbank was raised from 13 to 75 percent and then again, during the same day, to 500 percent; interbank one-month rates jumped from 16 to 70 percent between September 7 and September 17. Though less dramatic than in Sweden, exceptional increases in official and market interest rates were experienced in virtually all other countries whose currencies came under pressure.

63. Judging the effectiveness of defensive interest rate changes in defusing exchange market pressure is not easy, since other factors contribute to the final outcome. As in the case of intervention, however, two general lessons can be drawn. The first is that extreme or very large interest rate hikes can act as "circuit breakers," temporarily stemming the pressure on a currency by making the cost of rolling over short positions and of covering long positions in a currency very high. Interest rate increases are more effective in this regard when combined with announced and credible commitments to act effectively in the near term through fiscal adjustments or other measures to address the source of the exchange rate pressure.

64. The second lesson pertains to circumstances in which there is no fundamental need for policy action to strengthen public finances or wage and price performance. In such cases, the effectiveness of interest rate adjustment may depend on whether market participants perceive that the authorities are strongly committed and politically able to maintain interest rates at the adjusted levels on a prolonged basis, if necessary. The lesson is illustrated by the experience of France in the period that followed the referendum on European Union. The key issue in that situation was to demonstrate to the markets that both the French and the German authorities were determined to defend the parity. Germany showed this intention through intervention; France, through a moderate increase in interest rates that could plausibly be expected to be sustained for a fairly long period of time. With this move, the French authorities further demonstrated that their desire to see lower interest rates in Europe had a lower priority than maintaining the parity within the ERM band. It should be noted that the increase in French rates was relatively moderate; behind the success of the operation was the fact that the markets were impressed by the clear evidence of coordination between France and Germany.

65. Interest rate policy is of key importance not only during, but also in the aftermath of, an episode of exchange market pressure. Maintaining relatively high interest rates for some time after the most immediate dangers for a currency have been overcome may help to reduce the perception that the risks are one-sided, thus discouraging the emergence of further speculative pressures in the future.

66. Under floating exchange rate regimes, exchange rate developments are only one of the factors affecting monetary policy. Interest rate changes may at times be warranted in light of market-driven exchange rate movements. The fact that exchange rate changes have effects on the level of spending on domestically produced goods and services may induce

the monetary authorities – at least of smaller/open economies – to believe that some offsetting movement in interest rates is called for. Generally one might expect that interest rates changes could be smaller than those required to maintain fixed parities, given the increased likelihood of two-way speculation. However, experience with managing a floating rate regime in Canada, for example in the Fall of 1992, indicates that, should exchange rate changes be driven by extrapolative expectations, more significant interest rate changes might be called for to stabilize such expectations. Once this stabilization occurs, then some reversal of the initial interest rate movement would generally be anticipated.

VII. Prudential Concerns

67. The increasing complexity, globalization, and operational speed of the international financial system has raised new prudential concerns and reinforced old ones. While significant operational problems were not encountered during the 1992 crisis, it has been noted that the situation might have been different in the absence of exceptionally large official intervention, which allowed many institutional investors and nonfinancial firms to unwind their currency exposures before exchange rates changed. The difficulties that might have arisen if many large institutions had suffered large losses underscore the importance of further progress in addressing prudential concerns.

68. Success in limiting the potential for problems in the future will require ongoing attention to a broad range of issues. In order to limit the risks faced by individual financial institutions, their internal prudential supervision and risk management systems must be kept under review and, where necessary, strengthened. Many market participants pointed out that

such systems have been reviewed as a result of September's experience. At the same time, continuing efforts must be made to minimize the potential for systemic problems to develop from the build up of excessive positions or other sources of difficulties at individual financial institutions. In this regard, the authorities may want to consider improving their information concerning non-banks' cross currency asset holdings.

69. While the interviews with market participants confirmed that the development of new financial instruments and techniques has significantly enhanced participants' abilities to manage market risks, the Deputies are concerned that other developments may have added elements of risk to the environment. With more large participants in financial markets, and more extensive interactions between different participants, problems that have the potential to develop into systemic difficulties can originate from a wider range of financial firms. With the expansion of off-balance-sheet transactions, the creditworthiness of counterparties has become less transparent, which has made banks more reluctant to lend and, thus, to serve as a reliable source of funding for institutions that come to face unexpected credit needs. With the increased availability of derivative instruments, financial positions that straddle a number of markets have become more prevalent, which has raised the potential for a liquidity problem in one market to spill over into others with possible systemic consequences. With the spread of high-speed communications networks between financial markets around the globe, the potential for large and rapid market reactions to new information has increased considerably, which in turn may have reduced significantly the time available for national authorities to formulate their own reactions.

70. The Deputies see a need for various types of actions to limit the incidence of difficulties at financial institutions. Measures to upgrade information processing technology and to strengthen management systems

can help insure that portfolio risks are managed effectively, and on a comprehensive basis, within individual institutions. Progress in these areas seems to be far from uniform at present. Efforts to achieve greater harmonization and transparency of national accounting, regulatory, and supervision systems – in a manner that strengthens these systems – are also very important for limiting the risks to the financial system.

71. The Deputies share a number of concerns that have been expressed about existing accounting, regulatory, and supervisory systems. One concern, which is being addressed by the Basle Committee on Banking Supervision, is to broaden the coverage of international capital adequacy standards to require minimum capital backing against market risks as well as credit risks, where market risks include those associated with net open positions in foreign exchange and in traded debt instruments and equities. A second concern, which is being addressed by the Eurocurrency Standing Committee at the BIS in the context of its Report on Recent Developments in International Interbank Relations, relates to the macroeconomic and macro-prudential implications of derivatives markets; a more complete understanding of the issues is needed in order to enhance supervisory policies conducive to financial stability. A similar set of issues is being considered by a recently formed Group of Thirty study group. At the OECD, work is in progress on the role of institutional investors in the present financial environment. A third concern is to develop common approaches to the supervisory issues that arise when entities with similar market activities and generating similar potential systemic risks are subject to different regulatory frameworks; when regulated financial entities are parts of conglomerates with unregulated nonfinancial entities; or when different regulators, sometimes in different countries, have responsibilities for different parts of financial conglomerates.

72. Some market participants voiced concerns that the risks posed by technology may not have been adequately addressed. By increasing the speed and ease with which information can be assembled and communicated, by reducing transaction costs, and by facilitating the design of new financial instruments and automated investment strategies, technology has increased efficiency and helped induce new entrants into the financial market place. However, by strengthening competition, these developments have also contributed to the erosion of the "franchise value" of traditional banking institutions, which may have encouraged some banks to hold more highly leveraged and risky portfolios than they would have otherwise maintained. In addition, specialization in information technology may have increased the concentration of risks in the financial system. In particular, to the extent that complex information and risk management systems necessary for the management of derivatives portfolios tend to be concentrated increasingly in a few large firms that enjoy a comparative advantage in information technology, a credit problem or technological failure in one of those firms could have the potential to create problems for the system at large. Though such problems remain somewhat hypothetical at present, they underscore the importance for these institutions to have strong risk management systems in place and for supervisors to have, in house, the requisite expertise for adequately exercising their responsibilities with regard to these developments.

73. In focusing on ways to prevent systemic difficulties, the Deputies place particular emphasis on the need to continue to protect and strengthen payment and settlement systems. The expansion of properly designed netting arrangements is regarded as a desirable approach for shielding settlement systems from strains associated with growing intra-day credit exposures and transaction volumes. In this context, it is important to make progress in resolving the legal ambiguities associated with cross-border netting. Further steps in other directions for strengthening settlement systems – such as raising

collateral requirements for clearinghouse members, shortening settlement periods, moving toward delivery-versus-payment systems, and placing limits on daylight overdrafts – might be prudent as well.

VIII. Implications for the Working of the International Monetary System

74. However welcome on broad economic grounds, the growth in the size, integration, and agility of international financial markets has greatly increased the scale of the pressure that can be exerted against an exchange rate when market sentiment shifts. This growth can be expected to proceed substantially further in coming years as the institutionalization of savings continues to expand and as institutional investors continue to diversify their portfolios internationally.

75. It is difficult to assess the precise consequences of the growing size and internationalization of financial markets on the effectiveness of traditional exchange rate policies and intervention strategies. Experience has demonstrated, however, that the effectiveness of such policies and strategies depends crucially on the circumstances in which they are employed. The nature of the exchange rate system is a major factor in this regard. The role of interest rates is especially crucial in a fixed-but-adjustable exchange rate system, such as the ERM. Nevertheless, close coordination and cooperation among countries on economic policies, particularly monetary and fiscal policies, continue to be an essential condition for exchange rates to be relatively stable under any type of exchange rate arrangement.

76. As evident from the experiences reviewed in Section VI, the effectiveness of exchange market intervention under any type of exchange

rate arrangement depends on two factors: whether market participants perceive that existing exchange rates are reasonably consistent with macroeconomic fundamentals, and whether the commitment of policy authorities to limit exchange rate movements is credible. These factors are not independent of each other. Commitments to limit exchange rate movements lack credibility when market participants believe that prevailing exchange rates have become inconsistent with macroeconomic fundamentals. In such circumstances, efforts to defend exchange rates through official intervention risk draining the resources of the monetary authorities. However, when existing exchange rates are not clearly out of line with fundamentals, intervention to allow market participants time for reassessment, together with appropriate statements to reaffirm commitments by policy authorities, may be sufficient to defuse market pressures. This prospect is more likely when the authorities also demonstrate that they are prepared to adjust interest rates. In turn, the effectiveness of interest rate adjustments depends on how strongly market participants believe that the authorities will be willing and politically able to maintain interest rates at the adjusted levels for a prolonged period, if necessary, to defend against exchange rate pressure.

77. In principle, exchange rate pressure can be defused by either boosting interest rates on the falling currency, cutting interest rates on the rising currency, or adjusting interest rates on both currencies simultaneously. These options may have different degrees of credibility as policy adjustments that can be sustained. In most cases the relative degrees of credibility and, hence, effectiveness of the different options depend on the prevailing and prospective macroeconomic circumstances in the two countries. The effectiveness of interest rate adjustment as a defensive mechanism may thus depend importantly on the willingness of countries to cooperate in undertaking the combination of adjustments that can most feasibly be sustained under the circumstances.

78. In general, a commitment to limit exchange rate movements requires close coordination of macroeconomic policies and can be undermined by market pressures if macroeconomic performances diverge substantially. Divergent macroeconomic performances typically imply that significant interest rate differentials must be maintained to hold exchange rate pressures in abeyance, with the higher interest rates required on the currency that is likely eventually to be weakened by the divergent macroeconomic performances.

79. For a pegged exchange rate system in which the policy commitment to avoid realignment is strong, such differentials may induce market participants to shift their financial portfolios toward the high-interest currency on the perception that exchange risk is limited and that, in any case, there will likely be sufficient time to shift out of that currency before any depreciation occurs. As long positions in the high-interest currency build, so does the volume of funds that investors may seek to quickly shift out of that currency if the course of events eventually casts doubt on the near-term sustainability of the exchange rate peg, and this can make the emergence of any doubt a self-fulfilling prophecy. Thus, for an adjustable peg system in which capital controls have become an ineffective and counterproductive policy option, convergent macroeconomic policies and performances are necessary to avoid exchange rate adjustment on a more durable basis. Although exchange rate realignment on some occasions can be avoided for prolonged periods without convergent macroeconomic policies and performances through the maintenance of divergent interest rates, if the divergent pattern of interest rates is not sufficient to promote convergence and the circumstances do not otherwise change, an eventual adjustment of exchange rates may be inevitable. Timely adjustment may involve lower economic costs and a smaller erosion of political credibility than attempting to resist adjustment for as long as possible. The policy implication, accordingly, is that the degree of resistance to exchange rate adjustment should be kept consistent

with the degree of convergence in macroeconomic policies and performances.

80. For countries with floating exchange rate arrangements, divergent macroeconomic performances and domestic policy needs can also make it difficult to limit exchange rate movements, should they wish to do so. Attempts to smooth exchange rate movements through official intervention or interest rate changes may be ineffective when they are seen by the market to be inappropriate in light of domestic cyclical positions.

81. Under any type of exchange rate arrangement, even when substantial convergence of macroeconomic policies and performances has been achieved, exchange rates can be strongly affected by unexpected events. Various types of shocks can create strong pressures for exchange rate changes based on the macroeconomic implications of the shocks. A country can thus experience downward pressure on its currency despite the fact that its macroeconomic policy and performance have been sound. In response to some shocks exchange rate adjustment may be the most desirable course. More generally, however, the nature of exchange rate pressures should be closely examined in order to determine the appropriate course of action.

82. Countries that wish to limit exchange rate movements in the face of pressures induced by shocks must be prepared to adjust macroeconomic policies in a timely manner when, and by as much as is, appropriate. Moreover, because shocks often create a need for many countries to adjust policies simultaneously, and because policy adjustments in one country often have spillover effects on other countries, the avoidance of exchange rate adjustment can be greatly facilitated when countries coordinate their policy responses to shocks.

83. In general, international monetary stability requires close consultation among the major countries to identify inconsistent policies and to encourage appropriate policy adjustments in a cooperative framework. Among nations that, in addition, seek to maintain a pegged exchange rate regime, the process of coordinating policy adjustments requires the acceptance of constraints on national autonomy in respect of macroeconomic policies, especially interest rate policies. Exchange rate stability also requires a common strong commitment to price stability.

84. The political ability of countries to accept such constraints in favour of a credible exchange rate commitment depends crucially on the effectiveness of their individual and collective efforts to maintain internal macroeconomic stability without monetary policy autonomy. These efforts are likely to be more successful in economies with relatively flexible wages and prices, low structural rigidities, and countercyclical fiscal stabilizers that are relatively effective and well-disciplined. Establishing effective mechanisms in these respects is necessary for countries to reap the full benefits from maintaining stable exchange rates.

DATA SOURCES

Section II

Paragraph 4

Sentence 2: IMF, "International Capital Markets — Developments, Prospects, and Key Policy Issues, Part I: Exchange Rate Management and International Capital Flows in the Aftermath of the ERM Crisis," February 4, 1993, p. 3.

Sentence 3: Research Department, IMF, "A Note on Recent Trends and Developments in International Financial Markets and International Capital Markets," section I.

Sentence 4: OECD, "New Instruments and Operations in Financial and Foreign Exchange Markets: An Overview," Table V.

Sentences 5 and 6: BIS, "Foreign Exchange Market Activity: A Survey," calculated from Table Ia.

Paragraph 5

Sentence 2: OECD, "New Instruments...," Table II.

Paragraph 9

Sentences 2 and 3: OECD, "New Instruments...," Table I.

Sentence 4: IMF, "International Capital Markets...," p. 3.

Sentence 5: IMF, "International Capital Markets — Developments, Prospects, and Key Policy Issues, Part I: Background Material on the Foreign Exchange Market and the ERM Crisis," February 11, 1993, Table 4.

Paragraph 10

Sentence 4: InterSec Research Corporation, as cited in IMF, "International Capital Markets..., Background Material...," p. 10.

Paragraph 12

Sentence 6: Estimate based on information from industry sources.

Paragraph 14

BIS, "Foreign Exchange Market Activity...."

Section III

Paragraph 19

Sentence 4: National balance of payments statistics.

Paragraph 20

Sentence 2: Estimate based on information from industry sources.

Section IV

Paragraph 29

Sentence 2: US Federal Reserve Board, staff estimate.

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M. FUKAO (OECD)	

[1] The following officials, who were Deputies at the time, participated in some of the meetings: MR. LAGAYETTE (France), MR. MULFORD (USA), MR. KAESER (Switzerland), MR. SMEE (Canada).

[2] MR. P. ISARD (IMF) and MR. R. SMITH (Federal Reserve System) also assisted the Chairman in various stages of the drafting of the Report.

ANNEXES TO THE REPORT

ANNEX I

SUMMARY OF INTERVIEWS WITH FOREIGN EXCHANGE MARKET PARTICIPANTS [1]

Approved by the G-10 Deputies

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[1] This summary is based on the reports on the interviews conducted by national authorities in each of the Group of Ten countries. It has been prepared by a team headed by Mr. Saccomanni (Deputy for the Bank of Italy) and comprising Mr. Bingham (BIS and member in the G-10 Secretariat) and Messrs. Rebecchini and Santorelli (Bank of Italy).

INTRODUCTION

1. Following the proposal of the Chairman of the Group of Ten to gain a better understanding of the functioning of exchange markets, the Deputies arranged for their representatives to conduct a series of interviews with leading market participants on the basis of a common set of questions. [2] In total, interviews were held with senior executives of 109 institutions, including banks, securities houses, investment funds, insurance companies and industrial enterprises. The questions focused on the structure and operation of the foreign exchange market, on the behaviour of market participants, and on the short and longer-term consequences of recent episodes of turbulence. Although the interviews were based on an agreed set of questions, each national authority conducted its own survey independently. In most cases only a small number of institutions of any one type was interviewed, and the institutions were sometimes chosen not because they were representative but because of the scope or nature of their exchange market operations. Notwithstanding the inevitably subjective and partial nature of the results, the surveys provide valuable information on the operation of the exchange market. The broad consensus recorded on many aspects was particularly noteworthy.

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[2] The text of the questionnaire is contained in the Appendix.

I - SIZE AND GROWTH OF FOREIGN EXCHANGE MARKETS

Growth and Determinants of Foreign Exchange Market Turnover

2. Respondents in all the G-10 countries indicated that their turnover was broadly in line with the picture provided by the coordinated national surveys of exchange market activity conducted in April 1992. In other words, there had been a further, but significantly slower, expansion of turnover between 1989 and 1992, and non-bank financial institutions had come to occupy a more prominent position in the market.

3. In general, respondents indicated that the growth of foreign exchange turnover was a consequence of deregulation, liberalization and financial innovation. They also gave several specific explanations for the increase in turnover related to structural or episodic factors. In major financial centres, the substantial increase in the number, type and resources of institutional investors (mutual funds, pension funds, hedge funds, securities houses) was said to be an important determinant of growth of exchange market activity. Many respondents in these countries cited the rapid increase of global investment by institutional fund managers as an important factor. By contrast, in some other countries, banks indicated that the growth of their turnover exceeded that attributable to institutional investors. Some respondents also indicated that the internationalization of the business of multinational enterprises and the growing sophistication of their treasury operations had also contributed to the expansion of foreign exchange activity – although experience was not uniform in this area.

4. The importance of the removal of capital controls, which had led to the greater international use of national currencies, was stressed mainly in those countries where liberalization was completed only recently. In one country with a long tradition of liberal financial markets it was noted that foreign exchange turnover had grown less rapidly than in other countries. The advance of computer and telecommunications technology, improvements in netting arrangements, and the development of managerial and professional skills were also seen as important factors contributing to increased foreign exchange turnover.

5. Another explanation, mentioned in several reports, was the existence in Europe during the last few years of large nominal interest rate differentials, coupled with expectations of stable exchange rates and the convergence of economic and financial fundamentals in the ERM countries. This combination had led to substantial flows of capital into high-yielding European currencies. It gave rise to what came to be called

"convergence trading", i.e. the acquisition of assets in high interest rate European currencies and the hedging of the risk through the forward sale of lower interest rate currencies such as the DM. Borrowing of low interest European currencies to fund domestic activity by residents of countries with high interest currencies – private enterprises as well as public sector – had a similar effect and added to inflows into the currencies which subsequently came under pressure. The conversion of foreign proceeds into domestic currencies often gave rise to complex chains of transactions boosting the volume of foreign exchange turnover.

Instruments and Location of Foreign Exchange Transactions

6. As for the use of different foreign exchange instruments, respondents indicated that traditional exchange market transactions such as spot and swaps continue to constitute the main part of foreign exchange turnover. Options and futures, although growing rapidly, still represent a small share of total turnover.

7. Most respondents, both financial and non-financial, noted that they had come to make greater use of derivatives, notably foreign exchange options. In major financial centres, derivatives were seen as providing the opportunity to improve the mechanics of risk management; this had been a significant factor, though not dominant, in the rapid growth of the activity in the foreign exchange market of securities houses and some investment funds. In addition, banks mentioned that options, like other derivatives, reduced their need for capital. Interviewees expressed a general preference for over-the-counter options but in some countries corporate treasurers favoured instruments traded on organized exchanges.

8. Market liquidity, infrastructure, human resources and a favourable time zone were cited as major factors affecting the choice of the location for foreign exchange transactions. There was also broad agreement on the potential importance of taxation and regulation. On the whole, market participants showed a tendency to conduct their business in major financial centres (mainly London, but also New York and Tokyo). In some countries with highly developed financial markets respondents said they were reluctant to move their foreign exchange business abroad. In the case of one major country, massive commercial orders were seen to make the domestic foreign exchange market more attractive. Respondents in some other countries also showed a preference for domestic financial centres, at least for business involving national currencies. The importance of the rapid availability of reliable market information was also noted as one factor determining the location of business.

II - MARKET STRUCTURE

Categories of Participants

9. There was broad agreement among those surveyed that several significant changes had taken place in the relative importance of different types of market participant. Although banks remained by far the most prominent institutions in terms of turnover and in the provision of market-maker services, fund managers and other non-bank financial institutions had greatly expanded their operations and become notable players in the markets for derivative products. Managers of international investment funds had perceived the advantages which portfolio diversification brought in terms of reducing risk and enhancing returns. Although accounting for only a minor part of total turnover, some commercial and industrial companies, and even high net worth individuals, had increased their recourse to the exchange market. The former generally did not treat their exchange market operations as a profit centre but rather used them to reduce costs and manage financial risk, to which they had become increasingly averse. Some corporate treasurers were familiar with derivative instruments, but many tended to make sparing use of them because they were not considered to be cost effective.

10. Bank transactions dominated spot and swap market trading. Nonetheless customer transactions were said to be the direct cause of most interbank trading. In one major financial centre the slowdown in customer business was considered to be one reason why the spot market had expanded more slowly than other segments. Banks used the swap market for interest rate arbitrage as well as liquidity and risk management. The introduction of capital adequacy standards for credit risk was cited as a reason for the comparatively modest growth of banks' longer term forward transactions. In addition, credit limits had tended to curb trading with some counterparties.

11. Non-bank financial institutions were generally believed to have increased their exchange market operations dramatically in recent years. In one major financial centre securities houses were active in all parts of the market. In particular, they were at the forefront of providing tailor-made derivatives. In another, securities houses were not "full service" providers of foreign exchange products and services but had increased their market-making activity in derivatives.

12. Fund managers appeared to have a variety of attitudes towards exchange market risk and a range of different strategies for contending with it. Some institutions, such as hedge funds, viewed foreign exchange as a separate asset class and the associated risks were managed actively with forwards and options. Other institutions, notably those active

in bond, equity and other long-term investments, tended to engage in long-term strategic positioning and to leave at least part of their portfolios unhedged. Despite the publicity given to the actions of hedge funds and other comparable institutions, long-term institutional investors had a far larger stock of assets at their disposal, and changes – even quite marginal – in their portfolio and risk management strategies were liable to have a more significant impact on exchange market activity.

Types of Transaction Giving Rise to Exchange Market Flows

13. While it was acknowledged that it is difficult, if not impossible, to quantify the relative extent to which commercial and financial operations give rise to exchange market transactions, market participants in most countries stressed the importance of financial operations. The control and management of interest rate, exchange rate and other risks were major reasons for exchange market deals, and the active management of portfolios and financial assets/liabilities had become both more common and more sophisticated. A smaller portion of exchange market transactions was reported to be specifically related to foreign trade, a fact consistently illustrated in the turnover surveys over the years. Concerning the role of bank credit in financing open positions, banks indicated that they would not knowingly lend for such purposes, but they did not have systems in place to monitor whether the loans they granted were used for this purpose. It was noted, however, that it would be easy for market participants wishing to obtain the necessary currency to roll over or finance a short position through the highly liquid swap market.

Market Efficiency and Price Formation

14. Market participants regard the exchange market as highly efficient and very liquid; nonetheless, its depth and resiliency were felt to vary across countries, from segment to segment and from currency to currency. In the largest and most active centres, respondents considered themselves to be price takers. Because of the large number of players, the rapid dissemination of information, and the scope for arbitrage, the impact of any one participant's actions on prices was highly uncertain and probably negligible except in the very short run.

15. In countries with lower turnover, it was noted that markets were concentrated or had a two-tier structure. Some participants saw themselves as price-makers and able to set markets in motion by taking positions, while others saw themselves as price-takers. Market participants in several countries indicated that there were often privileged circuits of information. Banks sometimes had better access to information than their customers,

and informational advantages could arise from their market-making activity. Moreover, some participants felt that there were a handful of very large institutions often able to affect prices by taking very large positions, mobilizing a broad range of instruments and publishing influential economic analysis affecting market expectations. Market manipulation or "power trading" was nonetheless regarded as the exception rather than the rule because market participants would quickly detect such practices and operate profitably in such way as to smooth out the price effects.

16. Market participants observed that, although the scope for occasional and very short-term one-way movements in the spot markets might have increased, deregulation and financial innovation were widely regarded as having significantly reduced the risk that exchange rates would remain for prolonged periods at levels out of line with the fundamentals.

Market-Making and Liquidity

17. Respondents in several countries reported that the number of market-making banks had clearly tended to decline and it was thought that this trend would continue. The reduction in the number of market-makers was the result both of mergers among banks and of the withdrawal of some smaller banks which felt that they could not earn sufficient profits in such a highly competitive business. The entry of securities houses and investment banks into market-making in derivatives had offset some of the decline, but these new entrants were not providing the full range of market-making services. Because competition was keen and information readily available to other market users, market-makers no longer played a pivotal role; moreover, there was little concern in the major financial centres that greater concentration would seriously undermine liquidity.

18. Liquidity was reported to be extremely good for major currencies traded in traditional market segments. Continuous two-way quotations could be obtained from a variety of different counterparties for standard lots. Spreads were generally narrow and markets robust in the face of most shocks. However, respondents indicated that even for the most widely traded currencies there were times and conditions in which liquidity would deteriorate. In the first place, spreads for large deals would be more variable and exposure limits sometimes would make it necessary to use more than one counterparty. Moreover, liquidity was tight at times (on Fridays, before holidays, and in the North American afternoon); it was also sometimes low before the release of key economic indicators and around chart points and options dates, which were tending to grow in number. In other market segments liquidity was generally good, but had shown signs of declining and tended to be more fragile. Credit risk and increased monitoring of counterparties were generally viewed as major causes of the curtailment of trading and

the reduction in liquidity. In the view of many market participants, the options market was the segment in which liquidity was most problematic. The number of market-makers was limited and the customer base small. Liquidity in this segment depended greatly on the liquidity of the underlying market in which options writers hedged their positions.

Impact of Changes in Regulations on the Structure of the Market

19. Market participants cited changes in three main types of regulation as having an impact on the structure of the market. Firstly, the liberalization or abolition of exchange controls had led to an expansion of trading particularly for investment purposes. Secondly, stricter capital guidelines were seen as having affected the exchange market by prompting banks to reassess their role as market-makers and to scale back their activity in some segments of the forward market. At the same time capital ratios had spurred the development of off-balance sheet business. Finally, rules and regulations governing portfolio composition were reported to have had an impact on exchange market activity. (For example, legislation in one country increased the foreign investment limits on pension funds from 10 to 20 per cent over five years.)

III - BEHAVIOUR OF MARKET PARTICIPANTS

Technical Analysis vs. Fundamentals in Position-Taking and Price Dynamics

20. Fundamentals and technical analysis were both seen as playing distinct and, possibly, complementary roles in shaping decisions affecting the exchange market. In general, respondents indicated that fundamentals were much more important than technical analysis in long-term strategic positioning. Technical analysis – the use of various techniques to infer future price movements from past price developments – had nonetheless come to play an increasingly prominent role in determining the exact timing of transactions; it was also frequently used in support of very short-term – especially intra-day – dealing strategies.

21. Those using technical analysis cited a number of reasons for its growing popularity, notably the reduced cost of computers and information systems and the more active short-term management of positions by investment funds. A perception that exchange rate cycles had become shorter compared with the 1982-87 period was also said to have enhanced the usefulness of this trading tool. Market participants indicated that technical analysis was most likely to affect exchange rates in calm market conditions when there is a dearth of news about fundamentals or when trends are difficult to discern. In such circumstances, signals identified using technical analysis may at times trigger a substantial volume of one-way trading. Although used in one form or the other by most market participants, the relative importance assigned to technical analysis appears to be greater among smaller and more risk-averse players.

22. As for the reasons why currencies come under pressure one at the time, sometimes without any obvious sign of a change in fundamentals, respondents underscored the fact that market players do not have the capacity to follow closely a large number of currencies simultaneously; thus, "success" in precipitating a devaluation could increase the resources available for speculation in other currencies. Moreover, the devaluation of any one currency could be seen as negatively affecting competitive positions of other countries, thus exposing their currencies to selling pressures. Some respondents also noted that herd instincts predominate in extreme conditions. Once a currency is thought to be a candidate for devaluation, it becomes a focus of attention and the process can be self reinforcing as banks and investment houses consolidate their own views on the basis of the orders they receive from customers.

The Role of Stop-Loss Orders, Dynamic Hedging and Program Trading in Price Dynamics

23. Stop-loss orders are widely used in the foreign exchange markets either to trigger sales or in risk management to signal the need to re-examine existing positions. The growth of over-the-counter options markets has led to greater use of dynamic hedging (i.e. a technique in which options writers cover their positions by buying or selling the corresponding currencies in the spot market as the exchange rate approaches the option's strike price). By contrast, program trading (i.e. the automatic execution of large transactions by computer programs) appears to be of limited significance in the foreign exchange market and its impact on price formation was said to be insignificant.

24. Although considered to be stabilizing in calm market conditions, stop-loss orders were widely regarded by respondents as amplifying the size and accelerating the speed of price adjustments in unsettled market conditions. The practice of centring stop-loss orders around "critical" exchange rate levels identified by technical analysis played an important role in this respect. When exchange rates broke through "key resistance levels", a concentrated volume of selling or buying occurred. This led other market participants to close out positions in order to limit losses and, in the process, increased the pressure on exchange rates, thus giving stop-loss orders a role in exacerbating market volatility. This, as well as predatory trading aimed at triggering stop-loss buying or selling, was noted by some respondents as making automatic execution risky. For all these reasons, the trading points embedded in stop-loss orders increasingly prompted consultations within the institution or with customers on the action to be taken.

Factors Bearing on the Size, Timing and Duration of Open Positions

25. The principal factors said to bear on the size of open positions were institutions' assessment of the fundamentals, their capital and attitude towards risk, counterparty credit lines, prudential exposure limits, exchange rate volatility, market liquidity, and the size of normal currency flows. For a given set of expectations about future exchange rates, the degree of risk aversion and the amount of capital available, foreign exchange positions were usually larger the larger the counterparty and prudential limits and the greater the market's liquidity; conversely, positions were lower the higher the volatility of the exchange rate in question. These determinants appeared to govern the size of both strategic and overnight positions. The duration of strategic positions was shaped by expectations about fundamentals. The timing of the opening or closing of positions was

determined by technical analysis, stop-loss orders and the approach of events likely to have an impact on market expectations (such as elections or referenda).

26. Decisions on the size, duration and timing of changes in strategic positions were generally said to be made at the senior management level. Senior officials were also involved in decisions relating to larger open overnight positions. Traders or heads of trading units had discretion within set limits for intra-day position taking.

27. The great majority of participants indicated that the size of the positions they were willing to take had increased in recent years, reflecting deregulation and the liberalization of capital flows, improved risk management capabilities, the development of new instruments and, at least until September 1992, higher liquidity, reduced volatility, and declining spreads in foreign exchange markets, especially for currencies participating in the ERM. A number of respondents asserted that the risks taken had not necessarily increased commensurately, and could in fact be smaller than in the past given the improvements in risk management and control systems.

The Effect of Financial Innovation and Deregulation on Risk-Taking and Exchange Rate Volatility

28. There was broad agreement that the development and use of derivative instruments had led to a better understanding and control of financial risks by banks and their customers. One of their most significant features was that they allowed market participants to unbundle risks and manage them separately. For example, foreign exchange exposures can be managed independently from holdings of underlying assets. However, some market participants reported that they chose not to use these instruments, in part because they were perceived not to be cost effective. At least in so far as customers were concerned, derivative instruments were used primarily for risk hedging purposes (directional risk) and were rarely used to take leveraged positions in the underlying instruments. Respondents noted that when market conditions were calm, the existence of options and the related dynamic hedging helped to foster market liquidity and trading volumes and perhaps to stabilize exchange rates. However, in more turbulent conditions the existence of options and related dynamic hedging could increase volatility, especially in the smaller and less liquid currency segments, as the spot exchange rate approaches the strike price. When strike prices and/or options maturities are highly concentrated, a large volume of one-way hedging could occur in a short period. Market participants reported that sharp, discrete movements in spot prices were frequently observed as a result of such concentrations.

Risk and Risk Management

29. Counterparty credit risk was widely reported as having become of growing concern to market participants and at the same time more difficult to assess. The combination of these two trends had led to intensified monitoring and control of counterparty exposures and to a concentration of trading with counterparties perceived to be the most creditworthy. Settlement risk was also said to be a cause for some concern. The great majority of market participants viewed both cross-border and domestic netting arrangements as an effective means of reducing both counterparty and settlement risks. The use of cross-border netting was, however, severely limited by legal uncertainties. Views on market risk were more differentiated. A number of market participants considered it the most important type of risk encountered in trading and position taking, and controlled it by strict position limits and stop-loss orders. Others felt that improved risk management systems and the wider use of derivative instruments had enabled them to reduce market risk and to control it better.

30. At the same time the growth of trade in derivative instruments was widely regarded as posing new challenges to risk management. Market-makers in derivatives were all highly conscious of risk, though their approaches to manage it are far from uniform. The hedging needs associated with derivatives portfolios had increased and made firms' cash funding requirements less predictable, especially in unsettled market conditions. A number of participants, including one market-maker in the over-the-counter derivatives market, expressed concern that end users, and perhaps even writers, were not fully aware of the risks involved in certain exotic derivative products. Others noted that risk management systems tended to rely on historical indices of volatility, which were not necessarily reliable indicators of current or future volatility. Finally, a number of participants argued that excessive concentration in derivatives markets increased financial fragility. Although the small number of institutions handling the bulk of operations involving derivatives were well managed and of high credit standing, a default, or even a technical problem, affecting one of them could have adverse systemic implications.

31. Many respondents indicated that they saw increased competition and the decline in the profitability of traditional banking operations as a factor contributing to systemic instability. Lower profitability forced many banks to take greater risks in the attempt to generate higher returns. However, a number of market participants expressed the view that the prevention and containment of systemic risk was not the responsibility of individual intermediaries but of the supervisory and monetary authorities.

IV - RECENT EXPERIENCE IN THE FOREIGN EXCHANGE MARKET

Causes of the Turbulence

32. Market participants noted that the turbulence in the second half of 1992 had occurred in conditions of high capital mobility, which had increased considerably as a result of financial innovation and liberalization. In their opinion, the direction and magnitude of capital flows had become highly sensitive to a set of factors that included interest rates, economic fundamentals, political decisions, and market rumors. It was possible that technical factors and trading practices had exacerbated exchange rate movements but they were not seen as the root cause of the turbulence. Rather, the development of economic fundamentals and policy decisions by the authorities before and during the period of tension were said to have been crucial.

33. In identifying the main underlying causes of the turbulence, market participants indicated a set of interrelated factors. A recurrent explanation was the unwinding of positions in high-yielding European currencies, once doubts came to be entertained about the outcome of the EMU process. In connection with the negotiations on the Treaty of Maastricht, large amounts had been invested in these currencies on the assumption that a convergence of economic and financial performance would make it possible to maintain existing ERM parities through to EMU. At the time, participants in major markets outside the EC indicated that they had a strong belief in the convergence of long-term interest rates. It is likely that companies had grown complacent about intra-ERM exposures after a long period without realignments, and fund managers had become accustomed to high returns on their holdings. On balance, there seemed to have been a general willingness to underestimate currency risks associated with interest rate differentials on the part of many market participants.

34. Around mid-1992, market participants had begun to re-examine their assumptions. Several factors contributed to the change in perception. The outcome of the Danish referendum and uncertainty about the result of the French referendum were said to have been two important factors. Others were: lack of a co-operative strategy in the management of the crisis; the inconsistency between German monetary policy, designed to cope with the inflationary pressures arising from the process of unification, and the policies required to counter the slowdown in economic activity in the rest of Europe and the United States. The rise in the German discount rate on 16 July was seen to have highlighted these tensions.

35. As uncertainty grew, many market participants had felt it necessary to reduce what in the aggregate were extremely large exposures in high yielding currencies. (According to one estimate, the overweightings in high yielding currencies built up in portfolios in recent years had amounted to 200-300 billion dollars.) The capital flows which ensued were of unprecedented size. In the opinion of several respondents, European central banks had not fully anticipated how large the portfolio shift would be and how quickly market participants would attempt to reverse their positions if confidence in ERM parities were shaken.

36. Among the underlying causes of unrest in the foreign exchange markets, several respondents also underscored the fundamental imbalances of many of the ERM countries that had built up after the last realignment in 1987. The convergence of economic performance in Europe had not been adequate, and exchange rate adjustments had been delayed for too long. The crisis had erupted when market participants perceived that the high interest rates required to maintain existing exchange rate parities were inflicting unacceptably serious damage on cyclically weakened economies and those with large fiscal deficits.

37. Several specific factors were also mentioned as having triggered the crisis in individual currencies. In the case of the Italian lira, market participants cited growing doubts about the authorities' determination or ability to tackle budgetary problems as well as some specific tax measures adopted in the course of the summer. In the case of the pound sterling, the destabilizing factors were seen to be the devaluation of the lira, the comparatively small reduction in German interest rates, the perceived unsustainability of British interest rate hikes and alleged comments by German officials that a wider realignment might have been desirable. In the case of the Swedish krona, respondents stressed growing fiscal imbalances and signs of dissension between the Government and the opposition about the implications for the domestic economy of the exchange rate policy pursued.

Changes During the Period of Turbulence

38. Descriptions of the operation of the foreign exchange market during the period of turbulence were strikingly similar across countries, pointing to a high degree of integration. In the first place, a sizeable increase in transactions was reported in all financial centres. US market participants estimated that market-making activity was 50-200 per cent above normal. Other data on large-value dollar payments channeled through the CHIPS clearing system suggested a more modest increase in settlements of foreign exchange transactions, perhaps in part because these data do not capture

transactions directly between non-dollar currencies. The turnover of DM and sterling futures and "exchange traded" options also expanded substantially in August-September. In some cases, market activity was reported to have been largely 'one-way'. Market participants indicated that the increase in volume had been mainly due to the activity of investment funds and large firms.

39. Virtually all respondents indicated that liquidity conditions had deteriorated during the crisis, in some cases considerably so. Bid-ask spreads had widened and the average size of transactions declined. In some financial centres several market-makers had ceased to quote two-way prices. In Japan, trading hours for European currencies had been shifted in some cases to correspond to those in the European time zone. Liquidity in the ECU market had been severely compromised by the introduction or reinforcement of exchange controls on some currencies making up the basket. Liquidity problems appeared to have been more acute in the forward and options markets than in the spot markets. In the case of sterling, for instance, British clearing banks had stopped quoting prices in the forward market for a while.

40. In spite of the substantial increase in volume no significant problem with clearing and settlement systems was reported. In some cases banks had increased their monitoring of back-office procedures to prevent confirmation and payments delays from developing. In general, in terms of technical operation the market was reported to have worked surprisingly smoothly during the crisis.

41. The behaviour of major market players varied across categories. According to participants in one major financial centre, institutional investors had tried at first to maintain their underlying asset positions but to cover their foreign exchange exposure. In cases where interest rates had soared to unprecedented levels or capital controls had been imposed, forward cover had become extremely expensive and difficult to obtain, which had prompted some asset sales. Mutual funds had also sold assets to finance anticipated redemptions. Some mutual funds were described as major losers because they had managed to make only marginal changes in their foreign exchange exposures. By contrast, a handful of hedge funds which characterized themselves as 'fundamental traders' had built up sizeable strategic short positions in the currencies most likely to devalue. They were reported to have increased those positions considerably as the crisis intensified, particularly from 15 September on, concentrating their exchange market activity on conventional spot and forward instruments.

42. Banks in most countries reported that their open positions had been small and for the most part limited to intra-day trading. Banks in general seem to have been content to concentrate on market-making and intermediating client business. The respondents indicated that the increase in banks' exchange market earnings in the third quarter of 1992 was largely the result of higher turnover and/or larger spreads.

Lasting Consequences of the Crisis

43. Although orderly market conditions had been restored relatively quickly after the crisis, a number of lasting consequences were noted. Many market participants indicated that they had become more cautious with respect to foreign exchange exposure. According to several market participants, expectations of exchange rate changes would probably have a more pronounced impact on investment and borrowing decisions in the future. Hedging activity had increased, and procedures for monitoring and managing exchange risk had been tightened and upgraded. In a few cases it was reported that market participants had closed out their exposures in some EMS currencies entirely because of the absence of forward cover during the crisis. In addition, risk premia on some currencies had increased, and it was noted that countries that had imposed capital controls would have to pay higher risk premia for many years to come.

44. A second consequence was that liquidity appeared not to have returned to pre-crisis levels for all products and currencies. Spreads had remained larger, especially for the EMS currencies outside the ERM and were showing exceptional volatility. There had been a reduction in the use of derivative instruments for these currencies and trading was concentrated on highly liquid instruments. Moreover, a few reports indicated that some major market players had suffered significant foreign exchange losses. This, together with the cautious attitude engendered by floating exchange rates, could further reduce market-making activity and overall liquidity in the future. Some reports also indicated that a major lasting consequence of the foreign exchange turbulence was a loss of confidence in the stability of the EMS and in the compatibility of economic policies being pursued.

Policy Lessons

45. In general, respondents stressed that the effectiveness of policies designed to stem market pressures was related to the credibility of the objective and the strength of the authorities' commitment. In this respect, several market participants emphasized the need for timely adjustments to bring exchange rates into line with fundamentals. Others underscored the need to improve policy coordination and to foster greater co-operation among central banks. They noted that during the recent crisis central banks had been perceived to have divergent objectives and to have been unwilling to take coordinated action to defend ERM parities. Interest rate changes and intervention were bound to be ineffective when markets came to doubt the authorities' willingness or determination to support all the currencies in the system. Moreover, unilateral realignments had conveyed the impression that the authorities were incapable of finding a lasting joint solution to the

crisis in the EMS. In the view of many market participants, a general ERM realignment in August or early September would have been much less disruptive and costly than the actual outcome.

46. Interest rate changes were seen by some respondents to be the most appropriate weapon to cope with exchange rate pressures. They pointed to delays by the authorities of some countries in using the interest rate instrument as an important factor undermining the credibility of their exchange rate commitments. Others, however, noted that, in countries where economic conditions were already very weak, interest rate hikes would not have been credible. Interest rate levels were regarded as unsustainable in the long run and in some cases further increases might even have intensified expectations of depreciation. A few market participants suggested that the authorities should investigate methods for insulating their domestic interest rate structures from changes in short-term rates designed to combat external pressures.

47. Most respondents thought that capital controls were ineffective at best and highly damaging at worst. Such restrictions made it impossible to hedge currency risk, thus accelerating capital outflows. In addition, they ultimately proved to be ineffective as they could generally be circumvented in the long run. A few market participants, however, expressed the view that capital restrictions could be preferable to very high interest rates which disrupted financial markets. Intervention was viewed as underpinning market liquidity and some respondents suggested that authorities might entertain the thought of intervening in derivatives markets. Nonetheless, in the presence of major imbalances, intervention was considered to be ineffective unless accompanied by measures in other policy areas. Some participants pointed out that, given the combination of forces at work in September, no conceivable amount of intervention could have maintained all the ERM parities. Finally, some respondents suggested that greater attention should be paid by policy makers to the impact of news and public statements on market behaviour.

ANNEX I

APPENDIX

QUESTIONNAIRE FOR THE INTERVIEWS WITH MARKET PARTICIPANTS

The interview is part of a study undertaken by the G-10 countries on the structure and functioning of foreign exchange markets in normal times as well as in periods of tension. We list below the main issues we would like to discuss with your institution. We are not asking for written responses, but rather would like to analyze in depth with you each of these broad topics.

The first three sections focus on the structure and functioning of the foreign exchange markets in general. The fourth section addresses some of these issues in the context of periods of turbulence, in particular the most recent. Not all issues are relevant for all market participants and for all financial centres. Whenever possible, however, we would appreciate your views with reference both to your own operations and to the general market.

As in all conversations with us, proprietary information will be held in strict confidence. We do not intend to reveal your participation in the interviews.

I. Size and Growth of the Foreign Exchange Markets

This section is aimed at achieving a general overview of the reasons for the growth of foreign exchange markets in the last few years. Background information on these issues is contained in the surveys on turnover in the foreign exchange markets conducted in 1986, 1989 and 1992, with the co-ordination of the Bank for International Settlements (BIS). Preliminary results on the 1992 surveys indicate that turnover has continued to grow, but at a less rapid pace than in the previous 3-year period. The rate of growth has varied considerably by type of instruments traded and geographical location. Growth has been concentrated in swaps and derivative instruments. Among the three major financial centres, growth has been most rapid in London, and least rapid in Tokyo.

We would like to have your views on these issues, focusing in particular on the following questions:

1 - **How does the turnover experience of your firm compare with that described in the national exchange market surveys, coordinated by the BIS?**

2 - **What factors have most influenced your firm's growth in foreign exchange volume?**

3 - **Which instruments or sectors have expanded most rapidly and why?**

4 - **What factors (e.g. taxes, capital guidelines, regulations on international capital flows) influence your choice of venue for conducting foreign exchange transactions (location, instrument, OTC versus exchange-traded, etc.)?**

II. Market Structure

This section focuses on market structure. Note that the next section deals with behaviour of market participants: to the extent possible, we would like structure and behaviour to be two separate topics, though there are obvious interconnections between them. We would like to assess who are the main participants in the market (both as market-makers and as final counterparts), which instruments they typically use, what are the linkages between foreign exchange markets and other financial markets, how competitive is the market, how is the market-making function performed and whether liquidity may at times become problematic in some segments of the market.

1 - **What are the major categories of participants in the different segments of the foreign exchange markets (spot, forward and derivatives)? What has changed in the last few years? Why did these changes occur?**

2 - **What are the main types of transaction which give rise to foreign exchange flows?**

3 - **In view of the speed with which information disseminates in the market, would you consider that all market participants are on the same footing and can be characterized as "price takers"?**

4 - **Under what circumstances can liquidity in the foreign exchange market, or some segments of it, become problematic?**

5 - **How important a role do market-makers play in the various segments of the markets? In your view, do they always provide adequate liquidity?**

6 - **How have changes in regulation affected the structure of the market, that you have described in your response to the preceding questions?**

III. Behaviour of Market Participants

This section focuses on behaviour of market participants and its effects on price dynamics. We hence ask about the way in which various participants analyze profit opportunities, the extent to which they are willing to take positions and risks.

1 - **What is the relative role of fundamentals and technical analysis in determining open positions and price dynamics in different circumstances? Have there been changes in the last 5 years or so?**

2 - **What is the role of trading techniques (stop-loss orders, program trading, dynamic hedging) in exacerbating market trends?**

3 - **What determines the size, timing and duration of open positions?**

4 - **How would you assess the effects of financial innovation (derivatives in particular) and deregulation on risk-taking and on exchange rate volatility?**

5 - **What are the main areas of risk that concern you and how do you manage or reduce those risks?**

IV. The Recent Experience in the Foreign Exchange Markets

This section of the questionnaire focuses on the implications of the changes in the structure and functioning of the foreign exchange market for periods of market turbulence, in particular the most recent.

1 - **In your view, what were the main causes of foreign exchange market turbulence in general and in the recent episodes of turbulence, particularly within the European Monetary System?**

2 - **Were there any noticeable changes in the markets during the recent period of turbulence in terms of: market structure (exit-entry of major players, concentration, market-making); technical functioning (bid-ask spreads, instruments used, payment systems, trading volumes); behaviour of major participants (risk management, intra-day positions, counterpart limits, trading strategies, intra-bank trading)?**

3 - **Were there any lasting consequences of foreign exchange market turbulence (risk management, payment systems, liquidity, bid-ask spreads, use of instruments, confidence, future corporate strategies)?**

4 - **What does the recent experience indicate about the effectiveness of interest rate changes, intervention and other policies (capital controls, regulatory constraints), in stemming extreme exchange market pressure? What could the authorities have done differently?**

ANNEX II

A NOTE ON RECENT TRENDS AND DEVELOPMENTS IN INTERNATIONAL FINANCIAL MARKETS AND INTERNATIONAL CAPITAL FLOWS [1]

Prepared by the Research Department, IMF [2]

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[1] Further analysis of the issues examined in this note can be found in The Determinants and Systemic Consequences of International Capital Flows, (International Monetary Fund, Occasional Paper 77, March 1991) and Report on the Measurement of International Capital Flows (International Monetary Fund, September 1992). The macroeconomic and financial that effected foreign exchange markets and capital flows in Europe in the fall of 1992 are examined in A Note on Macroeconomic Causes of Recent Exchange Market Turbulence, and International Capital Markets, Developments, Prospects, and Key Policy Issues, Part 1, Exchange Rate Management and International Capital Flows in the Aftermath of the ERM Crisis (forthcoming).

[2] The views expressed should not be regarded as the official views of the Management or Executive Board of the International Monetary Fund.

The past two decades have witnessed an unprecedented expansion in the volume and complexity of international financial transactions and capital flows which have been driven by economic fundamentals, technological changes, official policies and market distortions. The entry of new participants and the introduction of new financial instruments increased competitive pressures and produced important structural changes in international financial markets. To examine these developments, this note first identifies the key trends in international capital flows since the 1970s and discusses the factors that have influenced these trends. In addition, there is a discussion of the difficulties that have been created for the measurement of international capital flows by the introduction of new participants and new instruments into international financial markets.

I. Key trends in international capital flows

Four key trends have characterized international capital flows in the period since the 1970s.

a) Sharp expansion in the scale of net and gross capital flows in the major industrial countries

First, there was a sharp expansion in the scale of net and gross capital flows among the industrial countries, as well as a much increased participation by foreign investors and foreign financial institutions in the major domestic financial markets. The sharp upswing in the level of net capital flows among the industrial countries was the counterpart to the historically large current account imbalances during the period (Table 1). Although large current account imbalances were evident in 1973-75 and in 1979-81, net capital flows between the industrial countries expanded most rapidly after 1982. For example, the net capital inflow into the United States accelerated from an average of $2 billion a year (0.1 percent of GNP) in 1970-72 to an average of $139 billion a year (3 percent of GNP) in 1985-88 before subsiding to $65 billion a year in the early 1990s.

An even more rapid expansion occurred in gross capital flows (Table 2) which reflected increased cross-border banking transactions and flows of securities, the development of offshore (Eurocurrency) markets, and the entry of foreign financial institutions into domestic markets. For example, the stock of international loans (net of redepositing by banks) rose from $175 billion at the end of December 1973 (5 percent of industrial countries' GNP) to $3.6 trillion at the end of 1991 (21 percent of the industrial countries' GNP). The stock of Eurocurrency and foreign bonds also increased from $259

Table I

Net International Capital Flows of Major Industrial Countries, 1970-91

(Period averages)

	Germany				Japan				United States			
	1970-72	1979-81	1985-88	1989-91	1970-72	1979-81	1985-88	1989-91	1970-72	1979-81	1985-88	1989-91
Capital account balance [1] (in billions of U.S. dollars)	–1.01	7.59	–38.51	–28.14	–4.81	4.91	–75.41	–55.25	1.63	–2.89	138.56	65.12
Capital account balance (in billions of U.S. dollars deflated by U.S. GNP deflator (1985=100)	–2.56	10.08	–36.44	–24.42	–12.10	7.01	–71.81	–46.01	3.83	–3.52	132.47	55.56
Capital account balance as percent of GNP	–0.46	0.97	–3.90	–2.22	–1.89	0.49	–3.57	–1.78	0.13	–0.10	3.13	1.21

Source: International Monetary Fund, Balance of Payments Statistics.

[1] This is taken as the counterpart to the current account imbalance. A positive value indicates a capital account surplus (inflow).

Table II

International Bank Lending and International Bonds, 1973-1991 [1]

(in billions of dollars)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
International bank lending																			
BIS data (net of redepositing: stocks)	175	230	265	340	435	530	665	810	945	1,020	1,085	1,285	1,485	1,790	2,225	2,545	2,920	3,535	3,615
Growth rate (in percent)		31	15	28	28	22	25	22	17	8	6	18	16	21	24	14	15	21	2
BIS data (net of redepositing: flows)		45	50	70	55	85	125	160	165	95	85	90	105	195	300	260	410	465	85
Growth rate (in percent)		26	22	26	16	20	24	24	20	10	8	8	8	13	17	11	16	16	2
BIS data (gross: flows)		57	88	97	89	180	206	241	265	181	106	124	232	51	603	436	685	608	–57
Growth rate (in percent)		18	22	22	16	27	24	22	20	12	7	6	11	20	18	10	15	11	–1
IMF data (gross: flows)							347	414	404	186	166	180	278	539	802	554	836	729	–41
Growth rate (in percent)							27	24	20	8	7	7	10	17	20	11	15	11	–1
International bonds																			
BIS data (outstanding stock)										259	..	..	557	773	991	1,085	1,252.3	1,472.5	1,651.4
OECD data (net of redemptions: flows)										58	59	90	132	163	105	144	166.3	122	148.8

Sources: Bank for International Settlements (BIS); Organization for Economic Cooperation and Development (OECD); International Monetary Fund, International Banking Statistics (IBS); and IMF staff estimates.

[1] IMF-based bank lending data on cross-border changes in bank claims are derived from the Fund's International Banking Statistics (cross-border Interbank accounts by residence of borrowing bank plus international bank credits to non-banks by residence of borrower), excluding changes attributed to exchange rate movements. BIS-based data are derived from quarterly statistics contained in the BIS's International Banking Developments; the figures shown are adjusted for the effects of exchange rate movements. Differences between the IMF data and the BIS data are mainly accounted for by the different coverages. The BIS data are derived from geographical analyses provided by banks in the reporting area. The IMF data derive cross-border Interbank positions from the regular money and banking data supplied by member countries, while the IMF analysis of transactions with non-banks is based on data from geographical breakdowns provided by the BIS reporting countries and additional banking centers. Neither the IBS nor the BIS series are fully comparable over time because of the expansion of coverage.

billion at the end of 1982 (3 percent of industrial countries' GNP) to $1.7 trillion at the end of 1991 (10 percent of industrial countries' GNP). Moreover, between 1979 and 1991, the volume of international equity transactions increased on average by 15 percent a year; and reached $1.5 trillion in 1991. Cross-border ownership of traded bonds and equities increased from about $500 billion in 1983 to $2 trillion in 1989.

These international capital flows were associated with sharp increases in both spot and derivative foreign exchange market transactions. Net spot turnover on the three largest foreign exchange (London, New York and Tokyo) increased three-fold between 1986 and 1992, rising from $200 billion per day in March 1986 to over $620 billion per day in April 1992. Turnover in these market accounts for about two-thirds of turnover in all foreign exchange markets, which is currently estimated to be about $880 billion per day. By way of comparison, total non-gold foreign exchange reserves of the G-10 central banks amounted to roughly $400 billion in early 1992. The share of derivative instruments transactions (swaps, forwards, futures, and options) grew markedly relative to spot transactions, rising from less than 40 percent of all foreign exchange transactions in 1986 to about 50 percent in 1992.

The "foreign" presence in major domestic financial markets has also increased as the need to finance large fiscal and current account imbalances in the industrial countries has created pressures for the breakdown of restrictions in domestic and external financial transactions. While data on the residency of the holders of industrial countries' bonds are notoriously poor, the United States reported that foreign and international entities held 19 percent of the Federal Government's outstanding securities at the end of 1991. In Germany, central government debt held by foreigners increased from 5 percent at the end of 1974 to 23 percent at the end of 1991. As restrictions on holding of foreign assets by institutional investors (mutual funds, insurance companies and pension funds) were relaxed, these investors accounted for a growing share of international securities transactions. For example, the 300 largest private pension funds in the world currently invest about 7 percent of their $2 trillion of assets in foreign-currency denominated assets; and this is expected to rise to about 12 percent by the mid-1990s. The increased importance of such institutional investors has also been reflected in their growing share of foreign exchange transactions. While large international banks, securities houses, corporates, and central banks have continued to be the main players in foreign exchange markets, institutional investors such as mutual funds, pension funds, insurance companies, and, most importantly, hedge funds have shown that they are capable of making very large shifts of funds across currencies on short notice.

b) Globalization and integration of offshore and major domestic financial markets

The easing of capital controls and the broader liberalization of financial markets in industrial countries stimulated competition and brought about a growing integration

of domestic and offshore markets – which in turn generated important efficiency gains. Indeed, the integration of global financial markets has proceeded much more rapidly than that of goods markets – in part because the latter has been inhibited by protectionism.

The degree of integration of international capital markets can often be better captured by rate of return differentials (appropriately defined) between the markets than by the scale of capital flows themselves. A high degree of integration can be present even without a large volume of capital flows. For example, trading of some benchmark U.S. Government securities often takes place simultaneously on markets both inside and outside the United States, and unanticipated events (such as an increase in the Federal Reserve's discount rate) trigger an immediate adjustment in the prices of these securities in the markets in all countries without any capital flows or even any transactions occurring.

Interest rate differentials suggest that the degree of integration of short-term markets increased markedly during the 1980s, especially for those countries removing capital controls. In contrast, empirical studies indicate that the degree of integration of long-term markets still remains incomplete.

c) Dominant role of private flows in financing fiscal and current account imbalances

Private capital flows provided most of the cross-country financing of fiscal and current account imbalances for the developing countries in the 1970s and for the industrial countries in the 1970s and 1980s. Moreover, while banking flows were the dominant source of private financing to developing countries in the 1970s, flows of securities increasingly dominated private capital flows among industrial countries in the 1980s and 1990s.

In the 1970s, the financing of the current account imbalances of the non-oil developing countries (Tables 3 and 4) and the oil exporting developing countries (Tables 5 and 6) relied much more on indirect finance (through financial intermediaries) than direct finance (through securities markets or foreign direct investment) than in earlier periods. The large current account surpluses of the oil exporting developing countries initially led to the placement of funds in bank deposits and short-term government securities in industrial countries and offshore markets; only later was a large proportion of these funds invested in long-term securities and other less liquid assets. More than 80 percent of the current account deficits for the non-oil developing countries were financed by other net external borrowing which included borrowing from private creditors (mainly banks) and short-term official flows.

Table III

Non-oil Developing Countries: External Financing, 1969-80

(in billions of U.S. dollars)

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Deficit on goods, services, and private tranfers [1]	8.6	13.3	16.0	11.0	11.5	34.9	44.0	30.2	24.5	35.0	50.2	73.5
Non-debt-creating flows, net	4.6	5.4	6.8	6.6	9.8	14.0	11.9	12.2	14.2	15.9	21.1	21.0
Official transfers	2.4	2.5	3.0	3.4	5.3	8.5	7.4	7.2	8.2	8.0	10.9	11.7
Direct investment	2.1	2.3	2.7	2.8	4.3	4.8	5.0	4.6	5.3	6.4	8.6	8.4
SDR allocation, gold monetization, and valuation changes	0.1	0.7	1.2	0.4	0.2	0.7	–0.4	0.3	0.8	1.5	1.6	0.9
Asset transactions, net [2]	–1.1	–0.6	–0.9	–2.7	–3.6	–2.3	–1.6	–4.3	–5.7	–4.3	–7.0	–7.7
Net errors and omissions [3]	–0.9	0.3	0.6	0.2	–0.5	–1.2	–3.3	–5.0	–4.8	–8.7	–2.3	–8.9
Use of reserves	–3.0	–2.8	–3.5	–9.1	–10.9	–4.7	–1.9	–13.6	–14.4	–17.4	–12.1	–6.9
Net external borrowing	9.0	11.0	13.0	16.0	16.7	29.0	39.0	41.0	35.1	49.5	50.6	76.0
Reserve-related liabilities	–0.1	–0.4	0.2	0.2	0.2	1.6	2.6	4.0	0.8	1.8	1.1	4.1
Net credit from IMF [4]	–0.1	–0.4	0.0	0.3	0.1	1.4	1.9	2.6	0.1	0.6	0.8	2.7
Liabilities constituting foreign authorities' reserves [5]	0.0	0.0	0.2	0.0	0.1	0.3	0.7	1.4	0.6	1.2	0.4	1.4
Long-term borrowing from official creditors, net [6]	...	- -	2.4	3.6	3.2	5.7	9.3	9.1	8.5	9.9	14.9	18.5
Other net external borrowing [7]	...	11.4	10.3	12.2	13.3	21.7	27.1	27.9	25.9	37.8	34.5	53.4
Memorandum items:												
Net borrowing from commercial banks [8]	...	...	...	...	...	...	...	...	...	...	...	...
Exceptional financing	0.0	0.2	0.2	0.3	0.5	1.3	2.9	2.6	3.1	2.8	2.7	7.2
Of wich:												
Arrears	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.5	1.8	0.9	0.4	–2.0
Reschedulings	0.0	0.0	0.1	0.4	0.3	0.6	0.3	0.0	0.0	0.5	1.6	6.5

Source: International Monetary Fund, World Economic Outlook, various issues.

Note: Except where otherwise footnoted, estimates shown here are based on national balance of payments statistics. These flows are not always easily reconcilable with year-to-year changes in either debtor- or creditor-reported debt statistics, in part because the latter are affected by changes in valuation.

[1] Equivalent to current account deficit less official transfers. In this table, official transfers are treated as external financing. [2] Pertains primarily to export credit. [3] Positioned here on the presumption that estimates reflect primarily unrecorded capital outflows. [4] Includes use of Fund credit under General Resource Account, Trust Fund structural adjustement facility, and enhanced structural adjustement facility. The impact of prospective programs is incorporated. [5] Comprises short-term borrowing by monetary authorities from other monetary authorities. [6] Estimates of net disbursements by official creditors (other than monetary authorities) derived from debt statistics. Official net disbursements include the increase in official claims caused by the transfer of officially guaranteed claims to the guarantor agency in the creditor country, usually in the context of debt reschedulings. [7] Residually calculated. Except for discrepancies in coverage, amounts shown reflect net external borrowing from private creditors and short-term official flows (primarily interest arrears on official debt). [8] Based on changes in cross-border bank claims reported in the Fund's International Banking Statistics, adjusted for valuation changes attributed to exchange rate movements. Excludes six offshore banking centers covered by the World Economic Outlook (The Bahamas, Bahrain, Hong Kong, Netherlands Antilles, Panama and Singapore).

Table IV

Non-oil Developing Countries: External Financing, 1981-91

(in billions of U.S. dollars)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Deficit on goods, services, and private tranfers [1]	98.2	81.3	50.2	36.9	40.2	31.7	8.9	17.2	30.1	41.5	48.8
Non-debt-creating flows, net	26.7	23.2	21.4	22.2	29.6	28.7	35.2	35.0	33.2	45.8	45.9
Official transfers	12.6	12.3	12.8	13.3	16.0	16.5	16.3	17.1	17.6	21.5	22.4
Direct investment	12.8	11.8	9.1	9.4	8.7	10.0	13.0	15.8	15.5	18.6	25.0
SDR allocation, gold monetization, and valuation changes	1.3	–0.8	–0.6	–0.5	4.9	2.3	5.9	2.1	0.1	5.8	–1.5
Asset transactions, net [2]	–6.4	–5.5	–4.5	–4.2	–11.9	–7.8	–6.0	–17.0	–14.5	–14.0	1.0
Net errors and omissions [3]	–15.3	–19.5	–10.8	–7.8	0.9	0.9	–1.4	–6.2	–1.8	–6.2	–3.8
Use of reserves	–6.1	2.8	–9.1	–15.3	–6.1	–25.1	–47.1	–8.6	–15.1	–40.7	–54.4
Net external borrowing	99.3	80.3	53.3	42.1	27.7	35.0	28.3	14.0	28.2	56.6	60.1
Reserve-related liabilities	6.1	10.0	6.4	3.8	1.4	–0.8	–4.8	–4.4	–2.6	–6.2	1.7
Net credit from IMF [4]	5.8	5.8	9.7	4.2	0.7	–2.2	–5.3	–4.0	–3.1	–3.6	0.9
Liabilities constituting foreign authorities' reserves [5]	0.3	4.1	–3.2	–0.4	0.7	1.4	0.6	–0.4	0.5	–2.6	0.8
Long-term borrowing from official creditors, net [6]	27.3	29.4	32.9	32.7	17.7	26.3	21.7	16.3	23.7	41.4	17.3
Other net external borrowing [7]	65.9	40.9	14.0	5.6	8.6	9.4	11.4	2.1	7.2	21.5	41.0
Memorandum items:											
Net borrowing from commercial banks [8]	...	54.9	24.2	13.1	2.4	3.9	15.3	6.0	2.6	28.5	23.8
Exceptional financing	5.8	12.9	23.2	19.4	27.2	28.1	40.4	32.5	33.6	50.9	24.5
Of wich:											
Arrears	1.0	5.9	4.5	3.0	1.2	5.7	6.6	7.0	13.7	17.4	–10.0
Reschedulings	2.3	2.1	16.1	14.3	18.1	20.2	33.5	24.2	17.9	17.4	31.4

Source: International Monetary Fund, World Economic Outlook, various issues.

Note: Except where otherwise footnoted, estimates shown here are based on national balance of payments statistics. These flows are not always easily reconcilable with year-to-year changes in either debtor- or creditor-reported debt statistics, in part because the latter are affected by changes in valuation.

[1] Equivalent to current account deficit less official transfers. In this table, official transfers are treated as external financing. [2] Pertains primarily to export credit. [3] Positioned here on the presumption that estimates reflect primarily unrecorded capital outflows. [4] Includes use of Fund credit under General Resource Account, Trust Fund structural adjustement facility, and enhanced structural adjustement facility. The impact of prospective programs is incorporated. [5] Comprises short-term borrowing by monetary authorities from other monetary authorities. [6] Estimates of net disbursements by official creditors (other than monetary authorities) derived from debt statistics. Official net disbursements include the increase in official claims caused by the transfer of officially guaranteed claims to the guarantor agency in the creditor country, usually in the context of debt reschedulings. [7] Residually calculated. Except for discrepancies in coverage, amounts shown reflect net external borrowing from private creditors and short-term official flows (primarily interest arrears on official debt). [8] Based on changes in cross-border bank claims reported in the Fund's International Banking Statistics, adjusted for valuation changes attributed to exchange rate movements. Excludes six offshore banking centers covered by the World Economic Outlook (The Bahamas, Bahrain, Hong Kong, Netherlands Antilles, Panama and Singapore).

Table V

Oil Exporting Developing Countries: External Financing, 1969-80

(in billions of U.S. dollars)

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Deficit on goods, services, and private tranfers [1]	1.0	0.2	–2.6	–3.4	–9.0	–70.7	–43.2	–38.8	–27.6	–6.2	–66.5	–110.2
Non-debt-creating flows, net	0.6	0.6	1.0	–0.7	–0.6	–16.1	–2.8	–6.3	–4.0	–5.6	–5.1	–11.2
Official transfers	–0.1	–0.0	0.1	–0.1	–0.7	–2.1	–4.3	–3.6	–4.2	–5.8	–5.9	–7.4
Direct investment	0.6	0.5	0.5	–0.5	0.1	–6.3	1.2	–2.6	–0.6	0.5	–0.4	–4.7
SDR allocation, gold monetization, and valuation changes	0.1	0.1	0.4	–0.2	–0.0	–7.6	0.3	–0.1	0.8	–0.3	1.1	1.0
Asset transactions, net [2]	0.0	–0.3	–0.3	–1.9	–3.3	–23.0	–17.9	–26.9	–19.5	–15.0	–37.8	–70.3
Net errors and omissions [3]	–0.1	–0.1	–0.2	0.3	–2.4	1.8	–4.6	0.1	–3.8	–2.1	–7.7	–1.5
Use of reserves	0.4	–0.1	–3.0	–2.7	–4.4	–38.0	–9.1	–9.9	–11.5	3.4	–27.1	–30.1
Net external borrowing	0.1	0.2	–0.0	1.6	1.7	4.5	–8.8	4.2	11.1	13.0	11.2	2.9
Reserve-related liabilities	0.1	0.1	0.1	–0.3	–0.0	0.1	–0.2	- - -	0.0	–0.1	0.0	–0.2
Net credit from IMF [4]	0.0	0.0	–0.0	–0.0	–0.1	–0.0	- -	- -	0.0	0.0	0.0	0.0
Liabilities constituting foreign authorities' reserves [5]	0.0	0.1	0.1	–0.3	0.1	0.1	–0.2	- -	0.0	–0.1	- -	–0.2
Long-term borrowing from official creditors, net [6]	...	- -	0.9	0.6	0.9	0.4	0.8	1.6	2.4	4.2	1.3	1.7
Other net external borrowing [7]	...	0.0	–1.0	1.4	0.8	4.0	–9.4	2.6	8.7	8.9	9.8	1.3
Memorandum items:												
Net borrowing from commercial banks [8]	...	...	...	1.0	1.9	–0.9	2.2	7.7	6.6	18.2	14.5	11.0
Exceptional financing	- -	- -	- -	- -	- -	- -	1.2	0.3	- -	- -	- -	- -
Of wich:												
Arrears	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Reschedulings	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Source: International Monetary Fund, World Economic Outlook, various issues.

Note: Except where otherwise footnoted, estimates shown here are based on national balance of payments statistics. These flows are not always easily reconcilable with year-to-year changes in either debtor- or creditor-reported debt statistics, in part because the latter are affected by changes in valuation.

[1] Equivalent to current account deficit less official transfers. In this table, official transfers are treated as external financing. [2] Pertains primarily to export credit. [3] Positioned here on the presumption that estimates reflect primarily unrecorded capital outflows. [4] Includes use of Fund credit under General Resource Account, Trust Fund structural adjustement facility, and enhanced structural adjustement facility. The impact of prospective programs is incorporated. [5] Comprises short-term borrowing by monetary authorities from other monetary authorities. [6] Estimates of net disbursements by official creditors (other than monetary authorities) derived from debt statistics. Official net disbursements include the increase in official claims caused by the transfer of officially guaranteed claims to the guarantor agency in the creditor country, usually in the context of debt reschedulings. [7] Residually calculated. Except for discrepancies in coverage, amounts shown reflect net external borrowing from private creditors and short-term official flows (primarily interest arrears on official debt). [8] Based on changes in cross-border bank claims reported in the Fund's International Banking Statistics, adjusted for valuation changes attributed to exchange rate movements. Excludes six offshore banking centers covered by the World Economic Outlook (The Bahamas, Bahrain, Hong Kong, Netherlands Antilles, Panama and Singapore).

Table VI

Oil Exporting Developing Countries: External Financing, 1981-91

(in billions of U.S. dollars)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Deficit on goods, services, and private tranfers [1]	–54.9	5.0	16.8	5.6	–0.8	30.1	12.3	21.9	2.3	–16.5	25.7
Non-debt-creating flows, net	–5.0	2.3	–3.7	–1.6	0.5	–1.6	3.0	–1.6	0.7	–8.1	–19.6
Official transfers	–6.4	–5.0	–4.9	–4.4	–3.2	–2.8	–0.5	–1.9	–1.2	–10.6	–26.1
Direct investment	4.9	8.1	4.3	4.4	1.5	0.6	1.3	0.5	2.7	2.2	6.4
SDR allocation, gold monetization, and valuation changes	–3.5	–0.8	–3.1	–1.7	2.2	0.5	2.1	–0.2	–0.8	0.3	0.1
Asset transactions, net [2]	–64.1	–39.7	1.6	–4.5	1.4	–4.8	4.3	–2.5	–1.8	–9.8	31.0
Net errors and omissions [3]	–7.8	–6.1	4.4	9.1	7.8	3.1	5.6	5.6	8.1	7.4	–0.9
Use of reserves	10.9	34.6	5.7	4.5	–6.4	17.8	–4.7	13.1	–7.9	–11.0	–0.8
Net external borrowing	11.0	13.9	8.8	–1.9	–4.0	15.8	4.2	7.3	3.2	5.0	16.0
Reserve-related liabilities	–0.1	–0.1	0.7	–0.1	–0.6	0.0	0.8	0.8	1.6	1.8	–0.5
Net credit from IMF [4]	0.0	0.0	0.5	–0.0	–0.4	0.0	0.6	–0.1	1.6	1.7	0.2
Liabilities constituting foreign authorities' reserves [5]	–0.1	–0.1	0.2	–0.1	–0.2	0.0	0.2	0.8	0.0	0.1	–0.7
Long-term borrowing from official creditors, net [6]	2.4	6.3	3.3	2.9	7.8	5.7	8.9	5.1	7.9	11.8	10.7
Other net external borrowing [7]	8.8	7.7	4.8	–4.7	–11.2	10.0	–5.4	1.4	–6.3	–8.6	5.8
Memorandum items:											
Net borrowing from commercial banks [8]	8.7	9.8	5.4	–2.5	0.3	0.9	1.4	1.8	0.4	10.6	6.9
Exceptional financing	- -	3.4	8.0	1.2	1.6	8.4	3.7	4.3	3.3	2.6	2.5
Of wich:											
Arrears	- -	3.4	6.1	0.9	–1.7	–0.9	–4.8	3.3	–4.9	0.8	–1.0
Reschedulings	- -	- -	1.9	0.3	3.3	1.0	8.5	1.0	7.7	2.3	3.3

Source: International Monetary Fund, World Economic Outlook, various issues.

Note: Except where otherwise footnoted, estimates shown here are based on national balance of payments statistics. These flows are not always easily reconcilable with year-to-year changes in either debtor- or creditor-reported debt statistics, in part because the latter are affected by changes in valuation.

[1] Equivalent to current account deficit less official transfers. In this table, official transfers are treated as external financing. [2] Pertains primarily to export credit. [3] Positioned here on the presumption that estimates reflect primarily unrecorded capital outflows. [4] Includes use of Fund credit under General Resource Account, Trust Fund structural adjustement facility, and enhanced structural adjustement facility. The impact of prospective programs is incorporated. [5] Comprises short-term borrowing by monetary authorities from other monetary authorities. [6] Estimates of net disbursements by official creditors (other than monetary authorities) derived from debt statistics. Official net disbursements include the increase in official claims caused by the transfer of officially guaranteed claims to the guarantor agency in the creditor country, usually in the context of debt reschedulings. [7]Residually calculated. Except for discrepancies in coverage, amounts shown reflect net external borrowing from private creditors and short-term official flows (primarily interest arrears on official debt). [8] Based on changes in cross-border bank claims reported in the Fund's International Banking Statistics, adjusted for valuation changes attributed to exchange rate movements. Excludes six offshore banking centers covered by the World Economic Outlook (The Bahamas, Bahrain, Hong Kong, Netherlands Antilles, Panama and Singapore).

These inflows of private and official capital to developing countries were also accompanied by large scale capital flight. While the measurement of capital flight presents considerable conceptual and measurement problems, World Economic Outlook studies estimated the scale of capital flight from developing countries as $165-200 billion in the period 1975-85. Since both net lending by foreign creditors to developing countries and capital flight increased sharply during the second half of the 1970s, the intermediation between domestic savings and investment in some developing countries was essentially internationalized; a portion of domestic savings was placed offshore, and this portion was offset by increased bank claims on national governments and private corporations. With the onset of debt-servicing difficulties for many developing countries in the 1980s, this intermediation process stopped as voluntary private sector lending to many heavily indebted developing countries ceased.

During the 1970s and 1980s, fiscal and current account imbalances in the industrial countries were financed by large scale private capital flows. As already noted, large fiscal deficits were financed primarily through bond issuance. Moreover, between 1983 and 1988, when the United States ran a cumulative current account deficit of $664 billion, inflows of portfolio investment, other private short-term capital, and net foreign direct investment financed about 75 percent of the external deficit. Over the same period, Germany and Japan had cumulative current account surpluses of $165 billion and $397 billion, respectively. While cumulative net foreign direct investment abroad was equivalent to about 22 percent of the cumulative current account surplus for both of these countries in this period, cumulative net portfolio investment abroad amounted to $314 billion for Japan (88 percent of its cumulative current account surplus) versus $16 billion for Germany (10 percent of its cumulative current account surplus).

d) Growing importance of institutional investors in cross-border securities transaction

A fourth trend has been the growing importance of institutional investors in cross-border capital flows, especially in securities transactions. In the early 1970s, large institutional investors, such as pension funds, insurance companies, and mutual funds, played only a limited role in cross-border capital flows due to both official restrictions and the high costs of acquiring and managing a diversified international portfolio. In some industrial countries, capital controls and domestic prudential regulations limited the proportion of institutional investors' total assets that could be held as foreign assets. In addition, the gains from acquiring an internationally diversified portfolio were diminished by the costs of obtaining information on borrowers in different markets operating under different reporting requirements, accounting standards, and legal arrangements. Even when such informational problems could be overcome, relatively inefficient linkages between national clearance, settlement, and payments systems raised the costs of international transactions.

In the 1980s, however, the role of institutional investors in channeling funds between savers and investors increased, both in their domestic markets and across national borders. At the end of September 1992, for example, open-end equity, bond, and money market mutual funds were estimated to have total assets of $2.9 trillion. Moreover, as already noted, the 300 largest private pension funds have about $2 trillion of assets. During the period from 1980 to 1990, pension fund holdings of assets rose from 25 to 35 percent of GDP in the United States and from 23 to 55 percent in the United Kingdom. The growing importance of institutional investors reflected the transactions (commission) cost advantages enjoyed by institutional investors over individual investors, the increased willingness of individual savers to allow their portfolios to be managed by agents, and, in some countries, the tax advantages enjoyed by contractual savings plans. Increased holding of foreign assets by institutional investors were stimulated by the general removal of capital controls as well as by the relaxation of the restrictions on the share of their portfolios that could be invested in foreign assets. In addition, greater harmonization of accounting standards and disclosure requirements, as well as increased global role for credit rating agencies, improved information on the creditworthiness of different types of international borrowers. Moreover, improvements in cross-border clearance and settlement systems reduced both the costs and uncertainties associated with international securities transactions.

Despite the growing importance of institutional investors in cross-border flows, it has already been noted that the 300 largest private pension funds currently invest only 7 percent of their total funds (about $2 billion) in foreign assets. However, this proportion is expected to continue to rise during the 1990s. Within the European Community (EC), equity and bond mutual funds already hold a higher proportion of their total assets in cross-border securities. At the end of September 1992, for example, open-end equity mutual funds based in the EC held 38 percent of their assets in foreign equities; whereas open-end bond mutual funds held 18 percent of their assets in foreign bonds. Although activities of institutional investors have increased the scale of capital flows, their influence on the volatility of these flows is unclear. While institutional investors tend to hold an investment position for the longer term, they have demonstrated the ability to undertake large portfolio shifts when economic fundamentals change or when there are increased uncertainties about the authorities exchange rate commitments.

II. Determinants of capital flows

Over the past two decades, net and gross capital flows have responded to technological changes, economic fundamentals, official policies, and market distortions. Domestic and international financial markets channel resources from surplus units-households, firms, or governments-that spend less than their revenues, or save, to

deficit units – that are spending more than their revenues. Such financial transactions can help overcome the limitations imposed by self-finance; and, if asset prices appropriately reflect the inherent returns and risks associated with holding that asset, savings can be directed to its most productive investments. In an international context, these transactions give rise to net international capital flows that are the financial counterpart to a real transfer of resources through a trade or current account imbalance, which occurs only when savings and investment are unbalanced across countries.

However, channeling resources from surplus to deficit units is not the only function of financial markets; and gross capital flows between countries, which may be mutually offsetting, can be important in improving the liquidity of a portfolio and in diversifying risks. Gross capital flows need not correspond to a transfer of real resources across countries.

a) Technological advances

It would have been difficult to envision that the scale of net and gross international capital flows that occurred in the 1980s and early 1990s would have taken place without the major advances which occurred in telecommunication and computer technologies. By sharply reducing the cost of transmitting and processing information, these new technologies greatly facilitated the management of global portfolios, the search for arbitrage profits, and the pricing of new, complex financial instruments. Such technological advances also made possible a move toward shorter settlement periods, which helped reduce counterparty risk in international and domestic financial transactions. In addition, these new technologies often created new channels for cross-border financial transactions that thereby reduced the effectiveness of existing capital controls.

b) Economic fundamentals

Economic fundamentals including the global investment opportunities available, the co-variances between the expected returns on various instruments, the growth of wealth in different countries, and differences across economic agents in their willingness to assume risks and in rates of time preference have played key roles in stimulating net and gross capital flows.

c) Official policies

Official policies that have had important effects on international capital flows included capital controls; limitations on the entry of foreign firms into domestic markets;

restrictions on the domestic activities, products, locations, and interest rates charged by financial institutions; tax policies; and monetary and fiscal policies. While capital controls were seldom designed to completely eliminate all capital flows, they made international transactions more costly and eliminated certain types of flows. As these controls were removed in the industrial countries, there was increased arbitrage activity between domestic and offshore markets, new competitive pressures as foreign financial institutions entered major domestic markets, and sharp increases in capital flows as domestic and foreign residents sought to diversify their portfolios.

In the 1970s and early 1980s, restrictions on the domestic activities, interest rates, products, and location of financial institutions often stimulated activity in offshore markets as financial institutions provided restricted financial services to domestic enterprises through offshore subsidiaries. However, the gradual removal of many of these restrictions in the 1980s as part of extensive financial liberalizations played a key role in restoring the competitive positions of many major domestic markets.

Taxation has also affected the pattern and scale of capital flows. Holdings of foreign assets sometimes allowed domestic residents to avoid (or evade) taxation. Divergent tax withholding rates at times caused capital flows into countries or offshore markets where tax is not withheld. Turnover taxes on securities also tended to shift transactions to other countries or offshore markets.

Since most financial claims are denominated in national currencies, domestic monetary policies, exchange rate changes, and inflation can alter the expected relative returns on assets denominated in different currencies and thereby influence decisions regarding where and in what currencies wealth will be held. The perception that the monetary policies of the major industrial countries were at times pursuing conflicting or inconsistent objectives led to sharp changes on exchange rates and other asset prices, as well as to capital flows.

d) Market imperfections

Since there are often significant transactions costs associated with carrying out transactions in financial assets, these costs help explain why many individuals fail to hold internationally diversified portfolios, the standardization of financial assets, the existence of financial centers in which trading activity is concentrated, and the establishment of specialized financial institutions. In addition, these costs indicated why much of the international diversification of portfolios in the 1980s was carried out by large institutional investors.

Obtaining the information needed to evaluate and to monitor a borrower's investment activities can also be quite costly; and financial market participants are often

faced with asymmetrical information, a problem that can be made more serious as a result of different national systems for accounting standards, disclosure requirements, and the commercial codes governing the enforcement of contracts. While banks traditionally had a cost advantage in gathering information and monitoring of the activities of borrowers, especially in cross-lender transactions, the development of new computer and telecommunication technologies, the expanded global role of credit rating agencies, the increased importance of institutional investors and improved disclosure of corporate financial information have combined to erode the informational advantages of commercial banks.

Since savers and investors seldom deal with each other directly, especially in cross-border transactions, competitive financial arrangements work well only if they ensure that the savers' agents act in the interest of savers (the principals). While complex institutional and supervisory frameworks have evolved in most countries to meet this requirement, the extension of this protection to international transactions has raised intricate legal, regulatory, and supervisory issues. While progress was made during the 1980s in the international coordination of legal codes governing international capital flows and of the supervision of bank branches and subsidiaries and foreign branches of securities houses, many legal, accounting, and disclosure requirements (as well as taxes) have not been harmonized. Such differences make it difficult for savers to compare the performance of different agents and can create incentives for "regulatory arbitrage" – the shifting of financial activities to locations with least comprehensive supervision, or the lowest taxes.

III. Measurement of international capital flows

The preceding analysis of international capital flows in the period since the 1970s implicitly assumed that measurement problems were not severe enough to invalidate the broad trends evident in the data. However, the Working Party's Report on the Measurement of International Capital Flows (International Monetary Fund, September 1992), found that the growing volume and complexity of international financial transactions has been accompanied by a significant deterioration in the coverage and quality of the data on these transactions.

If all countries adopted symmetrical accounting treatments of cross-border transactions, the reported capital outflows and inflows of all countries (inclusive of changes in official reserves) would, in principle, just match. However, discrepancies can arise if a transaction is not recorded or recorded asymmetrically in the accounts of the capital exporting and capital importing countries and if official reserve transactions are recorded by partner countries, as portfolio investment or as "other capital flows.

Moreover, the scale of capital flows may be understated if a transaction is missed in both sets of accounts.

In practices, reported inflows have not equalled reported outflows in any component (Table 7). From 1985 through 1991, for example, recorded global capital inflows in each year have exceeded global outflows by an average of about SDR 57 billion per year.

Direct investment is the only category in which recorded outflows have persistently exceeded inflows during the period 1985-1991. The excess averaged more than SDR 15 billion per year. The main reason for the excess outflow was that many countries did not report the reinvestment of the earnings of multinational enterprises as direct foreign investment. There is a tendency for reinvestment of earnings to be recorded as a capital outflow by the major investing countries, but not to be recorded as a capital inflow by the host countries.

Table VII

Global Balances on Capital Account, 1985-91
(in billions of SDRs)

	1985	1986	1987	1988	1989	1990	1991
Capital account balance [1]	65.4	31.4	52.2	48.2	70.9	63.6	67.1
Direct investment	-7.2	-15.1	-13.5	-15.7	-20.5	-27.3	-8.1
Abroad	7.4	-79.9	-107.9	-127.6	-169.1	-175.0	-132.6
In reporting economy	0.2	64.8	94.4	111.9	148.6	147.7	124.4
Portfolio investment	46.4	4.6	11.5	-3.5	30.9	-2.7	82.2
Assets	-118.6	-158.5	-87.4	-147.2	-214.1	-129.8	-218.5
Liabilities	165.0	163.1	98.9	143.7	245.0	127.1	300.7
Other long-term capital	-23.8	-28.6	-20.9	-21.9	11.9	35.8	65.1
Other short-term capital	21.1	39.5	75.1	58.5	19.6	78.3	-53.9
Reserves	-13.3	-22.9	-120.4	-30.2	-41.8	-71.1	-42.4
Liabilities constituting foreign authorities' reserves	2.3	18.8	85.1	29.7	35.8	19.6	-5.0
Exceptional financing	39.9	35.2	35.3	31.3	34.9	30.9	29.2
Memorandum items:							
Current account balance	-78.9	-56.4	-37.6	-44.3	-59.2	-82.9	-66.6
Net errors and omissions	13.5	25.0	-14.7	-4.0	-11.6	19.4	-0.5

Source: International Monetary Fund, Balance of Payments Statistics Yearbook, Vol. 43, Part 2.

[1] Including exceptional financing transactions.

Portfolio investment has become one of the most difficult areas for compilers because of the liberalization of capital markets, financial innovation, and the changing behavior of investors. While there was only a relatively small measured discrepancy for portfolio investment during 1986-1989 (averaging about SDR 4 billion), this discrepancy could conceal larger errors and omissions. The Working Party was not able to fully explain these discrepancies. Moreover, the discrepancy rose sharply in 1991. Surveys of holdings of foreign securities are essential to provide a necessary benchmark for comparison with the flows data.

Other capital is a heterogeneous group of international capital flows that includes transactions of the private nonbank sector, of domestic banks, and resident official entities. This group has shown the largest excess of measured inflows over outflows (averaging more than SDR 37 billion per year between 1985 and 1991). Examinations of international banking data from the Fund and the Bank of International Settlements provided strong evidence that cross-border flows of both assets and liabilities of domestic nonbanks have been seriously understated in the balance of payments accounts; assets have been understated more seriously than liabilities.

Transactions in official reserve asset are generally well measured. However, because limited information is divulged on the instrument breakdown of reserves, it was difficult to identify the counterpart transactions in debtor countries' capital accounts. It is not always known where these reserves are invested and whether they are held as securities, as bank deposits, or in some other form.

The Working Party also found that balance of payments information for offshore financial centers was incomplete; activities in some financial centers have not been included at all (for example, the Cayman Islands).

In addition, the Working Party was unable to separately identify capital flows that were deliberately concealed (drug money and other illegal activities).

The Working Party was able to identify a number of sources of the global discrepancies and made adjustments to publish capital flows for the recent past. However, the substantial gaps remained in the net data and probably even more exist in the underlying gross data. The Working Parties' findings indicated, inter alia, an urgent need to begin enhancing the world balance of payments statistical systems to an acceptably effective level for users, particularly policymakers. Improvements will take time, commitment, and resources.

ANNEX III

NEW INSTRUMENTS AND OPERATIONS IN FINANCIAL AND FOREIGN EXCHANGE MARKETS: AN OVERVIEW

Prepared by the Directorate for Financial, Fiscal and Enterprise Affairs, OECD

I. Introduction and Summary

1. While financial markets experienced continuing innovation and structural change throughout the 1980s, one can usefully divide the period into two parts. In the first part of the decade, development was led by the expansion of offshore centres, banks were the predominant players, and many new financial instruments, including a vast array of derivative products, were brought to the market. After 1986, securities markets tended to be the locus of dynamic change. The focus of modernization shifted to domestic markets, which rapidly began to emulate the high level of innovation that had been achieved in the offshore market, thereby greatly advancing the average level of financial sophistication throughout the OECD area and making it possible to link national markets into an increasingly integrated system. [1]

2. Despite the previous wave of financial innovation, development of the world financial market was still uneven in the mid-1980s. In many cases, there was a rather sharp dichotomy between a relatively backward domestic sector, which was often characterised by heavy regulation and was not fully open to international activity, and the offshore centres where the market reigned supreme. After the mid-1980s, however, a large number of financial centres where market developments had been fairly restrained experienced a burst of innovation as, with markets increasingly deregulated and capital movements freed, the most advanced techniques existing in the international financial markets could be introduced. In some senses then, the period since 1985 can be conceived as the time when the less sophisticated markets narrowed the gap between themselves and the more advanced markets.

3. During the past two decades, governments have been progressively removing obstructions to financial transactions by the decontrol of domestic financial markets and the abolition of exchange controls. Since the mid-1980s, most OECD governments also took positive measures to promote the development of domestic financial markets. Of particular importance were 1) reforms of the markets for government paper, including the development of specialized intermediaries with responsibilities to maintain the depth and liquidity of government debt markets; 2) structural modernization of the brokerage profession and securities trading systems, and the organization of secondary markets,

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[1] Although the selection of any specific time as a turning point is open to criticism, the year 1986 can be seen as a key point. In that year, the BIS report entitled "Recent Innovations in International Banking" appeared in which many of the salient features of the growth of the international financial market were analysed in depth. This report proved to be a catalyst in calling the attention of the financial community to the risks involved in some of the newer financial instruments and in encouraging banking supervisors to refine mechanisms to monitor bank activity, to agree on international guidelines for the adequacy of bank capitalization and to agree on means to measure "off-balance sheet" risks. In the same year, the United Kingdom introduced a set of major legislative reforms, widely known as "big bang", designed to modernise the financial services industry and to enhance the competitiveness of London as a financial centre. In the next few years, most other European countries introduced reforms with similar intent, with the result that the financial markets of most European countries became significantly deeper.

3) legislation to permit the formation of financial groups which offer both banking and securities services; 4) the creation of futures and options markets; and 5) authorization of the introduction of money market instruments.

4. In response to these changes, **money markets** expanded rapidly. The authorities issued large amounts of short-term government debt using market-oriented issuing techniques as part of overall financing of their borrowing requirements and to develop a full yield curve of liquid government debt instruments. The growth of **bond markets** was initially spurred in part by the rise in real interest rates of the early 1980s and the emergence of large government borrowing needs. Governments came more and more to rely on market mechanisms to finance their requirements and therefore had to relinquish control over long-term interest rates. With the creation of a liquid government bond sector, it became easier to issue paper for other borrowers, such as official entities, banks and other financial institutions, and ultimately private non-financial borrowers.

5. The phenomenon known as **"securitization"** acquired greater importance. In its earlier phases, securitisation was mainly used to denote the issue of corporate debt securities as relatively close substitute for bank credit. More recently, however, the term has been used to describe operations in which the cash flows from specific financial assets are converted into marketable securities.

6. **Equity markets** continued to develop in the late 1980s. With the emergence of increasingly advanced risk management techniques, the risk inherent in equities could be offset against the higher historical return to equities compared to alternative investments. Trading on most national equity markets became increasingly internationalized.

7. Rather than developing new generic instruments, **financial innovation** since the mid-1980s has tended to take the form of novel combinations of existing financial products to support complex and highly sophisticated investment strategies, which enable market participants to identify opportunities, to decide what kind of risk should be taken and to execute these strategies. "Hybrid" instruments emerged which contained some elements of different financial products that had been previously developed. Market participants began to apply portfolio and finance theory to attain (potentially) better risk/return profiles using combinations of liquid cash and derivative positions. At the same time, a growing range of "custom-tailored" investment products has been developed to maximise possibilities for matching actual portfolio structures to theoretically-based investment models.

8. The development of risk management programmes in an internationalized environment has enabled all market participants to operate in a much broader range of product and currency sectors. Institutional investors now routinely hold internationally

diversified bond, equity and money market portfolios. Corporate treasurers, who traditionally focused mainly on money or foreign exchange markets, have become active in a larger variety of markets in response to the more ambitious "profit" objectives assigned to corporate treasury departments. Broadly speaking, the need to readjust risk exposure continuously, coupled with the availability of modern information technology, implies that market participants in general are now more likely to focus on transaction-driven investment strategies – a development which has been abetted by declining brokerage commissions and other transactions costs. And, perhaps more importantly, market participants seem willing to incorporate a wider spectrum of risks in their approach to financial management on the ground that risky positions can provide yield enhancement while, at the same time, they are nowadays more easily, and less expensively, reversible than used to be the case.

9. Demands for investment outlays which include a mix of cash and derivative positions meeting the investors' highly specific risk characteristics have led to a profound modification in the behaviour and modus operandi of the intermediaries (banks and securities houses). In particular, considerable efforts have had to be devoted to developing the in-house capability to identify investment opportunities and to market novel "financial packages". As a result, the intermediaries increasingly have had to re-orient their earning-generating strategies by putting greater emphasis on originating new investment vehicles, "custom-tailoring" instruments to meet the investors' requirements, and acting as a counterparty in some of the operations.

10. An important consequence of the development of specialized investment vehicles has been the growth of over-the-counter (OTC) trading (especially in equities and derivatives) at the expense of trading on the exchanges. In the OTC market, the intermediaries have far greater flexibility to design investment products. Moreover, this market offers an opportunity for the intermediary to earn income by replacing the exchanges in the process of price discovery and in information processing as well as in offering credit guarantees. In order to fulfil this role, the intermediaries are changing their product mix from the previous emphasis on intermediation fees to "risk arbitrage" in which they temporarily assume significant net positions in the course of active dealing and act as a principal in a large number of transactions. Because of the size of credit risk and market risk that now must be managed, intermediaries which aspire to be global players are constantly seeking to refine their systems of risk management to monitor, control and hedge risks.

11. The greater reliance on sophisticated globalised financial markets by governments strongly suggests that market participants will increasingly scrutinize macroeconomic policy and will exploit any perceived inconsistencies or lack of credibility in official policy. This has always been recognized to be the case for the foreign exchange market but, due to the rigidity of most securities markets and the

problems of controlling an international investment portfolio, the capacity of the market-place to react to changes in macroeconomic policy may have been much smaller and slower in the past. However, with the process of financial modernization, market participants have far more diverse portfolios to protect and a far more varied array of instruments and techniques to deploy in pursuing yield-maximization strategies.

II. The Growing Sophistication of End-Users of Financial Services [2]

12. **Corporate treasurers,** who are responsible for the efficient management of the financial position of non-financial companies, were among the original participants in the bond, syndicated loan, foreign exchange and money markets and have traditionally been very receptive to financial innovation. Thus, treasurers had extensive recourse to multi-currency loans since the late 1970s and were also among the first large-scale users of the swap market for reducing all-in funding costs. For the most part, however, the operations of treasurers remained closely linked to the underlying business of their company.

13. While the traditional motivations of corporate treasurers are still predominant, many of the world's largest corporate entities have come to realise the potential benefits of pursuing an active treasury strategy that is not confined to merely managing the firm's underlying financial position but, rather, aims at actively seeking profit opportunities that may exist in the market. Even though in most cases corporate treasurers still constitute the most risk-averse group of market participants, with the sophisticated synthetic investments now available, they have access to a much greater range of instruments to implement profit-oriented strategies. In the case of foreign exchange operations, reliance on leads and lags as a source of additional earnings has been increasingly complemented by active positioning and arbitraging between foreign exchange and money markets. Often, the shift to a more aggressive financial strategy has taken the form of borrowing in the financial markets to build pure risk arbitrage positions completely unrelated to the basic business of the firm. Similarly, companies which traditionally engaged in swaps to restructure market exposures or lower borrowing costs are now more likely to enter the swap market on an arbitrage basis, merely to earn income from acting as a swap

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[2] For purposes of exposition, market participants can be divided into i) the end-users of financial services, who may be further subdivided into individuals, corporate treasurers and institutional investors, and ii) the financial intermediaries (banks and securities houses). This text devotes little attention to the individual or the retail user of financial services, since this category of agents does not normally participate directly in the major world markets. There are also a number of official market participants, such a central banks who invest international reserves and agencies which engage in official borrowing. Although these official entities usually have mandates to act in the public interest, they increasingly have a mandate similar to that of the corporate treasurers, i.e. to borrow and to invest as advantageously as possible.

counterpart. And, going well beyond the traditional boundaries of "relationship banking", treasurers tend now to build close contacts with a large number of intermediaries, who devise new trading and investment strategies and seek to persuade corporate treasurers that these strategies can be used to increase returns while controlling risk.

14. Another noteworthy feature of the market has been the growing importance (Table I) of **institutional investors** (insurance companies, pension funds, and collective investments) – a category of participants with no function other than to manage assets in a fiduciary role for savers. There are several reasons for the emergence of institutional investors as major global players.

Table I

The Growth of Institutional Investors

Country	Pension Funds and Life Insurance Companies			Collective Investment Institutions			Total		
	1980	1985	1990 [3]	1980	1985	1990 [3]	1980	1985	1990 [3]
	financial assets as a percentage of household financial assets								
United States	17.8	21.1	23.5	2.2	5.0	7.7	20.0	26.0	31.2
Japan	13.8	16.6	20.8	1.8	3.6	5.6	15.6	20.2	26.4
Germany	19.4	24.2	27.1	3.2	4.8	8.1	22.6	29.0	35.1
France	8.0	11.2	14.7	2.7	12.4	21.7	10.6	23.6	36.3
Italy [1, 2]	1.6	0.9	3.2	n.a.	2.1	2.9	n.a.	2.9	6.1
United Kingdom [1]	39.9	49.9	53.7	1.6	3.1	4.9	41.5	53.1	58.6
Canada	19.4	23.3	26.7	1.0	1.6	3.0	20.4	24.9	29.7

Source: JOHNSON C., "New Players, New Rules – Financing the 1990s", Lafferty Publications.
[1] Total assets. [2] At book value. [3] For Italy and United Kingdom, 1989 figures.

15. Increasingly, individuals with discretionary income to invest have tended to conclude that the best means of enhancing returns, limiting intermediation costs, reducing volatility and of obtaining diversification and access to professional management is by participating in collective investment securities, such as unit trusts, investment trusts and mutual funds. Most OECD countries have taken measures over the past decade to facilitate the introduction of collective investment securities in their markets. Moreover, a large number of funds have been established in offshore centres to solicit the savings of the individual investor on international scale. These financial institutions have shown

great ingenuity in creating new products that match investor risk/reward preferences. Some funds that have been recently introduced include sectorial funds, country funds, index funds, venture capital funds, managed futures funds and asset allocation funds. It would be virtually impossible for small to medium investors to participate in many of these investment opportunities without having recourse to collective investments.

16. A special category of institutional player that has emerged in recent years is that of hedge funds (i.e. funds which hold long and short cash positions as well as derivative positions), which may pursue a variety of strategies. [3] Many hedge funds are usually available only to individuals with large amounts of money to invest and, whenever regulated, many are not approved for offering to the general investing public. Some hedge funds apply relatively low-risk technical trading strategies seeking to maintain a "market neutral" position, such as trading two derivatives or a derivative against the related cash product (e.g. bonds versus bond futures or equity warrants against the equity index futures) in order to take advantage of asymmetric changes in prices as the market evolves. Other hedge funds will rather take large speculative positions, meaning high-leveraged open positions based upon strong views of the direction of the market. In doing so, they may assume a role of "market leader", especially at times of great uncertainty and volatility. In general, the relative attractiveness of the latter kind of funds is closely tied to the reputation of the fund manager, for it is very difficult to postulate a neutral benchmark against which to measure performance.

17. Insurance companies or pension funds face future streams of payments obligations (insurance policy payments, annuity payments or pension payments) and must seek corresponding earnings flows to meet those obligations. In the case of insurance companies, the strongest expansion in business has occurred in "capitalization products" where the insurance company first seeks to maximize the capital value of the investment and subsequently must assure a steady flow of payments in the period during which the annuitant receives income. Such products, which are frequently tax-advantaged, originate two pools of funds to be managed. Like many collective investment funds, those assets that are in the accumulation phase can be invested aggressively in higher-risk assets offering greater potential returns, while funds in the payment phase must be invested so as to insure that contractual payments schedules are met.

18. Pension funds have been gaining importance with the rising average age of populations in OECD countries and the trend to move pension liabilities to a funded basis. Pension funds have been major players in the debt and equity markets in the United States and Japan for many years. The situation is less uniform in Europe, where a large share of pension liabilities is still unfunded, with strikingly large differences among

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[3] Information on hedge funds – which are privately subscribed funds, usually incorporated in offshore centres – is scanty. In the context of its ongoing work on institutional investors, the OECD Group of Financial Statisticians is looking at means of collecting systematic data on such funds.

European countries. Due to the traditional risk-aversion of these institutions as well as explicit or implicit official restraints, pension funds have tended to hold a rather low proportion of assets invested internationally. [4] However, the international share of total assets has been growing rapidly (Table II).

19. Besides generating overall demand for new investment assets, the specific features of institutional investors tend to alter the character of the market. The institutional investor, with a mission to achieve performance that matches or exceeds some standard, seeks to meet contractual payments while also attaining the highest possible yield and must decide what asset allocation best meets the specific requirements of his mandate. An institution will take a professional approach to risk management, making active use of risk-transfer techniques, including both derivative products which make it possible to transfer market risk and securitization techniques, whereby the credit risk of an asset is transferred. Finally, institutional investors usually focus on liquid portfolios which can be adjusted easily to reflect their changing perception of market conditions and which, in principle, can be analysed in depth using portfolio theory and a growing spectrum of risk management techniques. This is not to say that all institutions are now highly sophisticated, but that market pressure is leading to greater sophistication. On the other hand, it has often been alleged that institutions have a "herd instinct" in that they will tend to shift opinions as a group. This may be partly the effect of participants with similar objectives examining the same information. At the same time, the investor must also try to foresee how other market participants will react to change. Thus, if a piece of economic data is made public, the investor must try to anticipate the reaction of the entire market to the new information.

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[4] While the portfolios of institutional investors are becoming increasingly international, many analysts observe the high concentration of many institutional portfolios (e.g. pension funds) in domestic securities. To the degree that this represents failures by investors to take advantage of available opportunities, this problem will eventually be corrected by market pressures. However, many observers also contend that existing regulatory restrictions and prudential rules represent a serious obstacle to further international dealings. In this connection, rigid regulatory provisions that inhibit the international distribution of new issues or the listing of foreign securities for trading are a serious barrier to international securities. Given the virtual elimination of exchange controls in OECD countries, the end-result of such provisions is usually to drive business to a foreign jurisdiction or to an offshore centre, rather than to prevent such activity from taking place. In many countries prudential limits on the assets in which institutions may invest can represent another significant obstacle to the internationalization of the securities market. It is arguable that many restraints imposed upon institutional investors do not in reality result in sounder investment portfolios or in portfolios that yield the best possible yields to savers. Due to the small size of many countries, regional diversification may be too low for a well-diversified portfolio. Beyond this, prudential restraints on institutional investors may create a "captive savings" market and may be a serious impediment to capital mobility and may contribute to a serious misallocation of international financial resources. Such measures could also lead to an artificial over-valuation of the currencies of the countries pursuing such policies.

Table II

Institutional Investors' Holdings of Foreign Securities

As a percentage of their total securities holdings

	1980 [3]	1985 [4]	1990	1991
United States				
Private pension funds [1]	1.0	3.0	4.2	5.2
Japan				
Life insurance companies	9.0	26.4	30.0	28.4
Non-life insurance companies	7.4	19.4	29.1	28.5
Trust accounts of banks	2.2	14.0	19.4	22.1
Postal Life Insurance	0.0	6.7	11.6	12.1
Norinchukin Bank	4.3	10.3	22.7	32.6
Canada				
Life insurance companies	2.1	2.2	2.3	2.7
Pension funds	6.1	6.6	6.0	7.6
Italy				
Insurance companies	11.7	10.1	11.6	9.7
United Kingdom [2]				
Insurance companies	6.9	17.3	20.7	..
Pension funds	10.3	17.8	23.6	..
Belgium				
Insurance companies and pension funds	1.7	3.3	3.3	..
Netherlands				
Insurance companies	5.2	10.3	9.3	10.3
Private pension funds	10.6	13.8	21.1	23.5
Public pension funds	1.7	2.8	5.2	5.7
Sweden				
Insurance companies	..	1.5	10.4	12.5

Source: TAKEDA M. and P. TURNER., "The Liberalization of Japan's Financial Markets: Some Major Themes", BIS Economic Papers, No. 34, November 1992.

[1] Tax-exempt funded schemes (excluding IRAs). [2] Pension funds exclude central government sector but include other public sector. Unit trust investment allocated as follows: 50 percent foreign and 50 percent at end-1989 (on the basis of partial survey results); other years calculated in proportion to changes in the measured share of foreign assets. [3] For the Netherlands, 1983 figures. [4] For Sweden, 1987 figures.

III. Cash and Derivatives Markets: The Advent of Financial Engineering

20. The markets in derivative products (futures, options, warrants, forward rate agreements and swaps) have grown much faster than the underlying cash markets, and this is arguably where innovation is now most intense. The main characteristics of the derivatives market since the mid-1980s are: 1) the number of contracts traded has continued to grow exponentially, with virtually all OECD countries having created futures and options exchanges; 2) financial engineering has made it possible to use derivatives to formulate complex investment strategies; 3) market participants have learned to rely on derivatives to modify their positions and risk profiles much more frequently than in the past in response to changing market developments; 4) the OTC market in derivatives is now expanding much more rapidly than the traditional exchanges.

21. Derivative products have existed for many years. Trading in financial futures and options exchanges in the United States has been a feature of the market since the early 1970s, while the swap market in interest rates and currencies has been used in many countries throughout the 1980s. For a number of years, special facilities were created by adding a derivative to a conventional financing instrument. Bonds or loans have been launched with "caps" to limit borrowers' risk to interest rate increases, "floors" to limit lenders' risk to interest rate declines or "collars" that offer protection against excessive changes in either direction.

22. Over the past few years, the use of derivatives has multiplied. Following the wave of reform of securities markets in the late 1980s, the conviction gained ground that an essential measure for the modernization of financial markets was the development of a futures and options market. Nearly all OECD countries established exchanges which, at a minimum, traded contracts on money market interest rates, bonds and equity indices. Arbitrage between cash and derivative markets is common. Increasingly, the derivatives market is seen as indispensable to price formation in the cash market. In fact, trading volumes in most exchange-traded derivatives significantly exceed volume on the related cash market (see Table III) and, in many cases, market participants believe that prices in the cash market reflect trading in the derivative market – rather than the other way round.

23. By enhancing the capacity of investors to transform the characteristics of their portfolios and to hedge positions, futures and options enable investors to enter market segments which would earlier have been avoided due to concerns about the ability to control risk, while making them more willing to hold and trade cash positions. Indeed, some derivatives-related operations, such as index arbitrage, require active trading in the cash market. On the other hand, derivatives can be a more efficient way for attaining a desired exposure to a given market than outright transactions in the cash market.

Table III

Relationship Between Interest Rate Futures and Cash Markets

	1988	1989	1990	1991
	Ratio of futures [1] to cash transactions in government securities			
France	2.5	3.4	4.6	5.4
Germany	1.3 [2]	1.5	1.5	3.5
Italy	n.a.	n.a.	n.a.	0.1
Japan	1.3	1.5	1.5	1.6
Netherlands	0.1	0.4	0.4	0.1
United Kingdom	0.2	0.1	0.1	0.2
United States [3]	0.4	0.4	0.4	0.4
	Ratio of open positions [4] in futures to outstanding interbank claims [5] at end-year			
Euro-dollar	0.25	0.25	0.23	0.40
Euro-yen	n.a.	0.16	0.32	0.34
Euro-Deutsche Mark	n.a.	0.03	0.08	0.18
Euro-Swiss franc	n.a.	n.a.	n.a.	0.09
French Franc (PIBOR)	0.35	0.20	0.20	0.33
Three-month sterling	0.32	0.65	0.53	0.81

Source: BIS, "International Banking and Financial Market Developments", May 1992.

n.a. = not applicable

[1] Transactions in futures cover contracts on government securities traded on exchanges worldwide. [2] Bond futures contract first introduced on LIFFE in September 1988. Ratio calculated for the last three months of 1988. [3] Cash transactions include Treasury bills. [4] Open positions in futures cover contracts traded on exchanges worldwide. [5] Cross-border plus local Euro-claims of BIS reporting banks in the same currency as the futures contract.

24. Since they can be used to obtain a targeted exposure to market movements, derivatives are invaluable in constructing an "integrated" investment portfolio and for shifting quickly an investment posture in response to changing market conditions. Derivatives can be used by highly risk-averse investors to hedge the risk in a cash portfolio, or by speculators as a leveraged means of gaining exposure to a given market sector. It is virtually impossible to understand the strategy that an investor is pursuing without considering his cash-cum-derivatives portfolio and its sensitivity to market movements in either direction. For example, an investor can achieve exposure in the

currency markets without any foreign exchange operations: by purchasing a foreign treasury bond derivative, currency exposure is acquired. Conversely, a covered foreign interest arbitrage operation may have the same risk as a domestic money market investment and requires two foreign exchange transactions, but no foreign currency exposure is acquired. Derivatives also allow investors to "unbundle" the risks inherent in various assets. Thus, an institution may take a view about the likely range in which securities will trade in a given period and hedge the entire portfolio at the expected trading range while earning income from writing covered options within the range.

25. While the number of derivatives exchanges and the number of contracts traded thereon have risen considerably, the development of off-exchange derivative products, swaps in particular, has been one of the most striking features of the past few years (Table IV) and shows every likelihood of being a major trend in the future. Some intermediaries now engage in equity-index swaps, which give the investor the same exposure as owning the underlying shares or purchasing an index future, and have invested heavily in the development of "swaptions" – an OTC product offering the purchaser the option to enter or cancel a swap.

Table IV

Markets for Selected Derivative Instruments

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

	1986	1989	1990	1991
Exchange-traded instruments [1]	**583**	**1,762**	**2,284**	**3,518**
Interest rate futures	370	1,201	1,454	2,159
Interest rate options [2]	146	387	600	1,072
Currency futures	10	16	16	18
Currency options [2]	39	50	56	59
Stock market index futures	15	42	70	77
Options on stock market indices [2]	3	66	88	132
Over-the-counter instruments [3]	**500** (*e*)	**2,402**	**3,451**	**4,449**
Interest rate swaps [4]	400 (*e*)	1,503	2,312	3,065
Currency and cross-currency interest rate swaps [4, 5]	100 (*e*)	449	578	807
Other derivative instruments [4,6]	–	450	561	577
Memorandum item: *Cross-border plus local foreign currency claims of BIS reporting banks*	4,031	6,498	7,578	7,497

Source: BIS, "Recent Developments in International Interbank Relations", October 1992.
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.

26. The relative lack of regulatory constraints gives the OTC market a flexibility that is difficult for the traditional exchanges to match. Any exchange trades only a given number of specific contracts whereas an OTC dealer can offer a product from any exchange and can design new products. It is far easier for an intermediary offering an OTC derivative to "custom tailor" the product to the specific needs of the client and to use financial engineering techniques to develop new products. Standardised exchange contracts will usually not have the exact expiration dates that a customer may desire. Many foreign currency contracts are quoted against the US dollar, but many investors are more interested in cross trading. Similarly, an equity index may not have the exact industry characteristics that the investor is seeking while an OTC dealer can replicate the exact portfolio that the investor seeks. The swap market has enabled investors to gain access to sectors where direct entry is difficult, with some of the high-interest currency sectors in Europe being cases in point.

27. The derivatives exchanges and the swaps markets complement each other as well as compete. Thus, much of the net risk that is acquired in the swap market is eventually hedged using exchange-traded derivatives. Additionally, intermediaries can use a mix of exchange-listed contracts and OTC products in designing a tailor-made investment instrument. The response of the derivatives exchanges to off-exchange competition has been flexible. The exchanges are developing newer products that closely resemble OTC products. Thus, some exchanges now trade contracts on indexes of sectorial shares and consumer price index derivatives. Similarly, some exchanges are planning to introduce exchange-traded swaps. In addition, the exchanges are seeking to extend trading hours, to form links among exchanges and to rely increasingly on automation. [5]

28. Sophisticated investors, particularly institutions, seek to use all available tools to manage their portfolio through recourse to instruments that can provide yield enhancement and/or transform the risk profile of the portfolio in accord with the investor's objectives. In response to this demand, the profession of "financial engineering" has developed in which a financial intermediary uses analytic techniques to assist an investor or borrower in using all possible techniques to achieve his objective. The application of theoretical and quantitative models to a growing number of market situations has enlarged the possibilities for market participants to invest in a wider range of instruments while retaining controls on risk. The conceptual tools available to enable

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[5] For example, the Globex system organised by the Chicago Mercantile Exchange (CME) and Reuters allows for trading in a wide variety of instruments listed by the CME as well as by other participating exchanges (Chicago Board of Trade, Chicago Board Options Exchange and the Matif of Paris) in an automated system during hours when trading in the home exchange is closed. The Matif (Paris) and the DTB (Germany) are planning to introduce linkages that will raise the level of automation in trading and allow for common trading of products from both exchanges.

investors to exploit opportunities or to restructure risk have grown immensely in the past two decades. Market participants increasingly use portfolio theory to lower risk and volatility through diversification. Furthermore, the active use of derivatives gives the portfolio manager increasing capability to structure risk. The simple enumeration of the different markets mentioned thus far (equity, bond, money market, the entire yield curve, currencies and derivatives in each of these) highlights the immense number of permutations that can be identified. Models for yield enhancement and risk restructuring through derivatives form the basis of modern financial management and, in response to competitive pressures, major intermediaries have stepped up efforts to develop their in-house capability to master these techniques.

29. As the practical capability to use financial engineering has grown, efforts to improve techniques have been enhanced. Financial engineers working for intermediaries examine all possible options (using both analytic and communication technologies) that would permit the intermediary to offer the investor a "package" of cash and/or derivative positions creating a "synthetic" investment that achieves the desired market exposure with a "yield pickup" over an asset position with equivalent risk. For example, a desired exposure to equity markets can be achieved either by buying the shares outright or by holding most of the portfolio in cash and purchasing options; the application of an investment model using current market conditions (interest rates, historic volatility, dividend yields etc.) will identify the most efficient means of achieving the desired asset allocation. In creating such investments, intermediaries can offer their advisory services for performing the analysis that enables an investor to identify the opportunity and formulate an appropriate strategy. The intermediary may also wish to offer the investment as an OTC product.

30. A quantum jump has occurred in the derivatives markets since the mid-1980s. Through the mid-1980s, the futures and options markets were used by speculators to take open positions or by hedgers who wished to reduce the risk of holding their portfolios. The swap market was generally used at the launch of a bond issue or a loan to transform its currency and interest rate characteristics. Intermediaries in the swap market tended to accept little swap exposure on to their own books and hence the main counterparties were the end-users of financial services. In current circumstances, by contrast, market participants are constantly re-evaluating their portfolios in the light of advisory and "early warning" programmes and are constantly adjusting the risk characteristics of their portfolios, through the use of derivatives. The turnover of portfolios is rising partly because the range of choice of assets is broadening while intermediation and information costs are falling. Furthermore, the intermediaries are increasingly acting as counterparties in a growing number of derivatives, adding further depth to the market, and the characteristics of portfolios are becoming increasingly international, further enlarging the scope for the use of derivatives.

IV. Internationalization of Portfolios

31. In the past two decades, the financial markets have become increasingly internationally-oriented rather than national in scope. Indeed, one can conceive of the financial markets of OECD countries at some relatively early time (for example in the 1960s) as being mainly domestic in scope, subject to strict legal limitations of function and activity by national laws, and with regulations further impeding the scope of action of market participants. Lack of familiarity with foreign issuers, exchange controls and difficulties in accessing foreign exchanges impeded international securities dealings. With the deregulation of domestic financial markets and the easing of restrictions on cross-border operations, financial markets have been moving towards greater international integration.

32. In the 1980s, governments introduced policies to deregulate and to modernize domestic money and capital markets. Concurrently, exchange controls were progressively relaxed so that by the end of the decade the large majority of countries had virtually achieved complete freedom of capital movement. Most OECD countries which had previously maintained restrictions allowed foreign financial institutions to become established and to compete with domestic institutions. Aside from the removal of outright restrictions, OECD countries also took positive measures to promote the internationalization of their financial systems. Thus, many of the post-1986 reforms in securities markets were intended to widen international participation. Frequently, foreign intermediaries were encouraged to become major players in government debt markets as primary dealers or market-makers. Many of these reforms were partly aimed at encouraging foreign investors to purchase government debt. As of today, a significant share of the government debt of all OECD countries is held by non-residents (see Table V). Implicitly or explicitly, it was assumed that the investor community would examine yields in the home market in comparison with those elsewhere in the context of a multi-currency investment portfolio. The investor would then choose an asset allocation based upon an assessment of real and financial variables of several countries in a single market. The combination of the emergence of an increasingly aggressive group of end-users of financial services, a favourable official climate and the development of techniques to manage risk has made investment increasingly global in dimensions.

33. The process of internationalization of the securities business has taken several forms. The most traditional means of conducting international securities business has been to purchase foreign securities on the home exchange of the issuer or for a foreign entity to issue securities in a foreign or offshore market. A somewhat closer integration of markets occurs when a security, after initially being issued in its domestic market or in an offshore market, is listed in a foreign market and it is thus possible to trade that security in more than one market. An even higher degree of internationalization is found in

securities which are distributed internationally at issue and are specifically designed to be tradeable in more than one market. Cases in point are global bonds and equity issues with international tranches. The highest degree of internationalization or globalization is found in securities and derivatives that are widely-held, traded internationally throughout the day in huge amounts in several centres with the direct participation of the world's largest intermediaries. The government bonds of major OECD countries and related derivatives as well as some of the world's most liquid equities are traded in such global markets, and most large intermediaries organise securities trading on a global basis.

Table V

Foreign Penetration of National Government Bond Markets [1]

	1983	1985	1988	1989
Australia [2]	20	33	55	54
Belgium	4	10	13	14
Canada	16	21	31	37
France	4	2	6	15
Germany [2]	9	17	31	34
Italy	3	4	4	6
Japan	6	6	4	4
Netherlands	33	28	35	37
Spain [3]	0	0	2	5
United Kingdom	9	11	15	15
United States	13	14	17	19
Average	10	13	13	15

Source: TURNER P., "Capital Flows in the 1980s: A Survey of Major Trends", BIS Economic Papers, No. 30, April 1991.
[1] Non-resident holdings as a percentage of outstanding domestic and Euro-bonds. Central government unless otherwise indicated. [2] Central and local government. [3] Excluding Euro-bonds.

34. Growing links among securities markets, particularly those provided by the euro-markets, and the lifting of exchange controls meant that the national bond markets tended to merge into an increasingly internationalized market. With the development of deep and broad money and bond markets, a full yield curve has emerged, which can be managed through derivatives. With the swap market, the yield curves of various currencies can be linked. With derivatives, the equity market can be integrated into a total investment strategy.

35. To an ever growing extent, international bond yields are determined in the context of a broadly-based portfolio strategy in which investors can assess the prospects for relative bond yields, including the prospects for inflation, public sector deficits, exchange rates and other fundamentals. Under these circumstances, investors have

become more willing to hold international portfolios (Table VI) because it is recognised that a global portfolio can provide better diversification and increased possibilities to enjoy higher yields, while deeper markets and the use of derivatives make it possible to manage the additional risks.

Table VI

Bond Investment Flows
(in billions of US dollars)

	Annual averages						
	1975-79	**1980-84**	**1985**	**1986**	**1987**	**1988**	**1989**
Total outflows [1]	**16.7**	**40.1**	**107.7**	**156.9**	**107.2**	**178.8**	**186.1**
United States	5.6	4.0	3.8	3.2	7.4	7.0	5.3
Japan	2.5	13.7	58.8	94.7	71.2	84.1	95.4
Larger EC countries [2]	3.2	14.3	38.4	51.9	23.5	70.2	72.9
of which:	*0.9*	*1.2*	*5.6*	*10.8*	*46.0*	*7.5*	*5.8*
France [3]	*1.4*	*3.8*	*9.5*	*7.5*	*13.6*	*31.3*	*21.5*
Germany	*1.4*	*3.8*	*9.5*	*7.5*	*13.6*	*31.3*	*21.5*
Italy	*–0.2*	*0.3*	*0.8*	*2.2*	*3.6*	*5.5*	*9.1*
United Kingdom	–	*5.4*	*17.5*	*25.3*	*–4.2*	*12.2*	*27.5*
Belgium-Luxembourg	*0.1*	*0.1*	*0.2*	*0.4*	*1.5*	*7.4*	*10.9*
Switzerland	–	–	0.4	0.5	1.0	2.3	1.2
Total inflows [1]	**8.8**	**17.1**	**76.5**	**87.2**	**78.8**	**110.5**	**158.8**
United States	0.6	4.1	42.0	45.6	23.1	21.4	19.3
Japan	2.3	4.2	15.2	16.5	30.7	49.9	73.5
Larger EC countries [2]	3.9	5.9	16.5	19.3	20.4	28.4	56.6
of which:							
France [3]	*1.3*	*5.2*	*8.9*	*7.8*	*8.7*	*11.9*	*28.8*
Germany	*1.6*	*0.2*	*3.1*	*6.5*	*0.7*	*–7.8*	*0.6*
United Kingdom	–	*0.1*	*3.4*	*3.3*	*0.28*	*6.0*	*15.0*
Belgium-Luxembourg	*0.1*	*0.1*	*0.2*	*0.4*	*1.5*	*7.4*	*10.9*
Switzerland	–	–	0.4	0.5	1.0	2.3	1.2

Source: TURNER P., "Capital Flows in the 1980s: A Survey of Major Trends", BIS, Economic Papers, No. 30, April 1991.
Notes: *i)* A minus sign under outflows indicates a net sale of domestically-owned foreign assets; under inflows it indicates a net sale of foreign-owned domestic assets.
ii) Excludes public sector bonds.
[1] Sum of fourteen countries. [2] Belgium-Luxembourg, France, Germany, Italy, Netherlands, Spain and United Kingdom. [3] Portfolio flows (equities plus bonds).

36. Investors can take positions in a wide spectrum of currencies and among assets in each currency. At any given time, an investor may wish to be fully hedged, to hedge some of its currency exposures in a certain direction, or to run a complete open-risk book. Similarly, some investors with need for high current income may wish to purchase fixed income securities in high yielding currencies and may be willing to accept the risk of capital losses to achieve this goal. As in the case of all investment strategies that depend upon the mathematical measurement of relative yields among a wide range of possible

investments, such investment possibilities may have been identifiable theoretically, but were practically impossible to execute a few years ago. For example, it may have been possible for many years to compare yields among bond markets and decide that yields on treasury bonds in a high-yield currency were attractive. But until that particular market achieved necessary liquidity and the instruments were developed to hedge risk, international investors would not have been able or willing to invest in such bonds.

37. The internationalization of securities has progressed impressively in the past decade (Table VII), but a number of analysts and practitioners believe that international securities business has attained only a fraction of its potential. While global trading exists in some securities and derivatives, much international investing still remains within a single world region (North America, Europe or Asia-Pacific) rather than attaining truly global proportions. Many traders still hesitate to trade even highly liquid instruments in the cash or derivative markets outside of the trading hours of their "home" markets. At this time, one of the consequences in the negative attitudes of European investors toward relatively low-rated paper is that a global market only exists in paper rated AA or better. Furthermore although many investors hold diversified portfolios in liquid European government bonds, even a European market in corporate debt has yet to emerge.

Table VII

Portfolio Capital Movements in Industrial Countries

	1975-79	1980-84	1985-89	1990	1991 [1]
	in billions of US dollars, annual averages				
Total outflows	12.4	41.8	176.8	151.6	277.6
of which: United States	*5.8*	*5.8*	*9.5*	*28.5*	*46.2*
Japan	*2.6*	*13.8*	*89.9*	*39.7*	*74.3*
European Community	*3.8*	*18.9*	*62.6*	*79.8*	*144.0*
Total inflows	25.0	57.8	186.0	159.1	388.7
of which: United States	*4.6*	*16.7*	*59.2*	*2.9*	*52.3*
Japan	*3.0*	*11.9*	*23.3*	*34.7*	*115.3*
European Community	*8.5*	*17.7*	*70.4*	*94.4*	*173.7*
Memorandum item:					
Equity inflows [2]	*3.7*	*10.8*	*31.4*	*–16.0*	*90.1*
of which: United States	*1.5*	*3.4*	*8.7*	*–14.5*	*9.2*
Japan	*–0.2*	*3.5*	*–9.1*	*–13.3*	*46.8*
European Community	*2.2*	*2.1*	*22.7*	*11.5*	*32.1*

Sources: BIS, Annual Report, June 1992.
[1] Partly estimated. [2] Group of Ten countries except Italy plus Australia, Austria, Finland, Norway, Portugal, South Africa and Spain.

V. The Changing Roles of the Intermediaries: Product Innovation and Risk Arbitrage

38. Significant changes have transpired in the strategies being pursued by the intermediaries (banks and securities houses), partly due to difficulties encountered in pursuing their traditional lines of business. In pursuit of rapid asset growth, banks in the 1980s often neglected adequacy of returns on assets and risk, which resulted in declining profitability and deteriorated asset quality. In order to restore safer and sounder practices, banking supervisors decided that, while banks must be left free to make their own decisions concerning lending and their corporate strategy generally, they would have to be adequately capitalised. The most important single manifestation of the greater will of the authorities to insist on adequate capitalization was the 1988 Capital Adequacy Accord reached by the Basle Committee on Banking Supervision. Similar pressures arose from shareholders and rating agencies to enforce more rigorous prudential standards. The stress in banking on capital adequacy implies, inter alia, that banks will become more transactions-oriented, will pay greater attention to the scope for securitizing assets, and will tend to specialize in those activities in which they have a demonstrated advantage. Similarly on the side of securities markets intermediaries, profitability in the traditional brokerage business has shown a tendency to decline, despite the relative buoyancy of the securities industry in the 1980s.

39. In an environment of declining profitability in traditional lines of business, many intermediaries see "proprietary trading" as a field of endeavour where profitability remains relatively high. Indeed, market participants report that in order to be able to function profitably as an intermediary, it is essential nowadays to take large net positions, at least for short periods, and to influence the evolution of the market in a given asset. In this context, the intermediaries overwhelmingly prefer to deal in the OTC market. By replacing some of the functions that were traditionally offered by the exchanges (such as acting as a source of information and providing some assurance that liquidity will be available), financial institutions are able to capture some of the incomes of the exchanges as well as of those intermediaries who had privileged positions on exchanges (market-makers, specialists, jobbers etc.). Since the credit standing of counterparties is a critical factor in OTC markets, this kind of business also enables highly-rated institutions to use their favourable credit standings as a direct source of earnings, thus replacing the credit guarantees offered by the exchanges.

40. The intermediaries view the swap market as a field of activity where they can exploit opportunities for designing innovative instruments, thus increasing value added. The intermediary provides advice on how to create a desired exposure using a combination of cash and derivative positions. In constructing such an investment, the intermediary does not only act as an adviser and broker but will in all likelihood be a

counterparty to at least part of the operation. By taking this risk on his own books, at least for some time, the intermediary is required to use some of his own capital and will also need to develop in-house risk management techniques to identify risks and to be able to hedge or counterbalance them.

41. A process of concentration is under way in the wholesale financial markets, including the foreign exchange markets. In the first place, an increasing number of banks have found that it is unprofitable to deal in the wholesale markets and are seeking instead to stress retail banking and services, while the number of firms engaging in securities brokerage is declining. The market can usually support only a small number of well capitalized "players" who can deal in large amounts. Moreover, with greater activity in the OTC market, the sensitivity to counterparty risk increases and hence the best-rated intermediaries tend to attract even more business.

42. The rise in dealings in complex financial instruments by an ever smaller number of institutions means that the institutions themselves, the rating agencies and the supervisory authorities [6] must look very carefully at questions of risk. Within each institution, there is a considerable need to be certain that several categories of risk are adequately monitored and reported in a timely way. Because of the massive amount of operations that a major intermediary now routinely undertakes in a number of world centres throughout the day, controls over intra-day exposure as well as any longer-term risk must be of the highest quality. The intricacy of new financial instruments (especially tailor-made OTC products) requires that both the traders and those responsible for in-house risk management develop systems that accurately identify the risk that is present in each instrument and that risk is properly priced. The institution must strike a delicate balance between offering a product which is competitively priced, on the one hand, and adequately controlling the risk that is being assumed, on the other. Potential information problems can be identified. Thus, options pricing is done on the basis of mathematical models that may not be fully understood by senior management or by supervisors.

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[6] Clearly, the role of supervisory authorities has become more complicated. In particular, the fact that a declining number of institutions now account for a growing share of wholesale financial transactions means that a problem with any major intermediary might have greater systemic consequences than in the past. True, the fact that most remaining institutions are those that are highly-rated and have demonstrated capability to deal with risks is a factor that tends to support confidence. Likewise, market discipline may be expected to have a greater role in instilling prudence in the present environment. The credit standing of an intermediary is now of even greater value than in the past, for any slippage in the perceived standing of an institution will have a serious impact on that institution's attractiveness as an intermediary and hence on the institution's ability to remain a viable player. On the other hand, as institutions engage in new activities and operate in more than one jurisdiction, a principal concern for supervisors must be to minimize ambiguities about the responsibility of various supervisory authorities. Some of the major global intermediaries are categorized as banks and thus have some access to official safety nets, in particular access to central bank credit, while others do not. Also, institutions may be subject to supervisory authorities having widely different mandates. In particular, the securities supervisors are mainly concerned with investor protection and regulation of trading while banking supervisors have wider responsibility for the liquidity and soundness of the whole financial system. But in today's market, the failure of a major non-bank intermediary could have systemic consequences almost as serious as the failure of a bank as a result of its effect on the risk positions of counterparties.

Counterparty risk can be difficult to assess and price because of inadequate disclosure. Similarly, any assumptions concerning the adequacy of risk-reduction techniques should be considered in the light of possible market developments. For example, the technique of portfolio insurance, which was widely used in the US securities market before the 1987 market break, was adequate in protecting the value of equity portfolios in relatively calm conditions, but proved incapable of achieving this goal in adverse market conditions. And recent experience shows that option pricing models may no longer be operational at times of extreme volatility or in the face of sharp discontinuities in the variables used in the price determination process.

VI. The Dynamics of Financial Markets Development and Capital Flows

43. As made clear in the foregoing review, all recent trends have been leading to a more "global" financial market. Those with loanable or investible funds in any part of the world and those with needs for external finance operate nowadays in a single integrated market. Participants face a multitude of assets, currencies, yield curves and credit risks. Through recourse to derivative products, borrowers and suppliers of funds can transform the underlying characteristics of their assets and liabilities and (potentially) gain significantly greater control over risk and exposures.

44. The much greater degree of flexibility of today's world capital markets has sharply enlarged the capability of the financial system to channel resources to desirable but risky projects. Before the latest round of financial modernization, many relatively risky assets would not have been saleable on the world markets and many potentially productive activities would not have received funding. In this regard, the change in market attitudes has been remarkable. A large volume of resources can now be channelled to the emerging stock markets. The impaired debt of developing countries is now regularly priced and traded. The markets can direct resources to privatised enterprises in central and eastern Europe. Venture capital makes it far easier to finance innovative industries. The innovations of structured and asset-backed finance further enlarge the possibilities of borrowers to mobilize resources. The bond markets of many countries, which only a few years ago were illiquid, have become deep and active and are integrated into the world bond market. In most cases, by enlarging the number of investors and expanding possibilities for diversification, the risk premia paid by borrowers have diminished. To be sure, the decision of enterprises and governments to rely on the market for funding has an important corollary: the borrower must be willing to submit himself to the judgement of the market to a far greater degree than in the past.

45. In today's globalized market, investors examine not only individual sectors, but actively compare yields across markets to determine whether yields accurately reflect economic fundamentals. For example, the difference between two bond yields at a given

point on the yield curve should reflect expected exchange rate fluctuations, which, in turn, should be closely related to inflation differentials. If such a relationship is judged as unsustainable, possibilities to take open positions arise. Since asset markets are increasingly linked, this will be reflected in changes in virtually every other market.

46. As noted above, different market players pursue different strategies. At one extreme, certain "hedge funds" and some managed futures vehicles are prepared to take – and, indeed, some of them are explicitly created to engage in – very speculative positions. Funds with such mandates will continuously carry highly-leveraged open positions, mainly using short sales, futures and options contracts or OTC derivatives, in order to profit from expected trends in prices, interest rates or exchange rates. In the more common cases, international institutional investors can be expected to accept calculated risks in exchange for capturing yield premiums. Depending on its expectations, an institution may make an asset allocation decision to be exposed to a bond market in a high-yielding currency or to a particular equity market. Investors will accept uncovered positions in foreign bond markets if the exchange risk/interest differential seems appropriate; but when divergences appear, they can be expected to undertake strategies to restructure risk. Alternatively, the investor may accept the exposure to the bond market but hedge the currency risk. Intermediaries are constantly devising techniques (such as "basket hedges") to provide low-cost means of reducing currency risk. Other market participants are not as likely as institutional investors to take highly exposed positions, but they still tend to operate in a far larger number of markets than in the past and they also routinely take positions in short-term interest rates and currencies.

47. As the capacity to hold and manage international portfolios has grown, there ultimately emerged a global market in many currencies. As recently as the late 1980s, the only currencies used internationally for investment were dollars, yen, Deutschemarks, sterling and Swiss francs. Occasionally, other currencies such as Canadian or Australian dollars seemed to offer good opportunities. Most other European currencies were not used to any significant extent, particularly for bond issues. At present, however, the bond, money and equity markets of nearly all OECD countries are part of an integrated marked.

48. In particular, the European sector of the world financial market has become much deeper and more tightly interdependent owing to the ease of moving across currency sectors; and market participants have become accustomed to dealing with virtually every European currency, including high-yielding currencies. Against this background, investors have, over the past few years, increasingly focused on possible investment strategies ("convergence plays") to exploit differences in interest rates among European currencies in the context of an observed growing exchange rate stability.

49. As efforts intensified to achieve stability among European currencies and ultimately to aim for a single currency, investors noted that despite the significant

integration of bond markets and the decline in inflation through 1992, real and nominal interest rates did not converge as quickly as exchange rates, opening significant opportunities for those willing to take positions. Major institutional investors held portfolios of bonds in several European currencies, and sought to determine which assets, at which points of the yield curve, offered the most attractive opportunities. Thus, for example, over the past few years, investors have carefully followed the rise in short-term interest rates in Europe and the inversion of yield curves in most European markets and the simultaneous steepening in the US dollar yield curve.

50. In 1991, investors began to devise investment strategies based on extrapolations of the trend of declining inflation and convergence of interest rates. Under the exchange-rate mechanism (ERM), the authorities of EC countries had committed themselves to increased exchange-rate stability; and with the Maastricht Treaty, it appeared possible that, in the medium term, the stability already achieved in the ERM would be extended to lead to fixed exchange rates among EC currencies and ultimately to monetary union later in the 1990s. Investors reasoned that in order to attain this objective, governments would have to pursue stability-oriented financial policies. Market participants began to formulate "convergence plays" that incorporated these assumptions. While views differed as to the speed with which EMU would be achieved and the number of currencies that would be included in EMU at the beginning, the activity of the market participants generally reinforced the policy being pursued.

51. In addition to the possible investments in national currencies, investment strategies frequently involved positions in the ecu, which was expected to become the common EC currency following EMU. Most investment strategies based upon assumptions of continued convergence presumed that the convergence process would oblige countries to pursue disinflationary policies, thereby leading over time to lower interest rates and to capital gains for those holding bonds in relatively high interest currencies included in EMU. In view of the strong mandate of the European central bank to pursue monetary stability, many investors further reasoned that a bull market in European bonds was likely later in the 1990s.

52. The events since the Danish referendum of June 1992 have shaken confidence in these assumptions. Not only was ratification of the Maastricht Treaty placed in doubt, but exchange rates attained levels of volatility not seen in almost a decade. Hence, a large-scale reversal of positions took place. Many of the currency sectors which had benefited when market participants extrapolated the trend of disinflation experienced sharp corrections. This was particularly the case for the ecu bond market which, having no home economy on which to assess value, could only be valued in relation to the component currencies of the ecu and in relation to one's assessment of the likely path to EMU. When the basis for making such valuation was shaken in June 1992, the ecu bond market could no longer function and had to be practically closed for over six months. On

the other hand, activity in the short-term ecu market, which is largely driven by short-term arbitrage, held up better.

53. In the light of the extreme tensions that developed last year on both the exchange rate and interest rate fronts, financial markets displayed remarkable resilience. With the notable exception of the ecu bond market, debt, equities and derivatives markets appear to have overcome relatively quickly last summer's difficulties, with liquidity being restored to pre-crisis level well before the end of the year. On the other hand, a lasting legacy is likely to be the adoption of a more cautious approach by investors towards strategies relying heavily on convergence assumptions and using hedging by proxy. Recent events also suggest that markets have now acquired considerably enhanced powers to exploit any perceived shortcoming or inconsistencies of government policy. This has long been recognised in the foreign exchange market and in the bond markets of some countries. It is now becoming evident in the global capital market as well.

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ANNEX IV

FOREIGN EXCHANGE MARKET ACTIVITY: A SURVEY

Prepared by the Monetary and Economic Department, BIS

INTRODUCTION

This paper has been prepared by the BIS members of the G-10 Deputies group. Its purpose is to provide the Deputies with an overview of the results of the latest survey by central banks of turnover in the global foreign exchange market, as part of the background for the Deputies' study on international capital movements. A fuller version was published by the BIS in March 1993 on behalf of the twenty-six central banks which conducted the individual country surveys. The title of that document is "Central Bank Survey of Exchange Market Activity in April 1992".

SUMMARY

1. Global net turnover in the world's foreign exchange markets is estimated to have been some $880 billion per business day in April 1992. (This figure is adjusted for virtually all double-counting, as well as for estimated gaps in reporting.) The comparably estimated global turnover in April 1989 is now put at a slightly revised $620 billion, and the growth in turnover during this three-year period is therefore estimated to have been 42 percent (Table I). This represents a marked slowing down as compared with growth in the previous three-year period. Between March 1986 and April 1989 turnover reported by the four countries taking part in the earlier survey roughly doubled (Table Ia).

2. The slowdown in turnover growth was most pronounced in the spot market where estimated global turnover rose by only 15 percent in the latest three-year period. (Tables I and V). By contrast, turnover in other market segments, especially derivatives (futures and options), rose strongly, although also, overall, at a considerably slower pace than in the previous three-year period. Reported gross turnover in swap markets rose by 56 percent and the share of overall reported turnover accounted for by such transactions nearly doubled, to 40 percent. This implies that swap market activity is now easily confirmed as being the second largest turnover category after the spot market, the share of which fell from 58 percent to just under one-half. The fastest growth rate was registered for turnover in options, which more than doubled, though this market segment still accounts for only 4 percent of reported exchange market activity (Table V).

3. By currencies, the data show that the US dollar remains predominant in foreign exchange turnover, figuring on one side of 83 percent of all such transactions, and in as much as 95 percent of turnover in swap markets. Even so, the US currency's leading role has declined overall from the figure of 90 percent recorded in April 1989. The share of transactions involving the Japanese yen also declined somewhat, to 24 percent of the total. A rise in the share of the Deutschemark appears to have been the main counterpart to the declining shares of the dollar and the yen. This currency is now involved on one side of 38 percent of all transactions, making it the second most traded currency by a clear margin (Table IIa). By currency pairs, US dollar/Deutschemark transactions account for over one-quarter of total reported net turnover, and US dollar/yen and US dollar/sterling transactions for a further one-fifth and one-tenth respectively. Direct transactions between EMS currencies account in total for an additional 7 percent of all reported net turnover (Table IIb).

4. The bulk of exchange market transactions is still carried out between dealers (mainly banks), whether located in the same or in different countries. The evidence seems to suggest, however, that transactions with other market participants have expanded more rapidly than those between dealers in the most recent three-year period. The reported data

do not permit the extent of this shift to be measured precisely however (Table III). Nor do they permit any conclusions to be drawn as to the role played by different classes of non-bank financial institution. Over half of all reported net transactions were cross-border in April 1992, and nearly 60 percent in the case of inter-dealer business. The latter proportion appears to have increased moderately since 1989.

5. In geographical terms, foreign exchange market trading appears to have become somewhat more concentrated than it was in April 1989. This was almost entirely the result of the above-average growth of trading in the United Kingdom, which took its share of global trading (in the same twenty-one reporting countries) up from 25 percent in 1989 to nearly 30 percent in April 1992. The United States' share of trading increased marginally; but, given the virtual stagnation of turnover there, the share of Japan fell by 3 percentage points. Nevertheless, the combined share of these three major countries rose slightly to nearly 60 percent (Table IV). The next four most important centres, Singapore, Switzerland, Hong Kong and Germany, accounted together for around a further quarter of the total. Among the smaller countries the three Scandinavian countries excluding Norway, together with Spain and Greece, all registered large percentage increases in turnover.

GLOBAL FOREIGN EXCHANGE MARKET ACTIVITY

In April 1992 central banks and monetary authorities in twenty-six countries conducted surveys of the exchange market operations of banks, other dealers and brokers active in such markets in their countries. The aim of this exercise, as with those undertaken three and six years earlier, was to gauge the size and scope of foreign exchange market activity. This note brings together the results of the individual country surveys to provide a "slice of time" picture of activity in the global foreign exchange market in April 1992. Where relevant and possible, comparisons are made with exchange market activity in April 1989 and March 1986.

The 1992 survey differed from the ones undertaken in earlier years in two respects, and with obvious consequences for the comparability of the data over time. Firstly, a greater number of countries participated in the exercise. In 1986 only four countries collected data. In 1989 a total of twenty-one countries surveyed their markets, but some countries with significant markets did not participate, and coverage of national markets was not always comprehensive. In 1992 virtually all countries with important exchange markets (a total of twenty-six countries) provided information, which, moreover, was more comprehensive in virtually all cases than the data collected previously. Secondly, the definitions and breakdowns used in the national surveys were somewhat more consistent across countries, as well as being finer, in 1992 than in earlier years, thus making it easier to eliminate double-counting and to compare market structures across countries. In particular, more detailed information was collected on the nature of counterparties and on whether they were located at home or abroad, and a larger number of currencies was covered. Nevertheless, differences remain between countries in the breakdowns used and in the amounts of information collected.

April 1992 appears to have been a fairly calm month in the exchange markets (with Finland being the only notable exception). No dramatic political, financial or economic events occurred which might have been likely to influence foreign exchange market transactions in a major way, taking the month as a whole. The General Election in the United Kingdom did not cause undue changes in market activity there, or in the value of sterling. Exchange rates showed no pronounced one-way tendencies, and exchange market intervention did not take place to any notable extent. Day-to-day exchange rate volatility was comparatively low during the month, and most dealers reporting such information reported that activity was either below normal or normal, and had on the whole been steady over the preceding six months. In April 1989, activity was also reported to have been normal or somewhat below normal; hence, in this respect, the data may be considered to be comparable.

However, because the amount, type and locus of trading in the global exchange market can vary considerably from month to month, prudence must be exercised in

drawing conclusions about the size and structure of the market from information relating only to a single month.

Nature of the information

Activity in foreign exchange markets was measured in terms of turnover, or the total US dollar value of all spot, outright forward, swap, futures and options contracts concluded (not settled) during the month of April 1992. Dealers were asked to report spot, outright forward and swap transactions in terms of contract value; futures and options were reported in terms of notional principal values. Each transaction was to be reported once by every reporting institution and no adjustment was to be made for netting arrangements, for the fact that contracts might not be exercised or for the fact that derivatives are frequently settled in terms of differences, not principal value[1].

Apart from reporting by type of contract, participants also provided information on: the nature of their counterparties ("other dealers", "other financial institutions" and "customers"); the location of counterparties (at home or abroad); the currencies involved in the transactions; the maturity of forward deals; and, finally, on the extent to which brokers and automated dealing systems were used.

Three adjustments had to be made to the data reported by individual institutions to obtain figures for net turnover in the global market. The first was the elimination of double-counting arising from transactions between two reporting dealers located in the same country; some countries eliminated this form of double-counting themselves before transmitting data to the BIS. For the rest, adjustments were made by the BIS.

The second adjustment, which can (and should) only be made when pooling the data at the aggregate reported level, was the elimination of the double-counting arising from the reporting of the same cross-border transactions by reporting dealers located in both countries concerned.

Thirdly, ad hoc adjustments had to be made for less than complete coverage in participating countries, as well as for business conducted in countries not providing information. The seriousness of the latter omission was mitigated by the inclusion in reporting countries' data of cross-border deals concluded with entities located in non-reporting countries.

In what follows, discussion of the size and structure of the market will, where possible, be in terms of turnover net of both local and cross-border double-counting, i.e.

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[1] It is often noted, however, that the link between turnover and volatility may run in both directions, i.e., especially in derivatives markets, operations in which have been thought to be themselves one possible cause of exchange rate volatility.

"net-net", or simply "net". The derivation of the estimated global net total is presented in summary form in Table I and the appended Table VII shows a detailed breakdown of reported net-net turnover by market segment, counterparty and currency. Because cross-border transactions were not reported with a geographical breakdown, it is not possible to exclude cross-border double-counting from data for pairs of countries or for regional or other sub-groupings of countries. Turnover in individual countries is shown net of local double-counting, but not of cross-border double-counting, i.e. "net-gross". (Indeed, the latter adjustment would not be logically correct in this case, given that, by definition, no foreign counterparties are reporting the same deals. See page 4 above and Table IV below. Data for which no adjustment is made for either type of double-counting are referred to as "gross-gross", or simply "gross". The reconciliation and computation of the three measures are shown for each reporting country in Table VI appended).

Global turnover

After allowing for the elimination of double-counting and estimated gaps in reporting, global "net-net" exchange market turnover in spot, forward and derivative contracts may be estimated to have come to $880 billion per business day in the month of April 1992 (figures presented after such adjustments are the only ones referred to as "global" turnover). Total reported "net-net" turnover amounted to $832 billion per day. Transactions not captured by countries' surveys are assumed to have amounted to $48 billion. The largest omission relates to deals between any two non-reporting dealers both of which are located outside the 26 reporting countries, and transactions of these dealers with their customers. A smaller part relates to less than full coverage in the reporting countries themselves.

The figures presented for net aggregate global turnover in April 1992 do however probably still contain a certain amount of double-counting in the data on futures and some in that on options. For futures there would be a maximum amount of double-counting of $4.6 billion if all reported futures business had been with other reporting dealers. For exchange-traded options the maximum amount of double-counting would be $2.6 billion on the same assumption. For those over-the-counter options transactions reported without a counterparty breakdown, double-counting would amount to $2.6 billion if the composition of such trading corresponded to that of countries which did report the breakdown. However, no allowance is made for this in Table I, partly because of the uncertainty involved, and partly because there is reason to believe that the data may contain other biases in the opposite direction – in particular, to the (unknown) extent that the elimination of double-counting may have been applied to some business with non-reporting counterparties, and to the (also unknown) extent to which some turnover data may have been reported after a certain amount of netting had already taken place.

The data for total exchange market turnover were obtained by adding together data for different types of contract. To the extent that interest focuses on the use of the exchange market for risk management, the aggregation of different types of contract is more justifiable. But if interest is focused on settlements (or actual payment flows) the aggregation is less useful. The estimated net global sub-total of turnover in spot, outright forward and swap contracts came to $820 billion. The equivalent figure for April 1989 was $590 billion, giving an increase of 39 percent.

Table I

Global Foreign Exchange Market Turnover Corrected for Double-Counting and Estimated Gaps in Reporting: Daily Averages

	April 1989 [1]	April 1992 [2]		Percentage change [3]
	(in billions of US dollars)			
Total reported gross turnover	932	1,354	(1,263)	35
of which:				
– *with other reporting local banks/dealers*	*377*	*447*	*(428)*	*[14]*
– *spot, outright forward and swaps*	..	*433*	*(415)*	
– *OTC options* [4,5]	..	*14*	*(14)*	
– *with banks/dealers located abroad*	*431*	*630*	*(570)*	*[32]*
– *spot, outright forward and swaps*	..	*615*	*(555)*	
– *OTC options* [4,5]	..	*15*	*(15)*	
– *all other* [5]	*124*	*277*	*(264)*	*n.a.*
Adjustment for domestic double-counting [6]	– 189	– 223	(– 214)	
– spot, outright forward and swaps	..	– 217	(– 207)	
– OTC options	..	– 7	(– 7)	
Total reported turnover net of local double-counting ("net-gross")	744	1,130	(1,048)	41
Adjustment for cross-border double-counting [1,6]	– 184	– 298	(– 270)	
Total reported "net-net" turnover	560	832	(778)	39
Estimated gaps in reporting [1]	60	48	102	
Estimated global turnover [6]	**620**	**880**	**880**	**42**
of which:				
– *all "traditional" market segments* [7]	*590*	*820*	*820*	*39*
– *spot*	*350*	*400*	*400*	*15*
– *options and futures*	*30*	*60*	*60*	*100*

[1] Changes have been made to the earlier published estimates of both cross-border double-counting and gaps in reporting in 1989. [2] Figures in round brackets relate to countries providing data in both 1989 and 1992. Within these countries, coverage became slightly more comprehensive. [3] Except for estimated global turnover, percentage changes are calculated using data from countries reporting data in both years but, owing to changes in the classification of counterparties, the figures in square brackets are indicative only. [4] Estimates based on the assumption that one-half of OTC options business with other exchange market dealers is with local reporting dealers and one-half with reporting dealers abroad. [5] For 1992 gross OTC options business with non-dealer counterparties ($16 billion) and gross options business conducted via organized exchanges ($5 billion) are included in "all other". This category also includes gross turnover in futures ($9 billion) as well as all other business with non-dealer counterparties. In 1989, this category contained all estimated (non-interbank) business with "customers". [6] No adjustment was made for double-counting of exchange-traded options and futures or for countries not providing counterparty information on OTC options transactions. On the assumption that all such business was with other reporting entities the maximum amount of double-counting in 1992 would have been roughly $10 billion. [7] Spot, outright forward and swap transactions.

Estimated global turnover (including futures and options) amounted to a revised estimate of $620 billion per day in April 1989. The 42 percent expansion over the following three-year period in the estimated current dollar value of global exchange market turnover compares with a growth rate of 116 percent between March 1986 and April 1989 in reported turnover (net only of local double-counting) in the four countries which reported data in 1986.

If, as in the present survey, the US dollar is taken to be the numeraire or base currency, it appears that only relatively minor adjustments need to be made to the data to allow for exchange rate changes between April 1989 and April 1992. This is because the change in the international value of the dollar was not large between these two dates. It is only possible to make this adjustment for the "gross-gross" data, but if all such reported transactions are converted into dollars at constant exchange rates, the expansion of reported gross exchange market activity between April 1989 and April 1992 would come to 31 percent compared with the 35 percent calculated in unadjusted terms (Table I, first line).

Table Ia

Foreign Exchange Market Transactions Net of Local Inter-Dealer Double-Counting in March 1986, April 1989 and April 1992

Country	Total				
	March 1986	April 1989	April 1992	Percentage change 1986-89	Percentage change 1989-92
	(in billions of US dollars)				
United Kingdom	90.0	187.0	300.2	108	61
United States	58.5	128.9	192.3	120	49
Japan	48.0	115.0	126.1	140	10
Canada	9.5	15.0	22.5	58	50
Total*	**206.0**	**445.9**	**641.2**	**116**	**44**

Country	Spot					All non-spot	
	March 1986	April 1989	April 1992	Percentage change 1986-89	Percentage change 1989-92	Percentage change 1986-89	Percentage change 1989-92
	(in billions of US dollars)						
United Kingdom	65.7	(119.0)	147.9	(81)	(24)	(180)	(124)
United States	34.4	80.6	94.7	134	17	100	102
Japan	19.0	45.9	47.7	142	4	138	13
Canada	4.0	6.1	7.7	53	27	62	66
Total*	**123.1**	**251.6**	**298.0**	**104**	**18**	**134**	**77**

Note: Parentheses indicate rough estimates.
* No adjustment for cross-border double-counting.

However, if a different base currency, say the Deutschemark, were adopted as the numeraire, a larger downward adjustment would have to be made to the growth of reported gross turnover. On this basis the growth of turnover in current DM would come to only 19 percent. Making an analogous calculation for the growth of current yen-denominated turnover on the other hand would give a growth rate of 37 percent, almost the same as for the growth of US dollar-denominated turnover at current exchange rates. At constant DM or yen exchange rates, however, the growth of turnover would still of course be necessarily the same as the figure calculated for constant dollar (or any other denomination) turnover, viz. 31 percent.

Currencies

Foreign exchange market activity cannot logically be broken down by single currencies alone; in the popular phrase, "it takes two to tango". It can however be broken down in terms of the proportion of total turnover in which any given individual currency figures on one side of total transactions. This is the presentation given in Tables IIa and VII. In this presentation the sum of all such proportions necessarily comes to 200 percent.[2] Alternatively, the currency breakdown can be done in terms of currency pairs, in which case, the proportions will sum to 100 percent. This is the presentation given in Table IIb.

The US dollar remains by far the most important currency in the world's foreign exchange market. It figures on one side of over 80 percent of net reported turnover and seven of the ten most heavily traded currency pairs have the dollar on one side (Tables IIa and IIb). In the swap market its role is still more pronounced, where it is involved in 95 percent of total turnover. Despite its continuing importance, however, the dollar plays a less significant role than it did three years ago. At that time, about 90 percent of identified gross transactions involved the dollar on one side, though the coverage of the 1989 survey was less comprehensive and the currency breakdown less detailed.

Although the dollar remains the single most widely traded currency, partly because of its role as a vehicle currency, its significance varies from currency to currency counterpart. For example, 98 percent of all deals involving the Canadian dollar have the US dollar on the other side. Similarly, it is present in 93 percent of deals involving the Australian dollar and in 87 percent of deals involving the Japanese yen. By contrast, the dollar figures less prominently in deals involving European currencies: for the pound, Deutschemark and French franc, the shares are 70, 64 and 60 percent respectively. In terms of the location of trading involving the US dollar against local currencies, the

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[2] This is an entirely separate question from that of double-counting in reporting, which is discussed above.

importance of the dollar is pre-eminent in Canada and in the Asian time zone,[3] ranging from 99 percent in Canada to 91 percent in Japan. By contrast, trading in the local currency versus the US dollar accounts for a rather smaller share in European countries, with the highest share in Norway (77 percent) and the lowest in Portugal (17 percent). In European countries with large markets, the shares of local currency-US dollar transactions are 72 percent for Germany, 71 percent for United Kingdom and 64 percent for Switzerland.

The Deutschemark is now clearly the second most widely traded currency in the exchange market, and the evidence strongly suggests that its importance rose sharply between 1989 and 1992 at the expense of the dollar, and to a lesser extent, of the yen, against which it appeared to be of slightly greater significance in 1989 (Table IIa). The Deutschemark now figures on one side of nearly 40 percent of total transactions and is involved in four of the ten most heavily traded currency pairs (Table IIb). It is the only currency, apart from the US dollar, traded in large quantities against a wide range of other currencies. Together the US dollar and the Deutschemark account for 95 percent of all trading against the Japanese yen, pound sterling, Swiss franc, Australian dollar, Canadian dollar and French franc.

The focus in direct cross-trading against the Deutschemark (i.e. without passing through the US dollar) is clearly European, with the yen being the only non-European currency bought and sold against the Deutschemark to any notable extent. Precise comparisons with 1989 are not possible since comprehensive data on turnover in Deutschemark in Germany during April 1989 are not available. It nonetheless seems justified to conclude that the relative importance of the Deutschemark in the exchange market has increased considerably over the past three years.

The importance of the Deutschemark for the European currency market is illustrated by the fact that for some countries with relatively small-to medium-sized markets (Luxembourg, Ireland, Austria and Portugal) trading of the local currency against the Deutschemark exceeds local currency transactions against the US dollar. For several other European countries (Sweden, the Netherlands, Italy and Spain) local currency/Deutschemark transactions amount to nearly half of local currency/US dollar trading. The ratio of local currency/Deutschemark transactions to local currency/US dollar business is lower in European countries with very active exchange markets such as the United Kingdom and Switzerland, but Deutschemark activity is still clearly more important in these centres than in Japan.

Business into and out of the Deutschemark is therefore no longer conducted solely through the world's vehicle currency, the US dollar. Moreover, the share of deals done by

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[3] Australia, Hong Kong, Japan, New Zealand and Singapore.

dealers and other financial institutions is much higher for the Deutschemark than for any other non-dollar currency. The ecu was the only other non-dollar unit traded directly against a range of other currencies in April 1992 but transactions in it amounted to only 7 percent of those in the Deutschemark.

Table IIa

Total Gross Reported Foreign Exchange Turnover Involving Selected Currencies on One Side of Transactions: Daily Averages

Currency	April 1989		April 1992			
	Daily turnover in billions of US dollars	Percentage share	Daily turnover in billions of US dollars	Percentage share	Percentage share on a comparable basis[1,2]	Change in share of gross turnover[1,2] 1989-92, percentage points
US dollar	838	90	1,114	82	83	–7
Deutschemark	247 [2]	27 [2]	544	40	38	11
Yen	253	27	313	23	24	–3
Pound sterling	138	15	185	14	14	–1
Swiss franc	n.a.	n.a.	116	9	9	n.a.
French franc	n.a.	n.a.	51	4	4	n.a.
Canadian dollar	n.a.	n.a.	44	3	3	n.a.
Ecu	8	1	40	3	3	2
Australian dollar	n.a.	n.a.	32	2	2	n.a.
All other [3]	380	40	269	20	19	n.a.
All currencies [4]	1,864	200	2,707	200	200	n.a.

[1] Relates only to the 21 countries reporting data in both 1989 and 1992. [2] Excluding domestic trading involving the Deutschemark in Germany. [3] Identified and non-identified currencies. [4] Because two currencies are involved in each transaction, the sum of transactions in individual currencies comes to twice total reported turnover.

Despite the extensive use of the Deutschemark in the total market, the nature of trading in it differs substantially from that in the US dollar. Business involving the Deutschemark is much more heavily concentrated on spot transactions. Over 60 percent of the total cross currency deals involving the Deutschemark are in this category, in contrast to only 42 percent in the case of the US dollar. This difference reflects the heavy use of the dollar in hedging operations taking place in the swap, futures and options markets. The depth and diversity of US dollar markets are far greater than those of analogous markets in other currencies. As a result, it is easier to manage exchange, interest rate and other risks through this currency.

As already noted, comparisons between the amount of Deutschemark trading in 1992 and 1989 must be made with care because of the absence of data for Germany in the earlier year. Nonetheless, evidence from countries reporting data in both years

suggests that dealing in local currencies against the Deutschemark has increased more rapidly than exchange market activity on average. Particularly sharp rises were recorded for the United Kingdom and the Nordic countries, as well as for Ireland, Italy and France. In the latter country, the share of local currency dealing against the Deutschemark is now almost 43 percent, and nearly 38 percent in the United States. In some of the smaller European countries the share ranges from around 55 percent in Austria and Luxembourg to as much as 65 percent in Portugal. Although the 1992 shares are not as high in Sweden, Norway or Finland, the sharp increases recorded there probably reflect the decisions of these countries to peg their currencies to the ecu at various points in 1990 and 1991, something which will have tended to stimulate trading in European currencies, most notably the Deutschemark. By contrast, the relative importance of local currency/Deutschemark trading declined in Switzerland and Greece.

Table IIb

Total Net Reported Foreign Exchange Turnover by Currency Pairs in April 1992: Percent of Daily Average Turnover

Currency pair	Market segment						
	Spot	Outright forward	Swaps	Sub-total	Futures	Options	Total
US dollar/Deutschemark ...	29.6	21.7	19.4	24.7	41.5	34.3	25.4
US dollar/Japanese yen	15.7	20.4	25.0	19.9	29.9	27.9	20.2
US dollar/Pound sterling ...	8.5	9.4	11.5	9.8	11.1	4.1	9.5
US dollar/Swiss franc	5.9	6.1	6.8	6.3	7.2	3.3	6.1
US dollar/Canadian dollar .	2.0	2.9	4.9	3.3	2.9	2.7	3.2
Deutschemark/ Pound sterling	4.9	3.1	0.7	3.0	0.1	5.8	3.1
Deutschemark/Japanese yen	3.9	3.5	0.3	2.3	0.1	6.0	2.5
US dollar/Australian dollar .	1.5	2.1	3.4	2.3	2.0	2.2	2.3
US dollar/French franc	1.3	2.3	3.8	2.4	0.1	1.3	2.3
Deutschemark/Swiss franc .	2.9	1.6	0.2	1.7	0.1	2.4	1.7
Other intra EMS currencies (identified), excluding DM/£	7.0	4.0	1.0	4.3	0.2	1.4	4.1
All other	16.8	23.0	23.1	20.0	4.9	8.5	19.6
All currency pairs	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The Japanese yen is the third most widely traded currency, figuring on one side of 24 percent of total transactions and being involved in two of the ten most widely traded currency pairs (Tables IIa and IIb). Nonetheless, direct cross-currency business involving the yen is much less significant than that involving the Deutschemark, and the yen is not as widely

traded in third markets. For example 36 percent of total reported yen deals had a counterparty located in Japan, while only about 10 percent of Deutschemark trades had a counterparty located in Germany. However, the share of overall yen transactions accounted for by swaps is greater than that for the Deutschemark; in fact even the absolute amount of such transactions is greater (Table VII). The shares of yen transactions accounted for by futures and options are also somewhat greater than those of the Deutschemark.

The pound sterling is involved on one side of 14 percent of total transactions and the Swiss franc on 9 percent. Owing to the importance of London as a trading centre, one counterparty to deals involving sterling was located in the United Kingdom in nearly 50 percent of the transactions. By contrast, owing mainly to the fact that the Swiss franc is actively traded in the United Kingdom (24 percent of all reported Swiss franc exchange market deals are concluded there), only a third of Swiss franc deals have a counterparty located in Switzerland.

Other currencies account for smaller proportions of net total exchange market turnover. The French franc is involved on one side of 3.8 percent of all transactions, the Canadian dollar in 3.3 percent, the ecu in 3 percent and the Australian dollar in 2.4 percent. On a "gross-gross" basis the ecu is involved on one side of 3 percent of all transactions compared with 0.9 percent three years earlier (Table IIa).

Counterparties

Most exchange market transactions for which a counterparty breakdown was reported - 70 percent of total reported turnover [4] – are apparently between dealers, whether located at home or abroad. In April 1992, 41 percent of all reported transactions were with dealers located abroad and 29 percent were with dealers located at home.

It is not easy however to make comparisons of the relative importance of business with different types of counterparties between 1989 and 1992 owing to changes in breakdowns and definitions between the two years. In 1989 most reporting countries provided information on banks' deals with "other banks" and with "customers". In 1992 a finer breakdown was used. Sixteen countries, accounting for 56 percent of total reported turnover, provided information on deals with "other dealers", "other financial institutions" and "customers", the latter being a residual category. On balance, the data suggest that transactions with entities other than dealers have expanded more rapidly than business with banks (Table III). But given the changed counterparty breakdown used in 1992, it is not possible to be more precise than this.

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[4] Counterparty turnover shares are calculated as a proportion of this figure, and not of the total.

Table III

Total Reported Exchange Market Turnover by Type of Counterparty, Net of Local Inter-Dealer Double-Counting: Daily Averages

	April 1989	April 1992	Change between 1989 and 1992 [1] Percentage points
	(in billions of US dollars)		
Total reported transactions	744	1,130	41
With local banks/dealers	189	223	[14]
With banks/dealers located abroad	431	630	[32]
With other counterparties	124	277	n.a.
of which:			
– *with non-reporting financial institutions*	–	*97*	*n.a.*
– *with customers*	*114*	*137*	*[13]*
– *residuals* [2]	*10*	*44* [3]	*n.a.*

[1] Percentage changes are calculated using data from countries reporting data in both years but, owing to changes in the classification of counterparties, the figures in square brackets are indicative only. [2] The residual for 1989 includes transactions with monetary authorities which in 1992 were generally included in transactions with non-reporting financial institutions. The residual also contains turnover in exchange-traded options and futures. [3] Including $11 billion for unallocated transactions owing to incomplete reporting of the counterparty breakdown.

International/domestic trading

One sign of just how international the total foreign exchange market has become is the large share of cross-border business (Tables III and VII). Although some countries did not report a full breakdown of all types of business, information from those that did suggests that over half of all transactions takes place with counterparties located abroad. The exchange market operations of banks and other dealers have a particularly strong international orientation, and this appears to have increased over time. Nearly 60 percent of total inter-dealer business was cross-border in April 1992, whereas three years earlier 55 percent of reported interbank business was cross-border. It thus would seem that the slowdown in the rate of growth of exchange market dealing has been most marked in local markets.

Business with "customers" has a more local orientation. About 68 percent of spot and forward deals involving "customers" was struck in the domestic market in April 1992. Comparison cannot be made with 1989, however, because the relevant information was not collected then.

There is some variation across countries in the relative importance of cross-border business. The share tends to be highest in small countries with medium-sized or modest

exchange markets. Although "customers" conclude a larger share of their deals with local dealers in these countries, this effect is swamped by the tendency for local dealers to strike wholesale market deals with banks and similar institutions in the major centres.

Geographical patterns

The bulk of exchange market trading takes place in a small number of centres. The three countries with the largest average daily turnover ("net-gross"), the United Kingdom ($300 billion), the United States ($192 billion) and Japan ($126 billion), accounted for 55 percent of countries' total reported turnover. However, on a reporting country basis comparable with that of the 1989 survey there was a slight rise in the share of these three countries from 58 to 59 percent. This was largely a consequence of faster-than-average growth of activity in the United Kingdom (60 percent), and to a lesser extent in the United States (49 percent). In contrast, Japan's share of foreign exchange market transactions declined by 3 percentage points when measured on a comparable basis in both years.

The next four most important centres - Singapore, Switzerland, Hong Kong and Germany - each reported average daily turnover in the $57 to 76 billion range. Altogether the seven most important countries accounted for 78 percent of countries' total reported trading. Turnover in France, Australia and Denmark amounted to $36, 30 and 28 billion respectively. Seven countries had turnover of between $13 billion and around $23 billion, and nine countries had turnover of between $1 and 7 billion.

Rates of expansion of turnover varied considerably across countries, with the highest rates of increase being recorded in some fledgling markets in Europe, and the lowest in Asia (with the exception of Singapore). Spain and Greece registered growth rates in excess of 170 percent and Denmark one of 112 percent. In Japan and Hong Kong growth amounted to only 10 and 24 percent respectively over the three-year period. In Australia trading was almost stagnant.

There are considerable differences among centres not only in the scale of business, but also in its character. The currency composition of trading depends both upon the role of the home currency itself in the international monetary system and on the importance of the country as an exchange trading centre. For example, in countries like Luxembourg, Bahrain and Singapore, where the domestic currency is of minor significance for global commercial and financial activity, local currency trading is modest and accounts for less than 5 percent of reported turnover. Instead, the great bulk of trading in these centres is in foreign currencies.

Table IV

Reported Foreign Exchange Market Turnover in Selected Countries: Daily Averages

Country	April 1989			
	Gross turnover[1] (in billions of US dollars)	Percentage share	Net-gross turnover[2] (in billions of US dollars)	Percentage share
United Kingdom	241	26	187	25
United States	174	19	129	17
Japan	145	16	115	15
Singapore	63	7	55	7
Switzerland	68	7	57	8
Hong Kong	60	6	49	7
Germany	..	n.a.	..	n.a.
France	32	3	26	3
Australia	37	4	30	4
All others	112	12	96	13

Country	April 1992				Change in share 1989-92: percentage points[4]	
	Gross turnover[1] (in billions of US dollars)	Percentage share[3]	Net-gross turnover[2] (in billions of US dollars)	Percentage share[3]	Gross[1]	Net[2]
United Kingdom	369	27 (29)	300	27 (29)	3	3
United States	241	18 (19)	192	17 (18)	–	1
Japan	157	12 (12)	126	11 (12)	–3	–3
Singapore	87	6 (7)	76	7 (7)	–	–
Switzerland	79	6 (6)	68	6 (6)	–1	–1
Hong Kong	73	5 (6)	61	5 (6)	–1	–1
Germany	63	5 (n.a.)	57	5 (n.a.)	n.a.	n.a.
France	41	3 (3)	36	3 (3)	–	–
Australia	35	3 (3)	30	3 (3)	–1	–1
All others	208	15 (14)	185	16 (15)	2	2

Note: Percentages may not sum to 100 because of rounding.
[1] Gross of both local and cross-border double-counting. [2] Net of local double-counting; no adjustment for cross-border double-counting. [3] Figures in brackets show the share of the country's turnover in the total for the 21 contries reporting in both 1989 and 1992. [4] Computed using total turnover in the 21 countries reporting turnover in both 1989 and 1992.

By contrast, the share of the domestic currency in total transactions tends to be high in the markets of the countries of issue of the traded currencies. In the United States, Germany and Japan the domestic currency is involved in 89, 83 and 74 percent of all trades respectively. Most other countries fall between these two extremes but the currency composition of trading is in general skewed towards the domestic currency, since at least one counterparty for deals involving the domestic currency tends to be located in the country in question. In addition, since most of these countries do not host major trading centres, turnover in non-local currencies would not be expected to dominate trading in the local currency.

The United Kingdom is a case apart. It is the single largest centre for foreign exchange trading. In 1992 it accounted for 27 percent [5] of net turnover, up from 25 percent in 1989. Nonetheless, in contrast to the second and third largest centres, its currency is less widely traded in the market. At least one counterparty to all identified deals involving the pound sterling was located in the United Kingdom. However, the amount of foreign currency business conducted out of London is so great that domestic currency transactions account for less than a quarter of total trading there. In fact, foreign currency trading is so substantial that a larger share of trading in both US dollars (26 percent) and Deutschemark (27 percent) takes place in the United Kingdom than in either the United States (18 percent) or Germany (10 percent) respectively. In addition over 40 percent of all reported deals involving the ecu have one counterparty located in the United Kingdom. This centre is also the second most important site, after their domestic markets, for the trading of Swiss francs, Australian dollars and French francs. The United States, however, accounts for larger shares of yen and Canadian dollar trading than does the United Kingdom.

It is instructive to contrast the United Kingdom with the two main centres in the North American and Asian time zones. Given the continuing role of the dollar as the dominant currency in the total market, it is scarcely surprising that 89 percent of deals in the United States involve this currency. Moreover, a larger share of exchange market transactions is concluded with counterparties located within the United States. Although the US dollar/Deutschemark is the most heavily traded currency pair in this market (34 percent of total transactions), the share of yen deals is much higher than in Europe. The relative importance of options in the US market is also worthy of note.

One of the more salient features of the Japanese market is the relative importance of outright forward and swap business. At 57 percent of total turnover, it is higher than in either the United Kingdom or the United States. Moreover, customers are far more active in the swap market in Japan than they are in either of the two other major centres. This can be attributed to the high proportion of Japanese trade which is invoiced in dollars. Covering by customers leads to further swap activity by banks in Japan, which also use

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[5] 29 percent of turnover of the 21 countries reporting in both years.

the swap market to manage financial risks. The share of activity involving the Deutschemark has increased in Japan, but is not as great as in other major centres.

Market segments

Although there are close linkages between market segments through arbitrage, the construction of synthetic products and the funding and risk management activities of wholesale market participants, the various segments of the foreign exchange market have their own distinctive character. Moreover, their relative importance has changed considerably between 1989 and 1992. Transactions in the forward and futures and options markets have grown much faster than activity in the spot market.

The spot market

The spot market is still the single most important segment of the foreign exchange market. It consists of that part of the market in which two economic agents agree to exchange amounts of two currencies within the space of two business days. [6] The deals may be undertaken for commercial or financial purposes and may - or may not - be subject to netting arrangements, but they always entail a single outright exchange of principal. In the great majority of cases they lead to transfers through the payments systems of the countries of issue of the currencies in question.

In April 1992 total reported turnover in the spot market amounted to $394 billion per day net of all double-counting (Table V; estimated global turnover after adjusting for reporting gaps is estimated to have been $400 billion, an increase of 15 percent over the April 1989 figure, Table I above). Spot trading has grown less rapidly than other types of business in recent years and now accounts for a smaller share of aggregate turnover than in earlier years. Still net of all double-counting, it now seems that total spot market activity in the twenty countries which reported in both 1992 and 1989 may have been about $320 billion in the earlier year. [7] The comparable figure for April 1992 was $366 billion, an increase of only 14 percent. The share of spot market activity in the total therefore fell from 57 percent to 47 percent in these countries. Aggregate gross spot transactions in the twenty countries reporting data in both years expanded by as little as 13 percent, and in the four countries reporting in 1986 by 18 percent on a "net-gross" basis compared with 104 percent in the 1986 to 1989 period. There were considerable

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[6] Swaps, even when they have one leg for settlement within two days, are not included in the spot market for the purposes of this survey but are considered to be a separate type of transaction. See page 22 below.

[7] The discussion here is in terms of reported transactions. In Table I an estimate of global spot market turnover is presented adjusted also for estimated gaps in reporting; see also paragraph 2 of the Summary, page 4 above.

differences across countries in rates of growth. Greece and Spain, two countries which relaxed their exchange controls during the three year period, reported increases of over 100 percent. By contrast, three countries - Norway, Australia and Bahrain - registered outright declines.

Table V

Reported Foreign Exchange Market Turnover, by Market Segment: Daily Averages

Market segment	April 1992					
	Net-net turnover[1]		Net-gross turnover[2]		Gross turnover[3]	
	in billions of US dollars	Percentage share	in billions of US dollars	Percentage share	in billions of US dollars	Percentage share
Total gross turnover[4]	832.0	100	1,130.3	100	1,353.7	100
of which:						
Spot market	*393.7*	*47*	*540.6*	*48*	*659.5*	*49*
Forwards[4]	*384.4*	*46*	*528.7*	*47*	*626.4*	*46*
of which:						
Outright	*58.5*	*7*	*69.6*	*6*	*77.6*	*6*
Swaps	*324.3*	*39*	*457.5*	*40*	*547.1*	*40*
Futures[5]	*9.5*	*1*	*9.5*	*1*	*9.5*	*1*
Options[5]	*37.7*	*5*	*44.7*	*4*	*51.6*	*4*

Market segment	April 1989		Percentage change between comparable gross data[6] 1989-1992
	Gross turnover3 (in billions of US dollars)	Percentage of total	
Total gross turnover	*932.4*	*100*	*35*
of which:			
Spot market	*541.8*	*58*	*13*
Forwards[4]	*364.2*	*39*	*61*
of which:			
Outright	*28.4*	*3*	*60*
Swaps	*208.3*	*22*	*56*
Futures	*4.1*	{ *3*	*60*
Options	*22.3*		*124*

[1] Adjusted for both local and cross-border double-counting. [2] Adjusted for local inter-dealer double-counting. [3] Gross of both local and cross-border double-counting. [4] Totals do not sum owing to incomplete reporting of market segment breakdowns. The number of countries reporting disaggregated data in both years varies from component to component: (total 21; spot 20, 12 for outright forwards and swaps, 12 for futures, and 17 for options). [5] No adjustement for double-counting in futures and exchange-traded options. [6] Calculated from data for countries reporting information in both 1989 and 1992.

Spot business is somewhat more evenly spread across the major currencies than is total trading. For example US dollar business accounts for 72 percent of one side of total spot deals, whereas it is involved on one side of 82 percent of total exchange market deals. The Deutschemark figures on one side of over 50 percent of spot market deals but only 40 percent of total transactions in all market segments. The relative importance of non-dollar trading does not, however, reflect unusually strong activity by "customers" in spot transactions; their share, at a little over 15 percent, is not much different from their share in total transactions.

There is little difference between the spot and the total market with respect to the location of counterparties. In both cases, the relative size and nature of the national market have a bearing on how much business is conducted locally and how much is cross border. In countries with medium-sized or modest markets, counterparties tend to be located abroad. On the other hand, in the United States local counterparties account for an unusually large share of transactions.

The forward market

The forward market comprises two distinct segments, the outright forward market and the swap market. Outright forward deals are similar to spot transactions except that they are for settlement more than two days hence. Swap deals on the other hand have two separate legs. The two counterparties agree to exchange two currencies at a particular rate at one date and to reverse the transaction, generally at a different rate, at some future date. Most swaps have a spot and a forward leg but forward/forward transactions also take place. Swap transactions in the exchange market involve the exchange of principal. In this they differ from other currency swaps (for example interest rate swaps) which entail the exchange of cash flows, but which are not covered in this survey. Even though swap transactions have two legs, only one - the short leg - was recorded in the surveys and deals were considered to be forward transactions even if the short leg was for settlement within two days.

Forward transactions grew much more rapidly than spot business in the three years between the 1989 and 1992 surveys. For the twenty countries which reported data in both years, gross forward transactions expanded by 61 percent while spot business expanded by only 13 percent. Growth was particularly rapid in the Scandinavian countries, with Sweden and Norway showing growth rates of 264 percent and 195 percent respectively but high growth rates were also recorded in Spain (220 percent) and Italy (168 percent), two countries which relaxed exchange controls during the period in question and could therefore expect to see a sharp increase of financial operations in the forward markets. In all these cases, however, the growth occurred from a small base, and in Italy forward transactions still account for a smaller share of total transactions than in countries with a longer tradition of liberalized exchange markets.

In absolute terms, of course, two of the three countries with the largest markets, the United States and the United Kingdom, accounted for nearly 60 percent of the increase of $223 billion in reported total gross forward transactions.

The maturity of most forward business is quite short. Nearly two thirds of all transactions have a maturity of seven days or less, and only 1 percent have a maturity of more than one year. There is some variation across countries, with shorter maturities tending to account for a larger share of business in the countries with the most active markets. The maturity of forward deals involving the US dollar tends to be shorter than that of deals of other currencies against Deutschemark. This may be a function of the liquidity and depth of markets in short-term US dollar instruments, which make such markets suitable for liquidity management.

The outright forward market

In April 1992, reported "net-net" turnover in the outright forward market amounted to $58 billion per day or 7 percent of total measured net activity in all exchange market segments. Growth has been rapid, with gross transactions expanding by 60 percent between April 1989 and April 1992 in the twelve countries reporting such data in these two years (Table V).

The outright forward market is strikingly different from other market segments. Firstly, a far larger share of this type of business is with "customers", particularly in countries which do not host major trading centres. In the market as a whole, almost half of all outright forward deals are with customers, when measured on a net-net basis (see Table VII). On a net-gross basis, the share is 40 percent, but much higher than this - frequently above 50 percent - for example in Japan and Switzerland, but also in some countries which do not have major markets. Many of the deals are undertaken to hedge exposures arising from foreign trade rather than to manage financial risks arising from funding and portfolio decisions.

A second notable feature of the outright forward market is that trading is less international than in other market segments. Almost 56 percent of all deals are concluded with counterparties located in the same country, with the share of local deals being higher, sometimes much higher, in countries with small markets. The domestic orientation of the outright forward market owes much to the importance of business with customers, which tends to be more local in character (Table VII again). It is also noteworthy that the share of outright forward deals involving the domestic currency is higher than it is for other types of business. This again is consistent with the use of this market segment for hedging commercial risk.

Exchange market swaps

The swap market is the second largest market segment after the spot market and one of the fastest growing. It is capable of being used to a considerable degree for the purpose of hedging financial risk - in contrast to the use of outright forwards mainly for commercial risk hedging. Total reported "net-net" turnover amounted to $324 billion per day in April 1992. The growth in swap transactions for the twelve countries reporting such deals ("gross-gross") in both 1989 and 1992 was 56 percent, with the highest growth rate – 214 percent – being recorded by Spain which nevertheless still accounted for only 1 percent of countries' reported swap turnover in 1992 (Table VI). Growth of swap activity, at 144 percent, was also very rapid in Denmark. The growth in such activity was also accompanied by a notable reduction in the maturity of swaps between 1989 and 1992. Even if there had been no change in outstanding amounts, a reduction in maturity would have boosted reported turnover.

The swap market is heavily concentrated on the US dollar. This currency is involved on one side in 95 percent of all transactions. (See Table VII). Moreover, in this market segment, yen/dollar transactions (25 percent of total swaps) were greater than Deutschemark/dollar deals (19 percent). Dealers are particularly active in the swap market. "Customers", whose swap deals totalled $47 billion, acccounted for only 14 percent of all swaps.

Swap business is quite international, with about 57 percent of transactions being concluded with counterparties located abroad. The pattern of cross-border trading is not much different from that of the market as a whole. Dealers tend to do more of their business with counterparties located abroad while customers conclude the bulk (71 percent) of their deals with local counterparties (Table VII).

The share of swap business is unusually high in Belgium, where it amounts to 61 percent of the country's total exchange market turnover. One of the reasons for this is the extensive ecu swap activity of Belgian banks. The share of swap business, at 58-59 percent of exchange market trading, is also particularly high in Norway and Canada. Moreover, both financial institutions and customers engage in such transactions to a greater relative extent than in most other countries. This can be attributed to the liquidity management practices of Canadian banks and non-banks which are inclined to use US money markets whenever there is a slight incentive to do so. These linkages are reflected in the unusually high share of US dollar/domestic currency business in Canada. About 64 percent of total transactions in the Canadian market involve this type of transaction compared with an average of only 24 percent for all reporting countries.

Futures

Currency futures are exchange-traded contracts specifying the delivery of a particular currency on a given date more than two days hence. These contracts differ from forward contracts in that they are standardized and settlement takes place through the clearing house of the exchange on which the contract is traded. Because an exchange stands between the buyer and the seller, the identity of the ultimate counterparty is not known. Active markets in currency futures, the bulk of which are quoted in terms of the US dollar, also exist for the Deutschemark, yen, pound sterling, Swiss franc, Canadian dollar, Australian dollar and French franc. Trading in other currency futures is extremely limited.

To the extent that two reporting exchange market dealers are involved on opposite sides of the same deal, the figure reported here by dealers overstates total turnover, but in the absence of solid information on the nature of the counterparties, it is impossible to determine the precise extent of double-counting. Countries accounting for nearly a third of futures turnover provided a breakdown of contracts bought and contracts sold. These figures suggest that the amount of futures sold by banks and dealers corresponds in the aggregate to the amount purchased by them. This is consonant with the idea that banks and dealers are often counterparties to deals with other dealers, but since the counterparty on the other side of the deal may have been a bank or a non-bank, it does not allow the elimination of double-counting. On the extreme assumption that all reporting banks' futures deals had reporting banks as counterparties, these figures imply that exchange market dealers accounted for a substantial proportion - about two-thirds - of total futures turnover and that net turnover by banks was somewhat less than $5 billion.

Gross transactions in currency futures in the twelve countries reporting data in both 1989 and 1992 expanded by 60 percent over the three-year period mainly as a result of an increase of 114 percent in the United States. Activity in currency futures is highly concentrated. Reporting institutions in just two countries, the United States and the United Kingdom, together account for 94 percent of total reported turnover: 63 and 30 percent respectively. The Deutschemark future priced in dollars is the most heavily traded contract. In fact, 42 percent of dealers' total gross futures turnover was in this contract. The yen contract (30 percent) and pound sterling (11 percent) are the second and third most actively traded currency futures (Table IIb).

Options

Currency options, which give the purchaser the right, but not the obligation, to buy or sell a certain amount of currency (the notional principal of the contract) in the future at a predetermined rate, come in two forms. Exchange-traded options are similar to futures in that they are standardized contracts settled through the clearing houses of the exchanges on which they are traded. Over-the-counter (OTC) options are customized bilateral contracts agreed between two agents. Depending on the movement of the price

of the underlying instrument, they may or may not be exercised. The relationship between settlement flows and the gross volume of trading measured in terms of notional principal is therefore not necessarily very close. Because some institutions operate a global options book, it was not always possible to allocate activity to particular centres. In these cases the counterparty was taken to be the parent institution.

The aggregate amount of transactions in currency options came to $37.7 billion per day, with the great bulk ($31 billion) being identified as over the counter, and only a small part ($5.3 billion) being traded on organized exchanges [8] (Tables V and VII). These figures overstate the size of options turnover because of double-counting. Owing to the absence of a counterparty breakdown, no adjustment could be made for double-counting in the turnover data on exchange traded options, but the maximum amount of double-counting can be put at between $2 and 3 billion. It seems that, as in the case of futures, banks account for nearly three quarters of turnover and that in practice double-counting is therefore likely to be towards the upper end of this range.

A partial adjustment could be made for double-counting of over-the-counter (OTC) options trading. Countries accounting for 86 percent of gross options turnover provided information on the amount of OTC options transactions with other reporting dealers. [9] On the assumption that the structure of options trading in countries not providing such a breakdown was identical to that of countries which did, total OTC options trading net of all double-counting would come to about $28 billion (as opposed to the total of $31 billion implicitly included in the estimate of aggregate global net turnover in Table I).

By currency pairs the four most important options contracts were US dollar/Deutschemark (34 percent of total net options turnover), US dollar/yen (28 percent), Deutschemark/yen (6.0 percent) and Deutschemark/sterling (5.8 percent) (Table IIb). Reporting dealers were active both in writing and buying options, and transactions with other dealers were important. Nearly 60 percent of net OTC transactions in the seventeen countries providing disaggregated data were with other dealers.

Comparisons across countries are complicated by the impossibility of eliminating double-counting for all countries, but the United States appears to be the largest centre for options trading, with the United Kingdom and Japan roughly evenly placed for second position. Taken together these three countries account for over 70 percent of transactions in options.

Options trading has grown substantially in the last three years. If comparable gross data are taken for the seventeen countries that reported turnover in this type of contract in both survey years, transactions grew by 124 percent over the three-year period.

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[8] These figures do not sum because not all reporting institutions provided the breakdown.

[9] This adjustment is shown in Table I.

Table VI

Reconciliation of Gross-Gross, Net-Gross and Net-Net Data

(daily averages, in millions of US dollars)

Country	Gross-gross		Net-gross		Net-net
	Total	Of which: with local dealers[1]	Total	Of which: with cross-border dealers[2]	Total
	(1)	(2)	(3)	(4)	(5)
United Kingdom	368,733	137,031	300,217	161,784	223,583
United States	240,580	96,557	192,302	74,380	157,069
Japan	156,854	61,500	126,104	60,918	97,248
Singapore	87,323	22,926	75,860	54,404	50,090
Switzerland	79,232	22,308	68,078	42,153	48,111
Hong Kong	73,019	24,227	60,906	41,499	41,248
Germany	63,246	13,456	56,518	43,336	35,990
France	41,086	11,080	35,546	22,749	24,770
Australia	35,478	11,283	29,837	16,891	21,836
Denmark	30,992	6,784	27,600	18,689	18,747
Canada	26,518	7,977	22,530	12,638	16,544
Sweden	23,673	4,401	21,472	12,393	15,602
Netherlands	23,132	6,036	20,115	14,167	13,404
Belgium	17,303	2,732	15,937	10,124	11,142
Italy	17,235	3,452	15,509	9,547	10,987
Luxembourg	13,982	1,327	13,319	9,529	8,805
Spain	15,107	5,299	12,458	8,910	8,237
Finland	6,760	..	6,760	..	6,760
Ireland	6,511	925	6,049	4,886	3,734
Norway	6,540	2,646	5,217	2,746	3,917
Austria	4,903	1,012	4,397	3,051	2,951
New Zealand	4,820	1,196	4,222	2,484	3,045
Bahrain	3,467	..	3,467	..	3,467
South Africa	4,237	1,549	3,462	1,029	2,975
Portugal	1,525	403	1,323	866	913
Greece	1,457	723	1,095	517	851
Total	**1,353,713**	**446,828**	**1,130,299**	**629,688**	**832,026**

1. Gross spot transactions with local dealers + Gross outright forward transactions with local dealers + Gross swaps transactions with local dealers + half of OTC gross options written/bought with dealers.

2. Gross spot transactions with cross-border dealers + Gross outright forward transactions with cross-border dealers + Gross swaps transactions with cross-border dealers + half of OTC gross options written/bought with dealers.

Col. 3 = col. 1 – (0.5 x col. 2)
Col. 5 = col. 3 – (0.9 ÷ 1.9 x col. 4)

Table VII

Reported Exchange Market Turnover Net of Local and Cross-Border Inter-Dealer Double-Counting in April 1992, by Market Segment, Counterparty and Currency Total Reported Transactions in All Currencies

(daily averages, in millions of US dollars)

Category	Total	Specified currency against all other currencies[1]				
		US dollar	Deutsche-mark	Japanese yen	Pound sterling	Swiss franc
I. Spot	393,743.5	283,817.5	209,314.4	79,154.3	56,463.8	37,841.2
– with other dealers	282,048.9	200,684.7	160,301.5	57,377.9	40,364.0	28,008.7
local	118,905.0	87,505.9	60,866.7	27,109.3	19,787.6	12,133.0
cross-border	163,143.9	113,178.8	99,434.8	30,268.6	20,576.4	15,875.7
– with other financial institutions	47,431.2	35,537.0	24,401.3	7,324.9	7,707.0	4,123.5
local	11,856.7	8,879.1	5,096.5	1,498.3	2,446.9	820.7
cross-border	19,533.7	13,552.7	10,773.9	2,764.3	3,331.5	1,576.3
– with customers	62,006.8	45,696.2	24,003.3	14,176.2	7,943.7	5,678.5
local	29,319.7	18,631.7	10,517.0	7,953.4	3,347.4	2,268.7
cross-border	16,031.2	11,541.3	8,466.3	2,800.0	2,750.9	1,893.1
II. Outright forward	58,498.9	44,238.6	21,262.6	15,495.4	9,115.4	5,122.5
– with other dealers	20,555.3	16,719.9	8,026.9	4,564.0	3,107.9	2,170.5
local	7,991.6	6,563.6	2,839.4	1,806.8	1,508.3	882.6
cross-border	12,388.2	9,986.7	5,172.2	2,747.8	1,592.2	1,286.5
– with other financial institutions	10,000.6	8,398.9	3,198.0	2,550.4	2,120.8	838.5
local	3,391.9	2,600.6	719.4	1,206.1	1,213.7	79.1
cross-border	2,444.5	1,990.4	980.5	503.0	381.7	227.5
– with customers	27,851.7	19,102.5	10,016.0	8,381.1	3,838.9	2,109.2
local	15,981.4	9,782.1	5,004.7	6,396.5	2,244.9	982.3
cross-border	6,637.3	4,403.3	3,424.7	921.1	976.8	832.3
III. Swaps	324,288.6	308,956.7	72,571.3	83,349.4	41,635.0	23,549.2
– with other dealers	237,636.0	230,578.5	52,694.0	58,048.7	30,484.3	18,018.2
local	89,630.0	86,515.0	15,698.9	26,137.1	12,937.4	6,282.3
cross-border	148,006.1	144,063.5	36,995.0	31,911.7	17,546.9	11,735.9
– with other financial institutions	39,217.7	37,604.8	8,519.1	10,107.9	5,591.2	2,459.1
local	13,486.4	12,584.1	1,976.2	4,427.9	2,746.2	489.1
cross-border	13,246.9	12,620.2	2,900.1	2,591.1	1,683.7	890.1
– with customers	46,991.4	40,490.8	11,314.8	15,192.7	5,468.2	3,067.5
local	26,090.7	21,497.4	5,184.4	11,227.3	2,890.4	1,370.0
cross-border	10,471.9	8,789.3	3,774.1	2,126.1	1,730.1	1,088.8
Sub-total	778,123.6	638,548.7	303,433.8	178,098.5	107,361.2	66,512.9
IV. Futures[3]	9,490.7	9,226.5	4,010.1	2,869.1	1,079.5	691.7
– bought	1,563.4	1,445.0	1,068.6	259.8	31.6	18.3
– sold	1,574.8	1,460.5	726.2	264.5	382.3	12.9
V. Options	37,651.7	29,091.7	19,068.7	13,204.0	4,396.2	2,402.5
A. through organized exchanges[3]	5,314.9	5,211.1	2,359.7	1,943.2	374.0	235.1
– written	120.1	78.3	68.4	23.0	16.6	4.5
– bought	433.3	393.5	349.0	26.6	15.9	10.7
B. Over-the-counter	31,041.1	22,874.9	16,480.2	10,850.6	3,895.1	2,150.2
– written	9,543.7	6,800.3	4,966.6	3,524.4	1,247.3	677.2
of which: with other dealers	4,166.9	2,914.9	2,273.1	1,650.7	648.6	184.2
– bought	10,232.2	7,242.4	5,341.5	3,677.4	1,373.2	750.8
of which: with other dealers	3,954.1	2,830.6	2,039.8	1,634.7	661.2	144.5
Total	**832,026.0**	**682,366.9**	**329,647.6**	**194,366.6**	**112,986.9**	**69,812.1**

For footnotes, see opposite page.

Table VII (contd.)

Reported Exchange Market Turnover Net of Local and Cross-Border Inter-Dealer Double-Counting in April 1992, by Market Segment, Counterparty and Currency
Total Reported Transactions in All Currencies

(daily averages, in millions of US dollars)

Specified currency against all other currencies[1]							Category
Australian dollar	Canadian dollar	French franc	Ecu	Other EMS currencies	Currencies of other reporting countries[2]	Residual	
6,253.3	8,093.1	14,865.4	11,730.7	36,766.8	10,321.2	32,865.3	I. Spot
3,754.6	5,198.9	10,454.4	8,461.4	23,446.6	5,570.0	20,474.9	– with other dealers
1,706.4	2,319.2	4,343.8	2,820.1	9,612.5	3,879.5	5,726.1	local
2,048.2	2,879.7	6,110.6	5,641.3	13,834.1	1,690.5	14,748.8	cross-border
360.5	1,253.3	1,491.7	1,493.6	5,661.3	1,081.5	4,426.8	– with other financial institutions
82.9	168.9	585.3	560.1	2,234.9	842.0	497.8	local
78.8	88.4	616.2	895.5	3,426.4	239.5	1,723.8	cross-border
1,955.6	1,588.7	2,849.7	1,771.3	7,619.7	3,628.6	7,102.0	– with customers
217.4	147.0	1,831.8	1,022.0	6,091.7	3,508.3	3,103.0	local
199.8	90.1	606.3	402.5	1,519.4	120.3	1,672.3	cross-border
1,508.0	1,962.3	2,323.0	1,582.7	5,704.2	2,168.8	6,514.3	II. Outright forward
374.4	632.2	726.6	553.4	1,861.9	377.8	1,995.1	– with other dealers
171.3	187.0	291.8	188.1	678.5	287.8	577.9	local
203.1	303.8	433.5	365.0	1,183.5	90.0	1,412.2	cross-border
210.0	428.6	412.7	232.4	545.4	122.7	943.0	– with other financial institutions
64.7	74.5	191.5	77.6	271.2	107.5	177.7	local
16.1	32.9	93.6	117.3	274.2	15.1	256.6	cross-border
849.8	897.1	1,175.0	796.9	3,292.6	1,668.3	3,576.2	– with customers
173.5	210.1	786.7	577.8	2,597.7	1,461.5	1,745.0	local
76.1	73.9	233.4	184.0	690.5	206.7	1,251.8	cross-border
11,398.2	15,884.9	13,941.9	10,848.0	30,698.9	12,996.3	22,747.3	III. Swaps
8,150.3	11,610.3	9,399.0	7,590.4	22,771.2	9,131.7	16,795.4	– with other dealers
3,518.1	4,611.3	3,127.0	2,296.3	7,393.7	6,477.7	4,265.1	local
4,632.2	6,999.0	6,272.0	5,294.1	15,377.5	2,654.0	12,530.3	cross-border
509.6	1,835.6	1,611.0	2,334.4	4,077.2	1,408.1	2,377.3	– with other financial institutions
120.3	122.9	609.9	1,091.5	1,812.4	641.8	350.6	local
162.1	157.1	519.9	1,180.4	2,264.8	766.3	758.0	cross-border
2,581.7	2,330.3	2,792.8	923.1	3,798.3	2,456.5	3,565.9	– with customers
242.1	314.6	1,810.1	603.5	2,716.6	2,303.4	2,021.7	local
306.1	89.0	602.0	277.2	1,081.7	153.1	926.1	cross-border
19,159.5	25,940.3	31,130.3	24,161.4	73,169.9	25,489.2	63,241.6	Sub-total
210.9	272.7	11.2	1.7	162.5	38.0	407.7	IV. Futures[3]
0.3	0.6	..	0.6	14.4	85.3	202.3	– bought
0.4	0.5	..	0.6	81.9	18.9	200.8	– sold
1,039.4	1,044.3	615.0	80.6	647.1	112.1	3,601.7	V. Options
24.0	271.2	102.5	12.4	22.5	10.6	63.3	A. through organized exchanges[3]
..	6.1	0.1	4.6	15.0	5.2	18.6	– written
0.4	8.8	..	4.2	7.5	5.4	44.5	– bought
379.0	772.0	512.2	68.2	624.7	100.7	3,374.4	B. Over-the-counter
86.6	182.0	167.5	29.1	312.6	50.4	1,043.3	– written
21.1	57.7	90.5	14.0	179.3	4.8	294.8	of which: with other dealers
108.2	273.3	230.7	19.2	312.1	50.3	1,085.3	– bought
22.5	128.4	75.1	9.7	101.8	7.8	252.2	of which: with other dealers
20,409.8	**27,257.3**	**31,871.5**	**24,418.7**	**74,154.5**	**29,149.3**	**67,610.9**	**Total**

[1] Because two currencies are involved in each transaction, the sum of transactions in individual currencies comes to twice total reported turnover. [2] Includes only transactions where at least one counterparty is located in the country of issue of the currency in question. [3] No adjustment for double-counting.

ANNEX V

A NOTE ON MACROECONOMIC CAUSES OF RECENT EXCHANGE MARKET TURBULENCE

Prepared by the Research Department, IMF [1]

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[1] The views expressed should not be regarded as the official views of the Management or Executive Board of the International Monetary Fund.

Introduction

The turbulent events in foreign exchange markets in the late summer and autumn of 1992 demonstrated the enormous pressures that can be brought to bear against official exchange rate parities when market participants perceive that significant exchange rate realignments may be imminent. Market perceptions that some European exchange rate parities might be realigned began to strengthen when Denmark rejected the Maastricht treaty in a referendum held in early June. This provided an indication that the road to European Monetary Union might prove more difficult than had previously been expected. Subsequently, uncertainty over the outcome of the French referendum, and the specific temporal focus on September 20 as the date when French voters would provide an important signal, precipitated intense speculative pressures on a number of currencies participating in the Exchange Rate Mechanism (ERM) of the European Monetary System (EMS), as well as on Scandinavian currencies that were pegged to the ecu. These pressures led to the decisions on September 16-17 to suspend the pound sterling and the Italian lira from the ERM and to devalue the Spanish peseta, and left European exchange markets in a state of continuing turbulence. In a fundamental sense, however, the causes of the recent exchange rate turbulence were not the market pressures that were unleashed late last summer, but rather the underlying macroeconomic divergences that developed during the preceding few years and ultimately provided the foundation for these market pressures.

This note begins its assessment of the recent exchange rate turbulence with a brief review of the development of pressures in European exchange markets starting in the summer of 1992 (Section I). It then addresses the underlying macroeconomic causes of those pressures, emphasizing that, for a number of European exchange rates, macroeconomic developments had led market participants to form one-sided expectations about the direction in which any realignment would occur (Section II). It concludes by pointing to some lessons that can be drawn from the recent experience (Section III). A chronology of events is attached (Appendix I), along with a note examining the variability of nominal and real exchange rates over the past two decades (Appendix II).

I. The Development of Market Pressures

The discipline provided by commitments to maintain parities within the ERM was clearly helpful in assisting several participating countries that had histories of relatively high inflation to converge toward the inflation performance of participating countries with the lowest inflation rates. Confidence in the durability of this convergence process was enhanced by the agreement at Maastricht in December 1991 on a treaty for European

Monetary Union (EMU). In financial markets, these developments, which suggested a declining risk of exchange rate realignments in Europe, undoubtedly provided some inducement for investors seeking higher yields to place short-term funds in European currencies with relatively high short-term interest rates – in most cases the very currencies that subsequently came under severe pressure during the late summer and autumn of 1992.

The narrow rejection of the Maastricht treaty by Danish voters in early June 1992 provided a signal that progress toward EMU might not be entirely smooth and, accordingly, that the risk of exchange rate realignments for some European currencies was significantly greater than had previously been perceived. This warning probably reversed the earlier effect on financial market conditions of the perception that the discipline of commitments to exchange rate parities and to the Maastricht convergence process would continue to induce (or allow) governments to refrain from pursuing policies that gave priority to shorter-term domestic economic objectives. As a result, market pressures began to work against currencies thought to be potentially weak. In particular, Italy, with its large fiscal imbalance, and with political uncertainties following the parliamentary elections in April and the 12-week delay in forming a new government, began to lose foreign exchange reserves at an accelerating pace during the summer.

Initially, it was widely expected that the French referendum scheduled for September 20 would provide a strong demonstration of political support for the Maastricht treaty. However, when opinion poll results in August began to show a significant chance that French voters might reject the treaty, doubts grew not only about the fate of EMU but also about the viability of existing exchange rate parities within the ERM. The specific date set for the referendum provided a precise temporal focus for market pressures against currencies perceived to be potentially vulnerable to devaluation. Prudent investors who had earlier sought higher yields by placing funds in potentially vulnerable currencies increasingly saw the merit of covering their exposed positions before the French vote. Speculators who saw the potential for profit from one-way bets against currencies that might be devalued (but would not appreciate) increasingly saw the merit of opening short positions in potentially vulnerable currencies. Inevitably, the process snowballed, as sales of potentially vulnerable currencies by private market participants led to growing market tensions, which made prudent investors ever more concerned about the need for defensive cover and speculators ever more confident about the prospects for profit.

In the event, the first currency unhinged was the Finnish markka, which was forced off its peg to the ecu on September 8. Market pressures rapidly transferred to the Swedish krona, which (as discussed below) was perceived as vulnerable for the same general reasons as the markka. Two emerging packages of fiscal measures, heavy intervention,

and sharp increases in overnight Swedish interest rates – ultimately to an annualized rate of 500 percent on September 16 – successfully deterred this particular attack. However, increases in short-term Italian interest rates in early September, along with massive intervention by both the Bank of Italy and the Bundesbank, could not keep the lira above its floor in the ERM, which it had first fallen below on August 28. Over the weekend of September 12-13, it was decided to devalue the lira by 7 percent in the ERM, and it was agreed that the Bundesbank would reduce short-term market interest rates in Germany by, as it turned out, about 1/4 of one percent.

Thus, the mood of optimism that followed the agreement at Maastricht evaporated the weekend before the French vote. By Tuesday, September 15, markets sensed that, especially in light of continuing uncertainty about the French referendum, the actions so far taken were inadequate to relieve pressures against existing ERM parities. This was reinforced by wire reports of alleged remarks attributed to official sources outside the United Kingdom suggesting that further ERM realignment was desirable. An overwhelming attack against sterling then led the UK government to announce, in the evening of September 16, that the pound would be suspended from the ERM effective the next day. The Italian government also decided to suspend temporarily the participation of the lira at that time. Simultaneously, the Spanish peseta was devalued by 5 percent in the ERM. However, in the event of the "petit oui" vote in France on September 20, these actions proved inadequate to calm exchange market tensions. Following the French referendum, the Irish pound, the Spanish peseta, the Portuguese escudo, and the French franc came under downward assault, while the Belgian franc, the Dutch guilder and the German mark hit upper intervention limits. Increases in domestic interest rates, official intervention, and the use of capital controls – in combination with interest rate declines in Belgium, the Netherlands, and Germany – allowed for successful defense of the parities of the Irish pound, the Spanish peseta, and the Portuguese escudo. Massive intervention by both the Banque de France and the Bundesbank, interest rate adjustments in both France and Germany, and clear statements by both French and German officials that the devaluation of the franc was inconsistent with economic fundamentals warded off the assault on the French franc.

Respite was brief. In mid-November, the Swedish krona again came under intense pressure when multi-party negotiations over a broader package of budgetary control measures collapsed, and when markets perceived that substantial and prolonged increases in Swedish interest rates were not viable in light of the weakness of the Swedish economy and financial system. After a massive outflow of reserves, the Swedish authorities abandoned the peg of the krona against the ecu on November 19. Exchange market pressures quickly spread to the Spanish peseta, the Portuguese escudo, the Norwegian krone, the Irish pound, the Danish krone, and the French franc. On November 23, the central parities of the peseta and the escudo in the ERM were both adjusted downward by 6 percent; on December 10, the Norwegian krone was floated off its peg against the ecu;

and on February 1, the Irish pound was devalued by 10 percent within the ERM. The parities of the Danish krone and the French franc were successfully defended by intervention and by interest rate adjustments.

Notably, the pressures on European currencies were not universal. Within the ERM, exchange rates between the Belgian franc, the Dutch guilder, and the Deutschemark fluctuated very insignificantly throughout the crisis and post-crisis periods, although the Belgian franc came under downward pressure briefly in February and again in late March 1993 in the face of mounting political uncertainties associated with a budget crisis. Outside the ERM, the Austrian schilling has continued to fluctuate very narrowly against the Deutschemark throughout the past year, and the Swiss franc somewhat more broadly.

It is also notable that, in Canada, an entirely separate crisis developed without generating disorderly exchange market conditions. During September, the Canadian dollar began to experience strong downward pressure as market attention focused on political uncertainties associated with the constitutional referendum scheduled for October 26. The Bank of Canada, although not committed to defend a fixed parity, nevertheless acted to resist the depreciation of its currency. From early September through October 26, the Canadian dollar depreciated by more than 4 percent against the US dollar while Canadian short-term interest rates increased by roughly 300 basis points and US short-term rates declined slightly. Subsequently, the Canadian dollar has firmed and Canadian short-term interest rates have fallen most of the way back to the levels that prevailed before the crisis.

In seeking to explain the recent European exchange market crisis, it is important to note that the daily developments in exchange markets were not closely linked to specific contemporaneous developments in other economic variables. For the most part, there simply were not economic developments that could plausibly explain why massive exchange market pressures happened to emerge on one day rather than another, or why the pressures tended to spread haphazardly from one currency to another. Thus, rather than seeking an understanding of the day-to-day events, it seems appropriate to think of the recent European exchange market crisis in a manner analogous to the concept of an earthquake, where the underlying pressures are built up over a period of time and then suddenly unleashed by some triggering event in a huge shock, followed by a series of after-shocks. This paradigm suggests that, in efforts to diminish the likelihood of future exchange market crises, there may be relatively little to gain from simply seeking to avoid particular triggering events, which may only affect the specific timing of exchange market crises. Instead, attention might more profitably focus on understanding the economic pressures underlying the recent European exchange market crisis, and on designing mechanisms and strategies to avoid a build up of such pressures in the future.

II. Underlying Economic Pressures

For the most part, the economic pressures underlying the recent European exchange market crisis reflected a build up of macroeconomic imbalances within Europe. Nevertheless, before focusing on macroeconomic developments within Europe, it is relevant to note that the external macroeconomic environment was not helpful to European countries trying to defend the pegs of their currencies. Specifically, for the European countries that recently experienced recessions – notably the United Kingdom, Sweden, and Finland – the sluggish economic recovery in North America and, to a lesser extent, slow growth in Japan made their own economic recoveries more difficult. In addition, the substantial decline in short-term interest rates outside Europe since 1990 probably encouraged a flow of short-term capital into European currencies. With the growing conviction before the summer of 1992 that realignments among European currencies were unlikely, part of the flow was apparently directed toward countries where interest rates were somewhat higher than in Germany. When doubts began to grow about the durability of some exchange rate parities, defensive measures by the holders of this short-term capital clearly added to pressures in exchange markets.

It is important, however, not to overemphasize reductions in short-term interest rates in North America and Japan as primary underlying causes of the exchange rate pressures in Europe. Rather, insofar as interest rate developments outside Europe contributed to the recent exchange market tension, the primary causes underlying this source of tension were the fiscal and financial imbalances of the mid and late 1980s in North America and Japan. It is these earlier imbalances that contributed to the US and Canadian recessions, and that also limited the menu of policy options for supporting the subsequent recovery. The same holds broadly true for Japan, except that the fiscal consolidation achieved earlier in Japan has recently allowed stimulative fiscal action to counteract some of the other forces tending to weaken Japanese growth.

Within Europe, a key factor contributing to the build-up of exchange market tensions was the substantial fiscal imbalance in Germany in the aftermath of unification, together with a policy response under which short-term interest rates in Germany have been maintained at high levels. From the perspective of the prevailing economic and fiscal situation in Germany, the high interest rates were necessary to combat inflationary pressures. From other perspectives, however, including those of Germany's partner countries in the ERM, actions to reduce the fiscal deficit in Germany would have been a preferable response to the inflationary pressures, which emanated largely from the major fiscal stimulus provided in conjunction with German unification – a stimulus that impacted a West German economy already operating at or near potential. While Germany's partners in Europe generally benefitted from the first-round, expansionary effects of German unification through an increase in their exports, for many partner countries the second-round effects of unification, resulting from higher German interest rates brought on

by the mix of expansionary fiscal and tight monetary policies, have been difficult. The difficulties have been especially harsh for those European countries with economies in recession, or with obligations to pay interest on large stocks of government debt.

In the United Kingdom, the underlying causes of the cyclical downturn that began in 1990 included the tight policies the Government pursued to reduce inflation following the overheating of the economy during the late 1980s. The persistence of the UK recession also owed something to the sharp reversal of the strong upsurge in real estate values in the previous decade. The long-lasting recession placed the UK economy in a particularly poor position to deal with persistent high German interest rates and the historically low level of the dollar in the late summer of 1992.

The discipline imposed by the parity at which the United Kingdom entered the ERM in October 1990 facilitated the subsequent reduction of inflation in the United Kingdom, but while inflation fell below the German rate in the course of 1992 it did not fall sufficiently to improve Britain's competitive position against its partner countries. Moreover, current account deficits that have recently been running around 2 per cent of GDP, despite the domestic recession, likely reinforced the impression that sterling was overvalued, particularly against the US dollar. With the continuing recession and the balance sheet problems of British firms and households, together with the sharp reduction in inflation that had taken place and the further reductions which were in prospect, many market participants perceived that the British government would be reluctant to contemplate a further tightening of monetary conditions, which would have been unnecessary and inappropriate on domestic economic grounds, in order to defend the exchange rate of sterling if it came under intense pressure. Thus, economic developments in the United Kingdom, and elsewhere, created a situation by the late summer of 1992 where many market participants formed one-side expectations about the direction in which sterling would go if there was a realignment of parities in the ERM. When events outside the United Kingdom suggested that the likelihood of realignment had increased significantly, speculative market pressures against sterling rapidly became overwhelming.

The same may be said, with some variations, about the underlying macroeconomic causes of the exchange market pressures confronted by Sweden and Finland. Contractionary monetary policy made necessary by earlier excesses clearly contributed to the recent severe recessions in both countries, while Finland was also suffering from the collapse of its trade with the former Soviet Union. In this economic environment, with deep difficulties in the financial sectors of both countries, market participants perceived that maintenance of very high interest rates to defend exchange rate parities was not a sustainable policy.

For Italy, the situation was somewhat different. Although the Italian economy remained generally in phase with most other major European economies, Italy's competitiveness was gradually eroded over 1987-92 as domestic price and cost inflation stayed above that of key partner countries in the ERM (notably France and Germany),

and the cumulative inflation differential far outweighed the 3.7 percent devaluation of the lira's central EMS parity against the mark in January 1990 (Chart 1) [2]. Thus, despite cost containment in key tradable goods industries, the market had a basis both for the impression that the lira might be overvalued, and for worries that Italy might not be able to satisfy the inflation convergence criteria for EMU. Probably more important was the large budget deficit and the growing concerns that the Italian government might not muster the political will to reduce it sufficiently to meet the fiscal convergence criteria envisaged by the Maastricht treaty. In addition, the large outstanding stock of public debt placed the Italian government in a poor position to absorb the consequences of persistently high interest rates. All of these concerns, which have their origins in undesirable economic policies of years past, were clearly recognized in financial markets and made the lira highly vulnerable to any increase in uncertainty about the sustainability of exchange rate pegs in the ERM. Similarly, relatively high inflation rates in Spain and Portugal during recent years left the peseta and the escudo vulnerable to growing doubts about the sustainability of the ERM parities (Chart 1).

For France, it is difficult to attribute the downward pressure on the franc against the Deutschemark on recent macroeconomic developments. Inflation in France has been running around 3 percent for the past five years and has been below German inflation for the past two years. As a result, France has been gaining competitive advantage relative to its European partners, and its current account has remained roughly in balance while other major European countries have shown rising deficits. Nevertheless, after the suspension of the pound and the lira from the ERM, market participants may have perceived a significant chance that the EMS might break down completely, and may have anticipated that domestic stabilization policies would in that case be adjusted to provide a relatively greater stimulus to the French economy, thereby tending to weaken the franc.

In addition, France may well have been affected by the prospective effects on competitiveness implied by the depreciations of the currencies of major trading partners. Similar effects also seem to have been a factor for a number of other countries, including Denmark, where nothing in the recent economic fundamentals suggested underlying weakness or a need to devalue. In Norway, which has had a relatively strong external position, there was little speculative pressure against the krone in September, but massive pressure following Sweden's decision to float in mid-November. In Ireland, where inflation has been relatively low, downward pressures on the currency apparently stemmed from the relatively close links with the UK economy and the depreciation of the pound sterling.

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[2] Real exchange rates based on indices of the consumer prices of tradable and nontradable goods and services combined, as shown in the chart, often exhibit different longer-term trends than those based solely on prices or production costs of tradable goods. It should be noted, in particular, that for European countries other than Germany, measures of real bilateral exchange rates vis-a-vis Germany based on normalized unit labor costs in manufacturing tend to show smaller real appreciations between January 1987 and mid-1992 than measures based on consumer prices. It should also be noted that for some countries, in particular the United Kingdom, the perspective provided by Chart 1 is different than that provided by a longer data series (see Appendix II, Chart 2).

III. Lessons

The recent European exchange market crisis has demonstrated that a massive volume of financial resources can rapidly be mobilized in existing international capital markets, and that the pressures against an exchange rate parity can quickly become enormous. One of the clear lessons is that, in today's international capital markets, official intervention on any plausible scale, when not supported by other policy actions, can be overwhelmed by market forces.

Another lesson, which is by no means a new one, is that a pegged exchange rate arrangement is vulnerable to divergences over time in the economic performances of the countries participating in the arrangement. Even countries that succeed in maintaining sound economic fundamentals can find their currencies vulnerable to strong exchange market pressures triggered by currency depreciation in other participating countries. In the case of the recent European exchange market crisis, pressure under the ERM had been building for some time. Major fundamental factors that contributed to the growing underlying tension included German unification and the combination of monetary and fiscal policies that were subsequently implemented in Germany, the divergent cyclical position in the United Kingdom stemming in part from the earlier measures which the authorities had taken to dampen the inflationary pressures that arose in the late 1980s, and the large budget deficit in Italy.

The stability of a pegged exchange rate system today – given the size, profit orientation, and technical capacity of international capital markets – thus depends importantly on whether a high degree of convergence in the economic performances and domestic policy needs of participating countries can be rapidly achieved and maintained. Convergence of economic performance, especially convergence of national inflation rates toward a common very low rate, is a critical requirement for successful operation of a pegged exchange rate system without either frequent realignments or periodic large crises. For the countries that have participated in the ERM, much has already been achieved in terms of economic convergence, particularly for national inflation rates. Further progress on convergence is clearly possible and would surely contribute to enhanced stability of the ERM.

Experience indicates, however, that convergence of national inflation rates to very low levels is not always enough to assure exchange rate stability. This is readily apparent from the statistical evidence on exchange rate variability over the past two decades (Appendix II). Under any type of exchange rate arrangement, various unexpected developments will give rise to periodic conflicts between the objective of exchange rate stability and domestic economic objectives, and countries must be prepared to sacrifice at least temporarily the latter objectives to achieve the former.

As illustrated by the Canadian experience last autumn, virtually all countries, regardless of their particular exchange rate arrangements, will at least occasionally find it appropriate to limit exchange rate movements by diverting their monetary policy instruments at least temporarily away from the course that would otherwise be most consistent with the pursuit of domestic economic objectives. For many countries, moreover, the relative benefits of exchange rate stability can be sufficient to warrant pegged exchange rate systems, even at the sacrifice of short-run flexibility in the conduct of monetary policy.

Yet, so long as countries maintain meaningful independence of their national monetary policies, divergences in the domestic requirements for monetary policy that would normally imply exchange rate adjustments under a floating exchange rate regime will tend to put pressure – sometimes very intense pressure – on pegged exchange rates. With the present high degree of international capital mobility, there is no practical escape from this dilemma, short of either the abandonment of the exchange rate pegging arrangement or the effective surrender of the independence of national monetary policies for the countries participating in such an arrangement. In an environment of free capital mobility, there can only effectively be one monetary policy for a group of countries that seek to keep their bilateral exchange rates fully fixed. This could be the monetary policy of a dominant country to which other members of the group passively adjust, or it could be a monetary policy that is agreed by some common mechanism – but it cannot be separate policies for different members of the group. Moreover, since foreign exchange markets react not only to what monetary policies are today but also to how they are expected to evolve in the future, the mechanisms that assure the effective subordination of national monetary independence to the requirements of a pegged exchange rate regime must be perceived as credible.

ANNEX V

APPENDIX I

CHRONOLOGY OF EVENTS PRECEDING AND FOLLOWING THE SEPTEMBER 1992 CRISIS IN THE EUROPEAN MONETARY SYSTEM

June 2. Danish voters reject (by 50.7 percent) the Maastricht treaty. Subsequently, tensions within the ERM increase significantly, leading to sharp increases in short-term interest rates in Italy, in particular, as the lira comes under downward pressure.

June 3. France announces a September 20 national referendum on the Maastricht treaty.

July 2. The US Federal Reserve Board reduces discount rate by 1/2 of 1 percentage point, to 3 percent, and eases reserve pressures by a similar reduction in the federal funds rate.

July 16. Bundesbank raises discount rate by 3/4 of 1 percentage point, to a record high of 8 3/4 percent, but leaves the Lombard rate at 9 3/4 percent. The short-term interest rate differential between Germany and the United States widens to 6 3/4 percentage points and puts further downward pressure on the dollar.

July 20. Major industrial countries intervene to prevent the US dollar from declining further.

July 27. Bank of Japan lowers discount rate by 1/2 of 1 percentage point, to 3 1/4 percent.

August 14. Pound sterling falls to a new low against the Deutschemark.

August 20. Unexpectedly high growth in German M3 announced. Sterling falls to within 1 pfennig of its ERM floor (DM 2.788), and the US dollar reaches an all-time low against the Deutschemark.

August 27. Record levels of intervention fail to lift sterling significantly.

August 28. Italian lira dips below its ERM floor for the first time, reflecting growing concern over the budgetary situation and the loss of reserves.

September 2. The US dollar declines to a new historic low against the Deutschemark (DM 1.3862).

September 3. The Bank of England augments reserves by borrowing $14.5 billion in Deutschemarks, lifting the value of pound sterling above DM 2.8.

September 4. The US dollar drops almost 4 pfennigs as the Federal Reserve lowers its target for the federal funds rate by 1/4 of 1 percentage point, to 3 percent, in response to unexpectedly poor employment data. The Italian lira remains below its ERM floor despite large-scale intervention and increases in the Italian discount rate and in the Lombard rate of 1 3/4 percentage points (the largest increase in eleven years), to 15 percent and 16 1/2 percent, respectively.

September 5-6. Meeting in Bath of EC ministers of finance and central bank governors to discuss contingency plans in the event of a negative French vote on Maastricht treaty, German monetary policy, and ERM tensions. Participants agree to a four-point official statement including a strong reaffirmation of the existing EMS parities and a pledge by the Bundesbank not to raise interest rates "in present circumstances."

September 8. Finnish authorities float the markka, which declines 13 percent against the Deutschemark. Swedish central bank raises marginal lending rate to 25 percent and then to 75 percent. Weaker ERM currencies depreciate further against the Deutschemark. US dollar appreciates.

September 10-11. Italian lira remains below its ERM floor despite massive intervention by the Bundesbank and the Bank of Italy.

September 12-13. Official discussions about ERM tensions lead to a decision and announcement on September 13 by the EC monetary committee that the Italian lira would be devalued 7 percent and that there was a commitment by the Bundesbank to lower interest rates.

September 14. Bundesbank lowers discount rate by 1/2 of 1 percentage point, to 8 1/4 percent, and lowers the Lombard rate by 1/4 of 1 percentage point, to 9 1/2 percent. Devaluation of the lira and the reduction in German interest rates move the lira to the top of the EMS grid, and sterling appreciates. Swedish central bank cuts marginal lending rate from 75 percent to 20 percent.

September 15. Wire reports of alleged remarks attributed to official sources suggesting that further ERM realignment was desirable. Italian lira drops below new central ERM parity, and sterling falls to a new low against the Deutschemark. Spanish peseta drops below central ERM rate, which had been the intervention level for the Bank of Spain.

September 16. After several rounds of intervention, Bank of England's minimum lending rate raised in the morning from 10 to 12 percent. With sterling still at its limit in the afternoon, Bank of England announces there will be a further increase to 15 percent on the following day. By close of EMS operating hours at 4 pm, sterling was still at its floor. Later that evening the UK authorities rescinded the decision to raise MLR to 15 percent and, after consultation with the Monetary Committee of the European Community, EC Finance ministers and central bank governors noted the decision of the UK authrorities to suspend sterling's membership of the ERM. Intervention in support of the Italian lira fails to hold the currency above its new ERM floor. Sweden raises its marginal lending rate to 500 percent.

September 17. The lira's participation in the ERM is suspended, with the intention of rejoining soon. The Spanish peseta is devalued by 5 percent within the ERM. The French franc, Danish krone, and Irish pound all fall to their ERM floors. The Bank of England cuts its minimum lending rate from 12 percent to 10 percent. The Central Bank of Ireland intervenes to support the Irish pound.

September 18. Pressure against ERM currencies continues. Overnight rates in Ireland reach 300 percent. The value of the pound falls further. In Italy, the government enacts the bulk of the fiscal package for 1993 through a set of emergency decrees.

September 20. France narrowly (by 51.1 percent) affirms the Maastricht treaty. The French franc rises against the Deutschemark.

September 21. Closeness of the vote in France raises doubts about Maastricht treaty. The French franc falls to near the bottom of its ERM band despite concerted intervention by the

Banque de France and the Bundesbank. Italy announces that the lira will not immediately rejoin the EMS. Sweden lowers marginal lending rate from 500 percent to 50 percent.

September 22. Further pressure on the French franc, Irish pound, Spanish peseta, and Portuguese escudo. Spain intervenes for the first time since the devaluation of the peseta. UK announces 1 percentage point cut in base rates. The Central Bank of Ireland intervenes to support the Irish pound, which trades below its ERM floors against the Deutschemark, the Dutch guilder, and the Belgian franc.

September 23. Pressure on the French franc intensifies. The Banque de France raises short-term repurchase rate by 2 1/2 percentage points, to 13 percent, and German short-term market rates decline by about 50 basis points. The Banque de France and the Bundesbank engage in massive intramarginal intervention. Spain introduces exchange controls to defend the peseta. The Central Bank of Ireland repeatedly intervenes to support the Irish pound, which continues to trade below its ERM floors against the Dutch guilder and the Belgian franc.

September 24. The French franc stabilizes above its ERM floor. Ireland and Portugal introduce new exchange controls. Swiss National Bank cuts its discount rate by 1/2 of 1 percentage point, to 6 percent. The Central Bank of Ireland intervenes to support the Irish pound, which continues to trade below its ERM floors against the Dutch guilder and the Belgian franc.

September 25. The Central Bank of Ireland intervenes to support the Irish pound.

September 28. Ireland raises base rate by 3 percentage points to 13 3/4 percent. Pound sterling drops to a new low against the Deutschemark (in London) of DM 2.51. Swedish central bank cuts marginal lending rate from 50 percent to 40 percent.

September 30. Swedish central bank cuts marginal lending rate by 16 percentage points, to 24 percent, in response to an all-party agreement to reduce public spending in 1993 by SKr 20 billion. Canadian banks raise prime lending rates by 2 percentage points, to 8 1/4 percent, in reaction to the Bank of Canada's efforts to support the Canadian dollar.

October 1. Italian cabinet approves the 1993 budget calling for spending cuts and revenue increases of Lit 93 trillion (5.8 percent of GDP) relative to trend. Banque de France weekly report indicates that the central bank spent about Fr 80 billion to defend the franc during the currency crisis.

October 2. Italian government begins discussions with EC partners about a stand-by loan of ecu 9 billion to strengthen the lira and to sustain confidence in returning the lira to the ERM. Pound sterling closes the week at a new low against the Deutschemark of DM 2.43.

October 5. Spain lifts some of the exchange controls imposed in September. Pound sterling closes the trading day in London below DM 2.40.

October 7-31. Official interest rates are gradually reduced in most countries affected by the crisis, although rates remain somewhat above pre-crisis levels.

October 14. Finnish government announces plans to cut spending by Fm 54.2 billion ($11.6 billion) over the next three years and to restore calm in exchange markets following the floating of the markka on September 8. Portuguese government unveils a budget for 1993 that provides for a reduction of the deficit to less than 4 percent of GDP.

October 20. Italian parliament begins debate on spending cuts and tax increases worth Lit 93 trillion (including a freeze of public sector pay in 1993, a tax on luxury goods, stiffer tax scales

for salaried employees, and a minimum tax for the self-employed), and the government asks EC partners for a special stand-by loan of ecu 8 billion ($11.2 billion), the maximum funding possible from its partners to offset the loss of reserves from intervention in September.

October 21. The Bundesbank announces a reduction of 15 basis points in the minimum securities repurchase rate, to 8 3/4 percent, which is smaller than widely expected. Bond yields rise in the United States, Japan, and Germany and fall in France and the United Kingdom.

October 23. The Italian parliament approves four mandate laws aimed at implementing structural reforms in key areas of public expenditure. The Bank of Italy reduces the discount rate by 1 percentage point, to 14 percent.

November 1-30. Official interest rates are reduced further in many countries affected by the crisis, although they remain above pre-crisis levels.

November 5. Banque de France lowers short-term repurchase rate by 2 1/2 percentage points, to 10 1/2 percent, reversing the September 23 increase and coinciding with the full recovery of reserve losses sustained during the crisis.

November 19. Swedish central bank increases marginal lending rate, from 11 1/2 percent to 20 percent, to defend the krona. Later in the day, the Swedish authorities float the krona, which declines 9 percent against the Deutschemark, and the Swedish central bank reduces the marginal lending rate to 12 1/2 percent.

November 22. The Spanish peseta and Portuguese escudo are devalued by 6 percent within the ERM. Spain lifts special capital controls imposed during the September crisis.

November 23. The Norwegian central bank raises the overnight lending rate from 17 percent to 25 percent. The Central Bank of Ireland raises its short-term facility rate from 13 3/4 percent to 30 percent. The Bank of Spain raises its money rate from 13 percent to 13 3/4 percent.

November 26. Central Bank of Ireland raises its overnight rate to 100 percent.

December 1-31. Official interest rates are reduced in some countries affected by the crisis.

December 2. Central Bank of Ireland cuts its overnight rate from 100 percent to 30 percent.

December 3-14. Continued market pressures against the French franc, the Danish krone, and the Irish pound. Official interest rates reduced further in Belgium, Ireland, the Netherlands, Norway, and Sweden.

December 10. Bundesbank announces that it will raise its target range for growth in M3 in 1993 to 4 1/2 to 6 1/2 percent from the target range in 1992 of 3 1/2 to 5 1/2 percent. Norwegian authorities float the Norwegian krone, which declines 5 percent against the Deutschemark. The Central Bank of Norway cuts its key overnight lending rate by 5 percentage points to 11 percent.

December 13. EC heads of state meet in Edinburgh and adopt a growth initiative, including ecu 5 billion for the European Investment Bank and ecu 2 billion in capital for a new European Investment Fund that will guarantee bank loans to private industry. Participants also agree to grant Denmark legally-binding exemptions from the Maastricht Treaty.

December 21-31. Continued market pressure against the French franc. Trading reported to be unusually active with market reports suggesting intervention by the Banque de France as high as 45 billion French francs each week.

December 23. Bank of Italy lowers official rates by one percentage point.

January 5. The Banque de France raises official interest rates by introducing a new facility for banks to borrow overnight funds at 12 percent, as compared with the 5-to-10 day rate of 10 percent, and continues to intervene in support of its currency. The Bundesbank intervenes in support of the French franc.

January 6. The Central Bank of Ireland raises its overnight rate from 14 percent to 50 percent. Norway cuts its overnight lending rate by one-half percentage point to 10 1/2 percent. Central Banks in the Netherlands and Belgium lower official rates.

January 7. The Irish pound trades below its ERM floor, prompting intervention by some European central banks. The Bundesbank announces that its next securities repurchase agreement would be offered at a fixed rate of 8.6 percent, 15 basis points lower than its previous (variable rate) repurchase agreement. The Swiss National Bank lowers its discount rate by 1/2 of 1 percentage point to 5 1/2 percent.

January 8. The Central Bank of Ireland raises its overnight rate to 100 percent. The National Bank of Austria lowers its discount rate.

January 12-15. The Central Bank of Ireland cuts its overnight rate in three steps to 15 percent. The Bank of Norway cuts its overnight rate by one-half percentage point.

January 21-25. Central Banks in the Netherlands, Belgium, Austria and Ireland cut their key lending rates. The Bank of Spain cuts its money repurchase tender rate by one-half percentage point, noting the recent period of relative stability in foreign exchange markets.

January 26. The Bank of England reintroduces a minimum lending rate at 6 percent, resulting in a one percentage point cut in base rates to their lowest level since 1977.

January 28. Irish pound trades below its ERM floor, and the Central Bank of Ireland raises the official interest rate to 100 percent.

February 1-28. Official interest rates are reduced further in many countries affected by the crises.

February 1-3. Irish pound devalued by 10 percent within the ERM on February 1. Official interest rate in Ireland cut to 14 percent. French franc and Danish krone under pressure and associated money market interest rates rise. Overnight interest rates rise above 100 percent in Denmark as the Danish central bank raises official and market interest rates, which, along with sizable intervention by various European central banks, dampens the pressure on the kroner. Banque de France reopens its 5-to-10 day lending facility (suspended on January 5), effectively raising the rate from 10 percent to 12 percent.

February 2-3. Bank of Italy cuts its official rates by one-half percentage point.

February 4. The Bundesbank cuts its Lombard rate by 1/2 of 1 percentage point to 9 percent and its discount rate by 1/4 of 1 percentage point to 8 1/4 percent.

February 5. Banque de France cuts its overnight rate by 5/16 of 1 percentage point.

February 8. Minutes of the December meeting of the US Federal Open Market Committee indicate that the Federal Reserve shifted away from a bias toward easing short-term interest rates. Banque de France cuts overnight rate again by 1/8 of 1 percentage point.

February 17. Downward pressure on the Spanish peseta and Portuguese escudo with announcement that Spain's unemployment rate was 20 percent and Portuguese inflation higher-than-expected.

February 18. Central Bank of Sweden intervenes as krona hits all-time low against the Deutschemark.

February 19. It is announced that German M3 falls by 2 1/4 percent in January.

February 24-26. Reported intervention to support the Spanish peseta and Portuguese escudo. Official interest rates increase in both countries.

March. Political concerns weigh on the Italian lira; Bank of Italy reportedly intervenes at times. Portuguese escudo experiences downward pressure; Bank of Portugal raises official interest rates and repeatedly intervenes. Bank of Spain intervenes at times to support the peseta.

March 3. Central Bank of Ireland reduces official rates by one percentage point.

March 5. The Bundesbank reduces its securities repurchase rate by almost one-quarter percentage point.

March 10. Central Banks in the Netherlands and Belgium lower official interest rates. Central Bank of Denmark lowers its securities repurchase rate by one-half percentage point.

March 12. Central Bank of Norway lowers its overnight rate by one-quarter percentage point.

March 13. Budgetary agreement reached in Germany on Solidarity Pact that is expected to reduce the budget deficit by 1996.

March 18. Bundesbank lowers its discount rate by one-half percentage point to 7.5 percent; lombard rate left unchanged. Afterward, Central Banks in Denmark, the Netherlands, Belgium, and Austria cut official interest rates. Money market interest rates rise in France as the franc falls below DM 3.4. The Swiss National Bank cuts the discount rate by 1/2 of 1 percentage point.

March 22. The Central Bank of Ireland cuts official interest rates.

March 25. The Bundesbank lowers the rate at which it stands ready to sell three-day paper from 8.4 percent to 7.5 percent. The National Bank of Belgium raises official interest rates after the resignation of the ruling coalition government triggers strong selling of the Belgian franc inside the ERM.

March 29. The Central Banks of Ireland and Denmark cut official interest rates.

March 30. The Bank of Spain reduces the daily intervention rate from 14 3/4 percent to 14 1/4 percent.

March 31. The Bundesbank lowers the securities repurchase rate from 8.25 percent to 8.17 percent. The Central Banks of Belgium and Norway cut their official rates.

ANNEX V

APPENDIX II

A NOTE ON THE VARIABILITY OF NOMINAL AND REAL EXCHANGE RATES

I. Introduction and Summary

This Annex examines the variability of nominal and real exchange rates over the past two decades. In providing medium-term perspectives on the effectiveness of policy efforts to stabilize exchange rates, it provides support for the lessons drawn from recent developments in foreign exchange markets.

Variability is examined first for exchange rates among European currencies, using the Deutschemark as a convenient base, and then for exchange rates among major international currencies, using the US dollar as a base. Patterns in exchange rate variability over a medium-term time horizon are assessed by dividing the nearly 20 year period of generalized floating into four subperiods (the six-year interval leading up to the formation of the European Monetary System, and three subsequent intervals of approximately equal length), and then by examining how exchange rate variability has changed from subperiod to subperiod. Consistent with many recent discussions of exchange rate volatility, short-term variability of exchange rates is distinguished from long-term variability. The frequency of available price data implies that the shortest periodicity at which real exchange rates can be measured is monthly, and for this reason the measure of short-term variability adopted in this note is the standard deviation of month-to-month percentage changes in exchange rates [1]. Discussions of longer-term variability of exchange rates have mainly concerned exchange rate "misalignments," defined as substantial and persistent deviations of exchange rates from their "equilibrium" levels. Since no statistical measure of equilibrium exchange rates has been broadly agreed upon, the assessments of longer-term variability in this note are based simply on inspecting the cumulative movement of exchange rates during previously defined subperiods.

The principal conclusions from examining the evidence on short-term and long-term variability can be summarized as follows:

First, among European currencies, the short-term variability of both nominal and real exchange rates has generally been significantly lower during the two most recent subperiods (October 1983 through March 1988 and April 1988 through December 1992) than during the two earlier subperiods (April 1973 through March 1979 and April 1979 through September 1983). Notably, the decline in short-term variability of real exchange rates for particular European currencies vis-à-vis the Deutschemark is closely associated with the increasing tightness of the

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[1] The raw data on nominal exchange rate levels represent end-of-month observations. Real exchange rates are based on consumer price indices, but it may be noted that cross-sectional and time-series comparisons of short-term variability would be broadly similar for real exchange rates constructed from unit labor costs in manufacturing. Likewise, the cross-sectional and time-series comparisons of short-term variability would be broadly unchanged if the average absolute value of monthly percentage changes was used as the variability measure instead of the standard deviation. Finally, it should be noted that, although studies of the time-series behaviour of exchange rate variability have found significant degrees of persistence in the standard deviations of daily and weekly percentage changes, adjustment for such persistence does not appear to be necessary when analyzing the standard deviations of monthly percentage charges.

nominal link to the Deutschemark. For example, the Belgian franc, the Dutch guilder, the Danish krone, and the Austrian schilling show relatively low short-term real exchange rate variability during the 1970s along with a reduction in variability to very low levels during the 1980s. In contrast, while short-term variability for the French franc also declined over time, it did not reach the levels exhibited by the least variable European currencies until the late 1980s and early 1990s.

Second, the longer-term variability of real exchange rates, when measured using consumer price indices, also appears to have declined for many European currencies against the Deutschemark during the late 1980s and early 1990s. Again, the tightness of the nominal link to the Deutschemark apparently was a key explanatory factor. Convergence of national inflation rates to low levels (close to Germany's), which is itself an important accomplishment of the European Monetary System, apparently was also associated with small cumulative changes in real exchange rates based on consumer price indices.

Third, there is no indication of a significant change in the short-term variability of nominal or real exchange rates of major currencies against the US dollar across the various subperiods since the general advent of floating in 1973. This suggests that efforts to stabilize exchange rates among major currencies since the Louvre Accord in early 1987 have had no measurable impact on short-term exchange rate variability. This inference, it might be noted, is not sensitive to the particular choice of subperiods.

Fourth, the longer-term variability of nominal and real exchange rates against the US dollar, however, has clearly been smaller since the Louvre Accord than during the wide dollar swing from the late 1970s through the mid-1980s, although it has not been significantly smaller than during the early subperiod of floating. The recent relatively moderate swings in the foreign exchange value of the US dollar are also particularly remarkable in view of the very wide swings in the short-term interest rate differential between the United States and Germany since early 1987.

II. Exchange Rate Variability Among European Currencies

Since the advent of generalized floating in April 1973, the governments of a number of European countries have adopted a variety of arrangements for limiting the degree of fluctuation of exchange rates among their currencies. In particular, during the first subperiod from April 1973 until the formation of the European Monetary System (EMS) in March 1979, the Belgian franc, the Dutch guilder, the Danish krone, and the Norwegian krone were linked to the Deutschemark through the "Snake" arrangement, and at times the French franc and Swedish krona also entered into the arrangement. The Austrian schilling was also held tightly in line with the Deutschemark. During this initial subperiod, other European currencies were generally allowed greater freedom to fluctuate against the Deutschemark and its closely allied currencies (with the Irish pound rigidly pegged to the British pound). These exchange rate policies are clearly reflected in the data reported in Table 1 on the short-term variability of nominal and real exchange rates. Short-term variability against the Deutschemark is uniformly lower for the Belgian franc, the Dutch guilder, the Danish krone, and the Austrian schilling than for the other European currencies; while among the other currencies, the French franc, Swedish krona, and Norwegian krone show the lowest degrees of variability.

With the formation of the EMS in March 1979, the French franc, the Italian lira, and the Irish pound joined the group of currencies whose fluctuations against the Deutschemark were officially limited, although the Italian lira was permitted a wider band of movement than the other currencies participating in the Exchange Rate Mechanism (ERM) of the EMS. Norway and Sweden did not participate in the ERM. During the initial four and one-half years of operation of the ERM (reported in Table 1 as the second subperiod from April 1979 through September 1983), the degrees of short-term variability of the exchange rates of the French franc, Italian lira, and Irish pound against the Deutschemark all declined significantly from the variability levels recorded during the subperiod

preceding the formation of the EMS. Moreover, the short-term variability of both nominal and real exchange rates against the Deutschemark was generally lower for the ERM currencies and the Austrian schilling than for the other European currencies, apart from the variability of the real exchange rate of the Irish pound. Among the other European currencies, the Swiss franc, Finnish markka, and Norwegian krone were the least variable against the Deutschemark; the Swedish krona, Spanish peseta, and Portuguese escudo were somewhat more variable; and the pound sterling was the most variable. For the ERM currencies, realignments of central parities contributed to somewhat greater shorter-term variability of nominal and real exchange rates than characterized the two subsequent subperiods [2]. It is also noteworthy that, during the second subperiod from April 1979 to September 1983, in comparison with the remainder of the 1980s and the early 1990s, inflation rates were relatively high in the countries participating in the ERM (as well as in other countries) and divergences of inflation rates were also relatively large (Chart 1).

During the third and fourth subperiods reported in Table 1 (October 1983 through March 1988 and April 1988 through December 1992), inflation rates in European countries were notably lower and less divergent than during the 1970s and early 1980s (Chart 1). Also, realignments of parities for the currencies originally participating in the ERM became less frequent [3]. For these currencies, the short-term variability of nominal and real exchange rates against the Deutschemark was further reduced from that prevailing in earlier subperiods, with the nominal and real variability of both the French franc and the Irish pound against the Deutschemark during the fourth subperiod falling to the very low levels previously recorded for the Belgian franc, the Netherlands guilder, the Danish krone, and the Austrian schilling. The sole exception is the Italian lira during the fourth subperiod – a result that reflects fluctuations in the lira/Deutschemark exchange rate after the departure of the lira from the ERM in September 1992. For the European currencies not participating in the ERM, short-term nominal and real variability against the Deutschemark also declined significantly during the third subperiod, although it remained considerably higher than for currencies tightly linked to the Deutschemark. For the Swiss franc, Swedish krona, Finnish markka, and Spanish peseta, short-term variability increased during the fourth subperiod; in the latter three cases this largely reflected the turbulence in late 1992.

Chart 2 provides perspectives on the longer-term variability of nominal and real exchange rates among European currencies. Looking at real exchange rates, it is clear that for currencies that have been tightly linked to the Deutschemark, longer-term movements in real exchange rates based on consumer prices have generally been rather limited. This has been true for the Danish krone, the Netherlands guilder, and the Austrian schilling since the mid 1970s, for the Belgian franc and the French franc since the early 1980s, and for the Irish pound between the realignment of its central rate against the Deutschemark in early 1987 and the end of 1992. In contrast, the Italian lira has continued to show wider real exchange rate movements, including the persistent appreciation and subsequent sharp reversal from the late 1980s though 1992. Wider longer-term movements of real exchange rates against the Deutschemark also characterized the behavior of all the other European currencies shown in Chart 2 during the 1970s, and of all but the Swiss franc during the 1980s and early 1990s. Even these wider longer-term movements of real exchange rates, however, have generally been smaller than the movements of real exchange rates for European currencies against the US dollar.

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[2] EMS central rates were realigned seven times during the subperiod from April 1979 through September 1983. In the process, bilateral central rates against the Deutschemark were realigned six times for the Danish Krone, five times each for the Belgian franc and the Italian lira, four times each for the French franc and Irish pound, and twice for the Netherlands guilder.

[3] EMS central rates were realigned four times between October 1983 and March 1988, in the process of which bilateral central rates against the Deutschemark were realigned three times each for the Italian lira and the Irish pound, two times each for the Belgian franc, the Danish krone, and the French franc, and at no time for the Netherlands guilder. Between April 1988 and August 1992 the only EMS realignment was a 3.7 per cent devaluation of the central rate of the Italian lira in January 1990.

Table I

Short-term Variability of Exchange Rates Among European Currencies, 1973-92

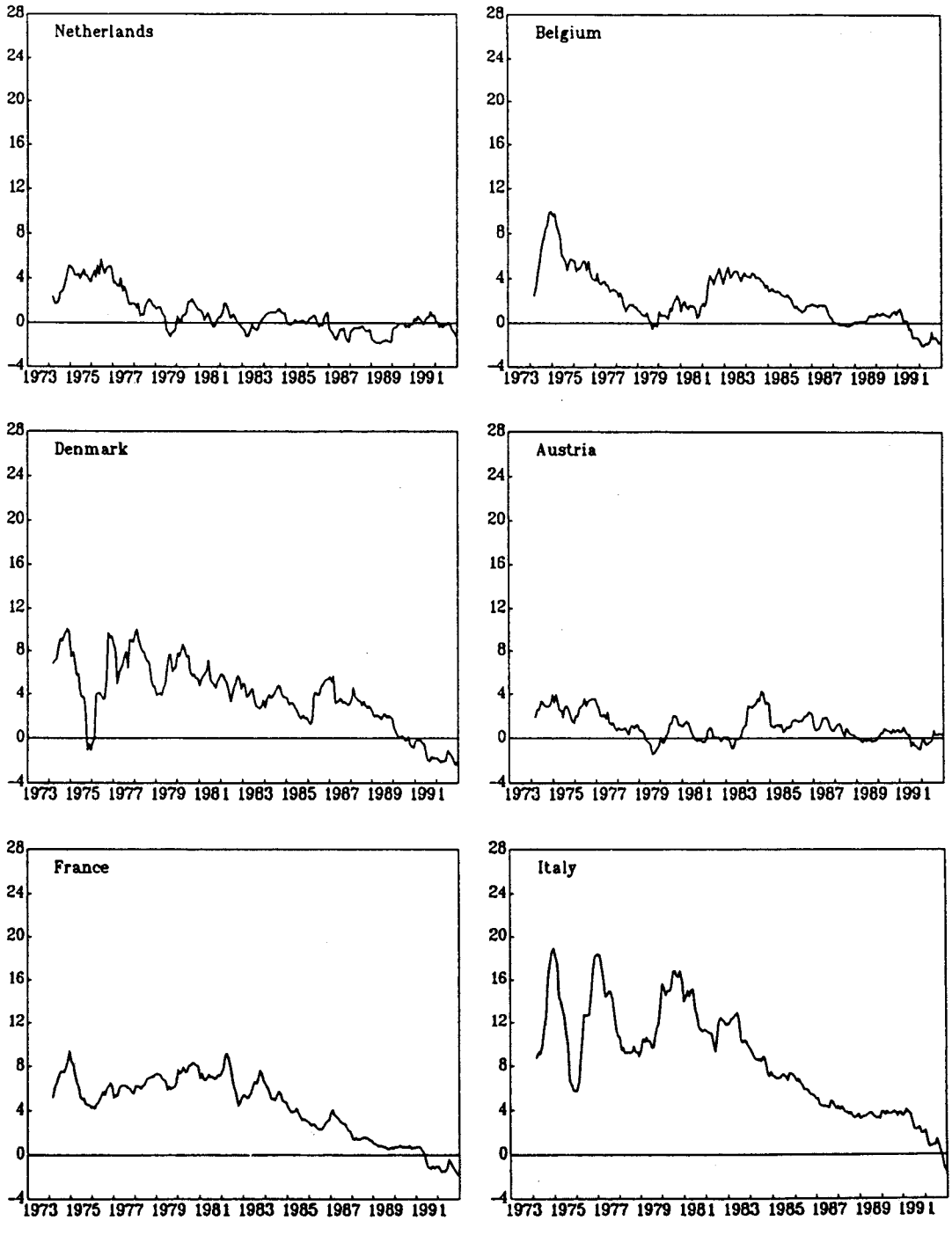
(Standard deviations of monthly percentage changes)

Bilateral exchange rates against the Deutschemark	April 1973-March 1979	April 1979-September 1983	October 1983-March 1988	April 1988-December 1992
Nominal				
Belgian franc	0.9	1.2	0.4	0.4
Netherlands guilder	1.2	0.7	0.4	0.5
Danish krone	1.3	1.0	0.6	0.6
Austrian schilling	0.8	0.3	0.3	0.4
French franc	2.1	1.4	0.9	0.5
Italian lira	3.3	1.2	0.9	2.1
Irish pound	3.0	1.0	1.2	0.4
Swiss franc	2.3	1.7	1.2	1.4
Pound sterling	3.0	3.4	2.5	2.3
Swedish krona	1.8	3.1	1.3	2.2
Norwegian krone	1.7	1.8	1.6	1.2
Finnish markka	2.2	2.2	1.1	2.8
Spanish peseta	4.2	2.5	1.3	1.7
Portuguese escudo	3.0	3.1	1.0	1.1
Real, based on consumer prices				
Belgian franc	1.1	1.3	0.4	0.5
Netherlands guilder	1.4	0.8	0.6	0.7
Danish krone	1.5	1.1	0.9	0.7
Austrian schilling	0.8	0.5	0.5	0.6
French franc	2.1	1.5	0.9	0.6
Italian lira	3.3	1.2	1.0	2.2
Irish pound	3.4	2.2	1.5	0.6
Swiss franc	2.4	1.7	1.2	1.4
Pound sterling	3.0	3.5	2.6	2.4
Swedish krona	1.9	3.2	1.5	2.4
Norwegian krone	1.7	2.0	1.7	1.3
Finnish markka	2.2	2.3	1.2	2.9
Spanish peseta	4.0	2.6	1.4	1.7
Portuguese escudo	3.4	3.2	1.4	1.3

Chart 1

Consumer Price Inflation Differentials, 1973-92

(Differentials vis-a-vis Germany in percent per annum [1])



1 Based on percentage changes in consumer price levels from 12 months earlier.

Chart 1 *(continued)*

Consumer Price Inflation Differentials, 1973-92

(Differentials vis-a-vis Germany in percent per annum [1]*)*

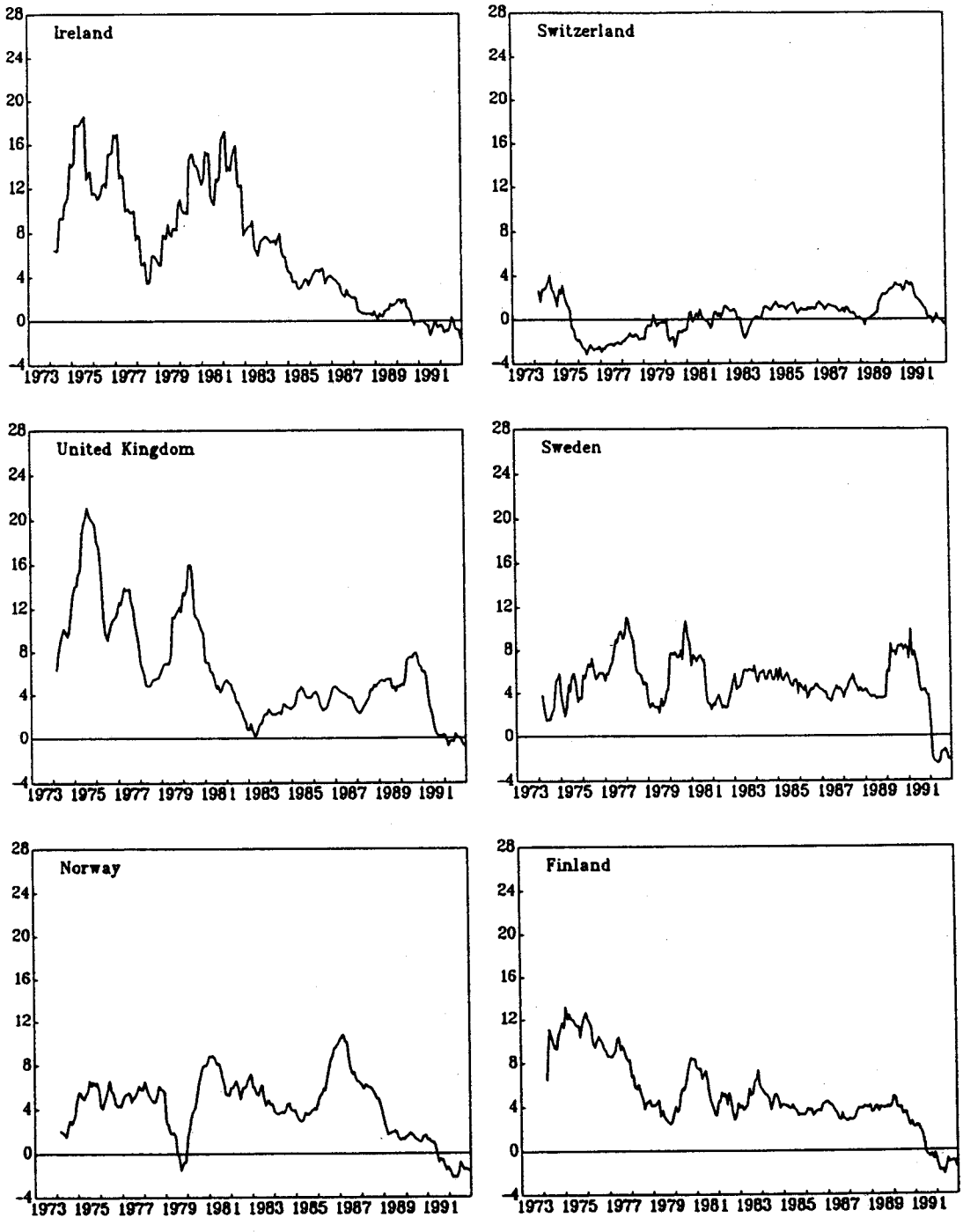


Chart 1 *(continued)*

Consumer Price Inflation Differentials, 1973-92

(Differentials vis-a-vis Germany in percent per annum [1]*)*

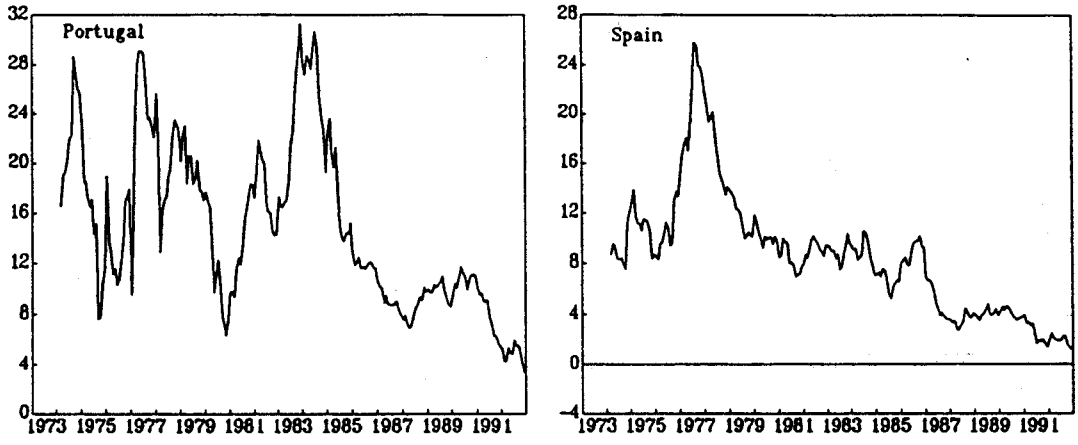


Chart 2

Longer-term Variability of Nominal and Real Exchange Rates Among European Currencies, 1973-92

(Bilateral exchange rates against the Deutschemark)

March 1979=100; logarithmic scale

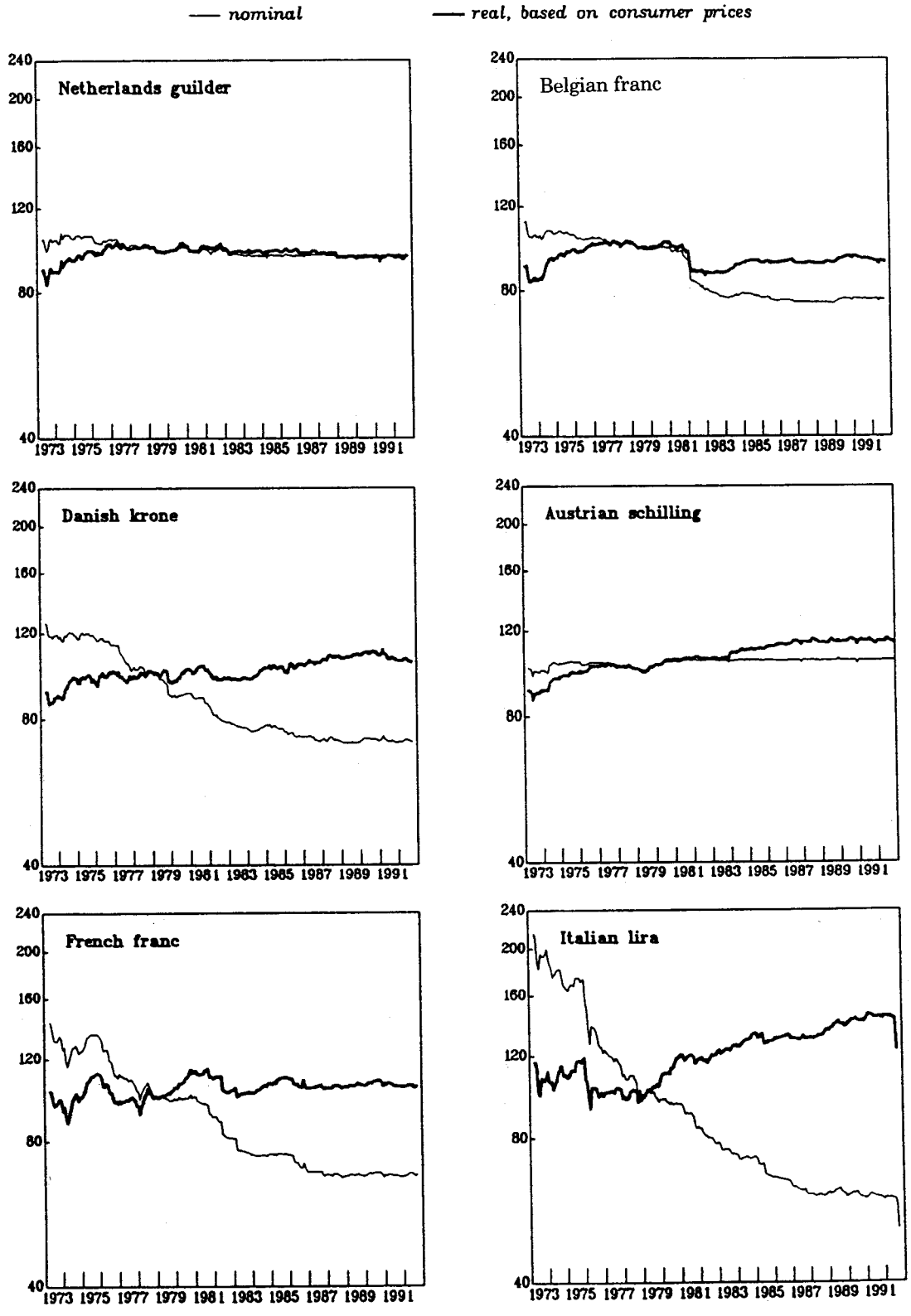


Chart 2 *(continued)*

Longer-term Variability of Nominal and Real Exchange Rates Among European Currencies, 1973-92

(Bilateral exchange rates against the Deutschemark)

March 1979=100; logarithmic scale

— *nominal* — *real, based on consumer prices*

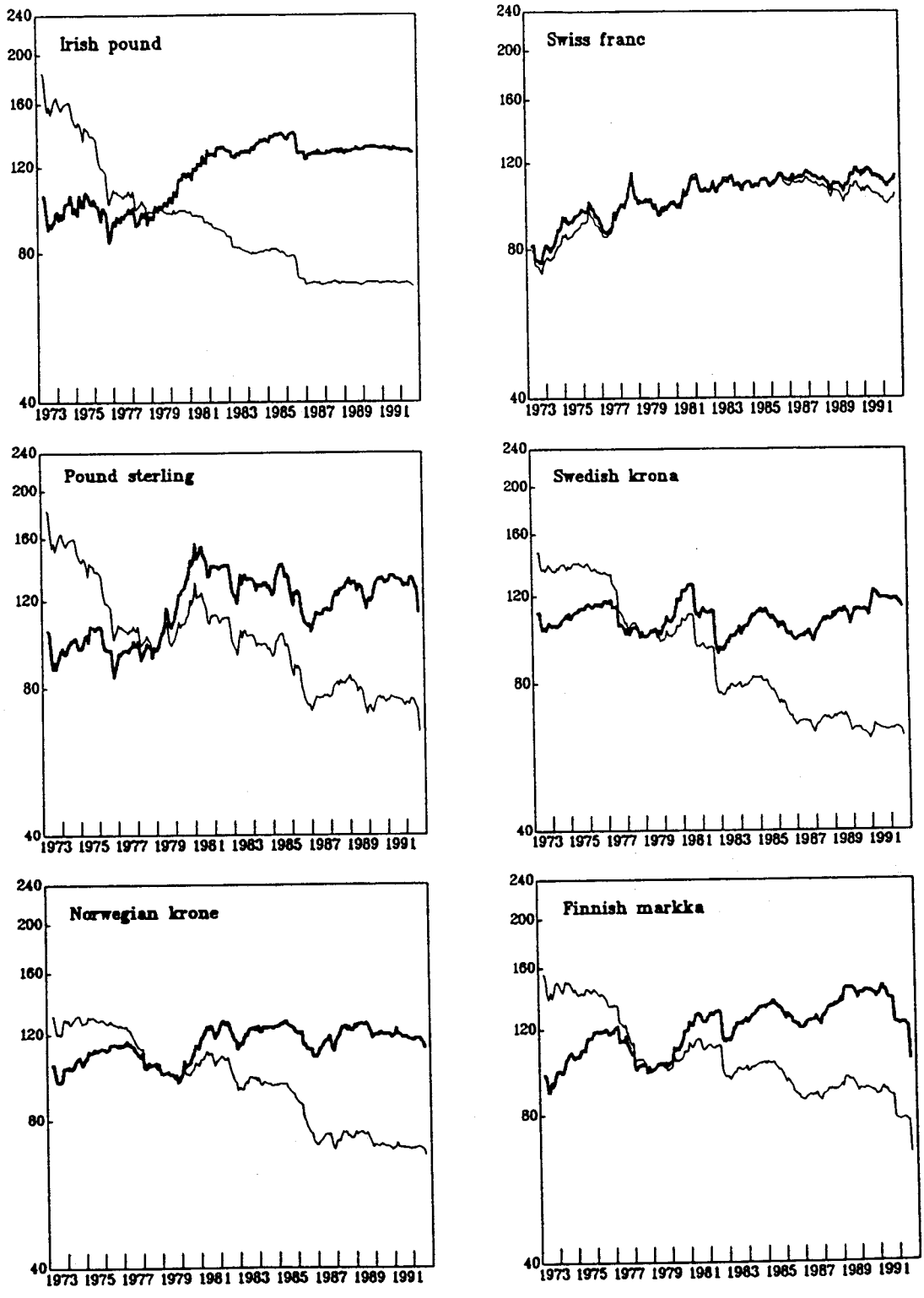
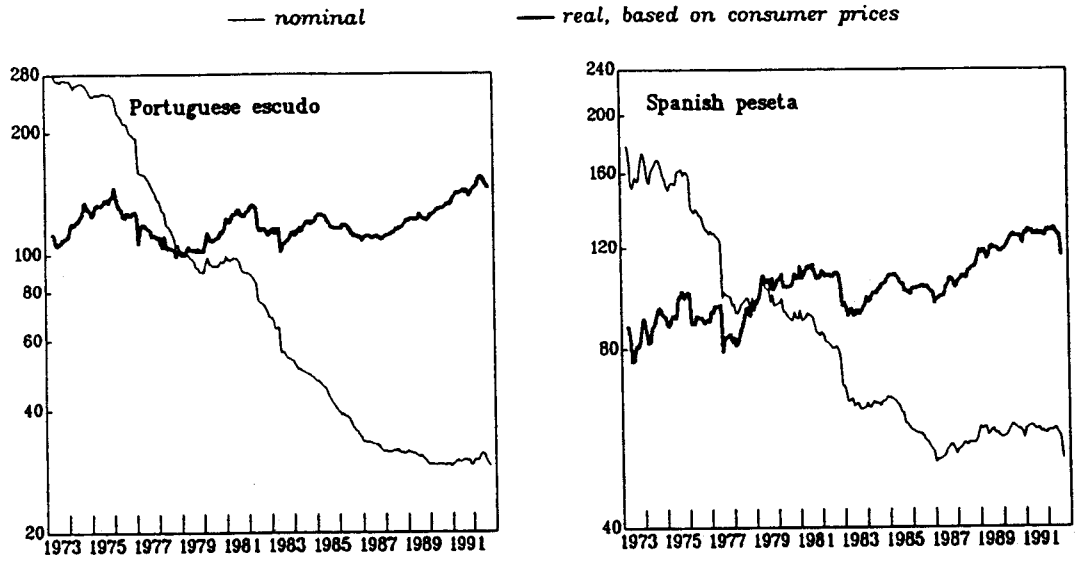


Chart 2 *(continued)*

Longer-term Variability of Nominal and Real Exchange Rates Among European Currencies, 1973-92

(Bilateral exchange rates against the Deutschemark)

March 1979=100; logarithmic scale



III. Exchange Rate Variability Among Major International Currencies

The results reported in Table 2 provide the key information concerning the short-term variability of nominal and real exchange rates for major international currencies against the US dollar for four subperiods since the collapse of the Bretton Woods system in the early 1970s. Notably, for the Canadian dollar, the standard deviations of monthly percentage changes in nominal and real exchange rates against the US dollar (a degree of variability that is roughly comparable that of the Swiss franc against the Deutschemark) have been only about one-third as large as the short-term variability of other major currencies against the US dollar.

Among the four subperiods identified in Table 2, there is no indication of any meaningful change in the short-term variability of exchange rates for the Canadian dollar, the Deutschemark, or the Japanese yen against the US dollar, while there are gradual upward trends in the short-term variability measures for the French franc and the pound sterling. This evidence indicates clearly that efforts at international economic policy coordination since the mid-1980s have not reduced the short-term variability of exchange rates vis-à-vis the US dollar.

With respect to the effects of policy coordination on longer-term variability, the evidence is more ambiguous. From Chart 3 it appears that (except for the Canadian dollar) the range of variation of nominal and real exchange rates against the US dollar since 1987 has been much narrower than the wide swings that occurred between 1979 and 1987. However, it is not clear that the range of variation since 1987 has been reduced from that which prevailed during the initial subperiod of floating rates. Moreover, as a technical matter, it is not possible to say that the decline in the range of variation of dollar exchange rates since 1987 is "statistically significant."

Nevertheless, a judgment that policy efforts since 1987 may have reduced the longer-term variability of exchange rates against the US dollar is supported by considering movements in US dollar exchange rates in the context of other important economic developments. In contrast with the experience of earlier years, since 1987 the cyclical movement of the US economy has, to a large degree, been out of phase with cyclical developments in most of Europe, especially in Germany; and to a lesser extent this has also been true for the United States vis-à-vis Japan. Normally, such out-of-phase movement would be expected to put pressure on the exchange rate between the dollar and other major currencies, in much the same way that the recent cyclical divergence between Germany and the United Kingdom clearly put intense pressure on the exchange rate between sterling and the Deutschemark. In addition, past experience suggests that the political developments surrounding the collapse of the former Soviet Union and the Gulf War and the associated wide swing in world oil prices would normally have had powerful effects on exchange rates against the US dollar. In light of these developments, the movements that have actually occurred in dollar exchange rates might be judged to have been relatively restrained.

In this regard, Chart 4 compares recent movements in the Deutschemark/US dollar exchange rate with movements in interest rate differentials between the United States and Germany. At the end of 1986, short term interest rates in Germany were below those in the United States by roughly 1 percentage point. During the Spring of 1987, the US Federal Reserve began to raise short-term interest rates in an effort to combat rising inflationary pressures, at a time when inflationary pressures in Germany were subdued and short-term interest rates there remained relatively low. As a result, the short-term interest rate differential between the United States and Germany widened to more than 3 percent in May 1987, and remained between 2 3/4 percent and 4 percent until April 1989. As signs emerged that US economic growth was slowing, US interest rates began to decline

in the Spring of 1989. Following a period of relatively steady US interest rates during the first half of 1990, the prominent slowdown of the US economy in the second half of 1990 and the recession of 1991 brought further interest rate reductions; and when the recovery proved to be very sluggish during 1991 and 1992, the Federal Reserve cut US short-term interest rates to the lowest levels since the 1960s. Meanwhile, the Bundesbank began to react to the inflationary impact of the policies carried out in conjunction with German unification, and short-term German interest rates were pushed sharply upward. The combined result of these developments was that short-term interest rates in the United States fell to the same level as interest rates in Germany by January 1990, and to as much as 6.5 percent below German rates in August 1992. Thus, between early 1989 and Summer 1992, the short-term interest rate differential shifted by a full 10 percentage points.

In the event, this very wide swing in the short-term interest rate differential was associated with relatively moderate movements in the Deutschemark/US dollar exchange rate – during a period when important political developments might also have contributed to wide swings in exchange rates. Arguably, this outcome reflected general confidence in the longer-run orientation of both German and US monetary policies toward the objective of low inflation. In this regard, it is noteworthy that during the past four years the long-term interest rate differential between Deutschemark and US dollar denominated assets has moved considerably less than might have been expected on the basis of past experience, given the extent of the movement that occurred in the short-term interest rate differential. The long-term interest rate differential is presumably influenced, to an important degree, by the differential of long-term inflation expectations between Germany and the United States. The fact that short-term money market conditions have responded sharply to the differing evolution of the German and US economies, without generating correspondingly large movements in long-term interest rate differentials, has clearly been reflected in the relatively moderate swings in the Deutschemark/US dollar exchange rate.

Looking back to the experience of the 1970s and early 1980s, it is clear that there were wide swings in public perceptions concerning the longer-run orientation of economic policies in major countries – most notably the degree of commitment of US monetary policy to the objective of reasonable price stability – and that these swings in policy perceptions were in turn a critical factor that contributed to very wide swings in nominal and real exchange rates among major currencies. The hopeful message from recent experience is that a recurrence of such wide swings in exchange rates may well be avoidable – provided that the public remains persuaded of the longer-run orientation of monetary policies toward the objective of reasonable price stability. If cyclical divergences among major economies are narrower in the future, leading to smaller movements in short-term interest rate differentials, there should also be hope that the amplitude of remaining exchange rate movements may be further reduced from that prevailing in recent years. However, the evidence on longer-term exchange rate variability during the past two decades of experience with floating rates clearly indicates that so long as the largest countries pursue independent monetary policies – committed to a common long-run objective of very low inflation but attuned to the specific circumstances of individual national economies – significant movements in exchange rates will occur as economic activity in these countries inevitably moves along somewhat different courses, both cyclically and over the longer term.

Table II

Short-term Variability of Exchange Rates Among Major Currencies, 1973-92

(Standard deviations of monthly percentage changes)

Bilateral exchange rates against the U.S. dollar	April 1973-March 1979	April 1979-September 1983	October 1983-March 1988	April 1988-December 1992
Nominal				
Canadian dollar	1.3	1.4	1.2	1.3
Deutschemark	3.4	3.2	3.6	3.8
French franc	3.1	3.3	3.4	3.7
Japanese yen	2.9	3.6	3.1	3.1
Pound sterling	2.6	3.2	3.6	4.2
Real, based on consumer prices				
Canadian dollar	1.4	1.5	1.2	1.3
Deutschemark	3.5	3.2	3.6	3.8
French franc	3.2	3.3	3.4	3.7
Japanese yen	3.0	3.7	3.2	3.2
Pound sterling	2.7	3.5	3.7	4.2

Chart 3

Longer-Term Variability of Nominal and Real Exchange Rates Among Major Currencies, 1973-92

(Bilateral exchange rates against the US dollar)

March 1979=100; logarithmic scale

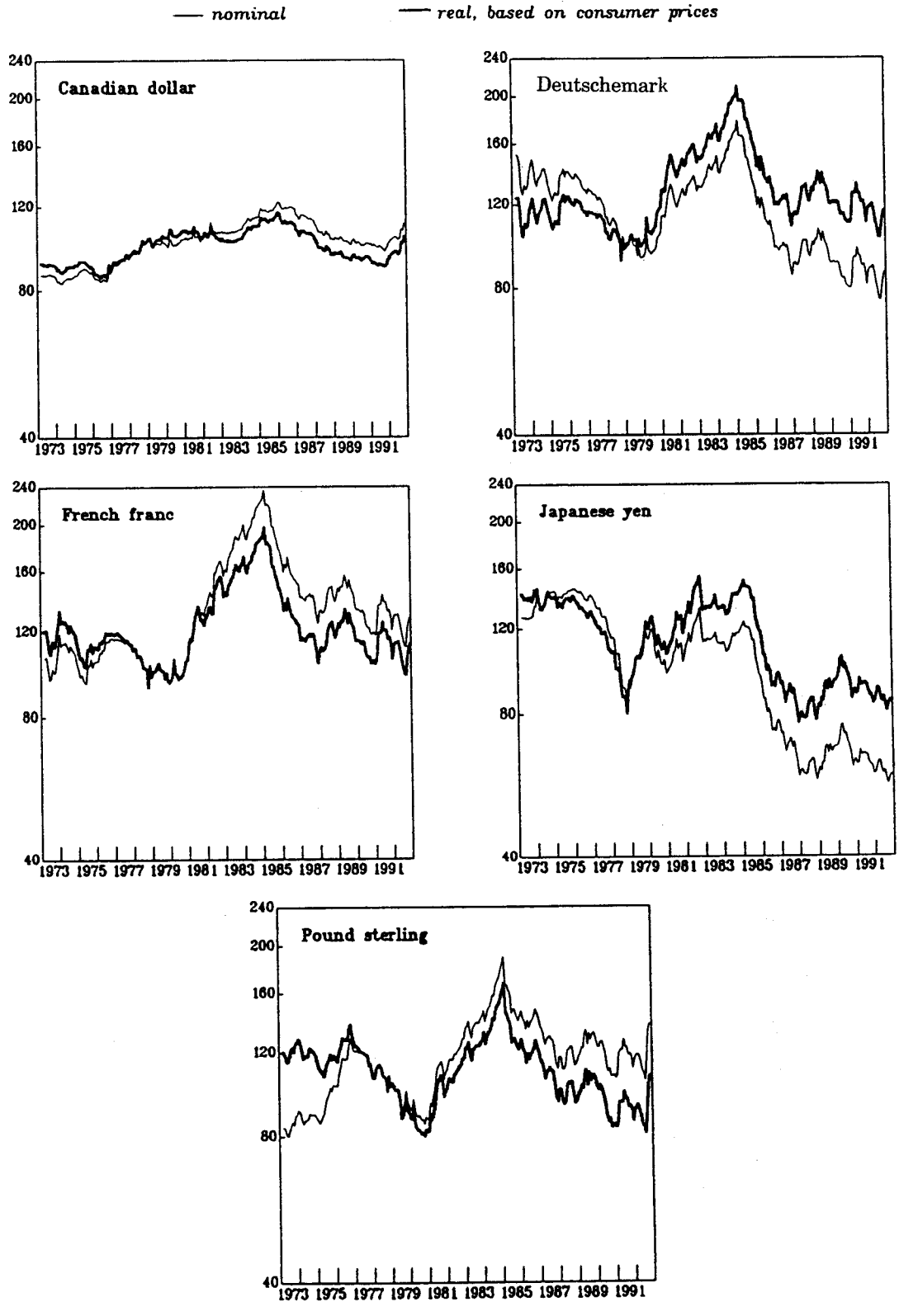
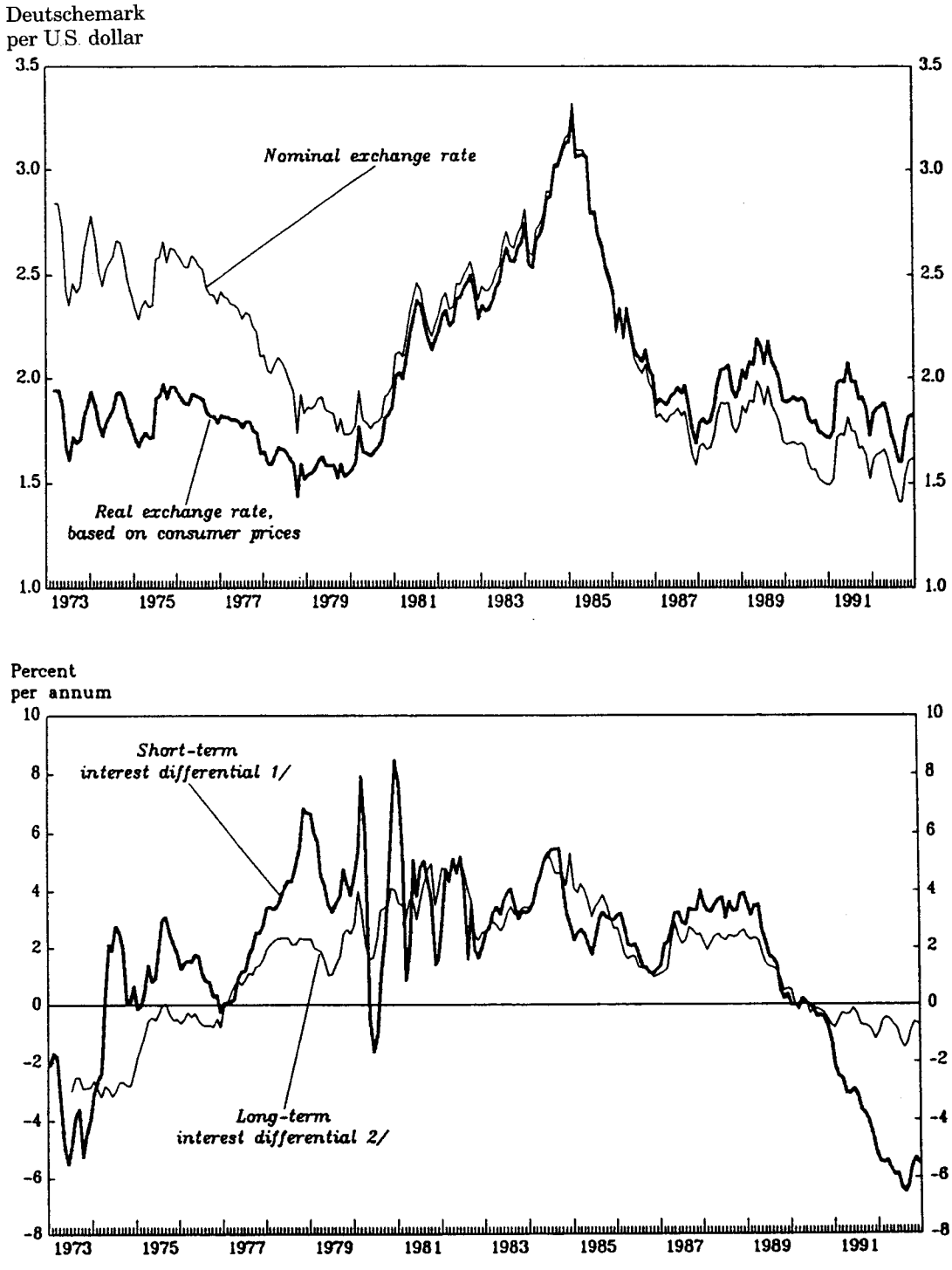


Chart 4

Exchange Rates and Interest Rate Differentials Between the Deutschemark and the US Dollar, 1973-92



[1] The difference between the 90-day certificate of deposit rate for the United States and the 3-month Frankfurt interbank loan rate for Germany.
[2] The difference between the yield on 10-year Treasury bonds for the United States and the yield on government bonds with maturities of 9-10 years for Germany.