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**INSTITUTIONAL INVESTORS,
UNSTABLE FINANCIAL MARKETS
AND MONETARY POLICY**

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ABSTRACT

This article focuses on the issues which may arise for central banks in the pursuit of *monetary stability* in the context of *asset price volatility*, and the impact thereon of *growth of institutional investors* such as pension funds, life insurers and mutual funds. The evolving pattern of volatility is considered to have entailed a major shift in the stability of central banks' environment and poses difficulties for monetary policy. The article first seeks to outline the reasons why institutions may destabilise financial markets, drawing on the economic literature and the outcome of recent discussions of the author with major institutional players, and supplemented by indications of their growing size and activity. Then it outlines four periods of market volatility, where institutions were heavily involved, and that raised concerns for monetary stability, namely the stock market crash of 1987, the ERM crises of 1992-3, the bond markets in 1993-4 and the Mexican crisis of 1994-95. The paper concludes that the following features recur intermittently in international financial markets; irresistible and rapid price shifts, in both directions; heavy involvement of institutional investors in both buying and selling waves; bank lending playing a rather subordinate role; international investment; signs of overreaction to the fundamentals and excessive optimism prior to the crisis; at times, inappropriate monetary policies; a shock to confidence which precipitated the crisis, albeit not necessarily sufficient in itself to explain the scale of the reaction; and rapid and wholesale shifts between markets, often facilitated by financial innovations. There are a range of policy implications. In particular, monetary policymakers generally will have to take increasing account of the actions, views and expectations of institutional investors concerning their monetary policy and economic developments. There is also a rich agenda for further research in this area.

Introduction

The concerns of central banks in monetary policy setting - maintenance of the value of the currency (monetary stability) and protection of the financial system against the possibility of a systemic collapse (financial stability) - are being pursued in the context of a rapidly changing financial environment. Financial liberalisation and deregulation, abolition of exchange controls, financial innovation, institutionalisation and growth of euromarkets constitute important components of recent financial change. These have entailed, for example, a decline in credit rationing, and hence a need for a more market-based approach in policy execution, as well as heightened instability of prices and flows in financial markets. In this context, the specific focus in this article is the pursuit of *monetary stability* in the context of *asset price volatility*, and the impact thereon of *growth of institutional investors* such as pension funds, life insurers and mutual funds. The evolving pattern of volatility, which involves not merely day-to-day fluctuations but also may at times entail medium term deviations from levels consistent with fundamentals, is considered to have entailed a major shift in the stability of central banks' environment and poses difficulties for monetary policy.²

The paper is structured as follows. First, it seeks to outline the reasons why institutions may destabilise financial markets, based on the current state of the art in this field in the economic literature, informed by the outcome of recent discussions of the author with major institutional players, and supplemented by indications of their growing size and activity. Then it outlines four periods of market volatility, where institutions were heavily involved, and that raised concerns for monetary stability, namely the stock market crash of 1987, the ERM crises of 1992-3, the bond markets in 1993-4 and the Mexican crisis of 1994-95. The paper concludes by considering features of these crises in the light of the theory, addressing economic and monetary policy issues raised by such instability and suggesting further research.

1 Institutional investors and asset market instability

In assessing whether behaviour of financial markets may be affected by the presence of the various types of institutions, a starting point is to consider the *aims of institutional investors*, and how structural features may lead their behaviour to differ from those of an individual, value-maximising investor. The

relevant comparison to be made is with the theoretical paradigm of *rational investors or speculators*, where, following Friedman (1953), such rational investors would seek to use all relevant information in an efficient manner (and if possible gain information others do not have), buy when prices are below fundamentals and sell when they are above, and thereby efficiently stabilise markets at levels consistent with the fundamentals.

Fund management, for example of a pension fund or mutual fund, is a service involving management of an investment portfolio on behalf of a client. Such delegation raises *principal-agent problems*, as unless the manager is perfectly monitored and/or a foolproof contract drawn up, he may act in his own interests (e.g. in generating excessive commission income) and contrary to those of the fund. One can suggest a priori that such monitoring will be costlier when managers lack reputation or relationships, which otherwise constitute assets that would depreciate in the case of opportunistic behaviour. Various features of fund management can be seen as ways to reduce principal-agent problems. For example, pension fund managers are offered short (3-year) mandates, with frequent performance evaluation;³ fees related to the value of funds at year-end and/or performance related fees. Open-ended mutual-fund and insurance managers will suffer loss of new business if they underperform, while closed-ended mutual funds may be taken over.

These means used to resolve the principal-agent problems in the fund management relation give rise to institutional behaviour which *could* induce capital market volatility. One is the *desire of managers to show they are of good quality*, for example in the context of short mandates. In the model of Scharfstein and Stein (1990)⁴, herding - whereby all managers move in the same direction to buy or sell assets - occurs because the market for fund management skills takes into account both the success of investment strategies and the similarity to others' choices. The first piece of evidence is not used exclusively, since there are systematically unpredictable components of investment, while good managers are expected to receive correlated signals (they all observe the same relevant pieces of information); hence all good managers may be equally unlucky. On the other hand, a manager who alone makes a good investment may be a lucky but poor quality manager. So mimicking others is the best way to show quality. A related factor that could induce volatility is the above-mentioned *regular performance checks against the market* (as frequently as monthly in the United States, but less in the United Kingdom). As

above this may induce similar behaviour, and hence 'herding' to avoid performing significantly worse than the median fund.⁵ As a consequence, funds may, for example, adopt similar portfolios even if their own information suggests a different pattern could yield better returns. This may in turn amplify shocks to prices.

Short time horizons may affect *information acquisition* and hence market dynamics (Froot et al 1992). This is contrary to the traditional view that there can be no distinction in behaviour between those with short and long time horizons, because an investor desiring to hold an asset for five minutes cares about the expected price then, which in turn depends on the expected price five minutes later, in an infinite regress which ensures behaviour remains in line with the long term fundamentals. The argument is, that whereas if assets were to be held forever, it would be rational to seek to gain information not held by others, it may be rational for fund managers with a short time horizon - for reasons as above - to concentrate on the same information as others, which may even be information extraneous to fundamentals. This is because the larger the number of investors who study the information, the more quickly it enters the market, and the greater the benefit from early learning. Use of chartism may be a case in point.

But these specific mechanisms are not the only possible reasons for institutional herding. A simpler mechanism may underlie sharp movements by open-ended mutual funds, namely simple *purchases and sales of units* by households, which oblige the manager to liquidate assets immediately in order to redeem the units. This may be a powerful mechanism if households are risk adverse and subject to major shifts in sentiment. It may be increased by the shift to defined contribution pension funds; such as 401(k) funds in the US; these assets are typically held in such mutual funds and their disposition is often at the discretion of the individual investor. Risk averse investors may sell funds in response to short run moves, contrary to appropriate long-run time horizons of their (retirement) assets. Or mutual fund managers may *transact repeatedly* to generate commission income, thus generating market volatility. Other reasons for herding by institutions could include institutions' *inferring information from each others' trades*, about which they are relatively well informed, and herding as a result (Shiller and Pound (1989)). Moreover, they may be *reacting to news*, which they all receive simultaneously, in a similar

manner; such news may cause sizeable portfolio shifts in a world characterised by *uncertainty*⁶ and not merely *risk*, if it causes funds to change their views about the future.

The main focus of the section above is on information, but the *risk management framework* may also play a role. If defined benefit pension funds have strict minimum solvency limits, they are subject to heightened shortfall risk if asset values decline (Davis (1995a)). This may encourage “herding” either via direct sales of equities for bonds or by the effects of hedging in so-called contingent immunisation or portfolio insurance strategies on market prices (see below). More generally, as shown by Frijns et al (1995), tighter solvency requirements will shorten time horizons, with possible consequences as noted in this section. Defined contribution funds are less subject to these effects, but as noted above may be vulnerable to changes in investor sentiment.

Herding by institutions need not always be destabilising, indeed it may speed the market's adjustment to a new equilibrium price, for example when there are tax changes, or offset irrational shifts in behaviour by other investors such as individuals and foreigners, or in response to monetary policy errors which result in overvalued exchange rates. What is needed is for institutions also to follow strategies which may be contrary to fundamentals and profit maximising - buying high and selling low - so-called *positive feedback trading*. Cutler et al (1990) suggest that institutions may *themselves* act in this manner. This may be a consequence of biases in judgement under uncertainty by fund managers, which leads to extrapolative expectations or trend-chasing rather than focus on fundamentals. Certain investment strategies may also induce such behaviour, such as stop-loss orders, purchases on margin and dynamic hedging strategies. These may be common when there are minimum funding limits. Institutions may also seek *indirectly* to provoke positive feedback trading (De Long et al (1990)), since in the presence of irrational investors such as households it is rational for institutions (such as hedge funds) to buy in the knowledge that their own trades will trigger further feedback trading by irrational investors, thus amplifying the effect.

There was evidence of positive feedback behaviour in the stock market (Shiller 1988), where investors' reasons given to sell in the wake of the 1987 Crash were often merely that prices had fallen, in expectation of further price falls. Also in forex markets (Frankel and Froot (1988)), forecasters persistently urged institutions to buy dollars during the “bubble” of the early 1980s although admitting

that the dollar was overvalued. Circumstantial evidence is provided by the correlation of stock returns at short time horizons, and negative correlation at long horizons, contrary to the random walk anticipated by efficient markets (Fama and French (1988), Lo and McKinlay (1988)). Lakonishok et al (1991) examine the evidence for herding, positive feedback trading or other forms of potentially destabilising behaviour for a sample of 341 US money managers' quarterly investments in individual stocks. Their conclusions were that there was weak evidence of such behaviour for smaller stocks, but not for large ones. However, they could not rule out market-wide herding, for example if money managers follow each other in market timing, or herding in individual stocks at a higher than quarterly frequency. It is market-wide and cross-market herding which is the main cause for concern for central banks. Indeed, an important phenomenon in recent years is that institutions increasingly “trade markets” and not stocks, reflecting profit opportunities⁷.

In principle, investors following positive-feedback trading strategies should make losses that may lead them to withdraw from the market. But in practice patterns of positive-feedback trading may persist if, for example each episode looks rather different so learning from previous mistakes is limited; or if the errors made by positive feedback traders lead them to accept higher market risk, and hence to gain higher returns. And historical evidence suggests it may occur over both short and relatively long horizons.

Linked to performance evaluation and herding is the *persistence of active management of institutional funds* instead of forms of indexation, despite the fact that the evidence is almost uniformly contrary to the efficacy of active management of funds within asset categories.⁸ Obviously active management is needed for the patterns above to arise. The superior performance of indexation is in line with the efficient markets hypothesis, which suggests that, given prices already incorporate all available information, there is no net benefit from spending extra cash to try to beat the index⁹. Active management by *mutual funds* may be explicable in terms of desire to generate fee income. Lakonishok et al (1992) suggest that the persistent use of active management by *pension funds* despite such evidence is related to further agency problems. In particular, they suggest that these may arise within the management structure of the sponsor of a pension fund; corporate treasurers seek to bolster their own positions vis-à-vis their managers, and hence seek fund managers that can offer good excuses for poor performance, clear stories about portfolio strategies and other services unrelated to performance. They

avoid indexation, as this would reduce their own day to day responsibilities, as well as internal asset management, as this would give them too great a responsibility for errors. The authors suggest these agency costs are additional to the difficulties (as noted above) which arise between a (rational profit-maximising) sponsor and the fund manager. However, an alternative explanation may be that active market-selection (as opposed to asset selection within a market) still provides value-added compared to global indexation. Moreover, the points made in this sector should not be exaggerated since some shift to passive management does appear to be underway, particularly within markets (“stock selection” as opposed to “asset allocation”). 30% of UK pension funds’ domestic equities may be indexed at present.

The above literature, which is largely centred on herding¹⁰ by institutions in securities markets, may be linked to the considerable research on foreign exchange markets, albeit usually focused on traders in banks rather than institutions per se, which has found similar behaviour patterns to these. Such research on herding is often based on the idea, which originated with Keynes (1936), of two groups of investors or traders in the market, one the professional investors, fundamentalists or informed traders who act in the light of economic theory, and the other being speculators, chartists or noise traders, who seek merely to profit from day to day movements. The analysis of authors such as Dornbusch (1990) suggests institutional investors may act in either capacity; they need not always be the informed traders. Following the discussion above, he highlighted the importance in an international context of performance assessment of fund managers over a short time horizon in relation to the median fund manager, which means that managers cannot afford to ignore a general shift in opinion regarding a foreign equity market or exchange rate, even if the movement is considered to be short term and reversible. Similar opinions were expressed by fund managers interviewed by the author, who talked of a “massive consensus that certain currencies should not be held” in early 1995. Note also that exchange rate risk and market risk can be dissociated by hedging, and in some fund managers are run as separate profit centres.

Institutions may also be susceptible to herd behaviour in foreign markets owing to *home asset preference*. Besides structural and regulatory reasons, a key economic factor seems to be scepticism regarding purchasing power parity holding, even in the very long term (Beenstock (1986)); long term shifts in real exchange rates mean currency mismatching can involve risk, especially for a mature pension

fund or one subject to strict solvency regulations, as assets may fall short of liabilities. Besides low foreign asset holdings relative to a "global portfolio" (Davis (1995a)), such preferences may induce shifts to domestic markets at times of asset price volatility.

As regards the dynamics which may be induced by such behaviour, Evans and Lewis (1993) show there are persistent excess returns in spot and forward currency markets, and in bond markets. They suggest that "informed traders" are more risk averse than "noise traders" and hence are unwilling to take large positions even when currencies are far from equilibrium. Alternatively, there may be a range of values of the exchange rate within which a precise equilibrium is not defined, and within which sharp movements can occur in response to "herding", as the influence of noise traders predominates, but also margins beyond which the rate is definitely considered contrary to the fundamentals, and the judgements of informed traders prevail (De Grauwe (1989)). Clearly, the width of the range may itself change as uncertainty increases. In a fixed rate system, such heightened uncertainty may ultimately shift the range of plausible values beyond the bands that the authorities seek to defend. Following these ideas, Carpatanis (1993), favours an explanation of heightened volatility based on an initial situation of dispersed expectations and heightened uncertainty, perhaps caused by divergent views on the appropriate macroeconomic policy of a government. This increases the weight of noise traders relative to informed traders, as *informed traders, lacking confidence in their own judgement, find it rational in such circumstances to follow the rest of the market*. In such a situation a loss of credibility by the authorities - for whatever reason - may lead to a crisis, with all market opinion converging, and a rapid shift in the rate, overcoming any resistance by authorities.

Such patterns as outlined are clearly long established features of investment and fund management; why should they come to the fore now? Basically, it is because the *size and activity of institutions has increased sharply*. The rapid expansion of the balance sheets of institutional investors is well documented. It underlies the widespread decline in the share of banks in financial assets (Table 1) as well as being apparent in the size of institutions' portfolios relative to GDP (Table 3). Growth has also been impressive; the 300 largest US institutions held assets equivalent to 30% of GDP in 1975 (\$535 billion) but in 1993 were 110% (\$7250 billion) although there has also been a more general growth of the financial assets/GDP ratio. Factors underlying such growth of institutional investors include the ageing

of the population in OECD countries, which has led to increased saving for old age, notably given the pressures to which state social security schemes are subject (Davis 1995a); advances in technology, which enable funds to be managed at relatively low cost, and with correspondingly high yields for investors; and the mutually reinforcing development of securitisation, which has provided a ready supply of assets in which to invest.

Besides size per se, evolving patterns of behaviour and related technology are important to the influence institutions may exert on financial markets. A key feature is the increasing *international investment* of these institutions, whereby cross border equity holdings rose from \$800 billion in 1986 to \$1250 billion in 1991, while total cross border ownership of equities plus bonds was \$2250 billion. This is reflected in foreign holdings of bonds (Table 2). This internationalisation has been accompanied by an increasingly *active approach to portfolio investment* on behalf of institutions. Whereas in 1982 UK pension funds held foreign equities for 2 years on average, in 1994 the average holding period was under 6 months (WM (1995)), while the stock of foreign equities held by UK pension funds had risen from around \$20 billion to \$150 billion. As noted in Howell and Cozzini (1991), the *rise of global asset allocation* as a tool of fund management, and the *development of derivatives markets* such as those for stock index futures have stimulated and facilitated massive increases in short term cross border flows. One equity transaction in three in Europe now involves a foreign transactor; and trading in index futures often far exceeds trade in the underlying. Although investors desire by adopting such strategies to reduce risk, the *focus of funds on a small number of leveraged instruments* often leads to market destabilisation and sharp price swings.

Nor need the behaviour be confined to securities markets. Besides the fact that flows of securities themselves have a direct effect on the exchange rate, there is broader evidence of institutionalisation of the foreign exchange markets, reducing the relative importance of banks. As recorded by IMF (1993), new players include *hedge funds* - themselves a form of institutional investor - and the increasing sophistication of *corporate treasury operations*. But most important was seen to be the effects on foreign exchange markets of internationalisation of portfolios of *pension funds, mutual funds and life insurers*, which combined with their absolute size, willingness to turn over investments and use derivatives gave them considerable leverage (see Section 2(b) below).

In the next section we outline four “case studies” of asset market fluctuations in which institutions played a major role, and note the difficulties they pose for monetary policy. Basically, we are investigating whether behaviour can be seen at a macro level consistent with the theory. Given lack of precise data on balance sheets and of individual transactions, the descriptions are largely qualitative.

2 Case studies

(a) Equity markets in 1987.

Whereas popular accounts tend to focus on October 19-20, focus on the Crash itself abstracts from the need for an explanation why the market rose so much prior to the Crash. Davis (1995b), summarising available accounts, suggests that there was a deviation between fundamentals and prices - a form of speculative bubble - which was reflected in historically unprecedented yield ratios between bonds and equities. Such a situation leads to a suspicion of forms of trend-chasing, led by institutions fearing to perform worse than their peers. Indeed, in line with the theory above, there is anecdotal evidence that fund managers felt under pressure from performance appraisal not to sell, even if they all individually agreed prices were too high, as they feared being left out in a further rise, while being comforted in the event of a fall that they would not be alone (Scharfstein and Stein 1990). Market technology may also have played a role, as lower transactions costs, combined with the spread of dynamic hedging techniques sold to institutions as “portfolio insurance”, fostered an impression of high liquidity and led funds into the illusion that they could exit before prices fell sharply (Brady (1989)). But only in the US was portfolio insurance used to a significant extent, whereas markets collapsed world-wide. And clearly many “fundamental” factors also played a role in generating buoyant expectations, such as the merger wave in many countries, falling interest rates over 1987, buoyant economic prospects and rapid monetary growth.

As regards the immediate causes of the collapse, since it relies on continuously rising prices, a bubble can be burst by any form of adverse news; in practice, factors underlying the crisis itself may have included current account imbalances between the US, Germany and Japan, which led to fears of a falling dollar and caused rises in long term US interest rates in the week prior to the crash. Also, tensions in the policy co-ordination process between those countries may have played a role in triggering the

crisis. Evidence supportive of the bubble hypothesis is that none of these items could in themselves justify a price adjustment of the magnitude observed (Fortune (1993)).

Some commentators in the United States also blamed the interaction between institutional investors' portfolio insurance and index arbitrage¹¹ strategies for causing volatility at the time of Crash itself. Basically, it was considered that computer-driven sell orders for futures, which are a normal feature of portfolio insurance (or 'dynamic hedging') strategies when prices fall, helped drive the market down much faster than would otherwise have been the case. The initial wave of selling of futures is thought to have driven futures to a discount to the market (known as backwardation) as well as reducing stock prices themselves and triggering further portfolio insurance-related sales of futures. The backwardation, encouraged index arbitrageurs to sell stocks and buy futures, thus leading to a so-called cascade effect or accelerating price decline (Brady (1989)). The view of the Crash itself as dominated by portfolio insurance is, however, disputed (for a survey see Fortune (1993))¹². What is less disputed is that institutions were heavily involved in the selling wave that accompanied the crash, with a particular tendency to dispose of cross border holdings, showing home asset preference. Such sales helped to generate the contagion across national markets, which was such a feature of October 1987 (Bertero and Mayer 1989).

The crash posed major issues for monetary policymakers in both the short and medium term. In the short term the major concern was to avoid systemic risk arising from failure of investment banks, which was combated by an easing of liquidity and moral suasion on banks to lend. Such easing was continued, however, owing to fears that there would be a "Great Depression" due to effects of lower equity prices on consumption and investment in the wake of the crash. In fact the latter fears seem not to have been justified, and the easing of monetary conditions foreshadowed inflation in a number of countries.

(b) The ERM crisis of 1992-3.

In assessing the effect of institutions on the operation of the ERM, it is important first to note that the success of the ERM had been built at times when a number of participants had exchange controls, thus limiting speculative pressures (though not eliminating them, see Gros (1992)). The disadvantages of such controls, for example in terms of higher risk premia (Cody (1989)), and corresponding restricted access to international capital markets, made them unattractive (as well as being contrary to the EU

Single Market). But there is a cost. It is widely acknowledged that in the absence of such controls, the need in a fixed rate regime for identical monetary policies, for similar inflation performance (ensuring alignment of real exchange rates) and for similar cyclical performance per se, becomes more urgent. It also puts greater weight on intervention and the level of interest rates as means of counteracting speculative pressures.

Second, the overall volume of transactions in the foreign exchange market had risen rapidly over the 1980s and early 1990s, tripling between 1986 and 1992 to reach \$1,000 billion, hence growing at a rate far beyond the growth rate in official reserves, which in 1992 totalled around \$500 billion¹³ (although note that the ERM included rules for limited sharing of reserves during periods of speculative pressure).

Third, as noted above, participants have become more diverse. *Banks and securities houses*, the traditional participants, can take positions against currencies particularly within a trading day, but these are limited by prudential requirements as well as internal risk-management rules; banks reportedly tended in 1992-3 to focus on their role as intermediaries in the foreign exchange markets, providing liquidity, innovative portfolio strategies and advice to customers. *Hedge funds* - a form of institutional investor - seek to profit from movements in exchange rates and interest rates by leveraged investments, either selling vulnerable currencies forward, using their capital to finance margin requirements, or by establishing interest-rate positions via futures to profit from an interest rate decline after the crisis. But analysts suggest that their relatively small size means that their direct influence should not be exaggerated; they may be more important for leading institutions and companies to re-examine their assumptions regarding a currency.¹⁴ *Corporate treasury operations* enable non-financial firms to fund themselves in the cheapest markets and cover themselves by use of currency swaps, and to hedge future earnings against currency shifts, as well as taking open positions in their own right.

But perhaps most crucial was the consequences of internationalisation of the portfolios of *institutional investors* such as pension funds, mutual funds and life insurers - in countries where regulations permit such diversification¹⁵. Commentators such as IMF (1993) and BIS (1993) suggested that institutional involvement was both the most novel feature of crises and also the reason why speculative pressures rapidly increased. International diversification meant such institutions would

inevitably be affected by exchange rate turbulence; and as noted they are becoming increasingly willing to turn over investments rapidly and change the currency composition of their portfolios, given falling transactions costs and development of derivatives; as outlined, managers are exceptionally sensitive to any losses that could make their own funds perform badly relative to the rest of the market, thus encouraging adoption of similar strategies; they often separate exchange rate and investment risk for investment management purposes by hedging, thus encouraging focus on exchange rates; and the resources available to pension funds and life insurers far exceed national foreign exchange reserves, so that relatively small proportionate portfolio shifts could lead to major pressures on exchange rates. In 1992 UK pension funds alone had assets of \$700 billion whereas in August 1992, the French reserves were \$28 billion, British \$40 billion, Italian \$20 billion and Swedish \$20 billion.

There are two further reasons why institutions should be *particularly* singled out for making the ERM vulnerable in 1992-3. One factor is the existence of *convergence plays*. The drive to EMU, as long as it was considered credible, led to large potential profits from holding assets in the weaker, higher yielding currencies. So long as the fixed exchange rate was expected to hold, or even with small realignments prior to EMU, large capital gains could be anticipated as yields on bonds denominated in such currencies converged with German ones. Such so-called convergence plays grew to extremely large volumes, as evidenced by portfolio inflows to countries such as Spain, France and Italy over 1989-91. UK pension funds, for example, built up foreign bond exposures quite considerably over this period, from 0% of their portfolios in 1986 to 4% in 1991 (Source: WM (1993)). The IMF (1993) suggest the total value of such investments prior to the crisis was \$300 billion. Note also that governments sought to encourage such international investment, as a means to reduce the cost of fiscal deficits and avoiding monetary financing, as well as improving access of domestic firms to equity finance and improving the competitiveness of their financial centres; the success of such approaches is apparent in Table 2.¹⁶ Reflecting confidence over convergence, US pension funds and corporations in the high-yield currencies would often content themselves with hedging against the DM, i.e. in the most liquid derivatives market. Not that institutional investors were the only convergence players. In addition, non financial and financial companies in the high-yield currency countries often sought to fund themselves in DM or Guilders.

Given the scale of the exposures involved, the unwinding of such "convergence based" exposures, or at least increased hedging, in the wake of the Danish referendum, could clearly have been an important component of pressure on the system. This reaction within the ERM was likely to be particularly strong since confidence - in a process such as EMU - is rarely measured in terms of gradations (as is the case of most forms of *risk*). Either there is confidence, or there is not (a characteristic of *uncertainty*). As noted by Raymond (1990), credibility may be binary in the ERM, either complete or low. The importance of confidence meant that any stimulus such as a data item perception of policy conflict or inconsistency in an economy that would lead markets to revise their opinions could have consequences seemingly totally out of line with the scale of the event in question, as it would lead the market to question not merely its current decisions but the processes and assumptions underlying such decisions. Evidence from market participants shows that pressure arose from unwinding of convergence plays in a number of ways. In order to protect the value of their investments, institutions sold their foreign assets, hedged their exposures and sold the vulnerable currencies short, while non-financial companies in countries such as Italy, which had arranged "convergence" financing in DM, undertook massive hedging to cover their exposures, and US corporations and investors that had hedged high-yield currencies with the DM sought to unwind their hedges.

A second feature linked to institutions (albeit also used by banks to hedge their over-the-counter derivative positions) is techniques developed for institutional investors seeking to protect the value of their foreign currency securities (or of options they have written on their assets), so-called *dynamic hedging*. These involved the construction of synthetic put options on a currency by a combination of a short position in one currency and a long position in another, and adjusting the ratio continuously in line with the exchange rates, interest rates and expected volatility. There are strong parallels with portfolio insurance during the Crash. Such instruments could exert increasing pressure on currencies when central banks raise their discount rates, contrary to the authorities' expectations, because they require the short position in the currency in question to be made shorter when the spread between the attacked currency's interest rate and domestic interest rates rises. In addition, according to the IMF, illiquidity in the cash and derivatives markets, by making such dynamic hedging strategies less viable, would often lead portfolio

managers to shift to 100% hedged positions using futures, which would entail further selling of weak currencies.

The issue for monetary policy raised by the crisis was the need to raise interest rates sufficiently to offset speculative pressures, at a time when economies were often undergoing a recession, so as to retain the ongoing counter-inflationary benefit of a currency peg. The UK, Italy and the Nordic countries proved unable to retain their pegs, while the ERM bands had to be widened for all the remaining ERM currencies except the Netherlands. Notably for the latter group, the degree to which fundamentals such as the misalignment of real exchange rates warranted pressures on nominal exchange rates is open to doubt.

(c) Bond markets in 1994.

In early 1994, as a consequence of a wave of one-way selling, bond yields rose sharply - albeit not by identical amounts - in all major countries, after having declined to historically low levels in 1993. An important trigger was the rise in US interest rates that took place in early 1994, and which was seen as the turning point in the interest rate cycle; also monetary growth in Germany was well above target at this point, and evidence was emerging of a more rapid recovery in Europe than had been previously anticipated. This sharp adjustment in bond prices shared a number of the features outlined in (b) above. The players were similar to the ERM crisis, in that hedge funds, investment banks and institutional investors from outside the countries concerned had built up large open positions and were the main sellers of government bonds during the adjustment. Foreign holdings of bonds stood at high levels (Table 2). Trading volumes were atypically large. Furthermore, there was felt to be an important role for derivatives markets (due to proxy hedging) in helping to drive bond markets down together, including those where the fundamentals were relatively favourable but which had liquid futures markets. Leveraged positions taken through the derivatives markets may have been one reason for rapid selling, although most open positions were not leveraged. Stop-loss orders, often driven by the risk-management systems of securities houses' trading desks, also played an important role.

Most crucially, prior to the adjustment the market had adopted strong views regarding future trends in exchange rates and interest rates, generating historically low levels of bond yields prior to the crisis. The low level of US interest rates may have contributed to this. But also as noted by EMI (1995), "bond prices can become detached from underlying fundamentals as extrapolative or "chartist"

expectations of future decreases in bond yields became self-fulfilling". The correction of these expectations, as in the case of the convergence plays, unleashed a wave of selling, notably by cross border investors and leveraged players (including some mutual and hedge funds) which induced a major price adjustment. As noted by BIS (1995), "it is not clear that the arrival of new information was sufficient to justify the average intensity of the response". A major role was also reportedly played by retail investors operating via mutual funds, which bought heavily in 1993 and sold in the downturn of the market.

The bond market adjustment was considered to be of major relevance as a signal of market concern over fiscal policy, of lack of credibility of monetary policies and in some countries as a signal of actual inflationary pressures. But there was widespread recognition that the quality of such signals may have been adversely affected by the previous overvaluation of bonds. The rise in yields also in itself entailed a tightening of monetary conditions, that may have helped to slow output growth.

(d) The Mexican Crisis of 1994-5

The collapse of the peso exchange rate in late 1994 and the severe financing difficulties undergone afterwards by the Mexican authorities have also been traced back partly to the behaviour of institutional investors. In common with many other developing countries, Mexico was the recipient of major capital inflows during the late 1980s and early 1990s. Most of these were in the form of portfolio investment¹⁷ and direct investment rather than bank loans. Inflows were encouraged by prudent macroeconomic policies (which reduced inflation and the government deficit and stabilised the exchange rate), privatisation, structural reform and improved economic prospects as a consequence of the North American Free Trade Agreement (NAFTA). However, the large capital inflows, in the context of a quasi fixed exchange rate regime¹⁸ and inability to sterilise the effects of the inflows on domestic monetary conditions, led to an appreciation of the real exchange rate and an increase in the current account deficit. Much of the latter was related to increased consumption and lower saving.

An output slowdown in 1993 - related to restructuring of firms in manufacturing, uncertainty about NAFTA and tightening of credit conditions - did not interrupt capital flows unduly nor threaten the exchange rate regime. Indeed the fall in bond yields in the US and other OECD countries led to a growing willingness by mutual funds to pour funds into countries such as Mexico - seeking a higher

risk/return trade-off. As noted by Reisen (1995), such funds must publish valuations daily and have sufficient cash to repay holders at times of crisis so are potentially unstable holders. Potential longer term investors such as pension funds often limited their investment in countries such as Mexico owing to low credit ratings.

In 1994 a degree of fiscal expansion was envisaged, while not threatening balance in the public sector. Approval of NAFTA was expected to lead to growing foreign direct investment as well as stimulating exports. Growth resumed and inflation fell to the lowest - 7% - for many years, although the external deficit expanded, along with imports and private sector expenditures. But the year was marked by growing financial turbulence ending in a balance of payments crisis in November. A key factor was the strong growth in the US, as well as recovery in other industrial countries, which increased the global demand for investment funds, and the partly-related rise in bond yields noted in Section (c) above. This made international investors reassess emerging markets. Mexico suffered particularly because of domestic political unrest. The assassination of the Presidential candidate Colosio in March led to a cessation of capital inflows and drain on reserves; pressure on the exchange rate was combated by allowing the interest rate to rise sharply, as well as a credit line from the US and Canada. Peso denominated bonds were in the ensuing months swapped for Tesobonos, short term bonds indexed to the US dollar but repayable in pesos. Private credit increased sharply. After an election in November, rumours of a new exchange rate regime and knowledge that Tesobonos were due for rollover provoked a flight from the currency and massive loss of reserves, while the interest rate was not increased; finally the rate was allowed to float on 20 December. Rating agencies downgraded the country. These led to a loss of confidence both in the currency and in Mexico's willingness to service its external debt. Private sector borrowers were also badly affected. By end-January, when the exchange rate had fallen 40% despite very high interest rates, the international community agreed a rescue package to forestall default on Tesobonos¹⁹.

According to IMF (1995), domestic and external shocks contributed to the crisis, by leading investors to question aspects of the overall situation they had hitherto chosen to ignore. But this was exacerbated by accommodating monetary policy that proved incompatible with the exchange rate. These together led institutions to consider the current account unsustainable, a concern that may be warranted

in the light of the large capital inflows since 1990 having financed consumption rather than investment, as evidenced by the fall in national saving. Such concerns on the part of fund managers were aggravated by the scale of redemptions by retail investors in mutual funds (including personal pension assets in “401(k)” accounts). As an example, a major mutual fund cut its exposure from \$9 billion to \$250 million during the crisis, before beginning to buy in March. Many funds were obliged to sell assets in other unrelated markets, thus spreading contagion elsewhere.

The policy implications of the crisis were considerable, not merely for the inflationary and funding risks to the Mexican economy, but also for leading to concern that there would be a domino effect on emerging economies which were also reliant on capital inflows, although this was disputed. This concern was the basis for the international loans advanced to Mexico in early 1995, as well as the extension of IMF “early warning” surveillance and own-funds. It also led to deeper consideration of the usefulness of temporary controls on capital inflows.

3 Conclusions

It is suggested that the events outlined above, whose effects are consistent with theory, have a number of common features, consideration of which may enable similar patterns in the future to be more easily detected, to offer clues about the appropriate response of the authorities, and provide a background for future research. These included:

- heavy involvement of institutional investors in both buying and selling waves
- bank lending played a rather subordinate role
- international investment
- signs of overreaction to the fundamentals and excessive optimism prior to the crisis
- at times, inappropriate monetary policies
- a shock to confidence which precipitated the crisis, albeit not necessarily sufficient in itself to explain the scale of the reaction
- rapid and wholesale shifts between markets, often facilitated by financial innovations.

This paper does not seek to argue that markets are *always* subject to excess volatility and deviations from fundamentals (indeed, average day to day volatility shows no tendency to increase).

Nonetheless, these features suggest that the stylised forms of behaviour outlined in Section 1, and empirically tested thus far in rather restricted market situations, are now *intermittently-recurrent* characteristics of a globalised financial market dominated by institutional traders. There seems to be little evidence of “learning” that might make such events less common in the future.

This section now goes on to seek to draw tentative policy conclusions for monetary policy. Policymaking in an institutionalised and globalised environment is clearly a more difficult and uncertain process than in a purely domestic and retail/bank based setting. Notably for countries defending exchange-rate pegs, the rapidity with which markets are able to react to news shortens the reaction times required of central banks, and necessitates action on the basis of less complete information. Reserves are likely to be wholly inadequate against the scale of transactions that institutions can undertake; hence greater stress is placed on the interest rate weapon in defending the currency, which may have adverse repercussions for the economy, and may be counterproductive if considered by markets to be unsustainable.

Bond-market globalisation, and the consequent tendency for foreign yields to have a greater influence on domestic bond markets, reduces the influence of domestic inflation expectations and short term interest rates on domestic long rates, and hence may diminish the leverage of domestic monetary policy over the economy. On the other hand, the sensitivity of bond yields to lax monetary and fiscal policy may be seen as a useful discipline, which may buttress central bank arguments for monetary stringency and fiscal consolidation vis-à-vis politicians. Third, the possibility of overshooting and movement for non-fundamental reasons reduces the clarity of the signals that may be derived from bond yields. Conventionally these are seen as composed of three components, real yields, inflation expectations and uncertainty, where the use of index linked bond yields and volatility of options prices enable an idea to be obtained of the size and movement of the inflation component. But the possibility of overshooting makes this approach potentially inaccurate.

To the extent that equity, foreign-exchange and bond-market adjustments become recurrent features of international capital markets, monetary policymakers generally will have to take increasing account of the views and expectations of the global financial markets concerning their monetary policy and economic developments. Policy actions which are not well explained may generate heightened

volatility. Talking to both domestic and foreign institutions on a regular basis may be warranted. Policymakers will need to be aware that, whereas markets may at times work on the basis of fundamentals and hence impose useful discipline on policymakers, at other times they may be subject to bubbles or trend chasing “amplifying the disruptive implications of collective misjudgements” in the words of BIS (1995). Massive and undetected overhangs of open positions may develop in markets, to be sharply unwound when the underlying market assumptions are proved incorrect. These issues make convergence of economies - notably in adopting fiscal consolidation, but also low inflation and provision of a “nominal anchor” - and co-operation between authorities yet more important. They may also present major dilemmas to the authorities when there is a potential conflict between growth and counter-inflation objectives, or indeed between monetary and financial stability more generally. They imply a need for improved capital account statistics to detect movements at an early stage and also data on distribution of shares and bonds across the household²⁰ and institutional sectors to calibrate wealth effects of market-shifts.

Some analysts would go further and criticise the “asymmetric” behaviour of the authorities themselves, which may worsen instability. They may be excessively willing to claim credibility as a consequence of falling bond yields rather than conceding that yields have undershot. Equally, there is rarely concerns over rising share prices, and real misalignments in exchange rates are often disregarded as long as spot rates remain stable. Convergence plays were seen as votes of confidence in the respective economies.

The broader issue of *capital controls* for all transactions remains a potential response to exchange rate instability, but most OECD countries have concluded that the benefits of open international capital markets, in terms of cost and efficient allocation of funds, for finance of economic development, budget and trade deficits is too valuable to be cast aside. Practice with controls showed they were often circumvented or subject to loopholes. Moreover, temporary introduction of exchange controls in a crisis would probably raise the risk premium on assets denominated in the currency concerned for a considerable period, and lead markets to anticipate their introduction in advance during the next crisis, thus aggravating the situation.

Others have revived the issue of the so-called *Tobin tax* on gross foreign exchange transactions to slow the response of financial markets to news (Eichengreen, Tobin and Wyplosz (1995)); others point out the well known shortcomings of this suggestion (Garber and Taylor (1995)), notably that a country imposing such taxes unilaterally would face disintermediation. Moreover, a tax imposed globally could still be avoided by undertaking of separate positions and transactions to mimic a foreign exchange deal, particularly via use of derivatives, necessitating application to an ever-wider range of instruments. And since success of such a tax would likely entail a decline in liquidity, and liquidity tends to be stabilising, it might have directly counter-productive effects on volatility.

A further point of major debate in the wake of the Mexican crisis was whether an *international lender of last resort for countries* is also needed. As noted, the IMF's funds have been increased to help it play such a role.

It is important to add in conclusion that internationalisation of portfolios is still in its infancy, while institutions themselves continue to show rapid growth, so these problems for policymakers are unlikely to recede. Moreover, the internationalisation of holdings of domestic securities such as government bonds seems likely to persist. These make further empirical investigation of the behaviour of global capital flows and the decision making processes of institutions all the more important. In our view, the following may inter alia prove fruitful avenues of research: interview surveys of fund managers' views on the constraints and pressures to which they are subject, pinpointing the precise forms of behaviour adopted; monitoring trades of a selection of managers in a global, cross-market context to detect "cross market herding"; and tests of whether deviations of prices from fundamentals actually *do* become more common when markets become pervaded by institutional traders (the evidence on day-to-day volatility at least would seem to be contrary to this expectation).

Table 1: Banks' relative importance in the financial sector

	1980	1993
UK	0.62	0.54
US	0.33	0.24
Germany	0.83	0.82
Japan	0.60	0.48
France	0.86	0.73

Bank assets as a proportion of assets of all financial institutions

Table 2: Government bonds held by foreign investors (% of total)

	1979	1992
UK	11.4	12.5
US	18.5	20.4
Germany	5.0	25.9
Japan	2.3	5.6
France	0.0	31.8
Italy	1.2	6.1
Canada	15.0	27.7

Source: IMF (1995)

Table 3: Assets of Pension Funds 1991

	Narrow definition ¹			Broad definition ²		
	Stock of assets (end-1991) \$ bn	% of personal sector assets	% of GDP	Stock of assets (end-1991) \$ bn	% of personal sector assets	% of GDP
United States	2915	22	51	3780	29	66
United Kingdom	643	27	60	786	33	73
Germany	59	3	3	80(3)	4	4
Japan	182	2	5	303(3)	3	8
Canada	187	17	32	205	19	35
Netherlands	145	26	46	242	43	76
Sweden	39	-	16	126	-	49
Denmark	22	-	16	82	-	60
Switzerland	173	-	70	-	-	-
Australia	62	19	22	110	34	39
France	22	-	2	41	-	5
Italy	50	-	6	-	-	-

(1) Includes only independent (private and public sector) funded pension schemes. (2).For the United States, Australia, Canada and Denmark includes data for pension reserves of life insurers; for the United Kingdom and Japan includes estimates of life insurance companies' pension fund reserves; for Denmark includes funds managed by banks; for Sweden includes social security (ATP) scheme; for the Netherlands includes the Civil Service Pension Fund (ABP); for France includes ARRCO/AGIRC reserves. (3) In Germany and Japan there are large reserve funded (or "booked") pension plans with assets held directly on the sponsoring firm's balance sheet. The value of these in 1991 was \$150 billion in Germany and an estimated \$120 billion in Japan. Source: Davis (1995)

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² It is not of course denied that the patterns illustrated may also have adverse consequences for financial stability and allocational efficiency more generally, see Davis (1994), (1995a and b).

³ Note that performance evaluation over a short period contrasts sharply with the nature of liabilities, whose maturity may extend to 25 years or more for life insurers and pension funds.

⁴ See also the related papers by Welch (1992) and Banerjee (1992), which assess rational herding, sequential decisions and so-called information cascades, where each decision maker takes into account the decision of previous decision makers in his or her choices, ignoring private information. Note, however, these are not applied specifically to institutions in the way Scharfstein and Stein and Froot et al are.

⁵ See Davis (1995a), who, after interviewing 12 fund managers on international investment strategies in London in 1991-93 found "Most of the managers, but particularly those who are external managers, felt some pressure not to underperform relative to their peers, for fear of losing the management contract. Indeed some trustees set an explicit objective to managers not to underperform the median fund - but obviously impossible for all managers. (In contrast, overperformance is not rewarded commensurately - i.e. there is a strong asymmetry in outcomes.) Such behaviour is reinforced by frequent use of benchmarks such as the CAPS median performance indicator (for small funds). This would in turn induce similar behaviour to other managers in terms both of bench-mark level of international investment and choice of market. Managers who could afford to act more freely, perhaps because of their firm's reputation, still felt a need to know the consensus in order to act in a contrarian manner."

⁶ That is, characterised by events such as market crashes to which probability analysis cannot be applied.

⁷ See Howell and Cozzini (1992), Davis (1995a).

⁸ As an example of recent evidence, Lakonishok *et al* (1992) show that most US investment management is active, but fund managers consistently underperform the market, for example the equity proportion of US funds (excluding the management fee) underperforms the S&P 500 index by an average of 1.3% pa over 1983-9, or 2.6% if returns are value weighted. Overperform in some periods is virtually never sustained.

⁹ Nevertheless, as noted by Grossman and Stiglitz (1980) and Cornell and Roll (1981), the efficient markets hypothesis does not rule out small abnormal returns as an incentive to acquire information, but those acquiring costly information should have only average net returns after the costs of acquiring information are taken into account. In practice, active managers underperform.

¹⁰ Abstracting from herding, Blake (1992) notes that volatility may increase with maturity of pension funds, as it implies less inflows, and the need for large and potentially destabilising portfolio shifts to adjust from equities to bonds.

¹¹ Index arbitrage involved buying and selling simultaneously a stock index futures contract and the underlying stocks, so as to profit from any discrepancy (known as spread or basis) between them.

¹² On the one hand, any form of strategy which aimed to lock in current values, such as stop-loss selling of equities (selling when the price had fallen to a pre specified level), would equally have induced a rush of sales when the market fell; and this was probably the more prevalent strategy. Also Fortune (1993) suggests that discounts between stock index and futures prices were in fact illusory, resulting from such cash market phenomena as delays in reporting of individual share prices, late openings or trading halts for individual stocks. Moreover Grossman (1988), examining US daily transactions data for 1987 as a whole, found no link from stock market volatility to programme trading.

¹³ Actual sales of DM by central banks to protect ERM currencies in the second half of 1992 totalled DM 188 billion (\$118 billion) (IMF (1993)).

¹⁴ Compare De Long et al (1990) outlined in Section 1.

¹⁵ Both life insurers and pension funds in a number of EU countries remain heavily restricted in their international investment.

¹⁶ Note in this context that internationalisation of portfolios may have an effect on exchange rates independent of the volume of assets outstanding only when international investors behave differently to those who are domestically based owing to *home asset preference*.

¹⁷ Personal contacts of Mexican officials to fund managers were reportedly an important aspect.

¹⁸ The rate was fixed in 1988 then allowed to depreciate at a preannounced rate.

¹⁹ Sachs et al (1995) note strong parallels to a bank run.

²⁰ The implications of large losses to a few rich individuals will differ from a more widely distributed effect, while indirect holdings via pension funds may mean short term fluctuations are seen as irrelevant to ultimate beneficiaries.