E. PHILIP DAVIS*

International Investment of Pension Funds in Europe; Scope and Implications for International Financial Stability[1]

1. Introduction

The rapid development of pension funds, and the increasing international diversification of their portfolios, raise important issues for economic policy. On the one hand, international investment is clearly desirable from the point of view of funds themselves, as a means of reducing risk, as well as having potentially beneficial effects on resource allocation and consumption smoothing at a macroeconomic level. On the other hand, some commentators have suggested that capital flows generated by pension funds threaten to destabilise international financial markets, generating equity-price volatility and deviations of exchange rates from fundamental values; and more generally, leading to loss of monetary policy autonomy. Such issues are of particular interest to countries such as Chile, as well as Switzerland until recently, were pension funds have accumulated considerable assets, but where international investment remains tightly restricted.

This paper seeks to address the underlying issues using data for six European countries - the UK, the Netherlands, Germany, Switzerland, Denmark and Sweden together with the US, Australia and Japan. Data for France and Italy, where pension funds are virtually non-existent, are included where appropriate. The paper first considers why international investment may be advantageous for pension funds and at a broader macroeconomic level. Second, it assesses actual experience of international investment by funds in the countries studied, and examines the main reasons for differences in the scope of such investment between countries. Third, it assesses possible reasons why pension funds could destabilise international financial markets, and fourth, it assesses the evidence for such destabilisation using data from the September 1992 crisis in the European exchange rate mechanism. Conclusions are drawn in a final section.

2. Why international investment?

2.1 Microeconomic benefits

A discussion of the reasons why international investment might be attractive to long term institutional investors such as pension funds must begin with an assessment of asset managers' objectives.

* E. Philip Davis is Deputy Head of Stage Two Division at the European Monetary Institute on secondment from the Bank of England and an Associate Member of the Financial Markets Group at LSE. Views expressed are those of the author and not necessarily those of the Bank of England, European Monetary Institute or Financial Markets Group. The errors remain his own responsibility. Thanks are due to an anonymous referee and to participants in the conference on Pensions Privatisation held in Santiago, Chile on 26 and 27 January 1994. E. Philip Davis, European Monetary Institute, Kaiserstr. 29, D-60311 Frankfurt am Main, Tel.: 069-27 227 642, Fax: 069-27 227 227.

Subject to the constraints imposed by the type of liabilities outstanding, fund managers generally aim for a high return at a given level of risk; in the case of external managers of company pension funds, as well as managers of personal pension schemes, a superior performance is likely to lead to more business, while for internal managers of company pension funds, reduced contributions may be required of the parent company[2]. As regards risk, in all cases, risk reduction (e.g. via international diversification) can be seen as protecting the pensioner (in the case of defined contribution funds) or offering a hedge to the company against shortfall risk (for defined benefit funds). Meanwhile, since funds' liabilities are typically long term, managers may concentrate their portfolios on long-term assets yielding the highest returns. Risks on such assets are reduced by pooling, i.e. diversifying the portfolio across instruments whose returns are imperfectly correlated.

Modern portfolio theory (SOLNIK (1991)) suggests that pooling in a domestic market can eliminate unsystematic risk resulting from the different performance of individual firms and industries but not the systematic risk resulting from the performance of the economy as a whole.[3] In an efficient and integrated world capital market, such risk would be minimised by holding the global portfolio, wherein assets are held in proportion to their distribution by current value between the national markets. Such a strategy should reduce risk for a given return in several ways. Crucially, to the extent national trade cycles are not correlated, and shocks to equity markets tend to be country specific, the investment of part of the portfolio in other markets can reduce systematic risk for the same return. In the medium term, the profit share in national economies may move differentially, which implies that international investment hedges the risk of a decline in domestic profit share and hence in equity values[4]. And in the very long term, imperfect correlation of demographic shifts should offer some protection against the effects on the domestic economy of ageing of the population.

Supporting arguments may be derived from the special circumstances of individual countries. There may be industries off-shore (oil, gold mining etc.) which are not present in the domestic economy, investment in which will reduce unsystematic risk even if trade cycles were correlated. The domestic stock market may itself be poorly diversified, being dominated by a small number of large companies (e.g. the Netherlands), or unduly exposed to one type of risk (e.g. Canada and raw materials). If the domestic currency tends to depreciate (as in the UK), real returns on foreign assets will be boosted correspondingly and vice versa for appreciation (though in the long run, real returns in domestic currency will be equalised if purchasing power parity holds). Other economies (e.g. Japan, and latterly the Pacific Rim and Latin America) may be more successful in terms of growth than the domestic economy and hence offer higher total returns, given stock market returns ultimately depend on dividends, which in turn are a function of profits and GDP growth. Similarly, there may be a higher marginal productivity of capital in lower-wage countries (e.g. Korea) which may be attractive to investors[5]. For investors in certain markets, international investment may be stimulated by the unavailability of certain instruments in the home market, such as commercial paper and floating rate notes in Germany until recently, and long-maturity bonds in Japan in the early 1980s. In the special case of Japan pension funds' investment in foreign assets provides a hedge against the possibility of a catastrophic domestic earthquake. Again, if oil prices change it is best to hold assets in both oil exporters (who benefit from an oil price rise and lose from a fall) and importers (vice versa). A high dependency on oil would imply a higher weighting towards oil producers. Finally, in the case of "unit-linked" life or pension policies related to foreign-currency mutual funds, all assets will in any case be held abroad (i.e. foreign investment may be driven from the liabilities side).

In the context of these arguments, a number of academic studies using data over the long term have shown that investors free to choose foreign assets

may obtain a better risk/return trade off than if they are restricted to assets of one country. (See LEVY and SARNAT (1970), SOLNIK (1974), ADLER and DUMAS (1983), MERIC and MERIC (1989)). To illustrate these arguments,[6] Table 1 compares the real returns and risks over 1967-90 on artificial portfolios holding 50% equity and 50% bonds domestically and with 20% international diversification, where the international assets are composed of the basket of equities and bonds from twelve major OECD countries, weighted by the shares of global market capitalisation, with the domestic indices of course being excluded. International asset returns are translated into real returns for a domestic investor by subtracting the change in the nominal effective exchange rate and the domestic inflation rate. Foreign investment is shown always to reduce risk, though in some cases there is a trade off with returns[7]. An increase of international exposure to 40% always reduces risk further, consistent with the global portfolio concept, while hedging[8] to eliminate exchange rate risk often *increases* risk on average over this 25-year period (because of offsetting movements in asset prices and exchange rates). Contrary to the view that benefits of diversification have declined, DAVIS (1995a) shows there is little evidence of a deterioration in the risk-reducing benefits of international investment from the 1970s to the 1980s.

Calculations of correlations between share prices in the major markets over shorter time horizons (Table 2) suggest correlations between foreign and domestic equities are positive but far below unity for all countries, which indicates some potential benefits to portfolio diversification via international investment.[9] However, contrary to the results quoted above, there is a clear trend for such correlations to increase over time in most of the pairwise comparisons, consistent with increased arbitrage by institutional investors such as pension funds. Data in MULLIN (1993) show much lower, albeit increasing, correlations with OECD markets for markets in Latin America and Asia. Meanwhile, Table 3 show correlations in profit shares, and confirms there is imperfect correlation over long periods, showing there are longer term advantages to international diversification.

Table 1: Mean (standard deviation) of real total returns on diversified portfolios 1967-90

Per Cent	Domestic[1]		Domestic & international[2]		Change in return and risk	Memo: return and risk at 40% international investment[3]		Memo: return and risk with hedged domestic and international portfolio[2]	
United States	2.1	(12.9)	2.8	(12.5)	+ (-)	3.6	(12.5)	2.7	(12.2)
United Kingdom	3.8	(14.8)	3.7	(14.1)	- (-)	3.7	(13.7)	3.2	(13.9)
Germany	6.1	(15.2)	6.2	(13.4)	+ (-)	6.3	(11.9)	6.2	(13.7)
Japan	5.5	(15.5)	5.3	(14.3)	- (-)	5.1	(13.7)	5.2	(14.4)
Canada	2.2	(1.2)	2.2	(10.8)	0 (-)	2.2	(10.7)	2.5	(10.7)
Netherlands	4.5	(17.0)	4.2	(15.2)	- (-)	3.9	(13.7)	4.6	(15.1)
Sweden	3.8	(13.5)	3.7	(12.3)	- (-)	3.7	(11.5)	3.5	(12.1)
Switzerland	2.0	(15.4)	2.0	(13.4)	0 (-)	2.0	(12.1)	2.8	(13.4)
Denmark	5.3	(18.9)	4.6	(16.4)	- (-)	3.8	(14.3)	4.6	(16.1)
Australia	2.7	(16.1)	2.8	(15.1)	+ (-)	3.0	(14.5)	2.5	(14.6)
France	5.2	(18.0)	4.9	(15.9)	- (-)	4.5	(14.0)	4.7	(16.0)
Italy	1.9	(22.1)	2.0	(18.7)	+ (-)	2.0	(15.6)	1.2	(19.1)

[1] 50% domestic equity, 50% domestic bonds.
[2] 40% domestic equity, 40% domestic bonds, 10% foreign equity, 10% foreign bonds.
[3] 30% domestic equity, 30% domestic bonds, 20% foreign equity, 20% foreign bonds.

Table 2: Correlations of monthly changes in share prices

		US	Japan	UK	France
Germany	1963-69	0.26	0.03	0.14	0.26
	1970-79	0.39	0.45	0.36	0.47
	1980-90	0.44	0.28	0.39	0.50
	1990-93	0.49	0.28	0.57	0.73
US	1963-69		0.09	0.31	0.10
	1970-79		0.43	0.55	0.42
	1980-90		0.40	0.58	0.42
	1990-93		0.44	0.62	0.58
Japan	1963-69			0.10	0.12
	1970-79			0.37	0.36
	1980-90			0.39	0.34
	1990-93			0.51	0.41
UK	1963-69				0.12
	1970-79				0.40
	1980-90				0.45
	1990-93				0.67

Table 3: Correlations of profit shares 1970-91

	US	Japan	UK	France
1. Changes:				
Germany	0.34	0.44	0.25	0.52
US		-0.29	0.13	-0.09
Japan			0.39	0.73
UK				0.39
2. Levels:				
Germany	0.80	0.30	0.52	0.19
US		0.00	0.78	-0.19
Japan			-0.20	0.57
UK				0.53

Given the force of these arguments, the puzzle for finance theorists is that global diversification is not pursued to its logical extreme; instead, as shown in Table 4, pension funds in all countries invest at least 60% of their assets in the home market, and in most, the figure is over 90%. Enormous differences is expected yields would be needed to account for such portfolios, in the context of the theory of efficient markets[10]. Reasons for this home asset preference may include the following: First, international investment poses additional risk compared with domestic investment. Exchange rate risk means that the returns from foreign assets may be more variable than for domestic instruments, especially in the short-term. Use of hedging instruments such as forwards, futures and options can to a certain extent reduce the risk, see BIS (1986), but the price of these instruments may offset part of the gain from foreign investment in terms of return, they may only be available for short periods, derivative markets may become illiquid at times of stress, and trust deeds for pension funds may limit their use. Transfer risk may affect the ability to repatriate returns, for example due to imposition of exchange controls or nationalisation of foreign assets. Settlement risk in certain securities markets may be large, with a high proportion of delayed or failing transactions. Liquidity risk that transactions may move the market against the fund may be significant in narrow markets. But settlement, liquidity and transfer risks may be avoided by appropriate choice of markets, and exchange rate risk, viewed in the context of modern portfolio theory rather than in isolation, is judged by many commentators to contribute to, rather than offsetting the benefits of offshore investment in terms of returns and diversification of risk (see Table 1).

Second, the arguments regarding global diversification may be considered to apply to different degrees in the cases of equities, property and bonds. They apply most precisely to equities, although one counter-argument is that a great deal of internatio-

Table 4: International investment, stock market capitalisation and import penetration (1990)

	International asset asset share of pension funds' portfolio	One minus percentage of global stock market	Imports/GDP
Netherlands	19	99	54
US	5	67	11
UK	21	90	27
Germany	1	96	30
Japan	7	67	13
France	5	96	23

Source: Adler and Jorion (1993)

nal diversification may be obtained by investment in the domestic market if firms carry out a large amount of foreign direct investment. Bond markets are perhaps more globally integrated and hence there is less benefit from diversification out of domestic markets. Indeed, if uncovered interest parity holds[11], total returns on bonds net of exchange rate changes will equalise. However, so long as markets are not totally efficient and globally integrated, international bond investment should show benefits. Property, while in principle a real asset similar to equity, is less liquid and more reliant on imperfect local information. Hence it may be more risky (see PLENDER (1982)).In practice, and probably reflecting these arguments, a survey of internal international investment rules for institutions from the UK, Australia, Switzerland and the Netherlands found equity investment to have the highest portfolio limit for foreign assets, and property the lowest (COOTE (1993)).

Third, in the above discussion fund managers are assumed to seek an improved risk/return trade-off, and international diversification may be a suitable way to achieve this. There are several reasons why institutions may not seek to do this. First, pension funds may have precisely defined liabilities (except for actuarial uncertainty), in which case precise matching of liabilities with assets (e.g. domestic government bonds) may be the preferred strategy to eliminate risks to solvency. Matching with foreign assets will be less precise given exchange rate risk (assuming liabilities are denominated in domestic currency). This argument applies equally to investment in capital uncertain assets such as equities and property. Second, a company may offer pensions with precisely defined returns, perhaps due to regulation, which again encourages a cautious investment policy based on domestic fixed-interest assets. In most countries[12] these two arguments apply somewhat less to pension funds than life insurers the other principal long term institutional investors - though it is notable that even for pension funds the diversification is not pursued to its logical conclusion, the global portfolio. Third, there may be risk aversion in the case of funds where individuals or employee representatives help to determine asset allocation, notably defined contribution funds or personal pensions[13]. Finally, foreign investment may be forbidden by the authorities, due to exchange controls[14], on "prudential" grounds, or by fiscal means. The appropriateness of such regulation is questioned below.

Fourth, foreign investment will not overcome systemic risks to world capital markets, such as those during the 1987 Crash. BERTERO and MAYER (1989) showed that heightened correlations during the crash were slow to subside. However, as shown in Financial Times (1988), correlations between different markets, though high during the Crash, are rather low at normal times. Again, the argument for the global portfolio assumes efficiency of markets. If markets are inefficient, for example showing bubbles, then global indexation by market capitalisation will not be an efficient strategy, as those building up holdings of Japanese stocks in the late 1980s and early 1990s discovered.

HOWELL and COZZINI (1990) suggest that an optimal level of international diversification can be estimated for institutions from any one country. This is based on the "openness" of the economy, and thus its exposure to output and inflation shocks. The reason why funds may seek to follow such a benchmark and not the global portfolio are basically that there is scepticism regarding purchasing power parity holding, even in the very long term (BEENSTOCK (1986)). This can be justified by the existence of long term shifts in real exchange rates, which means currency mismatching can involve risk, especially for a mature fund. An alternative way of looking at optimal portfolios is to estimate the so called frontier of efficient portfolios, which shows the best possible trade-off between risk and return. Minimum risk for a given return is often shown by such studies (such as GREENWOOD (1993)) to be at an exposure to foreign assets of 20-30%, a similar level to import penetration in medium sized economies.

A proxy for exposure to inflation shocks is the average share of foreign trade in total GDP, which for the major countries is around 20%. As shown in

Table 5: International equity flows, turnover and current account deficits ($bn)

	1986	1987	1988	1989	1990	1991
Net equity flows	42	16	33	87	3	101
Gross equity flows	864	1378	1167	1563	1391	1323
Ownership of foreign equities	469	541	656	869	741	918
World current account deficit	-	186.7	177.8	194.3	-	-
Foreign turnover ratio	206%	349%	230%	247%	306%	229%
Domestic turnover ratio	103%	125%	99%	116%	81%	-

[1] Includes merger and acquisition activity as well as institutional investment.
Source: Howell and Cozzini (1992)

Table 4, the actual share is far below the import share for most countries, and even further below the level required to hold the global portfolio (one minus the country's share of global market capitalisation). Home asset preference is thus confirmed.

2.2 Macroeconomic benefits

The section above has focused on the attractions of international investment to pension funds at the microeconomic level of the individual fund, which has implications for generation of *gross* capital flows as the pension fund diversifies its portfolio. But it is important to add that at a macroeconomic level, pension fund investment may be an important conduit for *net* international investment, i.e. for saving to flow to countries with demand for capital in excess of domestic saving, and thus high returns to capital (as well as balance of payments deficits).[15] As shown in Table 5, net flows already make a major contribution to finance of balance of payments deficits, even if focus is only put on equities.[16] This section focuses on these broader macroeconomic and global benefits of liberalisation of international investment in more detail.

The countries most in need of such inflows are those in the process of economic development - which in a free market economy (as opposed to planning and autarky) may require a long period of trade deficits and capital inflows, as in the US in the 19th Century. The marginal product of capital - and hence investment returns - should be highest in such countries. Again in principle, unlike banks, pension funds are particularly suitable vehicles for such inflows, as they are potential long-term holders who will not be forced suddenly to withdraw their assets due to short term demands for funds. Two cases can be distinguished. On the one hand, due to such factors as lack of development of securities markets, the debt crisis, exchange controls, illiquidity, or even limits on inward investment, institutions do not tend to invest in very low income countries. The argument regarding development also holds, however, for middle income countries such as Brazil, Mexico, Korea, Turkey, Greece and Spain, for whom restrictions and transfer risk are lower and who have thus been recipients of institutions' funds for some time. Also, the number of "emerging markets" in which institutional funds are invested continues to increase, i.e. the margin between acceptable and unacceptable risks is flexible.

More generally, the potential effects of imbalances in private saving and investment between OECD countries may be ameliorated by capital flows. Moreover, some have argued that pension fund

inflows may have higher quality in this context. If imbalances are financed by long term institutions they may act as stabilising speculators, which can balance out long term gains from higher relative interest rates in countries with deficits against the risks of revaluation in a floating rate system or realignment in a fixed rate system (a counterargument is presented in Sections 3 and 4 below). In contrast, a bank or corporate treasurer with a short time horizon may act as a destabilising speculator, shifting funds instantly in response to exchange rate risk, given the much lower potential interest return than for the life insurer or pension fund both due to the short holding period and the shorter term assets held. Again, to the extent that pension funds are interested in equity and not bond or money market investment, they will tend to foster stock market integration rather that interest rate linkages, thus preserving monetary autonomy (see Section 3). Similar arguments have been made more recently for emerging markets (GOOPTU (1993)).

Besides facilitating domestic private investment, the development of institutional investors is widely considered to have facilitated financing of budget deficits, as the constraint of domestic saving no longer applies. The more efficient are international capital markets, and hence the greater the substitutability of domestic and foreign assets in investors' portfolios, the less the effect of additional government borrowing on domestic interest rates. In some ways this may be seen as desirable, as it helps to ensure non monetary financing, and thus aids counter inflation policies[17]. Also in the short term, international capital flows can prevent potentially undesirable instability in exchange rates which might otherwise be generated. But equally, domestic monetary authorities may have less control of the exchange rate as a consequence, and perceptions by international creditors of disequilibrium in an economy can lead to major shifts of funds, as discussed in Sections 3 and 4. Also correction of fiscal positions may be delayed for longer than is desirable, as the government faces less budgetary discipline. A particular example of the processes outlined above may be seen in the way institutional investors (notably in Japan, once exchange controls were abolished) played a key part in financing trade imbalances between the G-3 countries over the 1980s[18], by investing heavily in US bonds. This may be seen conceptually as having facilitated a form of consumption smoothing[19], that would not be possible in closed economies, whereby Japanese savers were able to postpone consumption via international investment while allowing American consumers to advance it via international borrowing (BISIGNANO (1993)). This in turn helped to equalise covered returns on financial assets, making the world market portfolio more efficient. However, although financing of US trade imbalances by Japanese inflows may have been desirable in some ways, it may also have helped to generate exchange rate misalignment, as the weight of inflows drove up the value of the dollar, before it fell again equally precipitously after 1985. Again, as noted above, inflows may allow countries to pursue ultimately unsustainable policies for longer than was desirable. The example in this case is expansionary fiscal policy in the US, which given the role of capital inflows in its financing can be seen as the US government doing its own consumption smoothing, transferring income from future generations of taxpayers to existing ones, in precisely the opposite direction to that required by "ageing of the population".

As well as helping finance development directly, the arbitrage process inherent in international securities investment should enhance the efficiency of capital markets, by equalising total real returns (and hence the cost of capital) between markets. Such a process occurs as investment managers shift between over - and undervalued markets (such judgements are also, however, subject to local accounting and interest rate differences). Increased efficiency enables capital to flow to its most productive use and for savers to maximise their returns. There is some evidence (HOWELL and COZZINI (1990)) that international investment has tended to reduce the dispersion of real returns, although a longer run of data and more disparate economic performance between countries would be

Table 6: Asset Shares of Pension Funds End-1989

	US Funds	UK Funds	Japanese Funds[1]
US	-	31.0	66.0
UK	12.1	-	9.4
Japan	34.7	25.0	-
Continental Europe	39.0	35.0	12.5
Other	14.2	9.0	12.5

[1] All financial institutions; holdings exclude Japanese eurowarrants.
Source: Salomon Bros

needed to prove it. It is clearer that nominal covered returns have tended to equalise, notably as capital controls are abolished (FRANKEL (1992)). Indeed BISIGNANO (1993) argues that gross flows alone will only tend to equalise nominal returns; net flows of saving and investment are needed are needed to equalise real returns. But net flows are precisely what the ageing of OECD populations may be expected to generate, particularly with funded pension schemes, as countries with the most rapidly ageing populations export capital to those with relatively young ones. At least until the Mexican crisis this process appeared to be underway in the increase in flows to developing countries, which could make a major contribution to efficiency of global capital markets and equalisation of real returns. Such a process was also illustrated by the flows between Japan and the US, discussed above. Asset market effects of international investment are not confined to the transnational level. International investment may also help to relieve excessive pressure on domestic asset prices. In the mid-1980s the Japanese equity market might have been even more buoyant perhaps dangerously so - if institutions could not invest offshore while repatriation may have limited more recent declines. In the UK, the 1981 appreciation of sterling, which damaged the domestic economy, might have gone much further in the absence of capital outflows from UK institutions. The Swiss pension fund (and life insurance) sectors have been accused of distorting the housing market, as a result of which constraints on foreign and securities investment have been relaxed. With this discussion as background, we go on to examine experience of international investment in Europe, the US and Japan.

3. Experience of international investment

Patterns of portfolio shares of foreign assets for pension funds over time are shown in Table 7. This shows that UK pension funds' external assets were already sizeable in 1980, having reacted strongly to abolition of exchange controls the previous year as well as already holding sizeable quantities of foreign assets financed by back-to-back loans. Since 1980 UK and Japanese holdings have increased sharply as a proportion of funds' portfolios, in both cases as a stock adjustment to exchange controls' abolition, while US, Dutch and Swiss holdings have also grown. In contrast, German and Danish funds' foreign assets remained minimal over the decade. Swedish data are not available, but holdings are believed to be minimal.

US funds have been at the forefront of increases in international investment in the early 1990s. US funds' foreign assets grew 35% in 1991 to reach $125 billion, 4.6% of total assets. Projections by Intersec Corporation suggest a rise to 10% by the mid 1990s is to be anticipated. 68% of foreign assets

Table 7: Foreign assets (as a percentage of assets)

	1970	1975	1980	1985	1990*
UK	2	5	9	15	18
US	0	0	1	2	4
Germany	0	0	0	1	1
Japan	0	0	1	5	7
Canada	-	3	4	5	6
Netherlands	7	8	4	9	15
Sweden	-	-	-	-	-
Switzerland	-	-	-	3	5
Denmark	-	-	-	-	1
Australia	-	-	-	-	13

* 1987 for Denmark

Table 8: Foreign assets of pension funds end 1991

	Foreign assets ($ billion)	Percent of total assets	Foreign bonds as percentage of foreign assets	Foreign equities as percentage of foreign assets
UK	134	20.8%	15%	85%
US	125	4.6%	18%	82%
Germany	1(1)	0.6%	93%	7%
Japan	13(2)	7.0%	50%(3)	50%(3)
Canada	14	7.6%	6%	94%
Netherlands	28	19.1%	27%	73%
Switzerland	11	5.9%	70%(3)	30%(3)
Australia	9	14.9%	20%(3)	80%(3)
Denmark	1	2.6%	11%	89%

(1) Direct holdings of Pensionskassen only; Intersec estimate a total of $5 billion (4.5%) of assets if holdings via special funds are included.
(2) Pension trusts only; trust banks' total foreign assets in 1991 were $10 billion; life insurers had foreign assets of $140 billion in 1991 (12.5% of their assets) of which 76% were bonds and 23% equities.
(3) Estimated

represents assets of private funds. There has also, however, been a major shift into foreign assets by public funds, as private funds accounted for 88% of US funds' foreign assets in 1987. (Many public funds faced restrictions on international investment prior to the 1980s.) Some large funds are considerably more internationally diversified than the average, such as CALPERS, which holds 14.6% abroad, and GTE at 16.6%.

The outturns for 1991, including the composition of external holdings, are shown in more detail in Table 8. UK pension funds remained the largest international investors in 1991, both in terms of value of assets and portfolio share. The other significant holders are the US, Japanese[20], Swiss and Dutch[21] sectors.Danish and German funds hold very few foreign assets. Foreign equity holdings are larger than bonds for most countries; Japanese funds hold equal shares, while in Switzerland and Germany a cautious strategy is evident. Even German special funds, in which pension funds are allowed to invest without reference to foreign asset restrictions, reportedly hold only 27% equity and 6% foreign equities.

An issue raised by these data is that the benefits of international investment highlighted in Section 1 have always been present. Why has diversification increased so significantly in the 1980s? As noted in DAILEY and MOTALA (1992), factors underlying growth in foreign asset holdings include those underlying pension fund growth itself (better coverage, demographics, funding requirements, investment returns) and growth of the relative size of pension funds in domestic markets. But these do not explain growth in portfolio shares. Key autonomous factors underlying the general growth of international financial investment and trading, must be highlighted as having a causal significance. These include improved global communications, liberalisation and increased competition in financial markets, which have reduced transactions costs, improvement of hedging possibilities via use of derivative instruments and marketing of global investment by external managers. But most crucial, in particular to explain differences between countries, have been regulatory changes such as removal of exchange controls and other legal restrictions on foreign investment, and changes in prudential and diversification requirements. The current regulations are summarised in Table 9.

As noted, abolition of exchange controls has been an important factor underlying growth of international investment in Japan, the UK and Australia. But equally, it cannot be a complete explanation, as Germany, where funds hold few foreign assets, abolished exchange controls in the 1960s. In terms of regulation, the basic contrast is between countries that follow prudent man rules, thus enjoining sensible diversification and implicitly accepting the thrust of the argument of Section 1, and those that choose to impose direct restrictions on foreign investment for "prudential" reasons[22] or simply to ensure retention of domestic saving and monetary autonomy[23]. The rules are summarised in Table 9.

US pension funds are subject to a "prudent man rule" which requires the managers to carry out sensible portfolio diversification, and which is taken to include international investment; there are no limits on portfolio distribution. UK pension funds are subject to trust law and again follow the "prudent man" concept; they are not constrained by regulation in their portfolio holdings. (Although in both

Table 9: Portfolio restrictions on pension funds

	Portfolio regulations	Exchange controls
US	Prudent man concept; 10% self investment limit for defined benefit funds.	No
UK	Prudent man concept; 5% self investment limit, concentration limit for defined contribution plans.	No
Germany	Guidelines; maximum 20% foreign assets.	No
Japan	Guidelines; maximum 30% equity, 20% property, 30% foreign, 10% in one country; minimum 50% bonds.	No
Netherlands	Prudent man concept, 5% self investment limit.	No
Sweden	Majority to be in listed bonds, debentures and retroverse loans to contributors.	No
Denmark	Property, shares and investment trust holdings limited to 40%, foreign assets to 20%; 60% to be in domestic debt. No self investment; 20% can be invested internationally.	No
Switzerland	30% limit on domestic shares, 50% on property, 20% foreign currency assets, 10% foreign shares.	No
Australia	Prudent man rule	No
France	Assets of supplementary funds to be invested 50% in government bonds and less than 33% in loans to sponsors.	No
Italy	No pension law	No

countries trustees may impose limits on portfolio distribution.) Dutch funds are again unrestricted, except for the civil service fund ABP, which was only allowed to invest 5% in foreign assets in 1990 a ceiling that has already been reached. Japanese funds face nonbinding ceilings on foreign asset holdings, which are currently 30%. Meanwhile German funds are subject to the limits on foreign investment - effectively a ceiling of 20% - imposed on life insurers (till recently the limit was 4%). Until 1993, when a liberalisation occurred, binding limits also held in Switzerland. Danish and Swedish funds have only been allowed to hold a small proportion of foreign assets since 1990. In France[24] certain pension funds are constrained by fiscal regulation to invest solely in domestic assets - implying even tighter control than in Germany.

Even within these parameters, there remain further contrasts between sectors that warrant discussion. Despite freedom to invest externally, US pension funds' external asset holdings are a far smaller proportion of the portfolio than those in the UK, the Netherlands and Japan. It may be that they consider the domestic market to be sufficient for their needs, although the growth in share of external assets suggests this view is changing. (Table 1 certainly suggests that such a shift would be justified). As shown in Table 4, exposure of the economy to external shocks is relatively low. As noted in DAVIS (1991), Japanese pension funds (run by trust banks) have a lower portfolio share of foreign assets than life insurers, despite the difference in liabilities; this may partly relate to the less aggressive approach to diversification of the former, though also a greater focus on real long term gains may have justified (until 1989) a concentration of trusts on the domestic equity market. Pension funds in the Netherlands need to invest abroad given their size relative to the domestic securities markets.

As regards prospects for growth, portfolio shares generally remain even below exposure to shocks of the domestic economy (Table 4) and portfolios continue to grow strongly. Data for total assets of pension funds are shown in Table 10. The heavy constraints on European funds may entail sizeable

potential for cross border investment following deregulation there. (The proposed EC Pension Funds Directive would prevent authorities from restricting pension funds via currency matching requirements to international portfolio shares of under 20%.) And reform and development of pension funds in countries such as Germany, France and Italy (DAVIS (1993b)) would provide a major new source of international investment. For example, if French pension funds were to reach the size of their UK counterparts in terms of shares of personal sector assets, they would total $528 billion[25]. Similar calculations for Germany give $570 billion in assets, which compares with the $703 billion market capitalisation of the German stock market. In practice, personal sector financial wealth would probably be boosted by a switch from pay-as-you-go to funding, so the increase in value of funds - and consequent stimulus to capital markets - would probably be significantly greater. It is notable that in the Anglo-American countries, where social security is less comprehensive, the ratio of personal financial wealth to GDP is more than 2, whereas in France and Germany it is below 1.5. If French financial wealth reached the same level as the UK in relation to GDP, as well as pension funds attaining the same share of personal wealth, the stock of pension assets would be over $750 billion. To a degree depending on portfolio regulations and the investment climate, this should in turn boost demand for foreign assets.

Despite the benefits outlined in Section 1, the growth of pension funds' international assets discussed above has generated some concern, notably regarding potential volatility of capital markets and loss of monetary autonomy. Section 4 considers these arguments in more detail, while Section 5 examines their applicability to recent crises in the ERM.

Table 10: Assets of Pension funds end-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
US	2915	22	51	3780	29	66
UK	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	n/a	16	158	-	65
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 funded pension schemes, except Sweden - public ATP scheme.

[2] For the US, Australia, Canada and Denmark includes data for pension reserves of life insurers; for the UK and Japan includes estimates of life insurance companies' pension fund reserves; for Denmark includes funds managed by banks; for the Netherlands includes the Civil Service Pension Fund (ABP); for France includes reserves of ARRCO/AGIRC, for Swden includes funded social security (ATP).

[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.

4. How could pension funds destabilise international financial markets?

One disadvantage of free international capital flows in general is that policy autonomy of governments is reduced. In fixed rate regimes, policy autonomy is likely to be limited even with capital controls, as experience over the Bretton-Woods period prior to the early 1970s showed, but without them, monetary policy needs to be identical with the "anchor" country. Moreover, experience suggests that even if policies are identical, markets may focus upon any deviation in real exchange rates and asymmetric cyclical position to attack a parity (see the discussion of the ERM crisis in Section 4). Even under floating rates, policy autonomy may be limited, as countries seek to avoid exchange rate movements leading to misalignments and overshooting by tight control of inflation via interest rate policy, as well as intervention. And intervention will itself become less effective as financial assets become closer substitutes in investors' portfolios. A counterargument is that international investment solely in equities may not compromise policy autonomy, as long as they are poor substitutes for bonds. But recent capital flows have also been heavily focused on the bond market, as discussed in Section 4. And even equity flows may still generate downward pressure on the exchange rate under certain circumstances[26].

Focusing more narrowly on asset market volatility, one possible source of pension fund behaviour which could induce this is regular performance checks against the market (as frequently as monthly in the United States, but less in the United Kingdom), itself partly a consequence of principal-agent problems in the fund management relation. Research into securities markets has shown that this may induce similar behaviour, and hence 'herding' among funds to avoid performing significantly worse than the median fund (SCHARFSTEIN and STEIN (1990)). 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)). Third, 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[27] and not merely risk[28], if it causes funds to change their views about the likely state of the world that will prevail in the future. Herding need not always be destabilising, indeed it may speed the market's adjustment to a new equilibrium price or offset irrational shifts in behaviour by other investors such as individuals and foreigners. What is needed for increased inefficiency of markets is for institutions also to follow strategies which may be contrary to fundamentals, such as trend chasing or so-called positive feedback trading[29] (CUTLER et al (1990)). Herding combined with such strategies could drive prices further from fundamentals, particularly if the market in any case overreacts to news[30].

As regards evidence for these hypotheses, pressure on fund managers from performance evaluation, which may lead to similar approaches to investment, is a well established phenomenon. Both UK and US managers acknowledged the influence of this in surveys summarised in DAVIS (1988) and (1991)[31]. The Japanese also appear prone to herd, despite a less competitive environment for managers. In a recent article, 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 marketwide herding which is the main cause for concern. Particular mechanisms which could generate volatility can be identified at an international level. As noted in HOWELL and COZZINI (1991), the rise of global asset allocation as a tool of fund management, and the development of markets such as those for stock index futures

have stimulated and facilitated massive increases in short term cross border equity flows. One equity transaction in three in Europe now involves a foreign transactor; and trading in stock index futures often far exceeds that in the underlying. Although the investors desire by adopting such strategies to reduce risk, the focus of funds on a small number of leveraged instruments can lead to destabilisation of markets and sharp swings in asset prices.

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

Such destabilising behaviour need not be confined to equity and bond markets; on the one hand, flows to foreign securities markets can themselves have a direct effect on the exchange rate; on the other, explanations for herding outlined above may also carry across more directly to foreign exchange markets (note that the exchange rate risk and market risk can be dissociated by hedging, and in some funds are run as separate profit centres). In particular, authors such as DORNBUSCH (1990) have highlighted the importance in an international context of performance assessment 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. But other mechanisms noted above as generating herding may also be relevant, for example managers inferring information from others' trades; reacting simultaneously to similar news; and trend chasing or positive feedback trading.

Note that considerable research on foreign exchange markets, albeit usually directed at traders in banks rather than pension funds perse, has indeed found similar behaviour patterns to these. Such research 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. For example, 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 "trend chasers" or "noise traders" and hence are unwilling to take large positions even when currencies are far from their equilibrium values. Alternatively, there may be a range of values of the exchange rate within which a precise equilibrium rate 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, CARTAPANIS (1993), after an extensive review of the literature on foreign exchange rates, favours an explanation of heightened volatility based on an initial situation of dispersed expectations and heightened uncertainty, perhaps caused by divergent viewson 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 moving in the same direction, and a rapid shift in the rate, overcoming any resistance by authorities (compare the discussion of the ERM crises in Section 4).

Institutions may be of particular importance in international markets because to the extent that they do shift their assets in the ways outlined above, in response to small changes in market conditions and associated short-term expectations, enormous gross

flows may be unleashed, and some of the beneficial effects of liberalised capital flows note in Section 1 may be lost. In particular, markets may become less efficient signals of the appropriate allocation of resources; real exchange rates may deviate from equilibrium levels[32], again generating misallocation of resources and discouraging trade; and heightened risk may itself raise the cost of equity capital. (It is notable that for many of the major investors in overseas markets, turnover of stocks is well over 100% per year - "long term" flows may be a misnomer (see Table 5 and 13).) One example of asset market destabilisation is the effect of Japanese inflows to the US on the value of the dollar in the early 1980s, although monetary policy clearly also played a role. Heightened contagion between markets, as revealed during the 1987 crash, as well as currency instability, as in the recent crises in the European exchange rate mechanism (Section 4), may be other undesirable side effects of such behaviour. In each case increased market liquidity and use of derivative instruments facilitated sudden wholesale shifts of funds between markets (by considerably reducing costs, eliminating settlement problems etc.).

But it is important not to exaggerate pension funds' responsibility for exchange rate misalignments and volatility; currency crises and fluctuations long predate the recent increase in pension fund investment, there is no clear trend in exchange rate volatility, which could be correlated with growth in their international investment, even abstracting from the effect of the ERM (see Table 11), and there are many other players of equal importance in the market, such as corporate treasurers, banks and hedge funds (see the discussion of Section 4). Cartapanis (1993) considers that bank traders - who account for 75% of forex activity - play a pre-eminent role in price formation in exchange markets, as intermediary for customers such as institutions as well as taking their own positions, although institutional investors may intensify a crisis or shift by following their lead, or seeking to protect themselves by hedging against the consequences for their assets, which itself puts pressure on the exchange rate. One is probably on firmer ground in attributing major responsibility to institutional investors for equity market fluctuations, notably in countries such as Germany with a relatively small domestic investor base[33]; this may help explain the higher volatility of such markets than those with large pension fund sectors[34], as shown in DAVIS (1993b). HOWELL and COZZINI (1992) provide an analysis of the links between increased volatility in equity markets and international investment. In their view, diversification benefits of international investment in advanced countries' markets is declining as increased international capital flows, themselves a consequence of the increasing domination of international markets by institutions, equalise returns and increase correlation of market movements (as shown in Table 4). International capital flows also lead to increased potential both for sharper daily market movements and for prolonged shifts in share values away from the fundamentals. The underlying behaviour of institutions entails a switch away from a 'top down' asset structure to a system of tactical asset allocation based on macroeconomic information. Increased trading of derivatives has been both a cause and a consequence of these trends; with increased volatility the use of derivatives for hedging becomes increasingly attractive to institutions, which in turn increasingly focus on risk management; but the short-term international flows that cause the volatility are themselves partly a consequence of the use of derivatives as a lower-

Table 11: Exchange rate volatility 1975-93 (percent)

Standard deviation of monthly change in effective exchange rate	US Dollar	Yen	DM	£ Sterling	French franc	Lire
1975:1-1979:2	1.3	1.9	1.1	1.7	1.3	1.9
1979:3-1986:12	2.1	2.4	1.0	2.1	1.0	0.7
1987:1-1990:12	2.1	2.3	0.7	1.6	0.5	0.5
1991:1-1993:8	2.2	2.0	0.9	2.2	0.8	2.1
1975:1-1993:8	2.0	2.2	1.0	1.9	1.0	1.3

Source: Plihon (1993)

Table 12: Volatility of equity prices (standard deviation of monthly price changes)

Percent	1963-69	1970-79	1980-89	1990-93	Memo: 1963-93
Germany	3.2	3.3	4.4	4.2	3.8
US	2.6	3.8	3.7	2.9	3.4
France	3.8	4.1	5.2	4.7	4.5
UK	3.2	7.2	4.3	3.8	5.2
Japan	3.5	3.9	3.3	6.0	4.0

cost instrument facilitating international asset allocation. The authors fear that the increased volatility may itself disrupt net new long-term investment flows (as opposed to rapidly-shifting gross flows seeking trading gains[35]). These points regarding equity market volatility should be put into perspective. Table 12 shows that there is no systematic tendency in monthly equity market volatility over longer periods in the G5 markets, despite the rise of institutional investors. Volatility in the UK and US, for example, was higher in the 1970s than in the 1980s and 1990s. Fortune (1989), studying the US market, also concluded that there was no trend in equity price volatility, although he did detect a rise in volatility in the US bond market. The following section analyses the role played by pension funds in the recent crises in the European Exchange Rate Mechanism (ERM).

5. Pension Funds and the ERM

Having exhibited quite remarkable stability since 1987, when the last realignment occurred, the European exchange rate mechanism (ERM) began to suffer tensions in September 1992, which lasted till the end of July 1993. The end-result was the suspension of ERM membership of the UK and Italy, the abandonment of informal pegs to the ECU by the non EC Scandinavian currencies, and the broadening of the permitted fluctuation band of the remaining currencies vis a vis the DM, other than the Dutch guilder, to plus or minus 15% - little different from a free float, except that the mechanisms of the ERM had been preserved and the possibility of a future return to narrow bands is not excluded. A subject of considerable controversy - and relevance to the analysis of this paper - is whether the portfolio strategies of pension funds and other institutional investors made a major contribution to the breakdown of the ERM. If these could be proven, it would be a priori evidence that free international investment of pension funds can cause major macroeconomic problems. But it would not necessarily show that one country, by restricting international investment of its own pension funds, could avoid such difficulties. This is because many of the countries affected notably France and Italy - have vestigial pension fund sectors, but were nonetheless severely affected by the crisis.

5.1 The ERM Crises

The detailed events of the ERM crisis have been extensively recounted elsewhere (see for example BIS (1993), GROUP OF TEN (1993) and IMF (1993)). Suffice to say here that exchange rate tensions first arose in September 1992, in the run-up to the French referendum on the Maastricht Treaty, culminating in the suspension of members-

Table 13: Activity For UK Pension Funds in Equity Markets (percent)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
USA	59	88	81	77	77	122	93	137	67	100	121
Japan	53	111	85	99	164	160	137	149	87	105	107
Continental Europe	40	88	78	72	83	100	92	103	74	87	95
UK	29	51	54	56	80	58	77	42	42	59	59

Source: WM. Activity is the element of turnover in excess of net investment of new money, as a percent of assets.

hip of the UK and Italian currencies, and severe attacks on the French franc and Swedish kronor. In the late Autumn, the Swedish and Norwegian currencies were forced to abandon their links to the ECU, and over the period from September to June the Spanish peseta, Irish punt and Portuguese escudo had to realign against the remaining ERM currencies. Last, there was renewed and sustained tensions arose in June 1993 for the remaining currencies other than the Dutch guilder - that is, the French franc, the Belgian franc and the Danish krone, as well as the Irish, Spanish and Portuguese units, leading at the end of July to a widening of the permitted fluctuation margins from 2.25% to 15% in each direction. This diffused the speculative pressure on the system, but also led initially to a depreciation of the former narrow band currencies against the DM - a depreciation that at the time of writing (December 1993) has been wholly reversed. Macroeconomic explanations for the crises (such as BIS (1993)) highlight a number of causal factors. The success of the ERM in reducing inflation in the long-established member countries, and the drive towards European Monetary Union (EMU), with its stringent fiscal and inflationary convergence criteria, made membership of the ERM increasingly attractive to others, such as the UK, which joined in 1990, and the Scandinavian countries, which sought to gain the benefits of membership by pegging to the ECU. But the drive to EMU also made countries increasingly unwilling to accept realignments, that had been a common feature of the ERM prior to 1987, due to the associated loss of counter-inflationary credibility. Some commentators have argued that this entailed gradual losses of competitiveness for a number of countries, evidenced by balance of payments deficits in countries such as the UK, and which due to the increasing inflexibility of the system could not easily be resolved.

These tensions were worsened by the expansionary consequences of German reunification for the German economy. In a more flexible system, these might have led to a revaluation of the DM to diffuse inflationary pressures in Germany. Instead, the Germans were forced to use high interest rates as a counterinflation policy, which given their status as the anchor of the system were transmitted to all the other ERM participants. High interest rates were particularly unwelcome to countries that were entering recession and whose private sectors suffered from a high debt burden at floating rates, such as the UK; whose public sectors were largely financed at short term or floating rates, and where the control of the fiscal deficit was in doubt, such as Italy; or which had major banking problems that high rates would aggravate, such as the Scandinavian countries.

In these circumstances, the markets might still have remained calm if there had been no doubt about political will regarding convergence to EMU; and indeed, until the Spring of 1992, the markets seemed to believe that these tensions would be resolved without realignment. But the Danish referendum, which went against Maastricht, and the adverse opinion polls for the following French vote, caused increasing doubts about convergence over the Summer of 1992. These culminated in the speculative attacks on a number of currencies seen in September 1992 in the run up to the French referendum, as the markets assumed that a "no" vote would lead to an immediate realignment or even the breakup of the system. The countries which fell victim, either immediately (the UK and Italy) or in the wake of the initial wave of pressure (the Scandinavian countries), were those which suffered what were perceived by the markets to be fundamental difficulties in maintaining a position in the ERM, and in defending it with high interest rates for a prolonged period, as outlined above.

Once the UK and Italy had devalued, as major exporting nations both within and outside the EC, attention shifted increasingly to the perceived difficulties caused for trade competitiveness in those countries remaining in the system, even though their fundamentals were not adverse in the ways outlined above, and they had accordingly resisted initial speculative pressure. The slide of the EC into recession, heightened unemployment and the slow pace with which German interest rates were reduced, compounded this pressure. It culminated in intense

speculative pressure on the remaining narrow band countries in the early Summer of 1993, and the widening of the bands.

5.2 Financial market issues

In seeking explanations of the crisis from a financial markets point of view, it is important first to note that the success of the ERM had been built at times when a number of the larger participants had exchange controls, thus limiting speculative pressures (though clearly not eliminating them, as repeated crises for the French franc in the early 1980s showed), see GROS (1992). The disadvantages of such controls, for example in terms of higher risk premia on domestic assets (CODY (1989)), and corresponding restricted access to international capital markets, made them unattractive (as well as being contrary to the EC Single Market). But there is a cost. As noted in Section 3, 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 the sole 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 central banks' foreign exchange reserves, which in 1992 totalled around $500 billion[36]. Besides the traditional operations of banks, which could take (limited) positions against currencies, a number of other components of the foreign exchange market were highlighted by the crises. First, there is the development of specialised, and unregulated, hedge funds, which would seek by leveraged investments to profit from adjustments in exchange rates, and could exert strong pressure on currencies. Second, there is the increasing sophistication of corporate treasury operations, enabling non financial firms to fund themselves in the cheapest markets and cover themselves by use of swaps, to hedge future earnings against currency shifts and take open positions in their own right. And third, there is the internationalisation of institutions' portfolios outlined above.

Internationalisation means pension funds would inevitably be affected by exchange rate turbulence; and the resources available to pension funds and life insurers (Table 9) far exceed national foreign exchange reserves[37] (although note that the ERM included rules for limited sharing of reserves during periods of speculative pressure). Institutions' increasing willingness to turn over investments and use derivatives would increase their potential leverage. And reasons have already been presented for funds to be exceptionally sensitive to any losses that could make the fund managers perform badly relative to the rest of the market, thus encouraging adoption of similar strategies. But why should institutions 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 bonds in the weaker, higher yielding currencies. As 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 (Table 14). UK funds built up foreign bond exposures quite considerably over this period, from 0% of their portfolios in 1986 to 4% in 1991[38]. The IMF (1993) suggest the total value of such investments for all nationalities and types of investor 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 financing 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 suc-

Table 14: Portfolio Capital Inflows for EC countries (billions of local currency)

	1989	1990	1991	1992
Italy	4750	-337	-7561	
Spain	718.3	417.6	433.3	157.4
France	162.8	188.1	80.6	187.9
Germany	-5	-6.4	37.7	-21.5
UK	-20.9	-10.6	-14.8	-2.1

Source: IMF (1993)

cess of such approaches for countries such as France is apparent from the scale of foreign holdings of government bonds (as well as equities) as shown in Table 15. And reflecting confidence over convergence, US institutions in the high-yield currencies would often content themselves with hedging against the DM, i.e. in the most liquid derivatives market, thus taking the risk of a possible shift in ERM parities. 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, and US corporations as well as pension funds carried out proxy hedging. The overall pattern of convergence plays could be seen as a form of overreaction be financial markets to prospects for EMU, encouraged by forms of herding as outlined - what GUTTENTAG and HERRING (1984) term "disaster myopia".

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. Extending the discussion in Section 3, which highlighted the importance of uncertainty in generating exchange rate volatility, 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 zero. The scale of convergence plays outlined would make the market particularly vulnerable to shocks to confidence, so that any stimulus such as a data item, perception of policy conflict or of policy 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. Similar effects were apparent before financial crises such as the Crash of 1987 and the ldc debt crisis (DAVIS (1995b)).

A second feature linked to institutions (albeit also used by banks to hedge their over-the-counter derivative positions) is new 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. 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

Table 15: Foreign holding of shares and bonds (end 1992)

	Government bonds	Equities
France	33%	18%
Germany	36%	20%
UK	13%	13%
Italy	10%	n/a
Japan	n/a	6%

Source: Plihon (1993)

rises. In addition, according to the IMF, market 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 pressure on weak currencies.

5.3 Evidence

Evidence on the role of institutions such as pension funds in the crises is fragmentary, partly as a consequence of the lack of data on institutions' portfolios, particularly at intervals of less than a quarter, and the almost total lack of data on institutional participation in the derivatives markets. So one is forced to rely on partial data and on anecdotal evidence. The flow of funds accounts of the UK and Dutch pension fund sectors are of particular interest in the present context, as they show the activities of the largest international investors among European pension funds. Other EC countries' sectors, as shown above, tend not to hold significant quantities of foreign assets, and/or are themselves extremely small (US funds would be expected to play a major role, but flow data on foreign asset holdings are not available). The data do not show major shifts out of sterling, or repatriation of Dutch foreign assets, as might have been expected (Tables 16 and 17). Note, however, that desire to retain portfolio balance might lead funds to shift *between* foreign markets. The data for inflows to German bond markets over 1992 do show quite sizeable inflows; in the second half of the year, total inflows were DM120 billion ($75 billion),compared with DM13 billion ($8 billion) in the first half; flows into DM bonds came notably from UK investors, consistent with the hypothesis of portfolio shifts by UK pension funds out of markets vulnerable to realignment, albeit also from investors based in France, Switzerland and Japan. But it cannot be proven that pension funds were *particularly* active.

Data for the banking sector show much larger shifts. As recorded by BIS (1993), the banking sector in the UK carried out net exports of domestic currency of

Table 16: UK Institutions; Flow of Funds (billion)

	1992 Q1	1992 Q2	1992 Q3	1992 Q4
Pension funds:				
Domestic shares	-0.2	-0.2	0.5	-0.2
Domestic bonds	-0.4	1.2	0.2	-0.7
Foreign shares	-0.3	0.5	-0.2	0.1
Foreign bonds	-0.2	-0.4	-0.1	0.8
All Institutions:				
Domestic shares	0.3	1.5	1.2	0.5
Domestic bonds	0.4	5.6	4.8	4.1
Foreign shares	0.1	0.7	-2.1	-0.8
Foreign bonds	1.0	-1.2	1.1	2.5

Table 17: Dutch Institutions; Flow of Funds (billions of guilders)

	1992 Q1	1992 Q2	1992 Q3	1992 Q4
Private pension funds:				
Domestic shares	1.0	1.2	0.2	0.7
Domestic bonds	1.1	1.7	1.0	4.0
Foreign shares	2.2	-0.2	-0.9	4.4
Foreign bonds	2.1	1.3	0.5	0.0
Life insurance and pension funds:				
Domestic shares	3.5	1.3	0.1	1.5
Domestic bonds	2.9	4.3	3.3	6.4
Foreign shares	3.3	0.2	0.4	5.6
Foreign bonds	2.6	1.5	0.4	1.2

$11 billion in the third quarter of 1992, and French banks of $24 billion, which were largely taken up by international banks located outside these countries and sold on the foreign exchange markets, as illustrated by the foreign banks' net foreign currency positions, which deteriorated by $5 billion to net liabilities for sterling and $21 billion for the franc. There were also large net flows in the banking sector into the DM and other "safe haven" currencies, with a $32 billion increase in the net DM asset position of banks located outside Germany and the German banking sector importing $21 billion, for example. But again, as noted by the BIS, the data are ambiguous, as they do not necessarily reflect the banks' own position taking, but were probably mainly the counterpart of forward transactions resulting from customers' sales of the currencies in question; in

other words not inconsistent with the pre-eminence of nonbanks during the crisis. Data for the derivatives markets show record levels of turnover for 1992, notably for options and futures traded on exchanges, which saw a 35% increase. Interest rate futures and currency options were in particular demand. The hedging needs of institutional investors were the main reason for this increase, although difficulties in the over the-counter markets - largely due to interest rate and exchange rate volatility that made pricing difficult, but also partly due to heightened credit risk compounded the demand for exchange-traded instruments. Meanwhile the IMF estimate that currency sales from dynamic hedging accounted for 10-20% of total sales during the crisis for sterling in October.

As regards anecdotal evidence, the author spoke to a number of UK pension fund managers in the wake of the crisis. Such discussions did reveal a willingness to use forwards to hedge exposures against the risk, for example, of an ERM realignment. Most, however, suggested that pressure from funds was not particularly significant in the crises of 1992 and 1993 and cited money funds and corporate treasurers as more active. Some funds reportedly even 'helped the central banks to hold the ERM together' (the sale of foreign equities by UK funds in the third quarter is consistent with the comment.) Such declarations may risk being self serving, but they do leave the burden of proof on those wishing to establish a destabilising influence.

The IMF (1993) are more positive in identifying a role for institutions in September 1992. They suggest that in order to protect the value of their investments, funds sold their foreign assets, hedged their exposures and sold the vulnerable currencies short, using their assets as collateral in roughly equal proportions, although outright sales were more common in Italy, a market in which forward cover is hard to obtain. But they also suggest that non financial companies in countries such as Italy, which had arranged "convergence" financing in DM, undertook massive hedging to cover their exposures, while US corporations and investors that had hedged high-yield currencies with the DM sought to unwind their hedges. Meanwhile, in the IMF's view, the hedge funds were less important for their direct leverage that in leading institutions and companies to re-examine their assumptions. Banks were constrained by capital adequacy requirements in their open positions, and were perhaps most crucial in arranging the financing for institutions and companies' strategies (the IMF note that short selling, hedging and liquidation of long positions all require bank finance, whether directly or to a counterparty).

6. Conclusions

Drawing together the analysis of this paper, it has been shown that there are sizeable differences in international investment by the pension fund sectors in European countries as well as the US and Japan. This relates obviously to the size of the sectors, but also to regulation, liabilities and more general differences in fund managers' attitudes to global diversification. These results imply that many institutions obtain a less desirable risk/return trade-off than is possible by using the full opportunity set. Meanwhile even in the most unregulated sector (the UK) there appear to be limits to the perceived benefits of overseas investment. Moving to the macro level, it would appear that although theoretical benefits arising in terms of movement of capital to its most profitable use and consumption smoothing have historically been limited to the most advanced (and large) countries, funds are now becoming much more willing to invest in developing countries. Without securities markets, and a certain level of economic development, however, there is no interest at all. Public sector, banking and direct investment flows are more likely to help initial stages of development of the poorest countries. Focusing purely on these analyses, it seems clear that given the benefits in terms of reduced risk of international investment to portfolio managers, restrictions on foreign investment for pension funds are not justified from the point of view of funds themselves. Alternatives are a "prudent man

rule" enjoining sensible portfolio diversification (as applied to pension funds in the US), or at least a low degree of currency matching as in Japan. Some regulations preventing excessive concentration of risk in foreign assets may be warranted (to prevent losses such as those incurred repeatedly by Japanese institutions on US bonds). At a macro level barriers to international investment must imply a degree of inefficiency in global capital markets, preventing risk sharing between countries and hence are also undesirable in this context. The question to be addressed is then whether considerations of financial instability are a sufficient reason to override these judgements.

The ERM crises certainly illustrated the power that can be exerted by the international capital markets once they are convinced that a fixed exchange rate is unsustainable, as well as the speed with which such judgements may change. But it is harder to maintain that the markets were invariably wrong in a fundamental sense. Particularly in countries such as the UK, authorities have since acknowledged that the exchange rate/interest rate constellation in the ERM was unsustainable in the light of the situation in the domestic economy and could ultimately have led to a "debt-deflation". More doubt may be expressed about the market's judgement over currencies such as the French franc in 1993, where inflation and debt burdens were low, the banking system sound and a balance of payments surplus was maintained (MOUTOT (1993)).

Yet more questionable is whether the events suggest that controls on institutions' portfolios at a domestic level can help protect a currency, in the absence of exchange controls. It is notable that countries with large institutional sectors were unaffected by the crisis (Netherlands) or at least did not undergo extensive capital outflows from domestic pension funds (UK). Home asset preference may help explain these patterns. Countries affected were often those with small pension fund sectors and/or controls on their international investments already in place. The broader issue of capital controls for all transactions remains a potential response to exchange rate instability, but most countries, at least in the EC, have concluded that the benefits of open international capital markets, in terms of cost and efficient allocation of funds, for finance of investment and fiscal deficits are too valuable to be cast aside. Furthermore, it is not clear that the special circumstances of the ERM translate readily to floating rates elsewhere. The special circumstances of convergence plays made the system particularly vulnerable in 1992. The potential for a realignment offers a strong focus for speculative pressure, since it entails a possibility of a large, discrete shift in the value of assets. Rates of interest needed to compensate for a small possibility of a realignment a short time in the future might destabilise the domestic economy[39]. Central banks defending current alignments without such increases in rates risk effectively making large transfers of value to speculators over such periods, particularly if they are unwilling or unable to use interest rates as a backup.

Such circumstances are less likely to arise for floating exchange rates, when rates may gradually adjust to perceived disequilibria. Concern in such cases is rather that due to bubbles or fads, rates will diverge over a long period from fundamentals, overshooting sustainable levels. This raises a different set of issues - in particular the relationship between government policy and such shifts. Such volatility may be of particular concern to developing countries, such as Chile. But the arguments above that restrictions on domestic funds may have little benefit and sizeable costs, carries over. The case to be answered is rather whether foreign investors should be restricted. Most countries in the Far East and Latin America have concluded that benefits of open capital markets exceed the risks.

A possibly workable alternative for small markets is to only permit foreign investment via closed-end funds. Alternatively, MERTON (1992) has suggested that using stock index swaps may be a way for developing countries to achieve the benefits of inward international diversification by pension funds from major countries without transfer of capital resources. By separating capital flows from risk sharing, it avoids capital imbalances or foreign intervention in domestic capital markets.

Footnotes

[1] The paper draws on DAVIS (1995a), Chapters 7 and 9, and Appendix.

[2] A recent survey by the European Federation of Retirement Provision, suggested that a 1 per cent improvement in pension funds' investment returns can reduce employers' costs by 2-3% of the payroll.

[3] See, for example, FROST and HENDERSON (1983).

[4] This will be of particular importance to defined-benefit pension funds where liabilities are tied to wages and hence rise as the profit-share falls. Similarly, at an individual firm level, investment in competitors' shares hedges against a loss of profits due to partial loss of the domestic market.

[5] Technically these results imply inefficiency and/or slow adjustment of global capital markets. FELDSTEIN and HORIOKA (1980) suggested this was certainly the case prior to 1980, though more recent research has shown a weakening of this result.

[6] These calculations employ a dataset of annual asset returns used in DAVIS (1993a) and (1995a).

[7] This generally relates to interaction of changes in the exchange rate and domestic inflation over time. With a structural depreciation, for example, as in the UK, returns on foreign assets are boosted.

[8] No implicit charge was imposed for hedging - which would clearly reduce returns markedly.

[9] FRENCH and POTERBA (1990) calculate an average pairwise correlation between six major equity markets of 0.502 over 1975-89.

[10] For example, FRENCH and POTERBA (1990) suggest that the low level of Japanese investment in US equities could only be rationalised by five percentage points higher annual expected yields in Japan than the US.

[11] In practice, research has tended to validate covered interest parity -efficiency of forward markets - but not uncovered interest parity (BISIGNANO (1993)).

[12] Lower case, BODIE (1989) suggests US regulations which impose asymmetrically heavy penalties on under - as opposed to overfunding may lead defined-benefit pension funds to adopt immunisation strategies based on fixed interest securities in order to match assets to the present value of benefits implied by the guaranteed floor. Only above this level is investment in equities - and foreign assets -optimal. More generally, a defined-benefit fund which is closed to new members will switch to bonds as obligations become of shorter duration (BLAKE (1992)).

[13] Data for the US suggest that personal pensions (IRAs) are invested more cautiously than company pension assets, but this is less true of defined contribution relative to defined benefit. In the UK all three types have similar portfolio distributions, around 80% equity and 30% foreign assets (DAVIS (1995a)).

[14] None of the countries analysed currently have exchange controls. In the EC it is inconsistent with the Capital Movements Directive.

[15] This is likely to be a counterpart to the ageing of the population in OECD countries. This is because in equilibrium, domestic saving will tend to exceed domestic investment in the countries, such as those of the OECD, that are ageing and have a developed industrial infrastructure. Implicitly, the accumulation of foreign assets will tend to occur in order to ensure an inflow of factor income from abroad in the future when the population is old.

[16] It is certainly the case that a large proportion of the increase in international saving from $173 billion in 1980 and $424 billion in 1988 highlighted by COOPER (1991) - mainly in outflows from Japan, the UK and Germany - was conducted via pension funds.

[17] European countries have taken advantage of this, as well as the US, discussed below. In France, for example, whereas in 1986 1% of government debt was held abroad, in 1992 it is 33%, and 36% in Germany (PLIHON (1993)). Foreign holdings are lower in countries with major institutional sectors, such as the UK 13%, the US 18%, Canada 20% and Japan 6% (BISIGNANO(1993)).

[18] Indeed, as shown in Table 6, the investment of Japanese, US and UK funds is heavily concentrated in the major blocs of the OECD (North America, the EC, Japan).

[19] Such consumption smoothing as highlighted here for the G3 is a general feature of capital flows among advanced countries, according to research by BRENNAN and SOLNIK (1989); they suggest that over the past two decades it has yielded benefits in eight advanced countries equivalent to 4-8% of total annual consumption in the early 1970s.

[20] A survey in "Global Investor" quoted in DAILEY and MOTALA (1992) contrasts with the official data used here in showing Japanese pension funds managed by trust banks holding 15% foreign assets, equivalent to $24 billion.

[21] The data are for private funds; the civil service fund ABP holds 5% of its portfolio in foreign assets.

[22] These concerns may refer to information deficiencies about local business and financial conditions, regulatory standards for issuing securities, as well as the various risks to foreign investment outlined in Section 1.

[23] As noted in Section 4, preservation of monetary autonomy may depend less on regulation of domestic funds than on openness to, and dependence on, international capital flows.

[24] Full data on portfolios of French pension funds are not available -but HOWELL and COZZINI (1992) suggest foreign asset holdings in 1991 were $1 billion (4.3%).

[25] Calculations are based on 1991 data.

[26] In particular where foreigners become more pessimistic relative to local investors, which is presumably common given "home asset preference" (REISEN and WILLIAMSON (1994)).

[27] As noted in DAVIS (1995b), uncertainty reflects the changing environment, in which the random element is not well represented by stationary probability distributions. Hence the future is not knowable either precisely or probabilistically (inferring from past data). Uncertainty applies also to events whose implications resist purely objective analysis, such as wars, major changes in policy regime, financial crises, and their economic consequences. These alter the economic environment in a way that cannot easily be anticipated, diversifies, or hedged against. There is not precise economic theory a to how decisions are made under uncertainty. Uncertainty may be ignored (if events are felt to have a sufficiently low probability and information is costly to obtain). Alternatively, subjective ex-ante probabilities may be applied, together with a risk premium to cove unspecified adverse events. In each case, people tend to watch others and do not deviate widely from the norm in terms of factors taken into account and weights given to them. When the crowd is wrong ex-post, there is the making of a financial crisis, but there is no objective bases to prove before the event that the crowd will be wrong.

[28] That is, characterised by events to which objective probabilities can be attached.

[29] That is, buying shares when they are dear and selling when they are cheap - the opposite to normal profit maximising investment.

[30] De BONDT and THALER (1985) present evidence which favours this view.

[31] In the UK DAVIS found that whereas most internal managers considered the time horizon over which they were judged to be 3-5 years, external managers considered that two bad years in succession could lead to loss of the mandate. In the US, time horizons appeared to be shorter, with weekly or monthly monitoring and possible changes every one and a half years. The concerns of external managers are increased by desire to produce suitably impressive figures on their existing mandates in order to attract new ones.

[32] Note that to the extent that pension funds themselves are partly responsible for this, they account in a circular manner for their own home asset preference.

[33] As shown in Table 15, foreign ownership of shares in Germany (20%) and France (18%) far exceeds that in the UK (13%) and Japan (6%).

[34] As argued in DAVIS (1993b), a larger domestic institutional sector would probably reduce volatility in these markets.

[35] Many authors have assumed that large gross flows which characterise international financial markets at present are a disequilibrium phenomenon related to portfolio adjustment by pension funds to a larger share of international assets. But the view expressed here is rather of a permanently high level of gross flows, encouraged by low transactions costs and desire to optimise risk and return. In the view of the author, evidence tends to support the latter view, for example, as shown in Table 13, voluntary turnover of UK funds in international markets has continued to increase at a rate in excess of portfolio diversification.

[36] Actual sales of DM by central banks to protect ERM currencies in the second half of 1992 totalled DM 188 billion ($118 billion).

[37] In August 1992, the French reserves were $28 billion, British $40 billion, Italian $20 billion and Swedish $20 billion,

[38] Source: WM(1993).

[39] WYPLOSZ (1988), for example, notes that a 10% depreciation expected in a week's time requires an interest rate increase of 520% to offset it.

References

ADLER, M. and B. DUMAS (1983): "International portfolio choice and corporation finance" Journal of Finance 38, pp. 925-84.

BEENSTOCK, M. (1986): "A theory of home currency preferences", Weltwirtschaftliches Archiv.

BERTERO, E. and C. MAYER (1989): "Structure and performance: global interdependence of stock markets around the crash of October 1987", Discussion Paper No 307, Centre for Economic Policy Research, London.

BIS (1986): "Recent innovations in international banking (the Cross Report)", Bank for International Settlements, Basle.

BIS (1993): "Sixty-Third Annual Report", Bank for International Settlements, Basle.

BISIGNANO, J. (1993): "The internationalisation of financial markets; measurement, benefits and unexpected interdependence", paper presented at the XIIIeme Colloque Banque de France-Université, November 1993.

BLAKE, D. (1992): "Issues in pension funding", Routledge, London.

BODIE, Z. (1989): "Pension funds and financial innovation", Working Paper No. 3101, National Bureau of Economic Research.

BRENNAN, M. J. and B. SOLNIK (1989): "International risk sharing and capital mobility", Journal of International Money and Finance.
CARTAPANIS, A. (1993):"Le rôle déstabilisant des mouvements de capitaux sur le marché des changes: une question de contexte", paper presented at the XIIIeme Colloque Banque de France-Université , November 1993.
CODY, B. J. (1989): "Imposing exchange controls to dampen currency speculation", European Economic Review.
COOPER, S. (1990): "Cross-border savings flows and capital mobility in the G7 economies", Discussion Paper No 54, Bank of England.
COOTE, R. (1993): "Self regulation of foreign investment by institutional investors", paper DAFFE/INV(93)18, OECD, Paris.
CUTLER, D., J. POTERBA and L. SUMMERS (1990): "Speculative Dynamics and the role of feedback traders", American Economic Review 80, Papers and Proceedings, pp. 63-68.
DAILEY, L. and J. MOTALA (1992): "Foreign investments of pension funds in six countries", in: "IMF, Background papers to report on international capital flows", Washington DC.
DAVIS, E. P. (1988): "Financial market activity of life insurance companies and pension funds", Bank for International Settlements, Economic Paper No 21, BIS, Basle.
DAVIS, E. P. (1991): "International diversification of institutional investors", Bank of England Discussion Paper, Technical Series No 44.
DAVIS, E. P. (1993a): "The structure, regulation and performance of pension funds in nine industrial countries", WPS Working Paper No. 1229, The World Bank, Washington DC, originally prepared for study "Income Security for Old Age".
DAVIS, E. P. (1993b): "The development of pension funds, an approaching financial revolution for Continental Europe", in ed R O'Brien, "Finance and the international economy (winners of the 1993 Amex bank essay competition)", Oxford University Press.
DAVIS, E. P. (1995a): "Pension funds, retirement income security and the capital markets, an international perspective", Oxford University Press.
DAVIS, E. P. (1995b): "Debt, financial fragility and systemic risk revised and extended edition" , Oxford University Press.
DE BONDT, W. and R.THALER (1985): "Does the stock market overreact?", Journal of Finance 45, pp. 793-809.
DE GRAUWE, P. (1989): "International money; post war trends and theories", Clarendon Press, Oxford.
DORNBUSCH, R. (1990): "It's time for a financial transactions tax", International Economy.
EVANS, M. and K.K. LEWIS (1993): "Trends in excess returns in currency and bond markets", European Economic Review.
FELDSTEIN, M. and C. HORIOKA (1980): "Domestic saving and international capital flows" Economic Journal 90, pp. 314 329.
FINANCIAL TIMES (1988): "International fund management: F T Survey", Financial Times, 28.11.88, London.
FORTUNE, P. (1989): "An assessment of financial market volatility; bills, bonds and stocks", New England Economic Review, November/December, pp. 13-28.
FRANKEL, J. A. (1992): "Measuring international capital mobility; a review", American Economic Review.
FRENCH, K. R. and J.M. POTERBA (1990): "Investor diversification and international equity markets", Working Paper No. 3609, National Bureau of Economic Research.
FROST, A. J. and I.J.S.HENDERSON (1983): "Implications of modern portfolio theory for life insurance companies", in: Corner D. and Mayes D.G. (Eds.), Modern portfolio theory and financial institutions.
GOOPTU, S. (1993): "Portfolio investment flows to emerging markets", Paper WPS 1117, World Bank, Washington DC.
GREENWOOD, J. G. (1993): "Portfolio investment in Asian and Pacific economies; trends and prospects", Asian Development Review 11, pp. 120-50.
GROS, D. (1992): "Capital controls and foreign exchange crises in the ERM", European Economic Review.
GROUP OF TEN (1993): "International capital movements and foreign exchange markets", G-10, Rome, April.
GUTTENTAG, J. and R. HERRING (1984): "Credit rationing and financial disorder", Journal of Finance.
HOWELL, M. and A. COZZINI (1990): "International equity flows, 1990 edition", Salomon Bros, London.
HOWELL, M. and A. COZZINI (1991): "Games without frontiers; global equity markets in the 1990s", Salomon Bros., London.
HOWELL, M. and A. COZZINI (1992): "Baring Brothers' Capital Flows 1991/2 Review", Baring Brothers, London.
IMF (1993): "International Capital Markets Part 1. Exchange rate management and international capital flows", International Monetary Fund, Washington DC.
KEYNES, J. M. (1936): "General theory of employment, interest and money", MacMillan, London.
LAKONISHOK, J., A. SCHLEIFER and R.W. VISHNY (1991): "Do institutional investors destabilise share prices? Evidence on herding and feedback trading" Working Paper No. 3846, National bureau of Economic Research.
LEVY and SARNAT (1970): "International diversification of investment portfolios", American Economic Review 60, pp. 668-675.
MERIC, I. and G. MERIC (1989): "Potential gains from international portfolio diversification and intertemporal stability and seasonally in international stock market relationships", Journal of Banking and Finance 13, pp. 627-640.
MERTON, R. C. (1992): "Financial innovation and economic performance", Journal of Applied Corporate Finance 12, p. 1222.

MOUTOT, P. P. (1993): "Les charactéristiques et la gestion des tensions de change", paper presented at the XIIIeme Colloque Banque de France-Université, November 1993.
MULLIN, J. (1993): "Emerging equity markets in the global economy", Federal Reserve Bank of New York Quarterly Review 18, pp. 54- 83.
PLENDER, J. (1982): "That's the way the money goes," Andre Deutsch, London.
PLIHON, D. (1993): "Mouvements de capitaux et instabilité monétaire", paper presented at the XIIIeme Colloque Banque de France-Université, November 1993.
RAYMOND, R. (1990): "Conduite d'une politique monétaire nationale au sein d'une zone monétaire", Cahiers économiques et Monétaires de la Banque de France, p. 30.
REISEN, H. and J. WILLIAMSON (1994): "Pension funds, capital controls and macroeconomic stability", mimeo, OECD and IIE.
SCHARFSTEIN, D. S. and J.C. STEIN (1990): "Herd behaviour and investment", American Economic Review 80, pp. 465-479.
SHILLER, R. J. and J. POUND (1989): "Survey evidence of diffusion of interest and information among institutional investors", Journal of Economic Behaviour and Organisation, pp. 47-66.
SOLNIK, B. H. (1974): "The international pricing of risk, an empirical investigation of the world capital market structure", Journal of Finance 29, pp. 365-78.
SOLNIK, B. H. (1991): "International Investments, second edition", Addison Wesley, Reading, Mass.
WM (1993): "WM UK pension fund service annual review, 1992", The WM Company.
WYPLOSZ, C. (1988): "La libre circulation des capitaux et le SME: un point de vue francais", in Commissions des Communautes Européenes.