

SPECULATION,
HEDGING AND
INTERMEDIATION
IN THE FOREIGN
EXCHANGE MARKET

Malte Krüger

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(*) This project was carried out while I was visiting researcher at the Banco de España. I wish to thank the Banco de España for its generous support for the project and the provision of excellent research facilities. The project has benefited from comments by Juan Ayuso, Barbara Dluhosch, María Pérez Jurado, Miguel Navascués, Javier Santillán, Santiago Fernández and José Viñals. Furthermore, I would like to thank Diego González who patiently explained the details of the Spanish balance of payments and financial statistics to me and Amparo Ricardo, who provided part of the data.

Banco de España - Servicio de Estudios
Documento de Trabajo nº 9606

In publishing this series the Banco de España seeks to disseminate studies of interest that will help acquaint readers better with the Spanish economy.

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ISSN: 0213-2710

ISBN: 84-7793-461-4

Depósito legal: M-9883-1996

Imprenta del Banco de España

- ABSTRACT -

In this study it is attempted to estimate the amount of speculation in foreign exchange markets. Such an estimate is hard to make because it is theoretically as well as empirically difficult to delimitate speculation in relation to other activities. In particular, the distinction between speculation and hedging is highly problematic. Notwithstanding these difficulties it is shown how the composition of gross flows can be used to derive information about speculation and hedging.

In an extensive analysis of the interconnections of various fx market activities it is shown that hedging may generate large short-term capital flows which cannot be easily distinguished from speculation. The size of these flows does not only depend on capital and trade flows but also on net and gross stocks of foreign assets and liabilities.

Based on these findings, an analysis of capital flows between Spain and the rest of the world shows that a larger part than earlier believed of the capital outflows during the EMS crisis may have been due to hedging. The second case study which focuses on Japan reveals remarkable changes in the behaviour of Japanese and/or foreign investors.

What are the implications for economic policy? The study highlights the significance of stocks of open fx positions of foreigners and residents. If these stocks have been accumulating over many years, any crisis of confidence may trigger large outflows due to hedging, the size of which may by far be more important than the potential amount of speculation. Such hedging activities would hardly be deterred by a Tobin-tax or similar devices.

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1. Speculation in the foreign exchange market: the problem defined

The recent EMS crisis has highlighted the significance of capital movements for exchange rates and even entire exchange rate systems. This demonstration of the power of market forces was reinforced by the BIS report on international foreign exchange markets, which was published in spring 1993 (BIS (1993)), while speculation was still boiling. This report presented evidence as to the enormous size of the foreign exchange market and underlined the general impression that central banks are more or less helpless against speculative runs. Turnover of US\$ 880 bn. on a normal day, indeed, seem irresistible when compared to the volume of international trade or official reserves.

However, the question remains whether the bulk of transactions in the foreign exchange market is really due to speculation. The answer to this question presupposes a definition of foreign exchange speculation. In a very broad sense, every activity involving open fx positions can be considered "speculative". However, exposure to exchange rate risk would be too wide a definition of exchange rate speculation. Keeping an open fx position is not necessarily motivated by expected exchange rate gains. It may, for instance, also serve the purpose of risk reduction. What distinguishes exchange rate speculation from such activities is that the expected return depends entirely or significantly on expected exchange rate changes - or, to be more precise, on the difference between the forward rate and the expected future exchange rate (cf. ch. 2.1.).

This is a relatively broad definition which focuses on the building and closing of open fx positions. In the literature, speculation is often divided into "fundamental" and "non-fundamental" activities. This distinction raises the normative question of whether currency speculation is beneficial or not. Many economists claim that short-term speculation is the prime source of instability in the foreign exchange markets (Tobin (1982a) and (1982b); Dornbusch (1986) p. 31). Tobin, for example, argues that the expected future exchange rate is a "nebulous anchor" for the spot rate. If economic agents frequently revise their expectations with respect to the future exchange rate, they will also destabilize the spot rate. Consequently, the attacks on the EMS, or at least part of them, are attributed to self-fulfilling speculative capital movements which bear no connection to fundamentals.¹ Since speculative capital movements are mostly associated

¹ See for example Bofinger (1993), Eichengreen/Rose/Wyplosz (1994) and Vehrkamp (1992). Eichengreen, Rose and Wyplosz use a whole set of fundamentals, such as budget deficits and wage increases. Based on these fundamentals they conclude that the depreciations during the EMS crisis were not always justified. Similarly, the council of economic advisors in Germany has expressed doubts about the necessity of some of the devaluations (Sachverständigenrat (1992)).

with short-term capital movements, the call for a tax on capital movements, especially targeted at short-term capital movements, has been renewed.²

Other economists, however, have argued that short-term capital movements are necessary for the proper functioning of a system of flexible exchange rates. According to Mayer (1985), pp. 18-19 they facilitate international transactions by dampening the impact on exchange rates from fluctuations originating elsewhere. However, he adds that "in times of stress" short-term capital movements can contribute to instability (Mayer (1985), pp. 37-38). McKinnon goes one step further than Mayer, saying that a flexible exchange rate system could not work without short-term capital movements. Due to instability of trade and the j-curve effect, exchange rates would be indeterminate without stabilizing speculation (McKinnon (1986)).³ If the exchange rate fluctuates without any noticeable change in fundamentals, according to this group, the diagnosis could well be "lack of speculation" instead of "too much speculation".⁴ According to McKinnon (1986), the unpredictable monetary policy in many countries has raised uncertainty about the future exchange rate and thus reduced speculation.

The normative question whether short-term speculation has been beneficial or not, has received much more attention than the positive question whether and to what extent such speculation exists.⁵ There is, however, a large amount of empirical studies on the substitutability of assets in different currencies which focuses on uncovered interest rate parity. These studies allow a judgement about the general willingness to shoulder exchange rate risk to be made. The results show "that assets denominated in different currencies are viewed by the market as imperfect substitutes." (Goldstein/Mussa (1993), p. 20) This suggests that, on average, speculation is too weak

² For Tobin's original proposal "to throw some sand in the wheels of our excessively efficient international money markets" see Tobin (1982a), p. 489. Dornbusch (1988), p. 256 even proposed using "rocks". After the EMS crisis Eichengreen, Tobin and Wyplosz (1995) renewed the call for a "Tobin-tax".

³ For a system of fixed exchange rates, like the period of the Gold Standard, short-term capital movements have been analysed i.a. by Arthur Bloomfield, who comes to the conclusion, that short-term capital movements have been mostly stabilizing, facilitating the functioning of the system and rendering gold movements widely unnecessary (Bloomfield (1963), pp. 43-44). Although he observes that at certain times short-term capital movements have also been considerably contributing to instability, he concludes "that all such disequilibrating movements of short-term funds probably could not have persisted for long on any sizeable scale, ..." (Bloomfield (1963), p. 45).

⁴ Market participants support both views, that there is too much and that there is not enough speculation: "The consensus among respondents is that the speculator, narrowly defined, does not play his classical equilibrating role by having become too small in relation to the market's size to do so; and the larger volume of asset switching, leading and lagging adds to exchange market volatility, at least in the short run." Cf. Group of Thirty (1980), p. 25.

⁵ See, for instance, Singleton (1987).

to equalize expected exchange rate changes and the interest rate differential. In order to complement the existing literature which focuses predominantly on prices, the focus of this study will be on quantities. The aim is to find a way how to estimate fx speculation and to show how it should not be estimated. At least when it comes to making proposals for economic policy, it should be known whether foreign currency speculation is an important phenomenon at all. Exchange rate volatility can also be due to lack of speculation, as the arguments of economists like Mayer and McKinnon show. Even a currency crisis like the recent EMS crisis with its massive capital flows does not necessarily prove the existence of strong speculative forces. What has been labelled "speculative attacks" may also have been to a large extent hedging. Therefore, it has to be analysed whether speculative position taking in the foreign exchange market is large enough to have a decisive effect on exchange rates.⁶

In the following sections, it will first be attempted to define foreign exchange speculation. As will be shown, there is no clear dividing line between fx speculation and other activities in foreign exchange markets. Furthermore, it will be attempted to show how the composition of gross flows can be used to derive further information about speculation. This involves a classification of various capital account items according to the extent to which they are exposed to exchange rate risk (section 2.1.). Second, it will be discussed why the volume of capital flows during the EMS crisis or the volume of transactions in the foreign exchange market do not provide any reliable information about the amount of speculative activity. Instead, it is argued that the current account or the capital account can at least give an approximation of the amount of open fx positions (section 2.2.). In the third section, an extensive analysis of the interconnections of various fx market activities will be given. As will be shown, hedging may generate large short-term capital flows which cannot be easily distinguished from speculation. The size of these flows does not only depend on capital and trade flows but also on net and gross stocks of foreign assets and liabilities. In addition, hedging and especially international intermediation may produce a negative correlation of long-term and short-term capital flows. Therefore, short-term and long-term capital flows cannot be interpreted independently of each other (section 3). Since there is no clear dividing line between hedging and speculation which would allow for an empirical estimation of speculation with commonly used statistical methods, two case studies are used to obtain further insights (section 4). The use of case studies

⁶ In addition, it would be useful to have some idea of the time horizon of speculative transactions. Speculative intraday transactions of foreign currency dealers which can be quite large seem to dominate (Goodhart (1988), Frankel (1988)). But this kind of speculation can hardly have a lasting impact on exchange rates. Furthermore, it cannot serve to smooth out the effects of volatile volumes in international trade, as assumed by McKinnon, because dealers are not prepared to accumulate large open positions over time.

enables information about the structure of capital flows and the size and composition of stocks of foreign assets and liabilities to be drawn on.

2. Delimitating speculation in relation to other activities in fx markets

2.1. Theoretical problems

The "classical" definition of speculation comes from Kaldor (1939), p. 1: "Purchase (or sale) of goods with a view to re-sale (or re-purchase) at a later date, where the motive behind such action is the expectation of a change in the relevant prices relatively to the ruling price and not a gain accruing through their use, or any kind of transformation effected in them or their transfer between different markets." So, speculation is separated from investment, which is carried out to gain from interest payments, dividends etc. (the "gain accruing" from the use of the assets), from the purchase of intermediate goods which enter the production process ("transformation") and from arbitrage ("transfer between different markets"). Sohmen has applied this definition to foreign exchange speculation, arguing that only an uncovered forward sale or purchase can be considered as "pure" currency speculation, because the profits of this transaction depend entirely on the difference between the forward rate and the future exchange rate (Sohmen (1973) p. 60).⁷ The profit of other transactions, for example of an uncovered spot sale or purchase, depends also on interest rates (if they are not reversed at the same day).

It is questionable, however, whether such "pure" speculation is important except for very short periods such as within a given day. A wider definition of speculation encompasses all transactions whose expected yields depend *significantly* on the difference between the forward rate and the expected future exchange rate.⁸ So, Sohmen's notion that speculation is based on a belief about future exchange rates which differs from the forward rate is retained.⁹ Only the requirement that all profits have to

⁷ If the banks require collateral or if margin requirements have to be met, this may not be true in the strict sense, because in this case profits may also be influenced by interest rates. An uncovered options transaction in foreign exchange comes close to pure currency speculation, as well. However, the options price is also influenced by interest rates and by volatility.

⁸ Other foreign transactions, the yield of which depends only to a limited degree (or not at all) on deviations between the expected exchange rate and the forward rate will be labelled "foreign investment".

⁹ If it is costly to transact in the forward market a market participant may choose to keep an open position even if he expects the future exchange rate to be equal to the forward rate. In this case, it is not the difference between the expected rate and the forward rate but the difference between the expected rate

be derived from this difference is relaxed. It may seem somewhat surprising that this definition focuses on the difference between the expected exchange rate and the forward rate instead of the spot rate. However, somebody who expects the future exchange rate to be equal to the forward rate does not need to speculate.¹⁰ If, for instance, somebody owning foreign exchange expected an appreciation of the foreign currency equal to the forward discount, he could always convert the uncertain expected exchange rate gain into a certain gain by selling the foreign currency in the forward market. In practice, it may often be of minor importance whether speculation is based on the difference between the expected exchange rate and the forward rate or the expected exchange rate and the spot rate, because the forward rate is often close to the spot rate.¹¹ In order to keep the following exposition simple, a speculator will therefore be described as somebody who tries to profit from individually expected exchange rate changes. Furthermore, it seems plausible to assume that fx speculation usually takes place with respect to bilateral exchange rates. Somebody who expects the Yen to depreciate is likely to buy either US-dollars, D-Marks or sfrs. but not a whole portfolio of 20 currencies because in the latter case transactions costs would be higher and the speed of adjustment lower.

Given the above definition, which transactions could be considered exchange rate speculation? For one thing, open fx positions in derivatives markets surely can be considered fx speculation since the return on these positions is dominated by exchange rate changes whereas interest rates only play a minor role. Apart from derivatives, open fx positions involving short-term instruments can also be considered speculative. For these transactions, risk and return are nearly entirely due to exchange rate changes. For very short maturities there is hardly any interest rate risk at all¹² whereas exchange rate risk can still be considerable because of the high variance of short-term exchange rates. A two percent hike of the exchange rate within one day is equal to an interest rate (on a yearly basis) of 720 percent. A two percent change within a week is equal to an interest rate of 103 percent and a five percent change within a week is equal to 257

and the forward rate plus/minus transactions costs which matters. Similarly, not every difference between the expected exchange rate and the forward rate will trigger speculative capital flows. If there are transactions costs or if investors are risk averse, there may be persistent differences ("risk premia") between the expected exchange rate and the forward rate.

¹⁰ In more general terms, it is simply stated that speculative transactions will only take place, when the speculator's opinion differs from the market opinion or when his willingness to take risks is higher (if risk is introduced the forward discount - or the interest rate differential - does not necessarily reflect the expected exchange rate change).

¹¹ Wider differences can only be observed when inflation differentials between countries are large.

¹² This also implies that the absolute value of the covariance between foreign returns (G^f) and exchange rate gains (X) is low (cf. equation 3).

percent. Moving short-term funds for one week into a foreign currency (interest rate: 10 percent p.a.) which unexpectedly depreciates (appreciates) 5 percent, is therefore equal to receiving a negative (positive) interest rate of 247 percent (p.a.). Trying to profit from short-term interest rate differentials of a few percentage points can be risky indeed (compare figures in the appendix).¹³ Given the relatively low interest rate differentials and the high exchange rate risk, it can be assumed that unhedged short-term foreign exchange positions are held to speculate on exchange rate changes.

As the time to maturity is lengthened, the modified duration of a foreign investment is increased. This has two effects: returns increasingly depend on capital gains (see equ.1) and the risk of foreign returns (excl. exchange rate risk) rises (equ.2).¹⁴

$$(1) \quad G^* = i^* + (-D_t)di^*$$

$$(2) \quad \text{Var}(G^*) = D_t^2 \text{Var}(i^*)$$

G^* : Percentage return of the foreign investment in foreign currency

D_t : Modified duration i^* : Foreign interest rate

A longer time to maturity does not necessarily mean that the actual holding period is also increasing. What is important is that risk ($\text{Var}(G^*)$) and return (G^*) of a foreign asset are increased when an investor switches from short-term instruments into bonds of longer maturities or stocks. A market participant who buys a foreign long-term bond wishing to resell it within a few days can expect a return which is not strongly dominated by exchange rate changes because capital gains or losses can be considerable as well. Therefore, investments at the longer end of the bond market or investments in foreign stocks or other real assets cannot be interpreted as exchange rate speculation because their return depends significantly on capital gains or losses.

Furthermore, if exchange rate gains are negatively correlated with foreign returns, the overall risk can be lower if exchange rate risk were not hedged.¹⁵ However, this possibility is only important when the risk of foreign returns ($\text{Var}(G^*)$) is not too

¹³ Hauser/Levy (1991), p. 379 find that, "for the short-term foreign securities (one-year duration), the variance of the monthly rate of return is almost entirely due to exchange rate risk".

¹⁴ Douglas (1990), p. 62 gives some examples for the size of the modified duration of bonds with different maturities. For example, a $7\frac{1}{8}$ % bond with two years to maturity has a modified duration of 1.82 and a $9\frac{1}{8}$ % bond with ten years to maturity has a modified duration of 6.51 (under the assumption that interest is paid semiannually).

¹⁵ In addition, it is also possible that exchange rate risk is negatively correlated with local returns. See ch. 3.1.1.1.

small in comparison to the exchange rate risk ($\text{Var}(X)$) because for a low variance of G^* the absolute value of the covariance is bound to be low as well. Therefore, this effect is also more important for instruments with longer maturities (equ. 3). If an investor holds an open fx position because a negative covariance reduces the risk of his foreign investment he clearly does not qualify as a fx speculator, because his main aim is not to profit from exchange rate movements.

$$(3) \quad R^* = \text{Var}(X) + \text{Var}(G^*) + 2\text{Cov}(G^*, X)$$

X: Percentage change of the exchange rate

R^* : Risk (variance) in local currency of the return on foreign investments

G^* : Percentage return of the foreign investment in foreign currency

So, open positions in fx derivatives and short-term to medium-term foreign assets can be interpreted as currency speculation. Furthermore, any strategy of variable hedging of fx risks is also fx speculation in the wider sense. If, for instance, a market participant lowers the hedge ratio of foreign investments and later raises it again, he behaves exactly like a speculator who builds up an open position and closes it later on. Foreign investors, on the other hand, hold open fx positions if they consider foreign exchange rate risk to be low. In this case their net positions are guided by expected returns in the respective currencies (that is, in the currency where the investment takes place). If exchange rate risk is rising they will (c.p.) increasingly close these positions. They are not trying to profit from expected price changes.¹⁶

The reasoning above suggests, that the transition from foreign investment to speculation is a gradual one. It is not always easy to separate the two categories. For example, if an individual buys a foreign currency bond and does not hedge, the reason for not hedging may be risk reduction (the exchange rate may be negatively correlated with the price of the foreign bond or local currency investments). Or the investor thinks that in the long run "currencies are a wash".¹⁷ But it is also possible that the individual keeps the position open because he has a strong view on exchange rates, expecting a more favourable development of the foreign currency than is implied by the forward rate. In this case, expected profits depend on expected capital gains on bonds and the

¹⁶ Such a behaviour may be due to lack of knowledge. Gennotte and Leland (1990) argue that a large proportion of stock investors are ill informed about fundamentals and use the current price as single or most important source of knowledge. See also Shleifer and Summers (1990).

¹⁷ According to Gadkari and Spindel (1990), p. 53 this is "probably the most used line in discussions about international diversification". This impression is shared by Kindleberger (1987), p. 45 who states: "Long-term capital movements have by and large ignored exchange rate risk."

difference between the forward rate and the expected exchange rate. Therefore, it is difficult to draw the line, where fx speculation starts and foreign investment ends. The same applies when existing open positions are closed. Were foreign investors speculating or hedging when they closed their open Pta. position in the autumn of 1992? While in practice there is no clearcut division between these two kinds of activities, it can be assumed that the investor/hedger is primarily interested in profiting from interest rate differentials or price changes of foreign assets. For the investor/hedger exchange rate risk implies possible losses which he tries to avoid to a certain extent. The foreign currency speculator, on the other hand, wants to profit from exchange rate movements. Interest rate differentials which may represent either an additional source of income or costs of speculation are of minor importance.

The definition of fx speculation given above implies that it is useful for certain purposes to distinguish foreign investments not by holding period, but by time to maturity. That is exactly the distinction used in balance of payments statistics. This has often been criticized. Many economists have argued that it is misleading to speak of a long-term capital export if somebody purchases a foreign bond with ten years to maturity, because he can (and often will) sell it within a few days. But the fact that a capital transaction is reversed within a short period says little about the reasons for this move. Time to maturity, on the other hand, can be interpreted as a rough proxy for interest rate risk. Separating capital flows according to time to maturity into short-term and long-term flows can therefore help to get a better understanding of the different economic forces behind "long-term" and "short-term" capital flows and can help to separate speculative and non-speculative capital flows.¹⁸ Further information could be gained if the capital balance could be divided into more components, for example:

- short-term credits,
- long-term credits (variable interest rate),
- bonds,
- equity,
- direct investment, land etc.

This list of assets is characterised by a declining significance of the relative exchange rate risk.

¹⁸ This holds only with respect to fx speculation. Interest rate speculation is briefly addressed in ch. 3.2.

2.2. Empirical problems

Which market participants are speculating and what are their strategies? One group of market participants which is speculating in foreign exchange markets are industrial enterprises with foreign exchange operations. Studies conducted by the Group of Thirty in 1979 and 1985 (Group of Thirty (1980) and (1985)) as well as more recent investigations (Soenen/Aggarwal (1989), Glaum (1994)) show, that most firms are following a strategy of selective hedging.¹⁹ Although corporate treasurers usually reply that they think that it is in general impossible to beat the market, most of them report positive results from their selective hedging strategies (Group of Thirty (1980), p. 8 and (1985), p. 42). In other words, although paying lip service to market efficiency,²⁰ the respondents try to beat the market and claim to be successful in doing just that. So, for many large firms foreign currency operations have become an additional profit center (Goldstein et al. (1993), p. 5)

Even more important for forex trading activities are institutional investors. This group has been increasingly active in forex markets and invested an increasing portion of their portfolios in foreign assets.²¹ According to the Group of Ten (1993), p. 6 "the most significant development in foreign exchange markets in recent years is the emergence of these investors as major participants in the market." During the 1980s institutional investors increased the share of foreign assets strongly - in many cases by a factor of five or more (Bisignano (1994), p. 32). The largest proportion of these funds were put into stocks (14-100%, median 55%) and bonds (median 37%), (Group of Thirty (1985), p. 49). 70 percent of fund managers implemented changing views on exchange rates by selective hedging of stocks and bonds (Group of Thirty (1985), p. 50). Only 18 percent of respondents made currency decisions more often than foreign investment decisions. The average time horizon for individual foreign investments lay between one and three years. The average time horizon for currency decisions lay between four and twelve months (p. 51). 59 percent described their exchange rate analysis as "fundamental", 30 percent as "technical" (p. 52).

Some of these findings could be confirmed in later studies of the foreign

¹⁹ This view is confirmed by Giddy (1994), p. 481. Giddy also mentions anecdotal evidence that the amount of discretion in exchange rate management rises with the sophistication of a firm.

²⁰ Many corporate treasurers do not even seem to know the efficient market hypothesis. Glaum (1994), p. 88 found that from 22 treasurers of large German industrial enterprises only two knew the efficient market hypothesis.

²¹ Although the relative importance of international investment has increased, the level of international diversification is still surprisingly low. See French/Poterba (1991) and Goldstein/Mussa (1993), pp. 22-4.

investment behaviour of institutional investors conducted by Davis (Davis (1988) and (1991)). He also found that fund managers mainly followed a strategy of selective hedging. "Discretion is the main strategy." (Davis (1991), p. 35) Managers believed in market efficiency, however, they did not trust in historical covariances. Furthermore, they doubted that market efficiency was also given in the short run. Rather, they presumed the existence of herding phenomena (Davis (1991), p. 48). Therefore, relatively wide tactical deviations from strategically set currency compositions were allowed (Davis (1991), p. 39). Unlike the Group of Thirty report, Davis found that institutional investors were treating foreign equity and foreign bond investment differently. Bond exposures were hedged to a far larger degree (Davis (1991), p. 45).

A special group of investors, which has received much attention lately, are hedge funds. The capital employed in hedge funds is tiny as compared to other institutional investors (Group of Ten (1993), p. 49). The McKinsey Global Institute estimates the value of total assets of hedge funds in 1993 to be around US\$ 75 bn. (McKinsey (1994), ch. 4, p. 7). This compares to U.S. mutual funds assets of around US\$ 2.075 bn. (McKinsey (1994), ch. 5, p. 10). Ferrill Capital Management, a firm which tracks forex fund performance, estimates that investment funds devote about US\$ 10 bn. to currency speculation - an amount which normally will be leveraged up to five times (Hansell (1992), p. 36). However, they transact aggressively in the markets and are willing to take high risks. Using their assets as collateral or initial margin they can achieve high leverage.²² Furthermore, they may act as opinion leaders providing signals to other market participants (Goldstein et al. (1993), p. 11).²³

Trading in fx markets is dominated by large banks and securities houses which act as market makers. Both usually have tight limits for their traders' overnight positions. Intraday positions, however, may be quite large and it is estimated that the aggregated position of banks and market makers may at times be very large (Goodhart (1988)). Still, despite the fact that the bulk of fx trading takes place in the interbank market, the influence of interbank traders is "diffuse in terms of influencing the direction of rates" (Hansell (1992), p. 36). Furthermore, limits on open positions seem to have become tighter recently.²⁴ The proprietary trading desks of some securities houses

²² Goldstein et al. (1993), p. 5 have estimated that hedge funds can leverage their capital by a factor up to ten.

²³ After high profits in the years 1990 to 1993, most of them incurred losses in 1994. Some funds have reacted by reducing their capital base and running smaller risks (leveraging less). See Gawith (1995b).

²⁴ The immense losses on bonds in 1994 and the volatility of exchange rates seem to have led to a reassessment of risks and the capital for proprietary trading has been cut down. See Gewitz (1995) and

and investment banks which employ part of the firm's capital in speculative activity are also active in fx markets. However, the size of these trades is small relative to the market (Hansell (1992), p. 36).²⁵ If the speculative activities during the EMS crisis were representative for fx speculation in general, banks are not among the active speculators (Garber/Taylor (1995), p. 175). Not only are they constrained in many countries in taking large open foreign currency positions. They did not even reach the limits set by regulation. U.S. banks which are less constrained did also not build up large open positions. As an IMF report on the EMS crisis concludes: "The international banking system does not appear to have taken unusually large open positions in foreign exchange during the crisis." (Goldstein et al. (1993), p. 11). Banks mainly seem to have gained during the crisis by financing the speculation and carrying out transactions.²⁶

The wealthy individual as a stabilizing speculator with a long-term horizon seems to play no significant role in exchange markets anymore (Brown (1983)). Based on the existing knowledge about risk aversion, transaction costs and exchange rate volatility, Goodhart and Taylor (1992) show that fx speculation would be too risky for most individuals except "extremely wealthy individuals". While wealthy individuals lost significance, some central banks seem to have become more active players, actively managing their reserves (Hansell (1992), p.36).

Unfortunately, it is easier to find out who is speculating than to estimate the quantitative significance of speculation. Often, foreign exchange market turnover is used to show that short-term speculation is huge in volume, dominating other transacting by far.²⁷ Indeed, when compared to the volume of international trade or official reserves, turnover in foreign exchange markets is immense. However, the fact that turnover is about 40 to 50 times larger than international trade does not mean that 97 or 98 percent of turnover is due to speculation.²⁸ Equally, owning official reserves no more than the turnover of one day does not mean that central banks have no

Gawith (1995a). See also Hansell (1992) p. 36 who reports reduced exposure already for 1992.

²⁵ In any event, the bulk of the activity seems to be in bonds (Freeman (1995)).

²⁶ This cautious approach can be explained by empirical evidence which supports the view that position taking is not a reliable source of revenues and profits. See Braas/Bravler (1990) who find that "jobbing" in the market and customer business are the primary sources of profit in fx trading operations.

²⁷ See, for instance, Aliber (1987), pp. 210-212, Eichengreen/Wyplosz (1993), Leuschel (1988), Nölling (1993), Schulmeister (1987), Siebert (1991), p. 354.

²⁸ Foreign exchange market turnover on a normal day in 1992 was estimated to be US\$ 880 bn. See BIS (1993). The volume of world exports in 1992 was US\$ 3.688 trll. and official reserves (excl. gold) amounted to US\$ 953 bn. at the end of the year. See IMF (a).

influence on exchange rates. After all, turnover is just turnover. It says little about the willingness of market participants to hold open positions.²⁹ High turnover (and/or high exchange rate volatility) may even be the result of the missing willingness to be short or long in a foreign currency for a period longer than a few minutes or hours. In this case market makers close their open positions more quickly and inter bank trade increases (Burnham (1991), p. 135; Brown (1983), p. 17, McKinnon (1986) and Mayer (1985)).

The theoretical analysis of fx speculation seems to imply that the volume of short-term capital movements can be used to estimate speculation. However, this is not the case because it is not known to what extent transactions are hedged. As will be shown in this paper, hedged short-term capital movements can be due to changes in long-term capital flows or changing hedging behaviour of long-term investors/borrowers and foreign traders. What looks like erratic and destabilizing behaviour of short-term funds may indeed be simply the result of changes originating at the longer end of the market. Long-term capital movements, which are usually regarded as relatively stable components of international capital flows, can therefore contribute more to instability than is suggested by a simple look at balance of payments statistics.

Current account or capital account balances are a better measure for the amount of open foreign exchange positions than turnover figures. Any surplus or deficit on current account implies that someone must have been prepared to shoulder exchange rate risk. This may be central banks - in this case the counterposition to the balance on current account is a change in international reserves - or other market participants - in this case the counterposition to the balance on current account can be found in the capital account. Both the large balances on current account and the huge net capital flows of the 1980s and early 1990s clearly show that there are market participants which are prepared to shoulder exchange rate risk. However, it is neither very well known who these are nor based on which considerations such open foreign exchange positions are held. Therefore, a closer look at foreign exchange markets is needed in order to get an idea which part of these open positions is based on speculative transactions. This is a complicated matter, because most international statistics record capital flows or stocks of foreign assets or liabilities but they do not contain information to what extent these stocks or flows are hedged (Benzie (1992), p. 52).

If the various components of the capital account were independent of each other and independent of derivatives transactions, it would be easier to discriminate between

²⁹ Compare Krüger (1994) and (1995).

speculative and non-speculative capital movements. Simple empirical tests, such as Turner (1991), pp. 91-94 could enhance the knowledge of the underlying causes for capital flows considerably. Turner, for example, found that changes of short-term banking flows were more closely correlated with changes of the "financing requirements" of a country (balance on current account plus change in reserves)³⁰ than any other item of the capital account. Therefore, he concludes that changes in the current account have mostly been financed by short-term banking flows (Turner (1991), p. 91) and that these short-term flows have to be classified as "accommodating" capital flows.³¹ However, this conclusion is valid only if these short-term capital movements are not tied to capital movements in the opposite direction or derivatives transactions. Since Turner himself argues that short-term capital flows are hedged to a greater extent than long-term capital flows,³² it is not possible to draw direct conclusions from his findings, as tempting as that may be.

Casual evidence suggests that there are indeed links between the various items of the capital account. For instance, German short-term and long-term capital movements exhibited a negative correlation for many years. During the early phase of German Unification, when the overall capital balance shifted from deficit into surplus, this pattern was disturbed. Lately, it has been reemerging however (cf. case study Germany). Another example is Japan. During the 1980s, Japan experienced long-term capital outflows and short-term capital inflows (again: especially short-term banking flows). When the balance of long-term capital movements turned from deficit into surplus around 1990, the short-term capital balance moved in the opposite direction (cf. case study Japan).

If long-term and short-term capital flows are related, it is not possible to interpret either short-term or long-term flows independently and it becomes necessary to analyse the causes for this relationship. There is a number of factors which could help to explain the connection between short-term and long-term capital movements. For instance, short-term capital movements may be used to hedge long-term capital movements. Insofar as short-term capital movements do indeed reflect the hedging behaviour of long-term investors and foreign traders, they would have to be interpreted

³⁰ This is, of course, equal to the capital account. So, Turner, in effect, regresses the capital account on its components.

³¹ The distinction between "autonomous" and "accommodating" capital flows goes back to Meade (1951). See also Machlup (1983) who uses the term "induced" instead of "accommodating".

³² For instance, the marginal dollar which a Japanese bank invests in foreign assets has to be financed with a foreign currency credit (J.P.Morgan (1989), p. 3). Therefore, these flows do not constitute a source of finance for trade balances. Given the tight restrictions on banks' foreign currency exposure in many countries, the same probably applies in other countries and to other instruments as well.

as non-speculative flows, passively adopting to the amount of hedging. Another factor which can account for offsetting short-term and long-term capital movements is international intermediation, that is, simultaneous foreign borrowing and lending in order to profit from interest rate differentials (between assets denominated in the same currency) or interest rate changes.³³ Finally, simultaneous inflows and outflows will be recorded in the balance of payments whenever foreigners are shifting between different kinds of local assets.

3. The interrelationships between derivatives, short-term and long-term capital movements

3.1. Hedging

3.1.1. Hedging of long-term and short-term assets

It is not very well known to what extent short-term and long-term capital movements are hedged, but it seems to be generally accepted that "long-term flows tend to be covered by forward exchange contracts to a much smaller extent than short-term flows." (Turner (1991), p. 79) In what follows, it will be explored why long-term investments may, on average, be less hedged.

Viewed in isolation, an investment in foreign assets which is not hedged is likely to be much riskier than a foreign investment which is hedged. Only if there were a sufficiently strong negative correlation between the exchange rate gain (X) and the foreign return (G^*) would a hedged investment be riskier (see Table 1). Provided the expected return on hedging (i.e. forward discount or premium minus his own expected exchange rate change) is zero, hedging is therefore to be preferred whenever transactions costs are low. This is the "free lunch in currency hedging" (Perold/Schulman (1990)). As far as portfolios are considered which consist only of foreign assets, this free lunch does indeed seem to exist. However, for most investors the portfolio consists mainly of local assets with only a small proportion invested in foreign assets (Goldstein et al. (1993), p. 3, Bisignano (1994), p. 32). If the foreign investment is part of a portfolio which consists of local and foreign assets, not only the variance of the exchange rate ($\text{Var}(X)$) and the covariance of exchange rate changes (X) and foreign returns (G^*) have to be considered but also the covariance between

³³ The latter would probably not qualify as intermediation in the narrow sense and should rather be labelled "interest rate speculation".

exchange rate changes (X) and local returns (E). In this case, it is no longer clear whether complete hedging is advisable. Most studies found that, from the perspective of a US investor, hedging was to be preferred (Filatov/Rappoport (1992), Gadkari/Spindel (1990), Thomas III (1990)). However, for other countries the results were quite different, suggesting that in many cases it was more efficient not to hedge (Filatov/Rappoport (1992), Gadkari/Spindel (1990)). Furthermore, Jorion (1990) shows that hedging does not significantly change the risk of the portfolio when the share of foreign assets is low.

Table 1 Interest Rate Risk and Exchange Rate Risk

	Local investment	Foreign investment
Interest plus exchange rate risk:	$R = D\text{Var}^e(i)$	$R^* = \text{Var}^e(X) + D^*\text{Var}^e(i^*) + 2\text{Cov}(G^*, X)$
Expected return ³⁴	$E = i + Ddi^e$	$E^* = i^* + D^*di^{*e} + X$
Risk of a mixed portfolio (local, hedged and unhedged foreign assets)	$R^P = w_d^2\text{Var}E + (1-w_d)^2\text{Var}G^* + (1-w_d)^2(1-h)^2\text{Var}X + 2[w_d(1-w_d)\text{Cov}(E, G^*) + w_d(1-w_d)(1-h)\text{Cov}(E, X) + (1-w_d)^2(1-h)\text{Cov}(G^*, X)]$	
Expected return of a mixed portfolio	$E^P = w_dE + (1-w_d)[G^* + hF + (1-h)X]$	

F = Forward discount (premium)

Var^e = Expected variance

D = Modified duration of the local investment

h = Hedge ratio

X = Expected exchange rate change in percent

w_d = weight of the local investment in the portfolio

P = Portfolio

R = Risk

E = Expected return

$G^* = i^* + D^*di^{*e}$

* = Foreign variables

These findings show that the inclusion of unhedged foreign assets does not necessarily imply fx speculation. Given sufficiently small or even negative covariances, unhedged foreign investments can be used to diversify and decrease the risk of the overall portfolio in quite the same way as hedged foreign investments. In some cases, risk reduction may be even higher when the foreign currency risk is not hedged. Thus, keeping an open fx position may often simply be a device to reduce risks.

For a mixed portfolio with a large share of local assets the case for hedging does not seem to be very strong. At least at current levels of international diversification, the

³⁴ Ignoring the cross product term in the equation which yields the expected return of a foreign investment.

effect of hedging on the risk of the portfolio is likely to be small and may at times be even negative. However, once it is taken into account that historical covariances may not be stable over time,³⁵ a risk averse investor may be unwilling to rely too much on these covariances. This may help to explain the low degree of international diversification and may similarly provide a rationale for hedging. The example of the US shows that an unhedged foreign investment may, at times, be clearly much riskier than a hedged one. In the early 1980s, the combination of a high volatility of the effective exchange rate of the US dollar (i.e. high correlation of bilateral exchange rate changes) and a positive correlation between foreign returns (G^*) and exchange rate gains sharply increased the risk of unhedged foreign investments.

All these empirical analyses focus on stocks and bonds.³⁶ This reflects the fact that bonds and stocks account for the lion's share in international portfolios. Short-term instruments are much less significant. International money funds, which specialize in investing in short-term instruments, only have a small market share.³⁷ The low importance of short-term assets in international portfolios contrasts sharply with the high volume of transactions in short-term instruments in international financial markets. This indicates that investment in local and foreign short-term assets seems to be driven by somewhat different considerations than investment in stocks and bonds.

Liquidity management, for instance, acts under the binding constraint that at certain points in time cash balances must be available to make payments. Therefore, only short-term assets (debts) are employed because these assets do not involve any price risk. This is due to the fact that the modified duration approaches zero as the time to maturity goes to zero. Therefore, the variance of returns over the period to maturity of a short-term instrument is zero. The same is true for a foreign short-term asset - when it is hedged. Adding exchange rate risk would make a virtually safe asset into a risky one, making it unsuitable for liquidity management.

Furthermore, a large share of transactions in foreign short-term assets are carried out by banks. For the large Eurobanks which perform market making functions in the international money market, the composition of short-term assets is mainly

³⁵ Most authors agree that historical hedge ratios may perform poorly out-of-sample. See, for instance Hauser/Levy (1991), Eaker/Grant/Woodard (1991) and Kaplanis/Schaefer (1991). Furthermore, if stock or bond markets move together internationally, capital losses cannot be offset simultaneously in all countries (Gadkari/Spindel (1990)). If, for instance, the US dollar appreciates, foreign investors gain on their dollar investments but US investors lose on their open fx positions.

³⁶ Usually a portfolio is assumed which consists of 60 percent stocks and 40 percent bonds. This ratio is supposed to reflect the average portfolio composition of institutional investors (Jorion (1990), p. 41).

³⁷ See Flight/Lee-Swan (1988), pp. 117-124.

determined by customers. Therefore, the composition of their assets may rapidly change and it is easier for them to hedge individual transactions (i.e. look for funding in the same currency), than to rely on diversification. The same is true for their fx derivatives trades, which are also mostly customer driven. If open derivatives positions cannot be quickly closed by an offsetting derivatives position, it will be hedged in the money markets. Finally, in many countries regulation prevents banks from holding large foreign exchange positions.³⁸ Since banking flows usually account for a large fraction of short-term capital flows it can be assumed that a considerable portion of short-term capital flows is hedged.

If a large part of short-term movements does not involve open fx positions at all - at least not longer than a few minutes or hours³⁹ - the question arises whether net short-term capital flows can be used as an approximation of fx speculation. For instance, a net outflow must not necessarily constitute an open position because it can be covered by a derivatives transaction or a long-term inflow. As will be shown, hedging of capital flows or stocks of foreign assets and liabilities can produce erratic behaviour of short-term capital flows.

3.1.2. The role of short-term capital flows in hedging

In this section the interrelationships between hedging activities and short-term capital flows will be explored in some detail. The aim is to have a better understanding of the "mechanics" of the market in order to be able to better interpret short-term capital movements. It will be shown how hedging of capital flows or of stocks of foreign assets and liabilities can affect net short-term capital flows. Furthermore, it will be analysed to what extent this interrelationship is affected by the use of derivatives. This exercise will also prove to be useful in understanding the channels through which fx speculation in derivatives markets affects exchange rates.

3.1.2.1. Hedging in the money markets

In order to demonstrate the impact of selective hedging of long-term capital movements or transactions in international trade on short-term capital flows, a few

³⁸ See Goldstein et al. (1993) pp. 5-7 and 36-39. The authors also note that even during the EMS crisis banks did not usually take large open fx positions limiting their activities to market making and the provision of credit to hedgers and speculators (pp. 11-12).

³⁹ It should be noted that in certain situations hours may be enough to break a currency.

simplifying assumptions are made:

- There are only two countries: the US and Germany.
- All short-term transactions are hedged.
- Hedging takes place in the local and foreign money market.
- In the initial equilibrium short-term capital flows are assumed to be zero.

Long-term capital flows in both directions can be denominated in either currency. The same is true for the denomination of the trade contract. The currency risk can be hedged or not.

Table 2 Hedging and Short-term Capital Movements

Transaction	Currency	Hedging-Behaviour	Money Market
German Capital Im (US Capital Ex) or German Goods Im (US Goods Ex)	- in DM	Americans hedge	DM Credit/\$ Invest.
		Am. do not hedge	----
	- in US\$	Germans hedge	DM Credit/\$ Invest.
		Ge. do not hedge	----
German Capital Ex (US Capital Im) or German Goods Ex (US Goods Im)	- in DM	Americans hedge	\$ Credit/DM Invest.
		Am. do not hedge	----
	- in US\$	Germans hedge	\$ Credit/DM Invest.
		Ge. do not hedge	----

In Table 2 the effects of decisions regarding currency denomination and hedging on short-term capital movements are given. This overview shows that the currency denominations either of bonds or trade contracts are not relevant for the effects of hedging on short-term capital movements. Whether German capital imports or goods imports (US capital exports or goods exports) are denominated in DM or dollar, hedging will take place in the form of a short-term capital export to the US. The same is true for the denomination of American capital- and goods imports (German capital- and goods exports). The important question is whether those who carry the currency risk are hedging or not.

Table 2 seems to suggest that there is a clear-cut relationship between long-term and short-term capital movements if hedging takes place. Unfortunately, this is not the case. A balanced long-term capital account may go along with no short-term capital

movements at all, with a balanced short-term capital account or with a net movement of funds into one of the countries. If there is a net long-term capital flow, for example from Germany to the US, it can be expected that short-term capital will flow in the opposite direction. However, other possibilities exist. If German investors are hedging their foreign investments less than their American counterparts, then a balanced short-term capital account or a net flow to Germany may be the result.

In the following figures (Figure 1 and 2) the various possibilities are explored under the assumption that short-term capital flows only serve as a means of hedging.

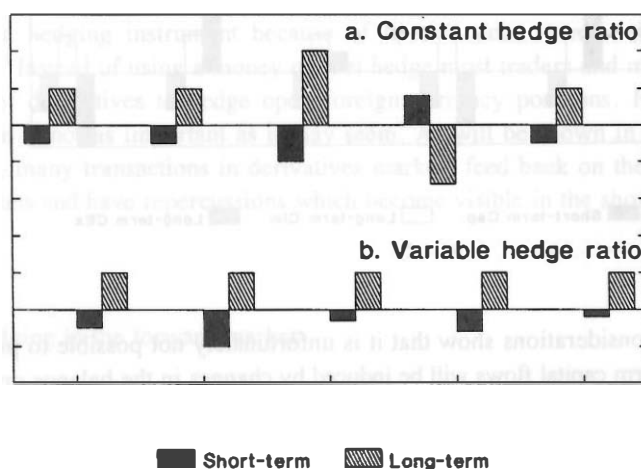
a. Constant hedge ratio

In this case capital imports and capital exports are both hedged in equal proportions. Consequently net short-term capital flows are a constant fraction of net long-term capital flows (always going in the opposite direction).

b. Variable hedge ratio

In this case, the hedge ratio for long-term capital exports and imports is still equal. However, it varies over time. Therefore, even when net long-term capital flows are constant, net short-term capital flows vary. However, net short-term capital still flows in the opposite direction.

Figure 1 Hedging of Long-term Capital Flows



c. Divergent hedge ratios

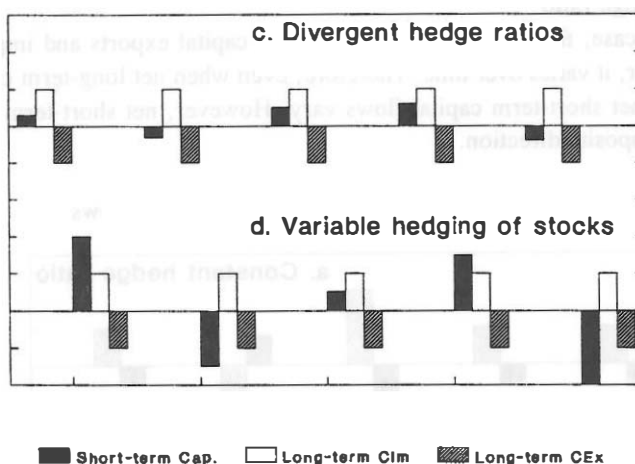
If hedge ratios are not only variable over time but may also differ for capital imports or exports, short-term capital flows may vary not only in size, they may also change the direction - even though gross and net long-term capital flows are constant.

d. Variable hedging of stocks

If the analysis includes changes in the hedging of stocks, net short-term capital flows may even be bigger than gross long-term capital flows.

Thus, even if long-term capital flows exhibit a fairly stable pattern, hedging of stocks and flows may induce erratic short-term capital movements.⁴⁰ The size of the flows depends on the desired hedge ratio of long-term investors and the size of long-term capital flows and net foreign assets. If net foreign assets have been accumulating over time a changing hedging behaviour may generate enormous short-term capital flows (see case study of Spain).

Figure 2 Hedging of Stocks and Flows



These considerations show that it is unfortunately not possible to predict what kind of short-term capital flows will be induced by changes in the balance on long-term capital. This can only be done when the components of long-term capital flows are known and/or the reasons for observed changes in the long-term account. It is, for example, quite likely that short-term capital movements are not affected by direct

⁴⁰ Genotte and Leland (1990) present a model in which the hedging activities of stock market investors can account for stock market crashes.

investment flows, because foreign direct investment is usually not hedged.⁴¹ Portfolio investment, on the other hand, is hedged to a certain degree. Therefore, changes in flows of portfolio capital should lead to corresponding short-term capital flows in the opposite direction. However, it is also conceivable that long-term investors increase capital imports and at the same time induce short-term capital imports. Such a move could be expected if sentiment shifts against the foreign currency (for example US\$) and if it is expected, that the local currency (for example DM) appreciates. In this case hedging of open positions in DM would be reduced and hedging of open positions in US\$ increased. As a result, long-term capital inflows would be accompanied by increased short-term inflows.

Although the effects of long-term capital flows on short-term capital flows can be manifold, certain general conclusions may still be appropriate. If long-term and short-term capital move in opposite directions, it can be assumed that at least part of the short-term capital flows serve the purpose of hedging. This applies specifically for short-term banking flows. Therefore, if net long-term capital flows are larger than net short-term capital flows, the difference can be used as a rough approximation of the amount of unhedged long-term capital flows.⁴²

But, as has been pointed out, short-term capital movements may be no longer needed as a hedging instrument because of the immense increase in the use of derivatives.⁴³ Instead of using a money market hedge most traders and many investors make use of derivatives to hedge open foreign currency positions. However, this qualification is not as important as it may seem. As will be shown in the following paragraphs, many transactions in derivatives markets feed back on the international money markets and have repercussions which become visible in the short-term capital account.

3.1.2.2 Hedging in the forward market

Following the BIS (1993), the term "forward market" can be defined in the broad sense, comprising the "outright forward" market and the "foreign-exchange

⁴¹ This is due to the nature of the assets involved. In the case of nominal shocks, the price movements of these assets are likely to partly offset exchange rate changes.

⁴² See J.P.Morgan (1989), p. 8.

⁴³ J.P. Morgan (1989), p. 8.

swap" market.⁴⁴ The outright forward market, which mainly serves to provide forward cover for customers is much smaller than the swap market. Its share in total exchange market activity is about 7 percent, while the share of the swap market is about 39 percent (BIS (1993), p. 17).

- The outright forward market

Instead of a money market hedge, a foreign trader or a long-term capital importer/exporter may prefer to use the forward market.⁴⁵ Table 3 shows how various transactions can be hedged in the forward market, creating demand or supply for forward dollars (forward DM).

Table 3 Forward Market Repercussions of Hedging Activities

Transaction	Currency	Hedging-Behaviour	Forward Market	
Ger.Cap.-Im (US Cap.-Ex)	- in DM	Americans hedge	Supply of forward DM	(Im 1)
		Am. do not hedge	----	(Im 2)
Ger.Goods-Im (US Goods-Ex)	- in US-\$	Germans hedge	Supply of forward DM	(Im 3)
		Ge. do not hedge	-----	(Im 4)
Ger. Cap.-Ex (US Cap.-Im)	- in DM	Americans hedge	Demand for forward DM	(Ex 1)
		Am. do not hedge	----	(Ex 2)
Ger. Goods-Ex (US Goods-Im)	- in US-\$	Germans hedge	Demand for forward DM	(Ex 3)
		Ge. do not hedge	----	(Ex 4)

⁴⁴ Often, the simple term "swap" is used leaving it to the reader to decide which kind of swap is meant. Therefore, Giddy's distinction between "foreign-exchange swaps" and "currency swaps" is used. (See Giddy (1994), p.18.) In a currency swap, interest and principal in different currencies are exchanged. The foreign-exchange swap consists of a combination of a spot purchase of one currency against another and the repurchase of the currency sold, at a certain date in the future. This having been said, hereafter the term "swap" will be used as an abbreviation for "foreign-exchange swap".

⁴⁵ The table does not include the possibility that foreign exchange exposure is only partly hedged.

If hedging is restricted to the forward market, the principal hedging decisions⁴⁶ of the long-term investors/borrowers and international traders on the forward market can be easily illustrated (see Table 4). As can be seen, in 4 cases the forward market is not touched at all. In 4 additional cases supply and demand rise by equal amounts. In the other 8 cases, however, there is an excess supply of or excess demand for forward DM. These excess supplies or demands could, of course, be reduced by price changes. However, as soon as the forward quotations start to move, covered interest arbitrage becomes possible and arbitrageurs, usually banks, will provide "forward cover". The forward rates are fixed by covered interest rate arbitrage.⁴⁷

Table 4 Long-term Capital Flows, Hedging and the Forward Market

	Ex 1	Ex2	Ex 3	Ex 4
Im 1	D = S	XS	D = S	XS
Im 2	XD	D = S = 0	XD	D = S = 0
Im 3	D = S	XS	D = S	XS
Im 4	XD	D = S = 0	XD	D = S = 0

D: Demand for forward DM (supply of forward dollar)

S: Supply of forward DM (demand for forward dollar)

XD: Excess demand for forward DM (excess supply of forward dollar)

XS: Excess supply of forward DM (excess demand for forward dollar)

If there is an excess supply of forward DM, banks will buy the excess amounts and provide the required forward dollar. This transaction can be covered by borrowing DM, converting these into dollars and investing the dollar proceeds.⁴⁸ This amounts to a short-term capital flow into the US. In the case of an excess demand for DM, there would be a short-term capital flow from the US to Germany. Thus, even if hedging takes place in the forward market it may cause a short-term capital movement from Germany to the US or vice-versa.

⁴⁶ The table does not include the possibility that foreign exchange exposure is only partly hedged.

⁴⁷ Empirical evidence clearly supports this "Cambist" view of the forward market and rejects the "Modern View". See Brooks/Cuthbertson/Mayes (1986), pp. 38.

⁴⁸ If banks hedge their open forward positions in the swap market (nowadays a common practice, see Giddy (1994), p. 182), the resulting adjustment process is more complicated. This case will be considered in the next paragraph.

Hedging in the forward market has a lot in common with a money market hedge. In both cases of hedging there is a short-term capital movement. In the case of a forward hedge the short-term capital movement of the hedger is replaced by a capital movement of a bank. Therefore, such forward transactions can be interpreted as a credit from the bank to the counterparty in the forward deal (Goldstein et al. (1993). Since forward transactions with customers also involve counterparty risk for the bank, just like credit risk in case of a loan, they require a certain amount of collateral (according to Garber and Taylor (1995) New York banks ask for 10 percent). Therefore, it is not correct to characterize forward speculation as "speculation without capital" (Vehrkamp (1992)).

- The swap market

The swap market has become the crucial link between credit markets, spot market and forward markets (see Figure 3). Highly developed swap markets make it possible to shop around in various money markets without incurring exchange rate risk. For example, Swiss and Canadian banks are said to use the dollar money market, swapping in and out of the dollar, and thus profiting from the depth and liquidity of this market (BIS (1993), p. 20; Brown (1983), p. 103). Swaps also connect the spot market with the forward market, allowing a spot transaction to be converted into a forward transaction and a forward transaction into a spot transaction (see Table 5). This capacity was widely used by speculators during the EMS crisis. Instead of using the forward market directly, they used the spot market and financed their DM purchases with swaps - thus converting a spot position into a forward position.⁴⁹ Furthermore, swaps can be used to roll an expiring forward position over.⁵⁰

It is this variety of uses which contributes to the depth and liquidity of the swap market,⁵¹ whose turnover is only a little smaller than turnover in spot markets. According to the BIS, in April 1992 daily turnover in the swap markets amounted to

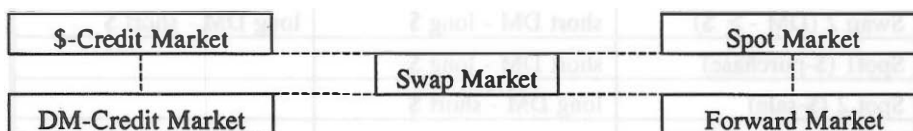
⁴⁹ A detailed analysis of these activities can be found in Linde/Alonso (1993).

⁵⁰ A forward position which is due in two days can be combined, for example, with a three months swap in order to generate a three months forward.

⁵¹ Another factor is the relatively small risk for market makers. The interest rate differential between two currencies is usually less volatile than interest rates themselves or exchange rates. Therefore, bid-ask spreads in the swap market tend to be very narrow, and limits on intra- and inter-day positions wider. See Brown (1983), p. 21.

US\$ 324 bn. (39% of total net-net turnover⁵²) while turnover in the spot markets was estimated to be around US\$ 394 bn. (47% of total net-net turnover).

Figure 3 "Overlapping Market Triangles"⁵³



One way to hedge foreign currency exposure is the sale or purchase of forward foreign exchange. This has been discussed already in the preceding paragraph. As has been shown, such forward transactions will induce short-term capital flows by those banks who take the counterposition in the forward deal. Nowadays, banks do not use covered interest rate arbitrage to hedge their forward business. Instead, they simply use the swap and the spot market. If they have, for example, sold forward dollars against DM, so that they are short in forward dollars and long in forward DM, they simply buy dollars in the spot market and swap these back into DM. Taken together, these two transactions are equivalent to a sale of forward DM. Generally speaking, each of the three transactions, spot, swap and forward, can be interpreted as a combination of the other two.

To derive the result of the various combinations of these three deals, one can simply add up the positions at each date for each transaction, with offsetting long and short positions canceling each other out (see Table 5). For example:

$$\begin{aligned} \text{swap 1} + \text{spot 1} &= \text{forward 2} \\ \text{swap 1} + \text{forward 1} &= \text{spot 2} \\ \text{spot 2} + \text{forward 2} &= \text{swap 1} \text{ etc.} \end{aligned}$$

The fact that banks do not hedge their forward positions by borrowing in one currency and lending in another, does not necessarily mean that the credit markets in

⁵² Adjusted for local and cross-border double counting. Total reported net-net turnover was US\$ 832 bn. Including estimated gaps in reporting the total amount was estimated to be US\$ 880 bn. See BIS (1993), pp. 5 and 17.

⁵³ This table is taken from Brown (1983), p. 67.

Table 5 Combining Swap-, Spot- and Forward Transactions

Deal in t_0	Delivery in t_1	in t_2
Swap 1 (\$ -> DM)	long DM - short \$	short DM - long \$
Swap 2 (DM -> \$)	short DM - long \$	long DM - short \$
Spot1 (\$-purchase)	short DM - long \$	
Spot 2 (\$-sale)	long DM - short \$	
Forward 1 (\$-sale)		long DM - short \$
Forward 2 (\$-purch.)		short DM - long \$

both countries are not affected.⁵⁴ If a bank sells forward dollars to a customer and tries to neutralize this transaction by buying dollars spot and swapping them into DM, it creates an additional demand for dollar/DM swaps - in other words it supplies what could be labelled "temporary dollar balances" and demands "temporary DM balances". To find somebody who is willing to swap DM into dollar, the bank has to bid up the swap rate (the difference between the spot rate [DM/\$] and the forward rate). Given the size and the liquidity of the swap market a tiny increase will be sufficient to induce market participants to swap their DM balances into dollars and invest those dollars in the dollar credit market. So, a chain of transactions which started with a customer selling forward DM to a bank finally leads to a short-term capital flow from Germany to the US.

Whether the banks cover forward commitments in the credit markets or in the swap market, in both cases a customer order induces a spot transaction and a short-term capital flow.⁵⁵ Therefore, the informative content of short-term capital flows about the amount of hedging of long-term investors and foreign traders is not reduced when these two groups cover their positions in the forward market. In addition, the same applies to speculators who use the forward market for fx speculation. Their transactions will also cause short-term capital flows of banks.

⁵⁴ The following also applies if a customer directly hedges in the swap and spot market.

⁵⁵ This is not all that surprising. If there were no swaps and forwards, the customer would have to borrow DM and convert these into dollars in order to hedge the exchange risk of the future DM payment he is expecting to receive. The various transactions described duplicate this transaction - however cheaper.

3.1.2.3. Hedging in the futures market

Futures have much in common with forwards. But given the liquidity of the futures market and the small transactions costs, this market is better suited for speculation than the forward market.⁵⁶ On the other hand, it has certain disadvantages, which makes it less convenient for hedgers, notably the limited number of expiry dates for futures contracts and the fixed size of the contracts. Therefore, the market share of hedgers in this market can be expected to be smaller. Insofar as the futures market is used for hedging purposes, the effects are not much different from the case in which a forward contract was used. The counterparty to the forward deal may hedge its position in the forward market or in the swap and spot market. This would trigger further transactions, as has been explained above, and ultimately result in a short-term capital flow.

3.1.2.4. Hedging in the option market

The connection between derivative and the underlying cash market is not as close for options as for forwards. Open options positions are also routinely covered, but not 100 percent, since it is not known whether the option will be exercised or not (BIS (1986)). Therefore, only a proportion which is given by the "delta" of an option will be hedged. For an option "close at the money" this is about 50 percent. The covering of an open option position can be brought about by spot purchases and sales, the net amount at the end of the day being swapped (thus creating a forward position) or by forward/futures transactions. In both cases, there will be repercussions in the credit markets in both countries, just as described above for forward and swap transactions. Therefore, the use of options for hedging purposes will also become visible in the short-term capital account, but not to the same extent as hedging operations via the forward market.

3.1.2.5. Derivatives markets and money markets

On a micro level, transactions with derivatives may be considered as a substitute for money market transactions. On a macro level, they have to be interpreted as a means to gain cheaper (indirect) access to the money markets. As Niehans has pointed out with respect to forward transactions: "By and large, forward markets are important

⁵⁶ See Flight/Lee-Swan (1988), p. 94. For detailed descriptions of the futures market see Grabbe (1991) and Giddy (1994).

for the banker and businessman, whose job it is to shave a few pennies from the costs of every transaction, thereby increasing the efficiency of the economy." (Niehans (1984), p. 154). Fund managers prefer to use derivatives in order to change the risk profile of their portfolios because this is cheaper than the use of the cash markets (Davis (1991), pp. 36 and 44, Levich (1988), p. 23, J.P.Morgan (1991), p. 8). This reduction in costs allows a fine tuning of asset/liability management (Dufey/Giddy (1994), p. 226). As the EMS crisis shows, derivatives may also reduce the costs of carrying out speculation. However, keeping the statement by Niehans in mind, the cost reduction is probably trivial for a small number of trades. Consequently, it should hardly matter for a speculator with firm expectations who wants to build up a speculative position. The effect of the spread of derivatives on the volume of speculative transactions should, therefore, not be overestimated (Stambaugh (1994)).

Furthermore, a look at turnover in derivatives markets suggests that interest rate risk is much more important for most market participants than exchange rate risk. The amount of interest rate swaps, futures and options is a multiple of currency swaps, options and futures (see Table 6).

Table 6 Derivatives Contracts

Instrument	1987	1988	1989	1990	1991	1992	1993
Over the counter swaps							
Interest	628,9	1010,2	1502,6	2311,5	3065,1	3850,8	6177,3
Currency	183,7	319,6	449,1	577,5	807,2	860,4	899,6
Exchange traded futures and options							
Interest	610,3	1174,6	1588,5	2053,6	3229,7	4287,6	7322,8
Currency	73,6	59,6	65,7	72,4	79,0	104,6	110,9

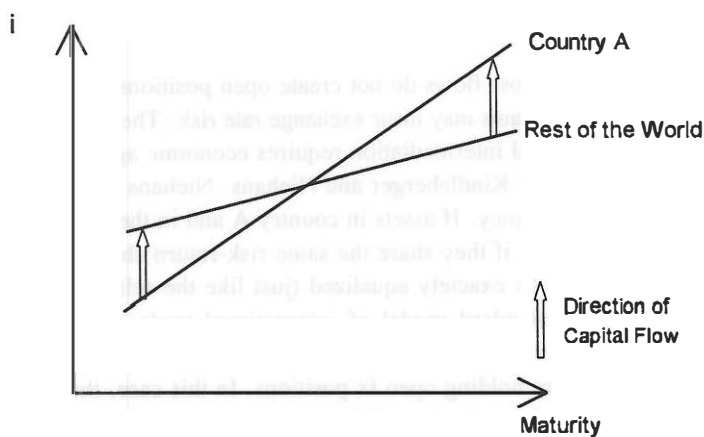
Notional principal outstanding at end-year, in billions of US dollars
Source: BIS, International Banking, p. 24 (November 1994).

3.2. International financial intermediation: gross flows without net flows

Economic agents do not necessarily have to take on exchange rate risk in order to carry out international financial transactions. If foreign currency investments are fully hedged there is no exchange rate risk for them. Therefore, foreign currency

transactions do not necessarily require a particular view on exchange rates.⁵⁷ Intermediation, interest rate arbitrage and interest rate speculation seem to be the common themes in a wide variety of international transactions. As will be shown, such activities, when undertaken in an international context, influence the shape of the balance of payments, particularly the structure of the capital account. This is, for instance, the case when economic agents borrow short and lend long in foreign currency. Such a transaction consists of two flows in opposite directions so that no net flow of funds takes place.

Figure 4 International Intermediation



The factors which can account for international differences in the (autarky) slopes of yield curves are risk aversion (liquidity preference) and the efficiency of intermediation (Kindleberger (1976), Niehans (1986)). Risk aversion determines the composition of asset supplies as well as the structure of asset demand. Thus, Kindleberger argues that the comparatively low volume of German long-term outflows in the 1970s was partly due to an unusual high liquidity preference of German investors. The efficiency of intermediation determines by how much the risk premium on long-term (illiquid) assets is reduced. This factor may be even more important than risk aversion in explaining the pattern of two-way flows (Niehans (1986), p. 162) and

⁵⁷ In an indirect way exchange rates may be important because expected exchange rate changes affect interest rates.

it has been used, i. a., to explain the structure of Japan's capital account (Tavlas/Ozeki (1992)). In addition, monetary policy can be an important factor. Kindleberger (1976) and Engels (1979) have argued that the Bundesbank's policy of buying only short-term assets has contributed to a rather steep yield curve in Germany which led to short-term outflows and long-term inflows in the 1970s.⁵⁸

Figure 4 illustrates a situation where average returns are the same in different countries but where the (autarky) slope of the yield curve differs.⁵⁹ In such a situation, there will be two-way flows of capital between different countries but no net flows. Residents of country A export short-term capital to the rest of the world and import long-term capital. They can be said to receive intermediation services from the rest of the world. This affects the slope of the yield curve in country A which becomes flatter once capital mobility is allowed for. If country A is small, the yield curve in the rest of the world will not be affected - otherwise it will become steeper.

If net flows are zero, gross flows do not create open positions in the aggregate. Still, individual market participants may incur exchange rate risk. The question whether and to what extent international intermediation requires economic agents to hold open fx positions is not analysed by Kindleberger and Niehans. Niehans assumes that both countries share the same currency. If assets in country A and in the rest of the world are perfect substitutes, that is, if they share the same risk-return characteristics, then the two yield curves would be exactly equalized (just like the relative price of two goods is equalized in the standard model of international trade; Niehans (1986)). Kindleberger does not address the problem explicitly. He seems to assume, however, that investors and debtors are holding open fx positions. In this case, the equalization of interest rates could still be brought about if investors and debtors were risk-neutral. Short-term capital would flow from country A to the rest of the world and long-term capital in the opposite direction until the slopes were equal.⁶⁰

However, even if economic agents were not prepared to shoulder any exchange rate risk the equation of interest rates would still be possible. If transactions costs were zero in forward markets and if there were perfect arbitrage over the whole time

⁵⁸ "Kindleberger-Salant-Effect" as it has been dubbed by Engels (1979), p.97.

⁵⁹ This figure is a modified version of the one Kindleberger uses to analyse Germany's capital flows in the 1970s. See Kindleberger (1976), p. 141. See also Niehans (1986) who shows that the exchange of capital can be analysed in nearly exactly the same way as the exchange of goods.

⁶⁰ If these flows were, for instance, denominated in foreign currencies, country A residents would hold net short-term fx assets and net long-term fx liabilities. While the aggregate foreign currency position would be zero, individual agents would still be exposed to currency risk.

spectrum of forward transactions, hedging would be costless for short as well as for long maturities.⁶¹ As long as net flows are zero, the demand for forward foreign exchange of long-term borrowers would be exactly matched by the supply of forward foreign exchange by short-term lenders. In this case, there would be long-term and short-term flows in opposite directions - both fully covered in the forward market.

In the cases discussed so far, international intermediation is the indirect effect of the transactions of market participants at both ends of the maturity spectrum. But intermediation can, of course, also be brought about directly by market participants who are prepared to borrow short and lend long. If "borrowing short and lending long" can still be considered the characteristic business of a bank, the equalization of interest rates can also be brought about by international banking. Borrowing short and lending long in a foreign currency does not presuppose open foreign exchange positions. The internationalisation of banking has therefore contributed to the increase in gross flows and a reduction in interest rate differentials. Furthermore, financing long-term foreign assets with short-term foreign loans has not been confined to banks. Many institutional investors have pursued the same strategy (Turner (1991), p. 72).⁶² Equalization of interest rates requires, however, that banks and institutional investors be prepared to commit sufficiently large amounts of capital to intermediation in foreign countries.

A special form of "intermediation" is interest rate speculation. Rather than speculating on exchange rate changes, many investors prefer to speculate on interest rate changes. For instance, a major portion of the large long-term inflows (and short-term outflows) into Spain or Germany after the EMS crisis have been due to interest rate speculation. Technically, this is not much different from intermediation in the narrow sense. It also consists of borrowing short and lending long (or the other way round).⁶³ The expected return depends mostly on expected price changes of long-term assets and not so much on the interest rate differential between short-term and long-term instruments. An interest rate speculator may even borrow short-term and lend long-term when short-term rates are higher than long-term rates ("negative carry").

⁶¹ Perfect arbitrage in the forward market requires the absence of basis risk or risk neutrality of the forward market arbitrageurs. Evidently, this is not the case in practice. However, forward rate arbitrageurs will be prepared to take over some of the basis risk from hedgers (see paragraphs below).

⁶² This does not apply to all institutional investors. Some of them try to avoid interest rate risk as much as possible. As Davis (1988), pp. 83-84 found out, duration matching was an important goal of many US institutional investors.

⁶³ A technique widely used recently is to finance the purchase of a bond with a repo. This is basically equal to the purchase of a bond which is financed by a short-term credit. Such a transaction constitutes a long position in bonds. A short position can be constructed if the party in a repo transaction which "borrows" the bond sells it to a third party.

Speculation on interest rate *differentials* is another form of maturity transformation. It takes place in the forward foreign exchange market. Unfortunately, it is hard to document statistically. "Speculation on interest rate differentials via the forward foreign exchange market is a little understood but far more important activity than is generally realized." (Burnham (1991), p. 130).⁶⁴ This kind of speculation, which is also known as "forward rate arbitrage" ("Terminkursarbitrage") has much in common with "carrying-charge" or "arbitrage hedging" on commodities exchanges (Goss/Yamey (1978), p. 20). Apparently, it has been introduced to the foreign exchange market by traders from commodity houses (Andrews (1984), p. 40, fn. 5). Forward rate arbitrage is based on the comparison of forward or swap rates for different maturities (say one month, two months....). Under the assumption that interest rate differentials between different currencies are fairly stable, market participants will try to exploit jumps in the rate structure.⁶⁵ If, for instance, the discount on the two months' dollar is far higher than twice the discount on the one month dollar, then it may pay to sell one month dollars and buy two months dollars. Unless the one month discount increases strongly, this transaction will yield a profit. The whole transaction is brought about with swaps and hardly any capital is employed.⁶⁶

Forward rate arbitrage directly affects the foreign exchange swap market. However, indirectly, the capital balance will be influenced. When there is a simultaneous purchase and sale of swaps with different maturities, short-term capital flows in both directions will be induced. In the example above, one month capital will flow from the U.S. to Germany and two months capital from Germany to the U.S.. Thus forward rate arbitrage influences the structure of interest rates in both countries and increases gross capital flows. Furthermore, the presence of arbitrageurs/speculators in the forward market which are prepared to take on basis risk is the precondition for two-way flows which even out those international differences in the structure of interest rates which are due to preferences and the efficiency of intermediation.

Gross flows without net flows are also recorded in the balance of payments statistics when foreigners shift between long-term and short-term assets. For instance, a sale of a bond by a foreigner who holds the proceeds in an account of a local bank would be recorded in the balance of payments statistics as a long-term capital export

⁶⁴ These activities are reported in various descriptions of the foreign exchange market. See for instance Fischer-Erlach (1991), pp. 76-78 and Brown (1983), pp. 26-27.

⁶⁵ When asked about their approach to foreign exchange trading 43 percent of the banks and securities houses questioned ranked "take mismatch gaps based on expected interest rate movements" first. Group of Thirty (1985), p. 20.

⁶⁶ For details see Fischer-Erlach (1991), pp. 76-78.

and a short-term capital import (Ito (1994), p. 38). While such activities hardly qualify as intermediation, they also affect the yield curve and account for long-term and short-term capital flows in opposite directions.

So far, the only derivatives market which has been included in the discussion of gross flows is the forward market for foreign exchange. Of course, some of the transactions described above could also be brought about using other derivatives. For instance, interest rate speculation can also take place in the futures market. However, as the discussion in the chapter about hedging has shown, derivatives markets are closely connected with cash markets and any net demand in derivatives markets will translate into a net demand in cash markets. Therefore, foreign engagements in the futures markets are likely to have the same effects on capital flows as the corresponding engagement in cash markets.

In many cases, international intermediation does not involve any cross-border transactions. The apparent international activity which is reported in the statistics is not affecting the foreign exchange markets. Exchange rates are neither directly influenced nor are exchange rate changes the cause of these transactions. Concern about the large exchange rate fluctuations sometimes obscures the fact that, for many players in international financial markets, interest rates seem to be much more important than exchange rates. "... given that most businesses and financial institutions in the large, less open economies are inherently more exposed to interest rate risk than exchange rate risk, ..., it should not be surprising that for most currencies the interest rate swap market has grown substantially larger than the currency swap market." (J.P.Morgan (1991), 6).

As far as hedging of fx assets and liabilities is concerned (as opposed to hedging in international trade) it is hard to draw the line between international intermediation and hedging. If a Japanese pension funds buys US government bonds and hedges 50 percent of the exchange rate risk it can also be said to be engaged in international maturity transformation. This is directly evident when the hedge is a money market hedge. In this case, 50 percent of the bond purchase is simply financed with a short-term credit. Indirectly, a forward sale of dollars would equally increase the demand for short-term dollar credits because the counterparty in the forward transaction would export short-term capital from the U.S. to Japan in order to cover its open forward position. However, the determinants of intermediation and (partly) hedged foreign investment are different. Intermediation is a function of the difference between long-term and short-term interest rates in foreign countries. Foreign investment which is partly or totally hedged depends on expected differences in foreign and local yields. And whereas foreign investment involves net flows of capital, international

intermediation only affects gross flows. Whatever the precise definitions, both kinds of activities can help to explain the observed negative correlation between short-term and long-term capital movements.

In an empirical analysis, Golup (1990) found that gross financial flows between countries were still small compared to financial flows within countries. But he could also show that their relative size had been rising between 1970 and 1986. This rise gathered speed in the early 1990s. International financial intermediation - including interest rate speculation - has been vastly increasing in the 1990s, as witnessed by the spectacular rise in two-way flows in many countries. These large two-way flows usually involved long-term and short-term capital flows in opposite directions.

3.3. Hedging and Intermediation: some empirical evidence

Given that hedging does not produce a clear pattern of long-term and short-term capital movements, it is hard to account empirically for the influence of hedging on the structure of capital flows. Yet, if it is assumed that the hedging behaviour of market participants is, at least for certain periods, fairly stable, a negative correlation could be expected between:

- short-term and long-term capital flows and
- accumulated short-term and long-term capital flows (or stocks).

Such a pattern is even more likely to emerge when international intermediation is quantitatively significant. The proposed link between long-term and short-term capital movements can be easily tested.

To test the relationship between long-term and short-term capital movements a simple regression has been employed:

$$S-T = a_0 + a_1L-T + \epsilon$$

where S-T are private-sector short-term capital flows and L-T are private-sector long-term flows.

As Table 7 shows, all the coefficients have the right sign, showing a negative correlation between long-term and short-term capital movements. As indicated by the t-values this relationship is quite robust. All coefficients are significant at the five percent level - except in the case of the United States for the period from 1970 to 1994. Thus, for all countries there seems to be a robust negative correlation between long-term and short-term capital movements. Only in the United States, for the period as a

whole, is there hardly any correlation between long-term and short-term capital movements, and for the period from 1983-1994 there is only a small negative correlation. This result may reflect the role of the US dollar as a "world currency", which has been diminishing somewhat since the seventies. The results also show that the correlation has become closer for the sub-period from 1983 to 1994. This is likely to be the result of the growing volume of international intermediation and interest rate speculation.

Table 7 The Correlation Between Private Short-term Long-term Capital Flows⁶⁷

	1970-1994	1983-1994
	X-Coeff.	X-Coeff.
Australia	-0,295	-0,497
Canada	-0,539	-0,691
France [*]	-0,785	-0,798
Germany ^{**}	-0,567	-0,573
Italy	-0,439	-0,444
Japan	-0,731	-0,985
Netherl.	-0,849	-0,902
Spain ^{***}	-0,554	-0,568
U.K.	-1,008	-1,016
U.S.	-0,129	-0,392

Quarterly data

Source: IMF (b)

^{*} First three columns: 1973-1994.

^{**} First three columns: 1971-1994.

^{***} First three columns: 1975-1994.

All coefficients (except U.S. 1970-1994) are significant at the 5 percent level.

If net flows accumulate over time, increasing the value of net foreign assets and liabilities, there should also be movements in opposite directions of accumulated long-term and short-term capital flows if both outflows and inflows are hedged to the same extent. To test this proposition, the relationship between private short-term and long-term non-equity flows has been analysed for ten countries (see appendix). Looking at the 1994 net stocks of foreign assets and liabilities (approximated by accumulated flows), these countries can be divided into creditor and debtor countries. The capital

⁶⁷ Excluding official capital movements.

side of the three creditor countries shows different patterns. Only for Japan do accumulated short-term and long-term capital movements have an opposite sign. Until 1989, Japan accumulated current account surpluses and net short-term liabilities and experienced long-term capital outflows. However, since 1990 the net short-term debt has been reduced and in 1994 Japan became a short-term creditor, while net long-term capital exports were still growing (see case study Japan). The Netherlands, with an accumulated current account surplus of around US\$ 90 bn., experienced steady outflows of direct investment and official capital and, since the early 1990s, of portfolio equity capital. Accumulated short-term capital flows remained close to zero, however. Until 1990 the counterpart to German capital account surpluses were outflows of official and private long-term and short-term capital. So, in this case, short-term and long-term capital movements went in the same direction. However, the declining net foreign credit position after German Unification has been accompanied by huge inflows into German bonds and outflows of short-term and portfolio equity capital. Thus, at least since the early 1990s, accumulated short-term and long-term flows were partly offsetting each other.

Similarly, differences can be observed for the debtor countries. Until 1992 Spanish inflows of equity capital more than matched the current account deficits. Canadian deficits were mostly financed by bonds sales, Australian and Italian deficits by other long-term capital flows. However, only in the case of Canada, were these accumulating long-term inflows partly matched by short-term outflows. The situation in the U.K. differs somewhat from the other debtor countries because the U.K. experienced a current account deficit and net long-term capital outflows which were matched by huge short-term capital inflows. So, while accumulated long-term and short-term capital movements went, indeed, in opposite directions, accumulated short-term capital movements were even larger than accumulated long-term movements. Still, together with Canada, the U.K. provides a second example for accumulated capital flows in different directions.

On the whole, stock figures provide only limited evidence of hedging and intermediation. However, the negative relationship between accumulated long-term and short-term capital flows seems to have become stronger in the early 1990s. Better results are obtained in the flow analysis. There is, indeed, a negative correlation between short-term and long-term capital flows. The correlation coefficient provides information as to the degree to which long-term and short-term capital flows are offsetting each other. This shows that it is not possible to interpret both flows independently of each other. The theoretical arguments presented above suggest that this negative correlation is due (partially) to hedging of long-term capital flows and intermediation. Unfortunately, this does not imply that the remaining capital flows are due to

speculation. As has been shown, variable hedging of stocks can cause short-term capital movements which are not related to long-term flows.

3.4. Estimating speculation: What has been learned, so far?

The starting point of the analysis has been the definition of fx speculation as a transaction, the return on which depends significantly on expected exchange rate changes. As has been shown, such speculative transactions are likely to be carried out with fx derivatives or short-term instruments whose interest or price risk is low. This points to short-term capital movements as a possible indicator of fx speculation because transactions in fx derivatives also affect the balance on short-term capital. However, net short-term capital movements do not necessarily reflect speculative behaviour. They can also be due to other types of transactions:

a. International intermediation

In this case there are offsetting long-term and short-term capital movements in the opposite direction. Therefore, no open positions are created and no exchange rate risk is involved. Because international intermediation tightly links short-term and long-term capital flows it is fairly easy to spot when undertaken on a larger scale.

b. Hedging of long-term capital flows

In principle, hedging of long-term flows should also produce a pattern of long-term and short-term capital movements flowing in opposite directions. Unlike in the case of international intermediation these flows do not have to be equal in size. If hedging is not complete, long-term flows should be larger. Furthermore, once it is taken into account that hedge ratios may be different for locals and foreigners and that they may change over time, it becomes clear that hedging may be difficult to detect.

c. Hedging of stocks

If investors change the hedge ratio of stocks, they may trigger net short-term capital flows which are larger than long-term capital flows and which are difficult to separate from speculation.

Given that hedging can produce almost any pattern of short-term capital flows, it seems questionable whether an analysis of short-term capital flows can provide information about speculation. However, if the short-term capital account is further disaggregated and if it is taken into account that certain transactions will nearly always be hedged and others not at all, it becomes possible to discriminate to a certain extent between hedging and speculation.

The balance on current account can be used as a starting point because it shows to what extent private and public investors (incl. central bank) were prepared to hold open fx positions. In order to measure the fx transactions of private investors, it has to be analysed in a second step how much of current account balances are financed by official capital flows and reserves. Third, transactions such as foreign direct investment (and portfolio equity investment) which are not exposed to a large degree to exchange rate risk and which are usually not (or little) hedged can also be subtracted. Fourth, short-term capital movements of banks can usually be interpreted as fully hedged.⁶⁸ Therefore, net short-term banking flows have to be traced back to long-term flows of banks, hedging activities or speculation of other market participants.⁶⁹ If short-term capital flows of banks and long-term flows (especially bonds and credits) of non-banks flow in opposite directions, this can be taken as an indicator of hedging. To the extent that short-term capital movements of banks cannot be explained in this way, it has to be considered whether it is plausible that the hedging of stocks has changed. Events such as the EMS crisis or the trade conflict between the U.S. and Japan which involved the attempt by the U.S. administration to "talk down the dollar" make it possible to infer which positions were increasingly hedged. In addition, exchange rate developments can also be taken into account. If it is not possible to "explain" short-term movements of banks in this way they may, indeed, reflect speculative activities of other market participants.

4. Case Studies

For the case studies two countries belonging to different exchange rate systems have been selected. Spain, which belongs to a system of fixed exchange rates, has been forced to devalue during the EMS crisis. It will be analysed whether this was, indeed, due to speculative attacks. The Japanese Yen floats vis-à-vis the other major currencies. Furthermore, Japan has been by far the world's largest capital exporter during the last 10-15 years. Since speculation has something to do with open position taking, Japan seems to warrant a closer look.

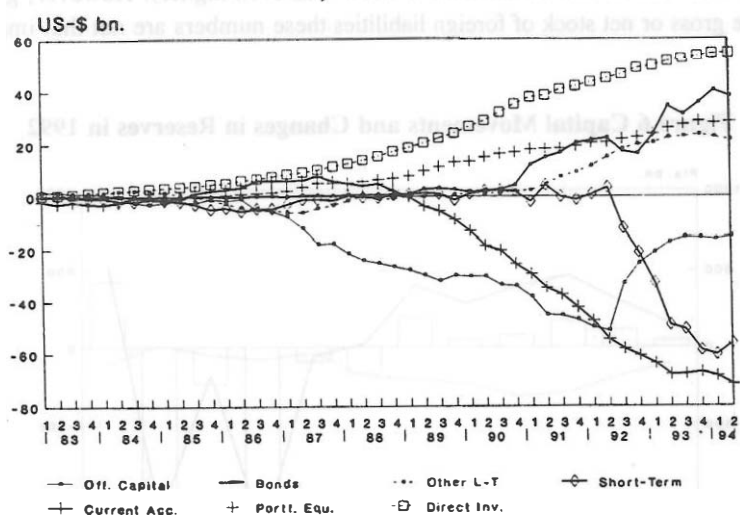
⁶⁸ Even during the EMS crisis, banks have not been among the active speculators. See Garber/Taylor (1995), p. 175.

⁶⁹ At this point, it is important to include local foreign currency positions in the analysis, because local investors may finance part of their foreign currency investments with fx credits from local banks.

4.1. Spain during the EMS crisis and after

A look at the accumulated figures of Spain's balance of payments shows that until 1992 the current account deficit was financed by long-term capital imports - mostly direct investments.⁷⁰ Since net capital imports in the second half of the 1980s were much higher than the current account deficits, the central bank had to buy relatively large amounts of foreign exchange and the foreign reserves rose considerably.⁷¹ The increase of foreign liabilities between 1983 and 1990 consisted largely of direct and portfolio equity investments. These investments are not exposed as much to exchange rate risk as assets whose value is fixed in nominal peseta terms. However, from late 1990 to early 1992 net bond purchases and long-term credits increased considerably. Within six quarters foreigners purchased about US\$ 20 bn.

Figure 5 Accumulated Capital Flows



Source: IMF

⁷⁰ According to stock figures calculated by the Banco de España net liabilities of Spanish residents (excl. the Banco de España) rose by Pta. 11200 bn. (from Pta. 4477 bn. in 1983 to Pta. 15497 bn. in 1991 - end of period figures). Net fx liabilities rose by 1382 bn., net equity liabilities by 6219 bn. and net Pta. liabilities by Pta. 3418 bn. In the same period reserves increased by Pta. 5485 bn. which is about equal to half of the increase of net foreign liabilities of Spanish residents. Source: Banco de España (1994b); own calculations.

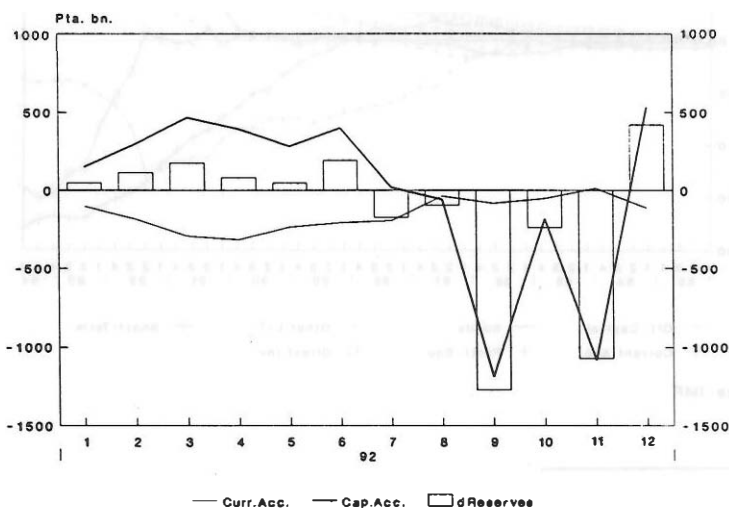
⁷¹ A detailed analysis of Spain's balance of payments in this period can be found in Ortega/Salavarría/Viñals (1990) and Dluhosch/Krüger (1991).

worth of Spanish bonds (net) and supplied (net) long-term credits of around US\$ 15 bn. These capital inflows seem to have been mostly unhedged, since the short-term capital account did not display any offsetting outflows.⁷² Thus, exposure to exchange rate risk increased considerably during the two years before the outbreak of the EMS crisis.

4.1.1. Spain during the EMS crisis

Looking at the capital flows and the changes in official reserves, the effects of the EMS crisis appear to be quite impressive. After steady increases in the first half of 1992 and relatively small losses in July and August, international reserves declined by nearly Pta. 2.6 trll. in September (balance of payments data) which equals about one third of the stock in August. This decline was due to a sharp turn in the capital balance. From September to November there was a net capital outflow of Pta. 2.1 trll. (if "errors and omissions" are included the outflow was even higher). However, given the size of the gross or net stock of foreign liabilities these numbers are not that impressive at all.

Figure 6 Capital Movements and Changes in Reserves in 1992



Source: Banco de España

⁷² Insofar as investors outside of the EU purchased these bonds they may have hedged the currency risk by selling DM forward. This strategy was based on the assumption, that there would be no revaluations before the transition to European Monetary Union. These transactions have been labelled "convergence play" (Goldstein et al. (1993), p. 8-10).

Table 8 Foreign Currency Positions⁷³

Pta. bn.

Stock s*	Gross Position			Net Position			Flows		
	For. Fx L	Loc. Fx L	Pta. L**	For. Fx L	Equ.	Pta. L**	Cap. Bal.	Er. Om.	Res.
12/91	-9955	-2914	-4567	-5188	-7783	-3711			
8/92	-12134		-4828	-7000	-8429	-3303			
9/92	-13042		-4564	-6893	-8410	-2793			
10/92	-13972		-4113	-7570	-8296	-2479			
11/92	-14319		-4045	-7111	-8359	-2066			
12/92	-14593	-4002	-4275	-7292	-8621	-2083			
Stock changes									
1992	-4638	-1088	292	-2104	-838	1628	-633	608	-1778
Sept.	-908		265	106	+19	510	1035	158	-1270
Oct.	-931		451	-677	+114	314	111	223	-236
Nov.	-346		68	458	-63	413	974	116	-1069
Dec.	-274		-230	-180	-262	-17	-594	-418	418
9-12	-2459		553	-292	-192	1220	1526	389	-2157
9-11	-2185		783	-111	70	1237	2119	329	-2575

* end of period

** excluding equity

For.Fx L = Foreign Currency Liabilities of Spanish Residents

Loc.Fx L = Local Foreign Currency Liabilities

Pta. L = Foreign Pta.-denominated liabilities of Spanish residents

Equ. = Investment in equity (incl. portfolio equity)

Source: Banco de España: (1994b) for "Loc.Fx L" and Boletín Estadístico for other items; own calculations.⁷⁴

⁷³ The last item gives the changes in official reserves. The other items are excluding reserves and changes in reserves. All liabilities are minus (assets plus). Increases in liabilities (including flow figures) are minus (increases in assets plus).

⁷⁴ The Banco de España provides monthly information on foreign assets and liabilities up to December 1992 in the Boletín Estadístico. These figures do not exactly match the annual figures provided in the Cuentas Financieras (Banco de España (1994b)).

At the end of 1991 gross foreign fx liabilities⁷⁵ of Spanish residents amounted to Pta. 10 trll. and gross local fx liabilities to Pta. 3 trll. (see Table 8). Thus, total gross fx liabilities amounted to about Pta. 13 trll. This figure rose until the end of August 1992 to about Pta.15 trll. (using the end 1991 figures to approximate the amount of local fx liabilities). These Pta. 15 trll. can be interpreted as the upper bound of hedging requirements of Spanish residents at the outbreak of the EMS crisis. However, gross figures may exaggerate the hedging requirement somewhat, since fx assets may be used to offset fx liabilities. Looking at net figures, the local fx position is, of course, zero. Net foreign fx liabilities, on the other hand, amounted to Pta. 5 trll. at the end of 1991 and rose by approximately Pta. 2 trll. to Pta. 7 trll. By the end of August.⁷⁶ The net figures can be seen as the lower bound of the hedging requirements of Spanish residents. But since fx assets and liabilities are not spread evenly over residents, the effective fx exposure which had to be hedged was probably much higher.

Gross Pta. assets of foreigners stood at Pta. 4.6 trll. at the end of 1991 and rose to Pta. 4.8 trll. by August 1992. The net assets amounted to Pta. 3.7 trll. in December 1991 and Pta. 3.3 trll. in August 1992.

If the gross fx liabilities of Spanish residents plus the gross Pta. assets of foreigners can be interpreted as the possible maximum of exchange rate exposure and the corresponding amount of net fx and Pta. positions as the minimum of exchange rate exposure, the possible hedging requirement lay between Pta. 10 and 20 trll. or between US\$ 90 and 180 bn. In order to avoid exchange rate losses the holders of these positions either could have reduced their positions by selling Pta. assets⁷⁷ and repaying their fx debts or they could have hedged. The first possibility would have become visible in a reduction of fx liabilities of Spanish residents and Pta. assets of foreigners. The second possibility, hedging, would mainly have become visible in banks' short-term capital movements because for most market participants it is cheaper to hedge with derivatives than to perform a money market hedge (compare paragraph 3.1.2.). If other market participants are shortening the Peseta in the derivatives markets they will induce

⁷⁵ In the following, a few technical terms will be used which are taken from the BIS: "foreign fx liabilities" ("assets") are liabilities (assets) against foreigners, "foreign fx liabilities" ("assets") are liabilities (assets) against foreigners in foreign currency, "foreign Pta. liabilities" ("assets") are liabilities (assets) against foreigners in Pta., "local fx liabilities" ("assets") are liabilities (assets) against residents in foreign currency.

⁷⁶ After a further liberalisation of short-term capital transactions in February 1992, fx borrowing by Spanish residents increased considerably, reaching Pta. 1,891 bn. in the first 7 months of 1992. See Banco de España (1993a), pp. 30-31.

⁷⁷ This would have driven up interest rates and depressed asset prices. For holders of assets with variable prices, especially fixed interest assets, the expected exchange rate losses would have translated into asset price losses.

short-term capital exports from Spanish banks. A look at Spain's balance of payments clearly shows extreme changes in the capital balance in the summer of 1992. After six months of net inflows the capital balance was close to zero in July and there was a small outflow in August. Afterwards, high deficits appeared. These deficits were mainly due to short-term capital exports of banks and, to a minor extent, to the sale of bonds by foreigners. In the period from September to November 1992 when the net capital outflow amounted to Pta. 2119 bn. banks exported Pta. 1541 bn. of short-term capital (net) and there was a net outflow in bonds of Pta. 369 bn. (mostly sales of Spanish bonds by foreigners). The huge amount of capital exports forced the Banco de España to intervene heavily in foreign exchange markets. According to the balance of payments statistics, the Banco de España sold Pta. 1270 bn. worth of foreign exchange in September, Pta. 236 bn. in October and 1069 bn. in November. For the three months as a whole reserve losses amounted to Pta. 2575 bn.

As impressive as these flows are, they are clearly much too small to cover the open fx positions of Pta. 10 to 20 trll. which existed in August 1992. If these figures were true, open positions of Pta. 10 trll. or more would have been closed only to a small degree (1.3 trll. in September and another 1.3 trll. in the next two months). Given that some of the transactions were speculative, the remaining open positions would have been even larger. However, this may be due to the fact that the recorded monthly figures understate the amount of capital exports which took place during the days before the depreciations of the Pta. on September 17 and November 22. It is quite likely that many speculators and hedgers unwound their short Pta. positions right after the two devaluations, thus partly reversing the capital outflows that took place before the devaluations. Therefore, the end-of-the-month September and November figures are probably understating the maximum amount of reserve losses (and the corresponding capital flows) by a wide margin. The true amount of reserve losses can only be guessed because the intra-month figures are not published.

The monthly balance of payments figures are providing - at best - a minimum estimate of the true amount of intervention right before the two devaluations in September and November. The stock of operational reserves (total reserves minus gold and SDR's) of the Banco de España can be used as a plausible maximum estimate. Given the size of fx reserves and the rather short periods of speculative attacks before the two devaluations it is fairly safe to assume that operational reserves were above zero throughout the EMS crisis. At the end of August, operational reserves stood at around Pta. 6.6 trll. and at the end of October at approximately Pta. 5.3 trll. These figures can be interpreted as the upper bound of interventions. Thus, the foreign exchange intervention of the Banco de España lay between Pta. 2.6 and 6.6 trll. in September and between Pta. 2.1 and 5.3 trll. in November. However,

there were open fx positions between Pta. 10 and 20 trll. in September and between Pta. 9 and 20 trll. in November which were exposed to the risk of a Pta. depreciation. So, even if the minimum hedging requirement and the maximum estimation of intervention were in fact the correct estimates, interventions would not have been enough to cover all exposed positions. This indicates that there must have been high foreign exchange losses for foreigners who were long in Pesetas and Spanish residents who were short in fx. It can further be concluded that a run on a central bank does not require speculators à la Soros. It suffices that there has been a gradual build up of open fx positions. As the numbers above show, the pressure on the Banco de España would have been much larger if 50 percent or an even higher proportion of investors had tried to close their positions. In this case, the excess supply of Pesetas (excess demand for fx) might well have gone as high as Pta. 10 trll. or more.

In a way, these large figures are the result of the success of the EMS in the late 1980s and early 1990s up to the Danish referendum. Market participants had put more and more faith into the stability of exchange rates during this period.⁷⁸ No matter whether investors (debtors) found the risk/reward relationship in high (low) yielding currencies more and more favourable as the EMS seemed to be heading towards a single currency, whether they thought that central banks would allow a cheap exit in case of emergency or whether they were simply unaware of the exchange rate risk they were running (like - possibly - a large number of Italian mortgage holders⁷⁹), Spanish residents increased their fx borrowing and foreigners their Pta. lending. Consequently the stock of fx assets and liabilities rose to ever higher levels. These huge open positions, while giving evidence of the success of the EMS, at the same time proved to be its greatest weakness once doubts about the viability of the system spread. The amount of open positions which required hedging was probably much more than speculators could put up, especially when it is taken into account that not only the Peseta was attacked. Unfortunately, the estimates given above say little about the proportion of speculators and hedgers. Short-term outflows by banks can have been caused by both groups. Still, given the size of existing open positions in August 1992, one cannot help concluding that the role of speculation has been overdone. Of course, speculation may have been dominant during certain short periods. However, the general force of the attacks against the Peseta is likely to stem from hedging activities. Speculators were riding on top of a wave of non-speculative transactions which were meant to close open positions. The counter hypothesis that most of the pressure on exchange rates came from speculation implies that most investors with

⁷⁸ Even after the referendum up to early September many market participants seem to have believed in the stability of the EMS. For these investors the devaluation of the Italian lira was the turning point. See Hansell (1992), p. 33.

⁷⁹ See Bisbey (1995).

open Pta. positions passively accepted the reduction of their net wealth without trying to protect themselves. This is highly unlikely.

4.1.2. Factors influencing fx exposure

By 1992 Spanish residents had high fx liabilities and the rest of the world had huge amounts of Pta. assets. The size of these positions, however, was not solely due to market forces. The Banco de España and the Spanish public sector were also partly responsible for this. The increasing budget deficits⁸⁰ led to high interest rates; in addition, the expectation that Spain would succeed in achieving convergence led to expectations of falling interest rates which attracted a lot of foreign capital. Thus, net inflows were increased and the stock of Spanish bonds held by foreigners quickly grew. The corresponding capital inflows drove up the value of the Peseta and pushed it to the upper limit of the EMS band. This created a policy dilemma for the Banco de España. Whereas the exchange rate target required a more expansive monetary policy, the relatively high inflation rate required a more restrictive monetary policy. For a certain period, the Banco de España tried to achieve both goals. However, given the commitment to fixed exchange rates and given that EU rules required further liberalization of capital flows, the Banco de España's attempts to reduce the inflation rate with a policy of "monetary tightening cum capital controls" (Viñals (1990), p. 30) were jeopardized due to the lack of improvement in fiscal consolidation. Keeping Pta. interest rates high induced foreigners to invest in Spain and Spanish residents to borrow in other currencies.⁸¹ In both cases, the supply of foreign exchange increased and the Banco de España had to buy other currencies in order to prevent a further appreciation. Therefore, interest rate policy had only a limited effect on the inflation rate, given the difficulties encountered in preventing the money supply from rising. This policy resulted in changes in the structure of the Banco de España's balance sheet. The share of foreign assets rose from 26 percent in 1985 to 53 percent in 1991.

If the effect had only been a change in the structure of the Banco de España's balance sheet, this would not have been problematic. However, the counterposition to a rising net foreign currency position of the Banco de España were rising fx debts of

⁸⁰ Measured in percent of GDP, the public deficit grew from 2.8 to 4.1 percent between 1989 and 1991.

⁸¹ This does not mean that high central bank interest rates will under any condition lead to a capital inflow. If high interest rates go hand in hand with the expectation of high inflation rates or high depreciations, then capital may not be attracted at all or flow out - pushing interest rates even higher. However, from the moment the Peseta reached the upper limit of the band, inflows could only have been prevented by tight capital controls or lower central bank interest rates. In this sense, short-term interest rates were "high" and therefore influencing the amount of capital inflows.

residents and Pta. assets of foreigners. Spanish firms partly raised credits denominated in foreign currency, either directly in foreign markets or through local banks.⁸² So, while the Banco de España was amassing foreign reserves which by itself looked quite reassuring, market participants were shouldering a higher amount of exchange rate risk. Once the market's belief in the stability of the currency was shaken, market participants came running back to reverse the deal.⁸³

If monetary policy had held short-term interest rates lower, residents would have borrowed more from the Banco de España, fuelling monetary expansion. However, this would have been somewhat countered by a reduction of capital inflows and exchange rate interventions.⁸⁴ While more money would have been created by lending directly to residents, less money would have been created by buying foreign currency. With both capital inflows and central reserves (i.e. capital exports of the Banco de España) lower, the real net inflow (the current account deficit) could also have been the same. At the same time Spanish residents and foreigners alike would have been less exposed to exchange rate risk. This is not to say that it would have been easy for the Banco de España to pursue such a policy. The Maastricht treaty required inflation convergence and the markets expected the Banco de España to be tough on inflation. Any softening of monetary policy (lowering of interest rates) could have been interpreted as a violation of the Maastricht treaty and as a shift towards a more expansionary policy. So in a way the Banco de España was caught in the inconsistencies of the Maastricht treaty which presupposes that central banks can autonomously set monetary policy even when exchange rates are fixed. To make matters worse, fiscal policy increased these problems instead of helping to reduce them.

4.1.3. From net to gross flows

December 1992 marked the beginning of a development of rising gross flows and declining net flows. Even as the EMS crisis boiled on in the first half of 1993,

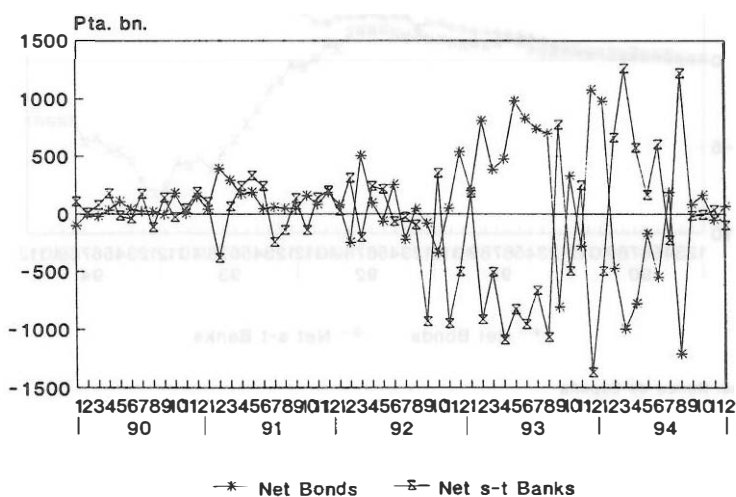
⁸² The banks did not assume fx risks to a large extent. They simply switched part of the intermediation into foreign currency, usually covering foreign currency loans with foreign currency borrowing.

⁸³ The problem for market participants was, of course, that they did not own those Pesetas anymore. These had found their way into economic circulation raising prices. So, in order to buy the foreign exchange back from the Banco de España they had to borrow additional Pta. funds from the Bank.

⁸⁴ If market participants had believed in the coming of a single currency and assessed exchange rate risk to be zero (which was not the case, see Ayuso, Pérez and Restoy (1994)), monetary policy would not have been able to influence the money supply.

foreigners increasingly engaged in interest rate speculation in Spain.⁸⁵ The currency crisis had propelled interest rates to high levels and foreign investors expected a sharp fall of interest rates in Spain after the end of the crisis. Therefore, they invested heavily in Spanish bonds. In contrast to the pre-crisis period this did not, however, lead to net capital inflows because investors were no longer prepared to hold an open Pta. position. Thus, nearly all the purchases of long-term instruments were financed by short-term Pta. credits. This led to a massive increase of capital flows as recorded in the balance of payments (see Figure 7 and 8). Net capital flows, on the other hand, became very small after the currency turmoil. On the one hand, this was due to the recession which reduced private capital demand. On the other hand, the reassessment of exchange rate risk may also have been a contributing factor. Namely, despite high interest rate

Figure 7 Bond Inflows and Short-term Capital Outflows



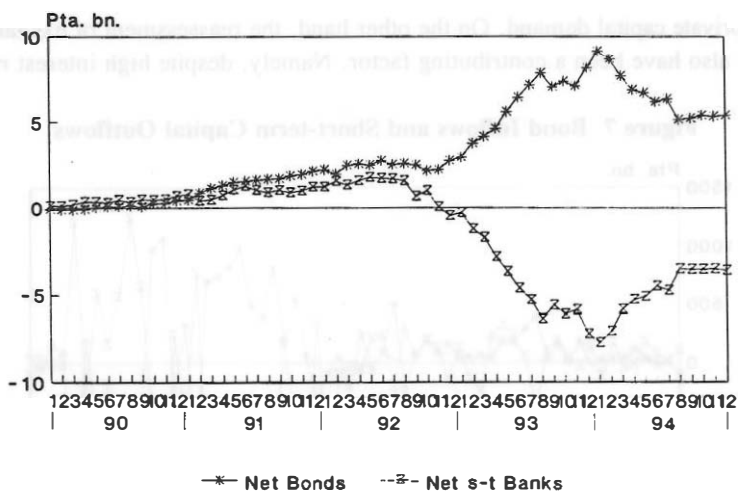
Source: Banco de España

differentials, foreign investors were not as ready as before the EMS crisis to hold open Pta. positions and the willingness of Spanish residents to borrow in foreign currencies also subsided. Foreigners bought larger amounts of Spanish bonds than before the crisis but they now fully hedged their exchange rate exposure. This increase in long-term capital inflows which were financed with short-term Pta. credits caused an increase of recorded capital flows. Long-term inflows and short-term outflows reached levels which had not been known before the EMS crisis. As Figure 7 shows, on the basis of

⁸⁵ Compare Banco de España (1994a); Ch. III.

recorded monthly averages, short-term banking flows even occasionally surpassed those in autumn 1992. This figure also shows the strong correlation between short-term bank flows and bond flows which emerged in late 1992/early 1993. This close relationship is also evidenced in Figure 8 which displays the accumulated monthly figures of foreign bonds purchases and sales and short-term bank credit. Both rose, with minor interruptions, until early 1994 and declined afterwards.

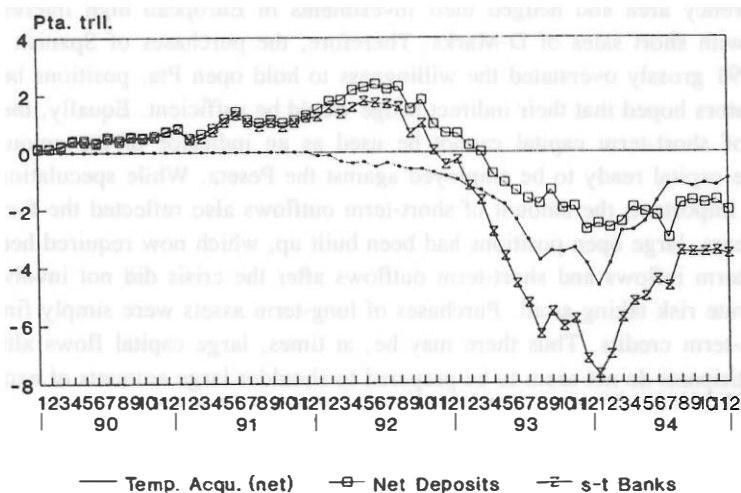
Figure 8 Accumulated Bond and Short-term Capital Flows



Source: Banco de España

A closer look at the short-term capital flows of banks also reveals the significance of repos (incl. "operaciones simultaneas") as a means to finance the purchase of Spanish bonds. Within two years, the outstanding amount rose from zero in early 1992 to above Pta. 4 trll. in January 1994 (see Figure 9). In early 1994, the end of interest rate optimism led to a substantial decline in speculative interest rate positions. This shift becomes not only visible in the sharp turn in short-term and long-term capital flows but also in the volume of transactions in futures and options markets, which jumped to new heights in January 1994 (having risen strongly already throughout 1993). As investors were becoming more pessimistic with respect to interest rates they hedged their open interest position in futures markets.

Figure 9 The Composition of Banks' Short-term Capital Flows



Source: Banco de España

Accumulated figures

Temp. Acqu. (net): Net temporary acquisitions (repos plus operaciones simultaneas)
 S-T Banks: Temp. Acqu. (net) + Net Deposits

4.1.4. Interpretation of the results

Spain provides an example of an economy which experienced both high gross and net capital flows. An analysis which incorporates the structure of capital flows, the size and the structure of foreign assets and liabilities and the correlation between certain items of the capital account shows that these large flows cannot by themselves be interpreted as evidence for a high willingness to bear exchange rate risk. Up to the late 1980s, the high net inflows consisted mostly of direct investment and portfolio equity capital, which are both less exposed to exchange rate risk. The flows into Spanish bonds in the early 1990s, the short-term capital outflows during the EMS crisis and the enormous increase in gross flows after the crisis overstated the willingness of international investors to hold open foreign currency positions. The bond inflows were based on the premise that there was no longer a currency risk - or that in the event that this expectation should not be fulfilled it would be possible to cover open positions before the devaluation.⁸⁶ This is illustrated by the "convergence play" which took place

⁸⁶ Of course, it is not possible for all market participants to get out at the same time. However, investors may have been confident that central banks would intervene, thus allowing a costless exit. This

in the early 1990s. Many foreign investors considered the EMS to be more or less a "de facto" currency area and hedged their investments in European high interest rate countries with short sales of D-Marks. Therefore, the purchases of Spanish bonds around 1991 grossly overstated the willingness to hold open Pta. positions because many investors hoped that their indirect hedge would be sufficient. Equally, the huge outflows of short-term capital cannot be used as an indicator of the amounts of speculative capital ready to be employed against the Peseta. While speculation may have been important, the amount of short-term outflows also reflected the fact that, over the years, large open positions had been built up, which now required hedging. The long-term inflows and short-term outflows after the crisis did not involve any exchange rate risk taking at all. Purchases of long-term assets were simply financed with short-term credits. Thus there may be, at times, large capital flows although market participants do not seem to be prepared to shoulder large amounts of exchange rate risk.

It is noteworthy that even during the currency crisis, there were net inflows of direct investment and (with the exception of the first quarter of 1994) portfolio equity investment. This shows that equity investment is either much less influenced by exchange rate considerations than other investments or in fundamentally different ways. Thus, there are large segments of the equity market, such as shares of export oriented firms, which can hope to benefit from a depreciation.⁸⁷

Finally, although substitutability of assets in different currencies may still be restricted by exchange rate risk, national financial markets are moving closer together. This is not only confirmed by tests of covered interest rate parity (cf. Goldstein/Mussa (1993), pp. 16-18) but also by the large volume of gross flows, which have risen enormously in recent years.⁸⁸ Market participants may still be reluctant to run exchange rate risks to a greater extent, but they are no longer confined with their activities to national markets. Intermediation, arbitrage, hedging and interest speculation are carried out in whatever market offers profit opportunities. This implies that financial markets

expectation proved to be right, so that it was indeed possible for many market participants to close their positions in time. See Group of Ten (1993), pp. 22-3.

⁸⁷ As Green (1994) notes, equity investors were rewarded for their investments in "weak currency stock markets". Those who, for example, invested in the Spanish stock market, gained more from rising prices than they lost from a falling currency value.

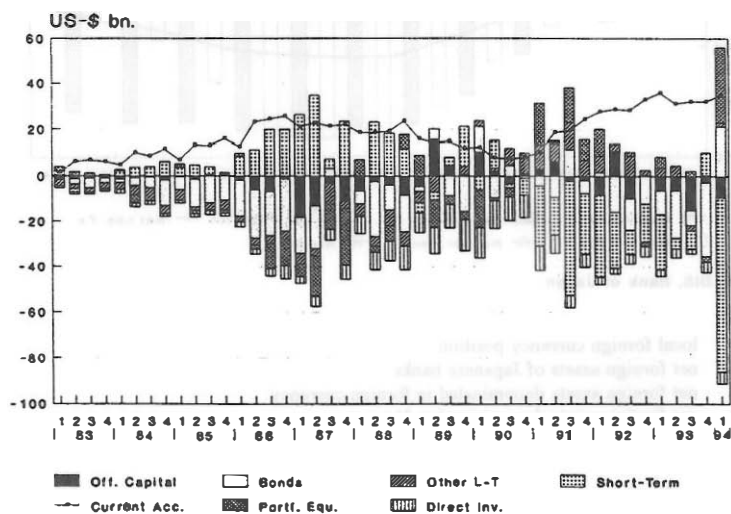
⁸⁸ Golup (1990) argues that gross flows rather than net flows might be the appropriate indicator of capital mobility. He finds that gross flows are still surprisingly small when compared to flows within countries. However, as the Spanish experience shows, gross flows have been rising considerably in the early 1990s. Therefore it can be concluded that, based on the gross flow criterium, capital mobility has increased significantly.

throughout the world will become more similar. Existing differences due to different attitudes towards risk, economic theories which are believed or not believed, regulations, habits etc. will be evened out. The aftermath of the EMS crisis illustrates this point. Foreigners were much more optimistic about interest rate trends and/or more prepared to speculate on their beliefs than Spanish or German residents.

4.2. Hedging, intermediation and currency speculation: Japan's capital account between 1983 and 1994

Japan has been by far the largest supplier of capital in world markets. From 1989 to 1993, 53 percent of world net capital flows came from Japan (IMF (1995), p. 83). This implies that Japanese, non-Japanese or both must have accumulated large open positions over the years. Therefore, the Japanese balance of payments warrants a closer look.

Figure 10 Japan's Balance of Payments

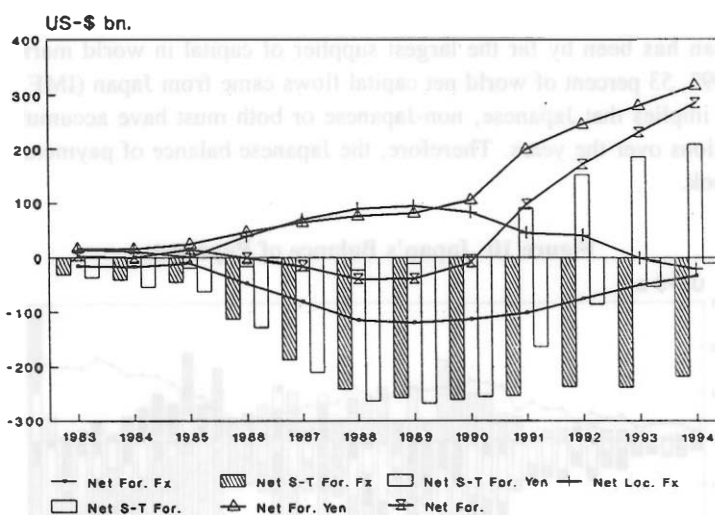


Source: IMF

The broad development of Japan's balance of payments since the early 1980s is well known. From 1983 to 1994 the nominal effective exchange rate of the Japanese Yen roughly doubled. In this period, Japan's balance of payments exhibited large current account surpluses. The current account surpluses were accompanied by corresponding net capital exports and (on average) increases in net foreign reserves.

This development is usually analysed from the goods side of the balance of payments. Such an analysis implies that capital flows passively adapt to the trade balance. Here, the balance of payments will be analysed from the capital side,⁸⁹ since a current account surplus implies that somebody must be willing to hold an open foreign exchange position. However, such willingness cannot be taken for granted. As will be shown, the capital flows of the 1980s and early 1990s between Japan and the rest of the world provide an example for hedging, intermediation and - to some extent - speculation.

Figure 11 International Transactions of Japanese Banks



Source: BIS, Bank of Japan

- Net local fx: local foreign currency position
- Net for.: net foreign assets of Japanese banks
- Net for. fx: net foreign assets denominated in foreign currency
- Net for. Yen: net foreign assets denominated in Yen
- S-T: short-term assets

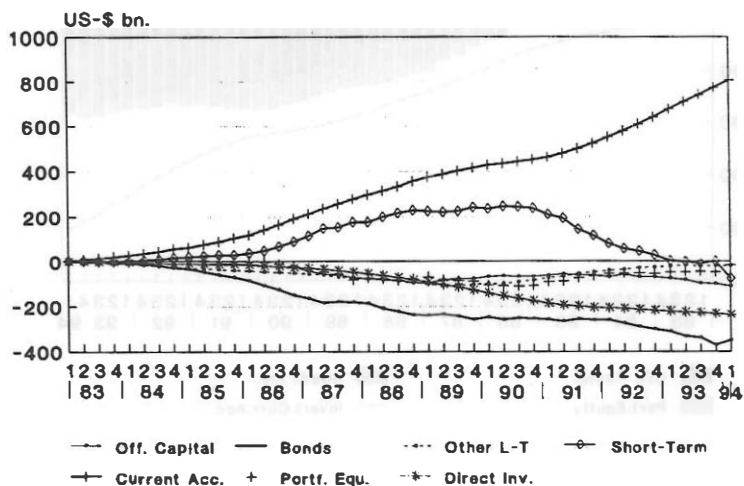
A closer look at the capital account reveals that there was a marked change in the structure of capital flows around 1990. Between 1983 and 1990, long-term capital exports were usually larger than current account deficits, the difference being made up by short-term capital imports. In 1990, this situation changed significantly. The long-term capital balance turned into surplus, with only occasional deficits, and the short-

⁸⁹ In Dluhosch/Freytag/Krüger (forthcoming) it is argued that in a world with capital mobility the balance on current account should be interpreted as the result of the transactions of international investors.

term capital balance turned into deficit.

The net movements of short-term capital are mainly due to the transactions of banks. Therefore, explanations of net short-term capital flows have to focus on the determinants of international short-term bank lending and borrowing.⁹⁰ Since the foreign currency exposure of Japanese banks is tightly restricted, it can be assumed that at the margin foreign currency lending must be financed by foreign currency borrowing.⁹¹ To the extent that the net short-term capital import reflects foreign currency borrowing, it must therefore be offset by foreign currency lending - either to foreigners or Japanese residents - or derivatives transactions. One reason for such simultaneous foreign currency borrowing and lending can be hedging of long-term capital movements by private non-banks. In this case, Japanese banks borrow funds in foreign currency to hedge foreign currency loans to Japanese investors. Japanese investors, in turn, require these loans to partly hedge their portfolios of foreign bonds (Takeda/Turner (1992), p. 85). These activities are mirrored by the increase of net local foreign currency assets of Japanese banks which peaked in 1990 reaching nearly US\$ 100 bn. (see Figure 11). Another reason for simultaneous foreign exchange borrowing and lending is maturity transformation, which was actively pursued by Japanese banks in this period (Turner (1991), p. 76).

Figure 12 Accumulated Capital Flows

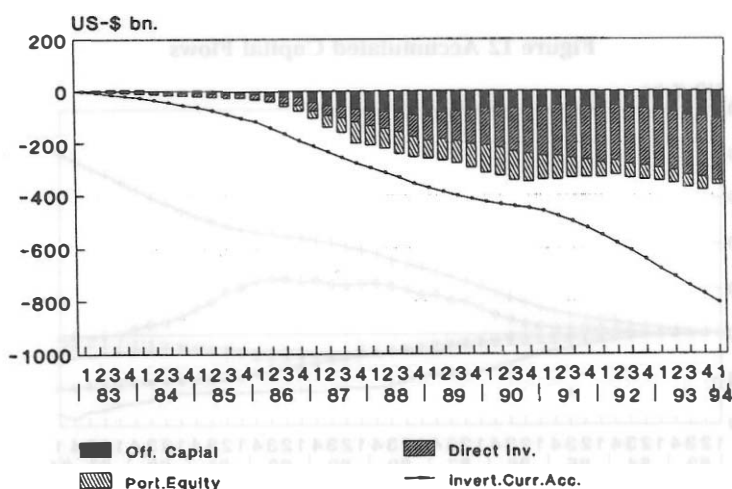


⁹⁰ Where "international" means transactions with foreigners and/or in foreign currency.

⁹¹ J.P. Morgan (1989), p. 3. See also Takeda/Turner (1992), pp. 84-85 and Nakao (1990), pp. 146/47.

The situation prevailing up to 1990 has much in common with the British position before World War I and the American position after World War II. Consequently, Japan is often referred to as a "world banker" borrowing short and lending long. However, one important characteristic of a world banker is missing. Since most of the lending and borrowing does not take place in Yen but in US dollars, Japanese banks have been active in maturity transformation but not in liquidity creation (Tavlas/Ozeki (1992)). In actively pursuing maturity transformation Japanese banks benefited from the difference between foreign long-term and short-term interest rates (Turner (1991), p. 76). When the yield curve in other countries (especially the United States) flattened, these activities were reduced (J.P.Morgan (1989), pp. 8-9). Figure 12 shows how short-term liabilities of banks approximately matched bonds outflows and other long-term non-equity outflows. On the whole, banks accumulated a considerable amount of short-term foreign liabilities, which reached around US\$ 250 bn. in 1988. This net position was nearly entirely due to foreign currency borrowing and lending.⁹² It came close to accumulated net bonds purchases and long-term credits of around US\$ 300 bn.

Figure 13 Accumulated Long-Term Capital Exports



Source: IMF

⁹² Net foreign borrowing in Yen was close to zero.

Covered fx lending to residents, making a market in derivatives and maturity transformation in foreign currencies did not involve any large open fx positions of Japanese banks. Consequently, they did not play an important role in financing the large current account surpluses. So, the question arises how these surpluses were financed. Figure 13 displays the accumulated figures of official capital movements, direct investment and portfolio investment in equity. It is fairly safe to assume that direct investment and official capital movements are not hedged. Foreign investment in equity is probably hedged less than, for instance, investment in bonds (Davis (1991), p. 45). Under the assumption that these components of the capital account are hardly hedged, it can be concluded that up to 1989/90 the current account surpluses had their counterparts mainly in public capital movements and private equity flows. In 1989 the accumulated current account surplus stood at around US\$ 400 bn. and direct investment, official capital movements and portfolio equity investments stood at around US\$ 300 bn. So, in spite of the huge current account surpluses, which seem to indicate a high willingness to shoulder exchange rate risk, Japanese investors were not prepared to expose themselves to exchange rate risk to a larger extent. They either bought foreign instruments which are less exposed to exchange rate risk (equity) or they hedged a large part of their foreign currency investments. Finally, it has to be kept in mind that the public sector was a major capital exporter.

On the whole, the analysis of the structure of Japanese capital outflows until 1990 supports the hypothesis that the large net outflows can be nearly entirely attributed to foreign investment, involving direct investment, portfolio equity investment and (partly) hedged long-term credits and investments in bonds.⁹³ Therefore, it can be concluded that currency speculation does not seem to have played a significant role in this period.

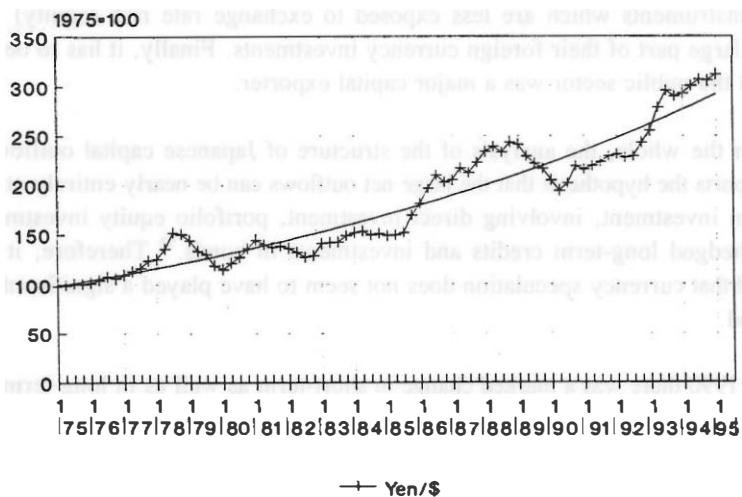
In 1990 there was a marked change in short-term as well as in long-term capital flows. Within four years the composition of net foreign assets changed dramatically. At the same time, the current account surpluses reached new records, raising the accumulated surpluses from around US\$ 400 bn. to over US\$ 800 bn. within four years. This increase was nearly entirely due to short-term capital exports and purchases of foreign bonds. By 1994 accumulated official capital exports, direct investments, equity portfolio investments and "other" long-term capital exports amounted to less than fifty per cent of the accumulated current account surpluses (Figures 12 and 13). This decline of net long-term outflows was the result of smaller outflows of Japanese long-

⁹³ It is often stated that the decline of the US dollar after its peak in the mid-1980s did not hurt Japanese investors because they had high unrealised capital gains due to price rises of Japanese land and stocks. If the analysis above is correct, the currency losses were smaller than is commonly thought, because a considerable portion of foreign investments was hedged.

term capital and growing inflows of foreign long-term capital (Table 9). Short-term bank flows similarly underwent drastic changes. While the net short-term foreign currency position nearly remained constant, Japanese banks increased their foreign Yen assets and reduced their foreign Yen liabilities. The result was a reduction of the short-term foreign liability position of US\$ 250 bn., which steadily declined from 1990 onwards reaching a net asset position of US\$ 50 bn. in early 1994 (Figure 11).

So, the period since 1990 is characterized by rising net capital outflows and a shift towards more exchange rate sensitive instruments. These outflows took place in a period in which the Yen experienced a strong real appreciation (Figure 14). The coincidence of these three factors seems to indicate that capital flows became more speculative. However, since most of the short-term outflows consisted of bank flows, such a conclusion may be premature.

Figure 15 The Nominal Effective Exchange Rate of the Yen



Source: IMF, Banco de España

The rapid decrease of the foreign liability position of banks cannot be easily explained. It has been argued that this shift was due to a change in the hedging technique. As investors shifted their hedging activities from the money markets to the derivatives markets, short-term capital inflows no longer seemed to be necessary to hedge long-term foreign assets (J.P.Morgan (1989), p. 8; Glick (1991), p. 30, fn. 27).

However, this hypothesis is not convincing. Any net demand of Japanese investors for instruments suited to hedge foreign currency risk will trigger short-term capital inflows into Japan, no matter whether forward contracts, futures, swaps or options are used (see ch. 3.1.2.). Therefore, a switch in the hedging technique cannot be responsible for the observed shift in the short-term capital account.⁹⁴

Basically, the increase of short-term capital exports by banks could have been caused by four different factors (although these factors may also have been simultaneously at work):

- a. Japanese investors increased their exposure to exchange rate risk.
- b. Foreigners increasingly issued Yen denominated debt.
- c. Foreigners either decreased their Yen assets or increasingly hedged them.
- d. Market participants speculated on a depreciation of the Yen.

a. The fact that Japanese long-term capital exports continued, albeit at a slower pace, while net short-term fx liabilities of Japanese banks remained more or less constant, suggests that hedging of foreign currency positions was reduced. Any new purchase of assets denominated in foreign currency must have been (on average) without hedging. Reduced hedging of Japanese investors can be due to the fact that they were prepared to bear more exchange rate risk. One possible explanation is that Japanese investors increased their foreign currency exposure speculating on a reversal of the marked appreciation of the Yen which took place in the early 1990s and which is still continuing. In addition, low returns in domestic markets may have induced Japanese investors to continue investing in foreign bonds, in spite of a greater caution with respect to currency risk in the early 1990s (Bank of Japan (1993), pp. 15 and 34). Another reason for a reduction of hedging may have been that foreigners increasingly issued Yen denominated debt.

b. The shift in the composition of capital flows may also be due to a marked increase of open Yen (short) positions of foreign borrowers who tried to profit from low interest rates in Japan.⁹⁵ Low Yen interest rates and the hope that the Yen had reached its peak tempted many borrowers to issue Yen debt.⁹⁶ The outstanding stock

⁹⁴ On the other hand, the increased use of derivatives for hedging purposes can probably explain the reduction of the net local foreign currency position of Japanese banks (see Figure 12).

⁹⁵ Such borrowing could also be undertaken by subsidiaries of Japanese firms. See Bank of Japan (1993), p. 22.

⁹⁶ For example, in May 1995 the director of finance at the Italian treasury explained that Italy had launched a large issue of Yen denominated eurobonds, because the combination of a recent decline of the Yen and low Yen interest rates had been "difficult to resist". See Lapper (1995).

of international Yen bonds rose from 131.4 bn. in December 1989 to 281.8 bn. in March 1994.⁹⁷ However, the statistics on international bond issues provide only information on the issuers of Yen bonds. Since debts can be swapped it remains unclear whether the issuer also remains the one who carries the exchange rate risk. Sweden provides a good example for this. In the early 1990s about 18 percent of Sweden's foreign currency debt was denominated in Yen. However, using swaps, Sweden reduced its Yen exposure to close to zero (Fontenay, Milesi-Ferretti and Pill (1995), p. 16).

Table 9 Japan: Foreign Assets and Liabilities

US-\$ bn.

	For. Liab.	L-T Liab.	Ba S-T Liab.		For. Assets	L-T Assets	Ba S-T Assets	
			Fx	Yen			Fx	Yen
1983	235	103	-94	-14	272	171	64	9
1984	267	113	-104	-26	341	229	65	13
1985	308	122	-122	-39	438	301	80	22
1986	547	192	-243	-79	727	476	131	64
1987	831	236	-350	-181	1072	646	163	158
1988	1178	312	-501	-264	1469	833	260	242
1989	1478	447	-576	-318	1771	1019	319	309
1990	1530	464	-621	-278	1858	1096	361	284
1991	1623	647	-555	-249	2007	1248	302	339
1992	1522	658	-500	-185	2035	1316	263	337
1993	1570	712	-468	-192	2181	1413	231	377
1994			-448	-231			232	439

Source: Bank of Japan

c. Table 9 and Figure 11 show that the most important changes in short-term net assets of Japanese banks were due to changes of Yen denominated assets and liabilities. Yen assets rose from 1990 to 1994 and Yen liabilities declined from 1989 to 1992. Especially in 1992, Japanese banks drastically reduced their short-term Yen liabilities vis-à-vis foreign investors. The fact that Japanese banks increased their net short-term Yen assets in a period of rising long-term capital inflows suggests that foreigners hedged a considerable portion of their Yen investments. In 1990 foreigners held 305

⁹⁷ Source: Bank for International Settlements, International Banking and Financial Market Development, various issues.

bn. worth of Japanese bonds (incl. gensaki transactions) and 182 bn. of credits to private non-banks. These figures rose until 1993 to 374 bn. and 268 bn., respectively.⁹⁸ It can be assumed that most of these Japanese liabilities were denominated in Yen. Therefore, an increased hedging of the stock of Japanese Yen liabilities held by foreigners as well as of new inflows could contribute to the explanation of the rapidly rising net short-term foreign Yen assets of Japanese banks. The rationale behind such behaviour could be that investors increasingly feared a reversal of the strong real appreciation of the Japanese Yen. In addition, the rising volume of short-term Yen loans to foreigners may also reflect the increasing activity of foreign institutional investors and investment banks in Japan. In order to actively pursue maturity transformation, interest rate speculation and arbitrage, these entities need short-term Yen loans.⁹⁹

d. The increase of foreign Yen assets may also reflect fx speculation. To the extent that foreigners borrow Yen to speculate on a Yen depreciation, foreign short-term Yen assets of Japanese banks are increasing. Similarly, if speculators transact in derivatives markets, selling Yen short, foreign banks require Yen loans to hedge their open positions. Consequently, in this case, Yen assets of Japanese banks are increased.¹⁰⁰

What is especially remarkable is not only the size of the outflow but also its persistence. Regardless of the continuing appreciation of the Yen, capital outflows increased in 1992 and 1993. So, despite the fact that expectations had been repeatedly wrong,¹⁰¹ market participants did not start to speculate on a further appreciating Yen. In the first two cases (a. and b.) the persistent appreciation of the Yen must have produced considerable foreign exchange losses either for Japanese investors or for foreign borrowers.¹⁰² In the third case (c.) the loss consists of profits foregone, since foreign investors do not profit from the appreciation of the Yen. The first two possibilities have in common that they imply that market participants had a strong view

⁹⁸ IMF (b), own calculations.

⁹⁹ Compare also Bank of Japan (1993), pp. 9-13 and 31.

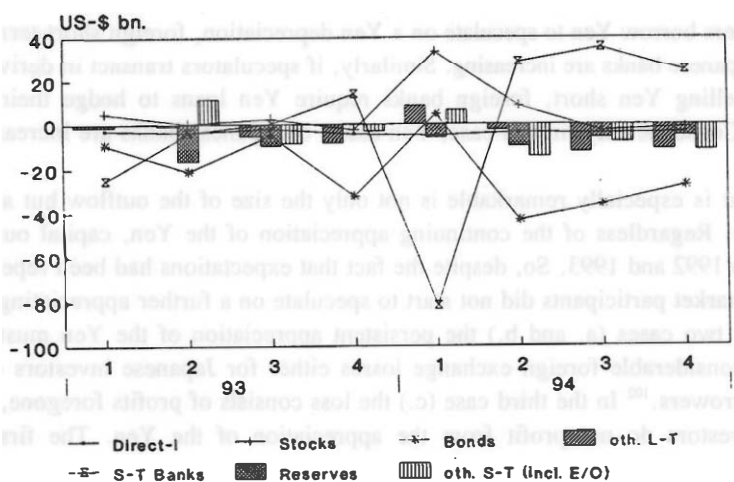
¹⁰⁰ If, on the other hand, the speculators buy derivatives directly from Japanese banks, the latter would be induced to increase their short-term fx assets.

¹⁰¹ The Yen appreciation was much larger than predicted by the interest rate differential.

¹⁰² Frequent reports in the press suggest that there are indeed many foreign debtors - many of them in Asia - which saw the cost of servicing their debts rise because of the continuing appreciation of the Yen. They include sovereign borrowers like the Republic of China (Yen debt: about US\$ 27 bn.) or Indonesia (Yen debt: about US\$ 40 bn.) and corporations like Thai Airways which has recently recorded poor profits because of fx losses on Yen denominated loans. See Murphy (1995), Bardacke (1995) and International Herald Tribune (1995). Many European countries have also issued Yen debt. However, it is not clear to what extent these debts have been swapped.

on the development of exchange rates and acted on it. In a period of marked appreciation of the Yen, Japanese investors considerably increased their holdings of non-Yen assets and/or foreign investors increased their Yen liabilities (either to hedge long Yen positions or to increase Yen short positions). Even though it cannot be decided whether such behaviour qualifies already as fx speculation, it can at least be said that both cases contain speculative elements. The third possibility has more in common with the behaviour of investors during the EMS crisis. Exchange rate uncertainty induced foreign investors to close some of the existing positions and to hedge to a large extent new investments in Japan. For the period as a whole, it is difficult to separate the other transactions from speculation. However, the volatile capital movements of 1994 allow for a better estimate.

Figure 15 Japanese Capital Flows in 1993 and 1994



Source: Bank of Japan

In 1994, investor sentiment became more uncertain and capital flows became more volatile. In early 1994 long-term capital flows (mainly bonds and portfolio equity) sharply turned. In the first quarter of 1994 there was a long-term capital inflow of over US\$ 50 bn. At the same time, there was a short-term outflow of US\$ 80 bn. This was partly due to foreigners shifting funds from short-term assets to long-term assets. At the same time long-term capital outflows of Japanese investors ceased. Much of this seems to have been due to the uncertainty about US monetary policy and the attitude of the US administration which seemed to pursue a strategy of "talking down the dollar". Under these circumstances it was hardly surprising that the long-term capital

exports ceased and long-term capital imports increased. But what is surprising is that there was still a net capital outflow (in addition to the short-term outflow due to the shifting of funds by foreigners). As the increase in net local foreign currency liabilities of Japanese banks in the first quarter of 1994 shows, there were still Japanese investors prepared to go long in foreign currency¹⁰³ (a look at the currency composition of worldwide local foreign currency positions suggests that these bank liabilities were mainly denominated in US-dollar) speculating against the trend of an appreciating Yen.

This episode reinforces the assumption that large exchange rate moves may trigger stabilizing speculative capital movements. However, it is by no means certain that such capital movements can always be relied upon. The change in sentiment of long-term investors in the first quarter of 1994 was neutralised by huge short-term outflows. However, whoever took a long dollar position or a short Yen position must have made considerable foreign exchange losses. If long-term investors should again prefer to leave their capital in Japan, short-term capital may be less willing to speculate on a depreciating Yen. In this case the initial effect would be another sharp and very large appreciation of the Yen. This could be witnessed in 1994 already when the Bank of Japan bought 27 bn. worth of foreign exchange (mostly dollars). In early 1995, the reductions of capital outflows, upward pressure on the Yen and interventions of the Bank of Japan accelerated. The dollar temporarily fell below 80 Yen and Bank of Japan interventions amounted to US\$ 32 bn. in the first three months alone.¹⁰⁴

So, for the second period, starting 1990, capital movements have not caused or reinforced the upward trend of the Yen.¹⁰⁵ Quite the contrary, they have reduced the exchange rate movement because an increased outflow of capital is (c.p.) equal to an increase in the demand for foreign currency. Some of these outflows can be interpreted as evidence for the existence of stabilizing speculators of the McKinnon/Mayer type. In the main, however, hedging and intermediation seem to have been much more important. This shows that also under flexible exchange rates large short-term capital movements do not necessarily signal strong speculative forces.

¹⁰³ The flow of funds analysis of the Bank of Japan reveals that two groups ("Public Corporations and Local Governments" and "Corporate Business") considerably increased their fx deposits with Japanese banks. See Bank of Japan, Economic Statistics Monthly.

¹⁰⁴ Between March 1993 and March 1995 foreign reserves increased by US\$ 85 bn.

¹⁰⁵ This raises the question why the Yen appreciated in the first place. An important factor for the explanation of the Yen appreciation is the long recession in Japan which has freed capacity for exports and held costs in check. The resulting increase in competitiveness of the tradable goods sector translated into a real appreciation.

5. Conclusions

In this study it was attempted to estimate the amount of speculation in foreign exchange markets. Such an estimate is hard to make because it is theoretically as well as empirically difficult to delimitate speculation in relation to other activities. In particular, the distinction between speculation and hedging is highly problematic. On the one hand, there are types of hedging which are clearly meant to reduce exchange rate risk; on the other hand, a strategy of variable hedging has to be interpreted as speculation. Similarly, open fx positions may be held mainly in order to profit from expected exchange rate changes or because a portfolio of local and unhedged foreign assets offers better risk-return characteristics than a portfolio which includes hedged foreign assets. The present study cannot offer an exact way to estimate speculative activity in fx markets. It highlights the difficulties of making such an estimate and shows how not to estimate speculation. Thus, it helps to obtain a more realistic view of the possible amounts of speculation.

Figures like the turnover in fx markets, the volume of short-term capital movements or the amount of capital flows during currency crises are not useful as estimates of speculative activity in foreign exchange markets. Rather, an estimate of speculative activity should use net capital flows as a starting point, because these flows provide information about the willingness to hold open positions. By including information about the structure of capital flows and the size and structure of stocks of foreign assets and liabilities, the potential size of non-speculative transactions can be estimated. The structure of capital flows provides information about the size of those capital flows which are not particularly exposed to exchange rates and which therefore cannot reflect currency speculation. Furthermore, co-movements of long-term and short-term capital flows can be used as an indicator of hedging. In addition, the size and the structure of foreign assets and liabilities can provide information about the possible amount of hedging. Finally, banking flows should be regarded as nearly fully hedged, that is, a net banking flow in one direction either mirrors another flow in the opposite direction or a derivatives transaction with a third party.

Based on these findings, an analysis of capital flows between Spain and the rest of the world shows that a larger part than earlier believed of the capital outflows during the EMS crisis may have been due to hedging. As the analysis of foreign currency positions shows, fx liabilities of Spanish residents and Pta. assets of foreigners were much larger than net capital outflows (which were approximately equal to reserve losses). Furthermore, it can be inferred that the large capital flows after the crisis did not involve any open fx positions at all. Foreigners were simply betting on interest rate changes, avoiding any exchange rate risk. The same could also be observed in Germany

after the crisis. The case of Japan is more difficult to interpret. After a number of years characterised by outflows of direct investment, portfolio equity and partly hedged bonds investment (plus high official capital exports), the early 1990s saw high exports in instruments which were exposed to exchange rate risk. The exposure to exchange rate risk was increased. This may have partly been due to the strong real appreciation which seems to have induced investors and debtors to speculate on a subsequent depreciation of the Yen.

What are the implications for economic policy? For one thing, this study may help to evaluate the size of official reserves and the effectiveness of measures, such as the Tobin-tax, which are meant to reduce exchange rate volatility. Some economists have recently compared official reserves to the turnover in foreign exchange markets and found that reserves were small indeed. However, the comparison of a stock of assets with a turnover figure is hardly meaningful. Whether the same amount of one million Pta. is traded only once in fx markets (turnover: one million) or ten times (turnover: ten million) does not make any difference; it is still one million and it can only buy one million worth of foreign exchange.¹⁰⁶ Imports, exports or the current account also do not provide a meaningful yardstick. This may have been different in times of fixed exchange rates and restricted capital mobility. Under these conditions, reserves must be high enough in order to finance potential future trade deficits. However, nowadays reserves have to be compared to potential capital outflows in times of crisis. Potential outflows are a function of

- local currency assets held by foreigners,
- foreign currency debt of residents,
- the potential amount of speculation and
- the ability of the government (or the central bank) to borrow in international markets.

If the results of this study are correct, the most important items in the list are usually the first two: the stock of open fx positions of foreigners and residents. If these stocks have been accumulating over many years, any crisis of confidence may trigger large outflows due to hedging, the size of which may by far be more important than the potential amount of speculation.

If such stock adjustments were indeed the prime source for the large capital flows during the EMS crisis or the Peso crisis, then exchange rates can only be kept stable when net foreign asset positions are small. If these conditions are not fulfilled,

¹⁰⁶ Similarly, a high turnover on the stock exchange provides no information about the ability of market participants to finance the purchase of new stocks and a high turnover in the money market compared to the monetary base does not mean that central banks cannot influence short-term interest rates or price levels.

a Tobin-tax would not help very much to preserve exchange rate stability. Such a tax would only make hedging more expensive. However, in times of crisis this would hardly deter anyone from closing open positions.¹⁰⁷ Interestingly enough, the only stabilising influence of the Tobin-tax, which was meant to reduce short-term speculation without hurting long-term flows, may come from its adverse effect on long-term capital flows. By making short-term capital movements more expensive, the Tobin-tax would increase the costs of hedging and make international money and derivatives markets less liquid. This reduces the expected return on foreign long-term investment and increases its risks.¹⁰⁸ Therefore, long-term investment would be negatively affected by a Tobin-tax, so that stocks of net foreign assets are likely to be smaller than in a world without the Tobin-tax.

¹⁰⁷ Similarly, it has been argued that such a tax would hardly deter speculators. See Garber/Taylor (1995), Kenen (1995) and Schrader (1995).

¹⁰⁸ This applies to portfolio investment and long-term credits - not to direct investment.

Appendix

Interest Rate Differentials, Exchange Rate Changes, Bond- and Equity Price Changes

1993	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DM/\$	2.28	1.6	0.35	-3.12	0.63	2.28	3.78	-1.11	-4.31	0.95	3.79	0.57
p.a.	27.36	19.2	4.2	-37.44	7.56	34.56	45.36	-13.32	-51.72	11.4	45.48	6.84
Euro-\$	3.12	3.05	3.1	3.06	3.04	3.11	3.11	3.05	3.06	3.08	3.13	3.27
Fibor	8.7	8.61	8.39	8.15	7.72	7.79	7.34	6.81	6.85	6.75	6.43	6.37
Diff.	5.58	5.56	5.29	5.09	4.68	4.68	4.23	3.76	3.79	3.67	3.3	3.1
Bonds	103.3	104.3	105.8	105.4	104.6	104.3	105.1	106.2	107	107.7	108.3	108.6
p.m.	1.18	0.97	1.44	-0.38	-0.76	-0.29	0.77	1.05	0.75	0.65	0.56	0.28
p.a.	14.16	11.64	17.28	-4.56	-9.12	-3.48	9.24	12.6	9	7.8	6.72	3.36
Equ	268.4	283.6	293.4	289.7	283.3	288.6	303.6	320.8	322.2	338.9	346.9	361.7
p.m.	2.8	5.66	3.46	-1.26	-2.21	1.87	5.2	5.67	0.44	5.18	2.36	4.27
p.a.	33.6	67.92	41.52	-15.12	26.52	22.44	62.4	68.04	5.28	62.16	28.32	51.24

Euro-\$: one month Euro-\$ interest rate

FIBOR: one month Frankfurt Interbank Offered Rate

Equ.: German Stockmarket Index, 1980=100

Bonds: Average Price of various 8% bonds

p.m.: change in % per month

interest rates: one month Euro-\$ and one month German FIBOR

p.a.: change % per year (arithmetically derived from the monthly changes)

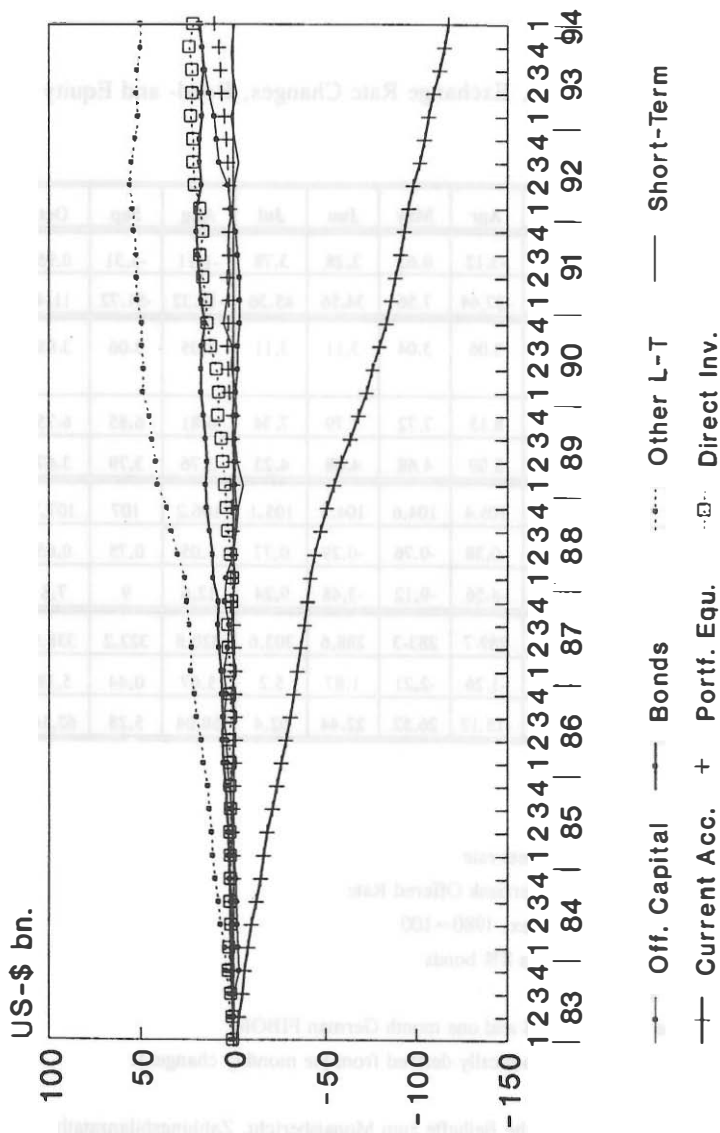
Source:

Deutsche Bundesbank, Statistische Beihefte zum Monatsbericht, Zahlungsbilanzstatistik;

Deutsche Bundesbank, Statistische Beihefte zum Monatsbericht, Kapitalmarktstatistik.

Accumulated Capital Movements

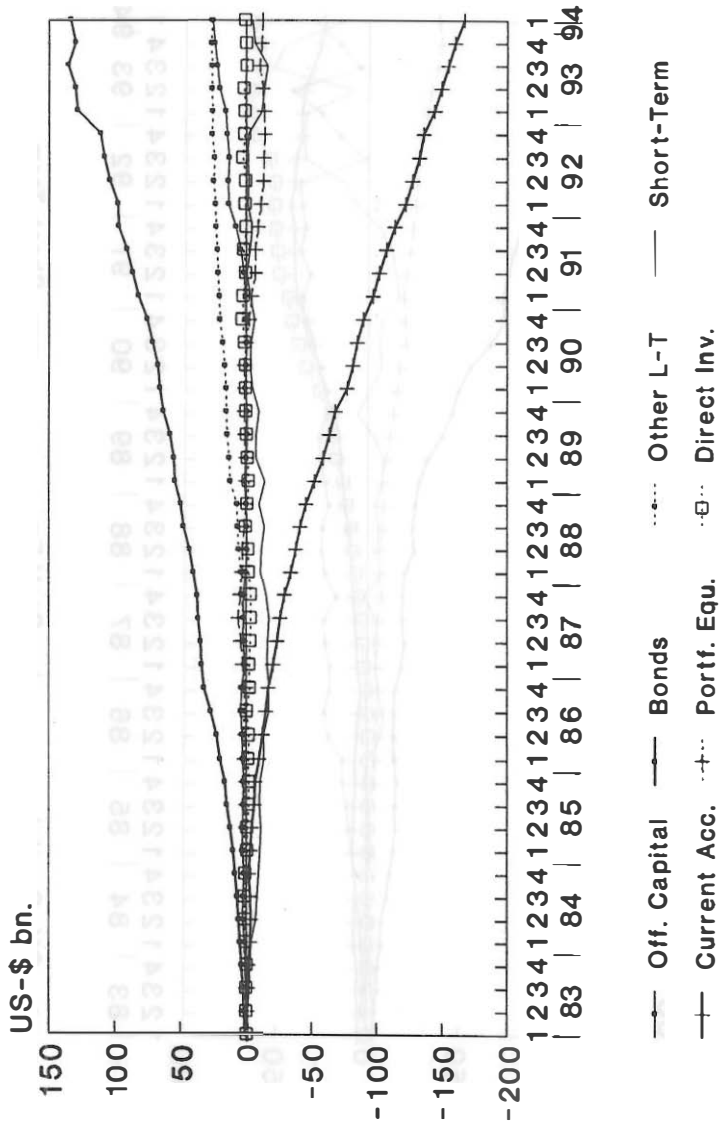
Australia 1983-1994



Source: IMF

Accumulated Capital Movements

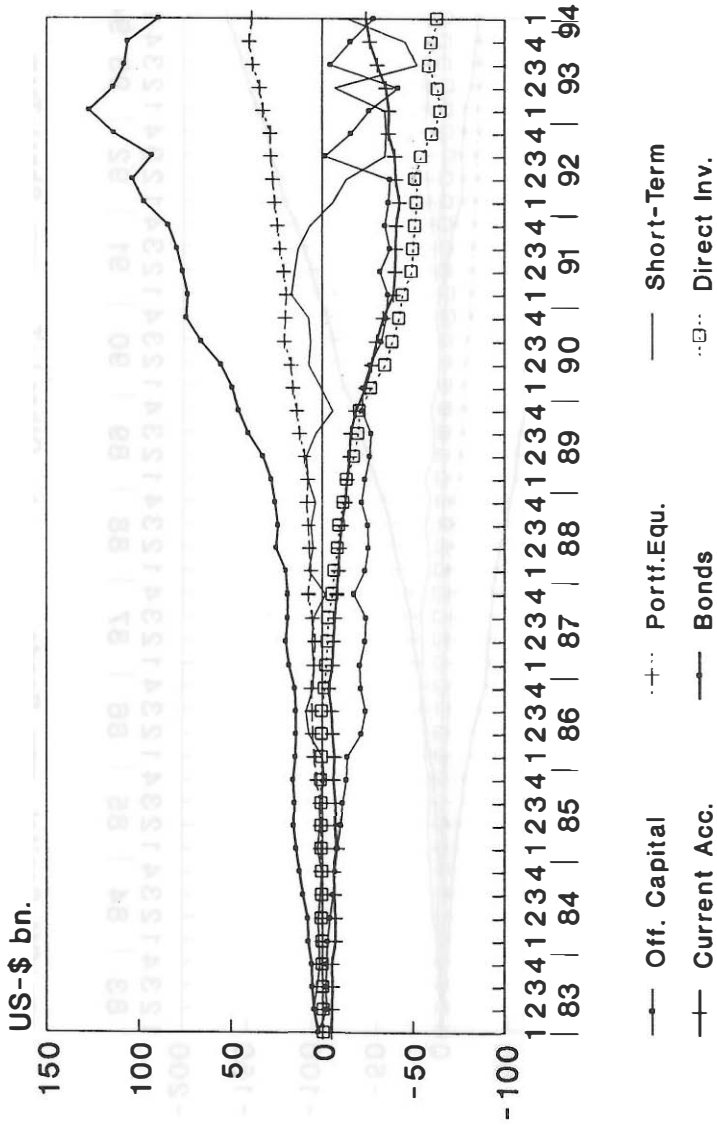
Canada 1983-1994



Source: IMF

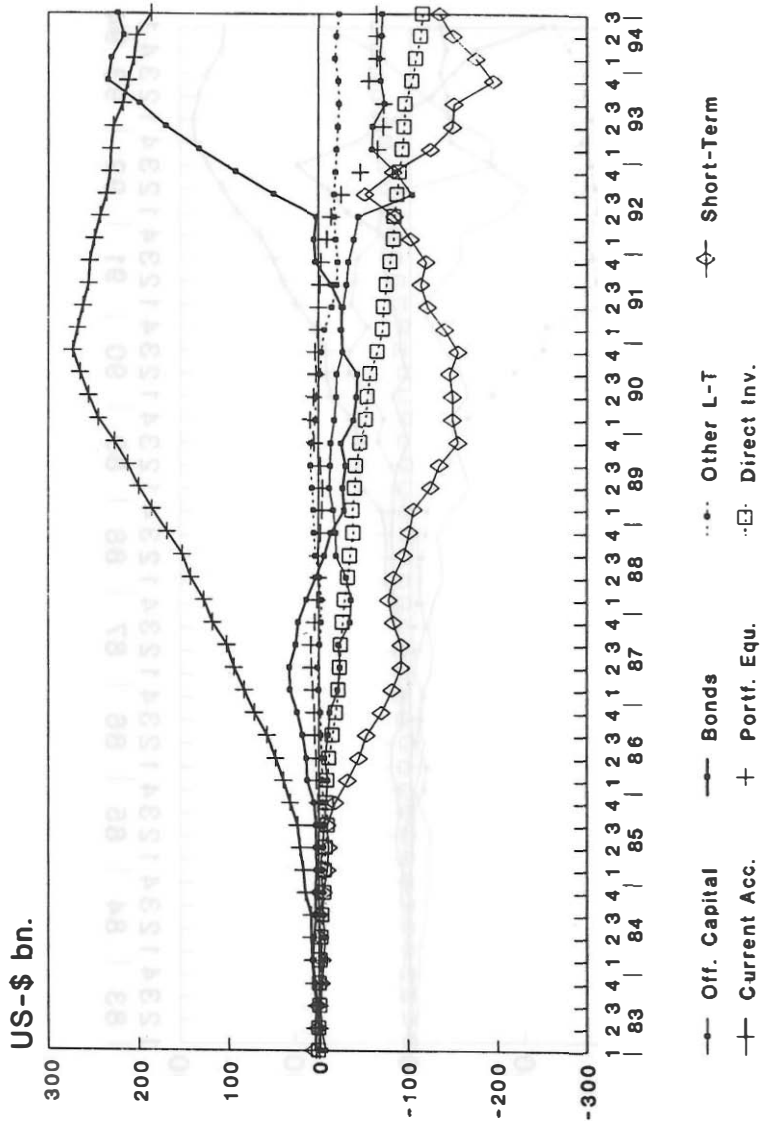
Accumulated Capital Movements

France 1983-1994



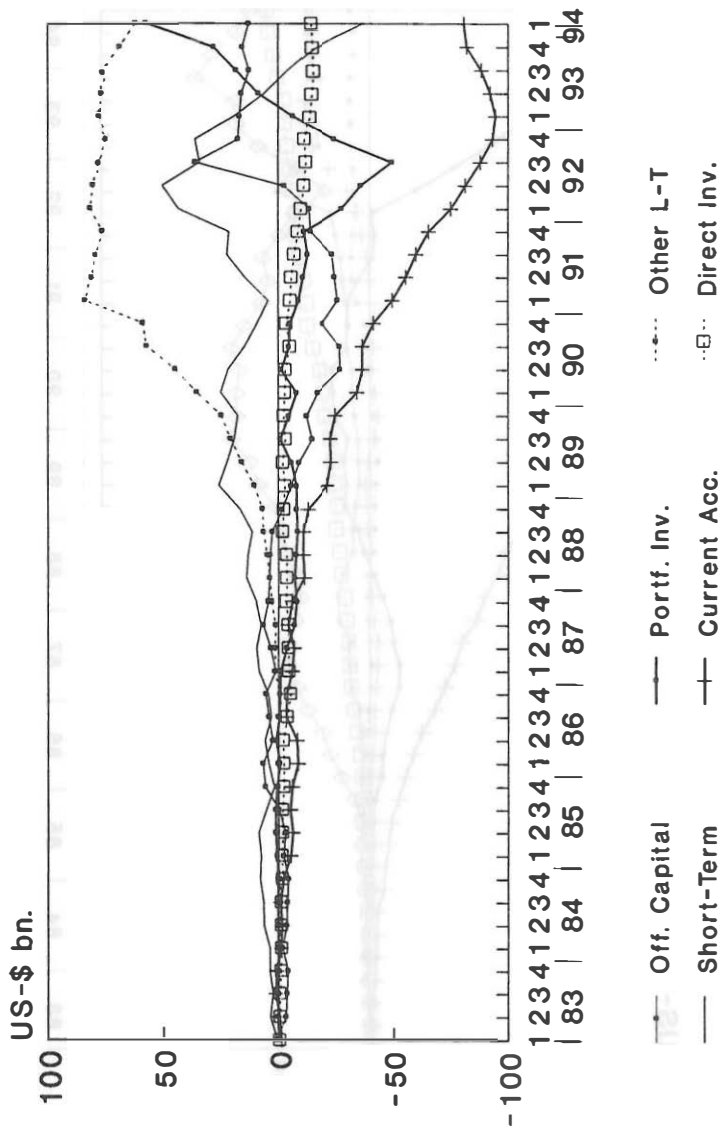
Source: IMF

Accumulated Capital Movements Germany 1983-94



Source: IMF

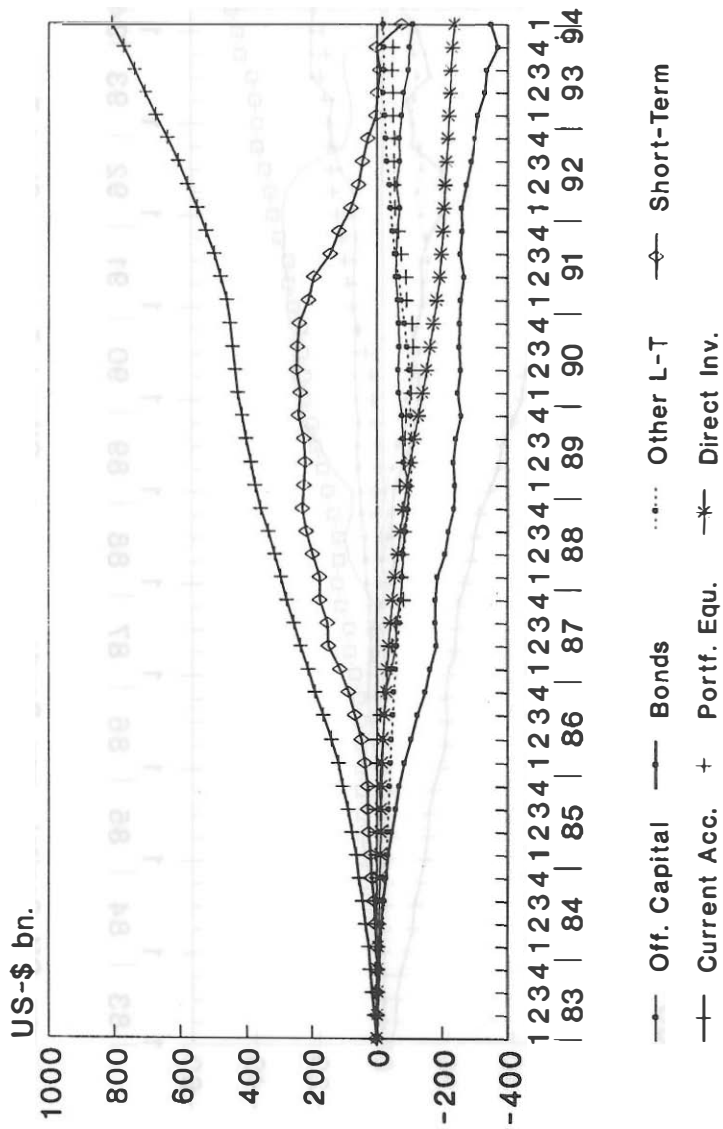
Accumulated Capital Movements Italy 1983-1994



Source: IMF

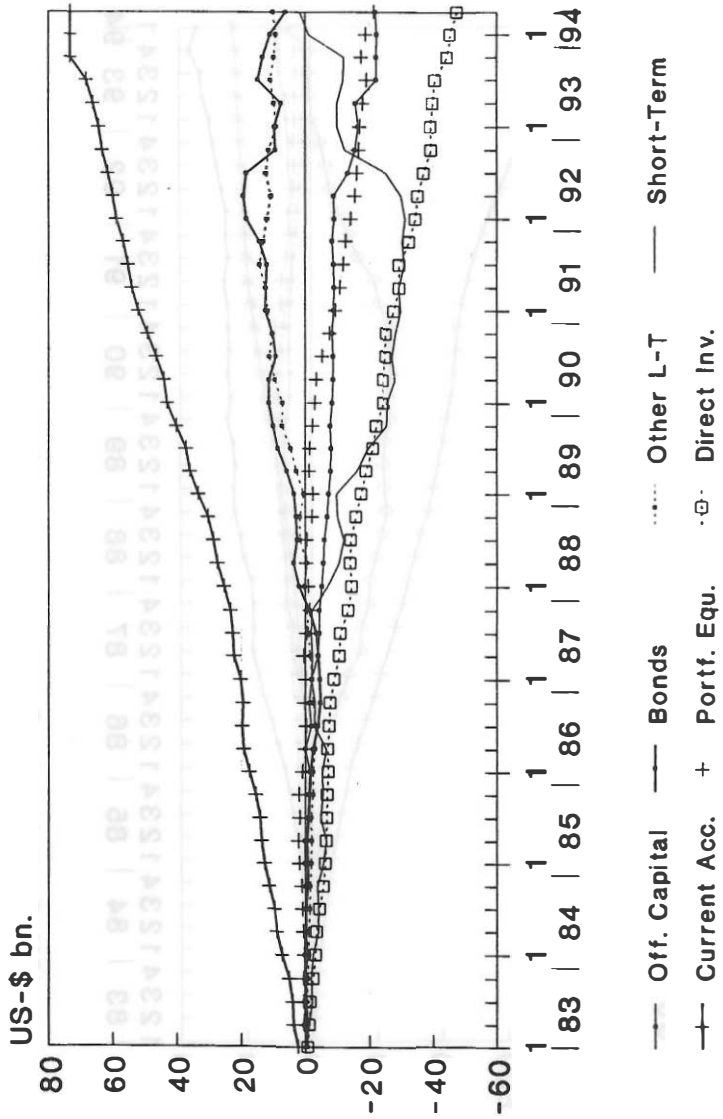
Accumulated Capital Movements

Japan 1983-1994



Source: IMF

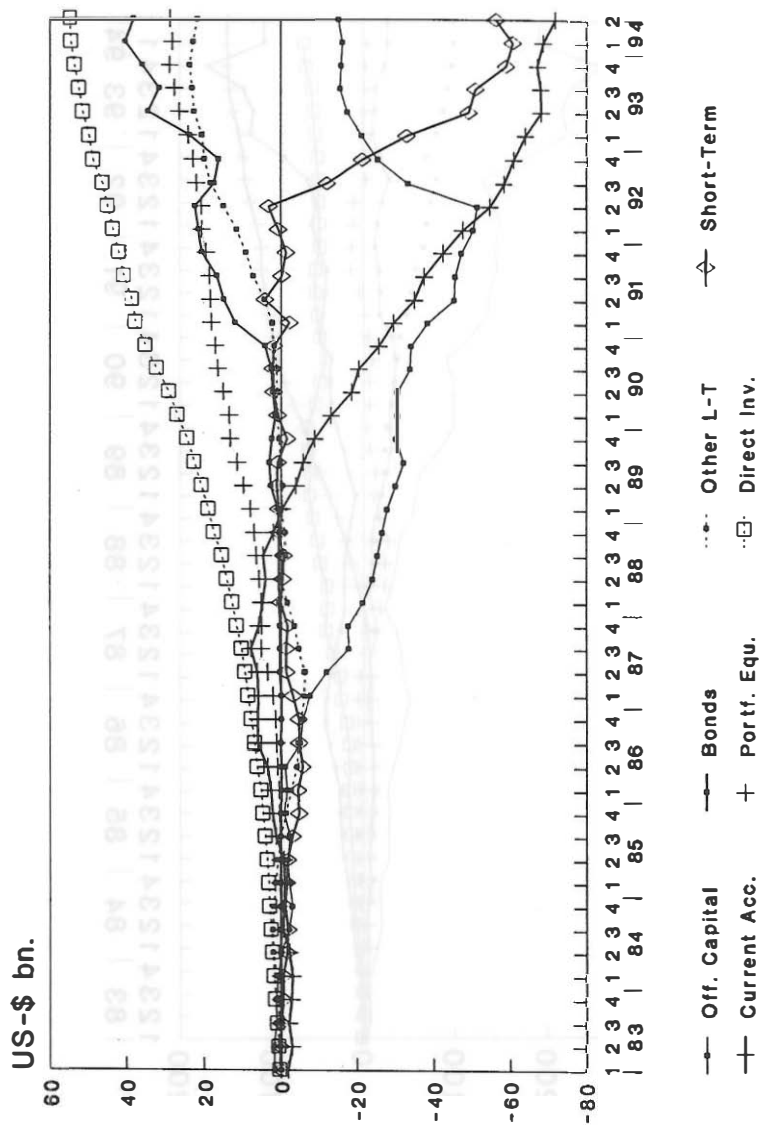
Accumulated Capital Movements Netherlands 1983-1994



Source: IMF

Accumulated Capital Movements

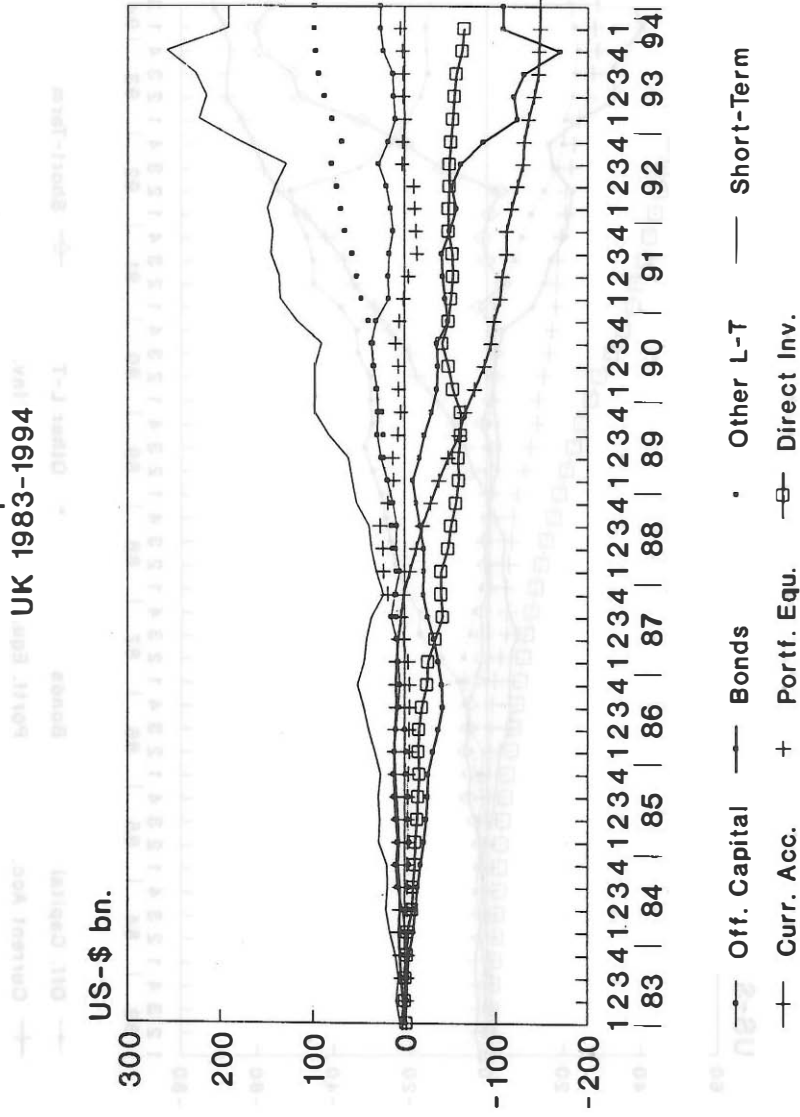
Spain 1983-94



Source: IMF

Accumulated Capital Movements UK 1983-1994

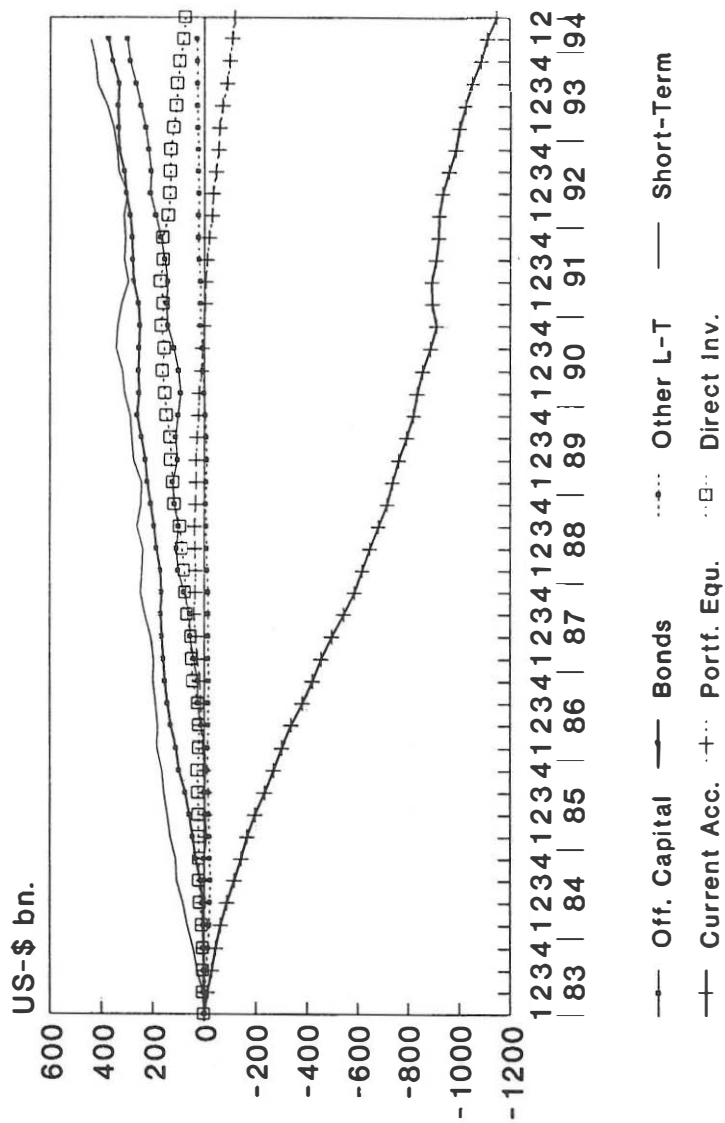
Source: IMF



Source: IMF

Accumulated Capital Movements

USA 1983-94



Source: IMF

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