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Do Hedge Funds Disrupt Emerging Markets?

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Abstract

By their very nature, hedge funds employ opportunistic trading strategies on a leveraged basis. It is natural to find their footprints in most major market events. A "small bet" by large hedge funds can be a sizeable transaction that impacts a market. However, highly leveraged trading strategies practiced by many market participants, if left unchecked, can lead to a convergence of bets. This, in turn, can leave markets vulnerable to disruption when confidence erodes and the herd heads for the exit. This paper examines the Asian Currency crisis of 1997. The "Asian Carry Trade" was a highly leveraged strategy popular among banks and domestic corporations in 1995-6. When concerns about the viability of the exchange rate pegs surfaced, the unwinding of this popular strategy gave rise to a "one-way bet" adopted by speculators such as hedge funds. Extrapolating from speculative hedge fund activities at the peak of a crisis can lead to the erroneous conclusion that hedge funds, who came at the end of a trade, were the culprits that "disrupted" the market. It is easy to point to the "last" straw that broke the camel's back. However, as is often the case, this last straw is no more responsible than any of the other straws. Here, we provide estimates of the hedge funds involvement during the Asian Crisis and address the question of their impact on the market. We also make recommendations on how hedge funds activities can be used to provide early warnings of "undesirable" convergence of certain highly leveraged trading strategies. This can be achieved in two non-intrusive steps. First, monitor hedge fund activities to detect potential converging speculative trading activities among market participants. This tells regulators where potential problems may be brewing. Second, routinely tabulate major commercial and investment banks' counterparty exposures to key market risk factors on an aggregated basis thus protecting the identity of the specific counterparties involved. When popular "bets" lead to similar positions, it should alert regulators to consider preemptive measures.

1. Introduction

Hedge funds are private unregulated investment vehicles for wealthy individuals and institutional investors.¹ Many hedge funds employ opportunistic trading strategies on a leveraged basis. It is natural to find their footprints in most major market events. A "small bet" by large hedge funds can amount to a sizeable transaction that can impact a market, especially one that has limited liquidity. A case in point is the well known "attack" on Sterling by George Soros's funds in 1992.² On one level, the presence of hedge funds is no more disruptive than any other group of large speculators. If speculation is part and parcel of an open capital market, then the presence of hedge funds is to be expected. However, highly leveraged trading strategies practiced by many market participants, if left unchecked, can lead to a convergence of "bets". This, in turn, can leave markets vulnerable to disruption when confidence erodes and the herd heads for the exit. This paper examines the Asian Currency crisis of 1997. In particular, we analyze the "Asian Carry Trade" which was a highly leveraged strategy popular among banks and domestic corporations in 1995-6. When concerns about the viability of the exchange rates pegs surfaced, the unwinding of this popular strategy gave rise to a "one-way bet" adopted by speculators such as hedge funds. This was similar to the famous attack on Sterling during the ERM crisis in 1992. It is tempting to extrapolate from the speculative activities of hedge funds at the peak of a crisis. This can lead to the erroneous conclusion that hedge funds, who came at the end of a trade, were the culprits that disrupted the market. It is easy to point to the "last" straw that broke the camel's back. However, as is often the case, this last straw is no more responsible than any of the other straws.

The Asian Currency Crisis of 1997 refers to the following set of events. For ten years from 1986 to 1997, the Thai central bank had successfully pegged the Baht to the US Dollar (See Figure 1). On July 2 1997, the central bank was forced to allow the Baht to float. That put pressure on other Asian currencies, eventually bringing down the Malaysian Ringgit, the Indonesian

Rupiah, the Korean Won, and the Philippine Peso. By the end of 1997, these currencies lost between 44% to 56% of their values against the US Dollar. (See Figure 2). The devaluation basically bankrupted many Asian corporations and banks that had borrowed in foreign currencies, leading to a significant contraction in these economies.

At the height of the episode, some Asian government officials accused speculators and hedge funds of attacking the Asian currencies and causing their downfall. A public debate ensued between George Soros, the well-known manager of the Quantum Fund, and Prime Minister Mahathir of Malaysia. The International Monetary Fund (IMF) was called upon to study of the role of hedge funds in the Asian Currency Crisis. The result was a study by Eichengreen et al (1998) which was published as an IMF Occasional Paper. They examined three causes of market disruptions. One, a single large position by a trader can overwhelm a market. Two, herding by traders who mimic other traders can overwhelm a market. And three, positive feedback trading strategies by traders can overwhelm a market. Through interviews with market participants, Eichengreen et al (1998) concluded that hedge fund did not play a central role in causing the Asian Currency Crisis. This study provides quantitative support to the conclusions of Eichengreen et al (1998) by estimating the positions of hedge funds.

Another study by Brown, Goetzmann, and Park (1998) applied the idea of Sharpe (1992) to estimate the exposure of 10 currency hedge funds using monthly returns, and 2 hedge funds using weekly returns. They concluded that "net positions of major funds were not unusual during the crash period, nor were the profits of the funds during the crisis." This study uses an alternative source of data. We examined monthly returns on *all* large hedge funds that had publicly available monthly returns during 1997 and assets under management in excess of \$1 billion at the end of 1997. In addition, we estimate positions for 10 of the 27 funds that had publicly available daily and weekly returns. Our estimation procedure allows for a large set of market risk factors.

As a complement to the analysis of Eichengreen et al (1998), we compared the role of the "carry trade" in the 1992 ERM crisis to the 1997 Asian crisis. We supplement their analysis of this highly leveraged trading strategy by examining the performance of hedge funds that specialize in emerging markets as well as relevant US mutual funds with focused investments in these markets. Our results corroborate the findings of Eichengreen et al (1998) that capital withdrawals from these investment funds have a much lesser impact than the unwind of the carry trade by other financial institutions.

The paper is organized as follows. Section 2 is devoted to an analysis of the two market events: the 1992 ERM crisis and the 1997 Thai Baht devaluation. Section 3 reports on the hedge fund exposures during the crisis period based on monthly performance data. Section 4 continues the analysis using weekly and daily performance data. In section 5, we analyze these exposure estimates in other countries in the region. Section 6 is devoted to an empirical analysis of emerging market hedge funds and mutual funds. The question of potential market disruption is discussed in section 7. Concluding remarks and recommendations are presented in section 8.

2. Market Events

Ex-post analyses of market events are interesting because many valuable lessons and insights can be gleaned from these studies. We begin with the European Rate Mechanism (ERM) Crisis in 1992. This was the high profile event that sparked much of the ensuing public interest in hedge funds. It was also "the episode where hedge funds are most frequently cited as having played an important role," according to Eichengreen, et al (1998, p. 15). It is therefore tempting to hypothesize similar hedge fund involvements during the Asian Currency Crisis.³ In our view, there is a lesser known, but more important, similarity between this primarily European currency crisis and the 1997 Asian currency crisis. In both cases, it was a simple and seemingly harmless leveraged trading strategy that contributed to the disruption of currency markets in 1992 and 1997 --- the infamous "carry trade".

The "carry trade" involves borrowing from a low interest rate currency and lending to a high interest rate currency, without hedging exchange rate movements. The trader captures the interest differential if the exchange rate movement is limited to a narrow range. It is a bet that the high interest rate currency will not depreciate by more than the interest rate differential. The "carry trade" can also be executed in the forward currency market, taking a long position in the higher yielding currency and a short position in the lower yielding currency. Covered interest rate parity ensures a "positive carry" so long as the spot exchange rate movements are limited.⁴

The following analysis of the 1992 ERM crisis in Fung and Hsieh (1999b) provided a description of the "carry trade" used at that time and set forth the framework for our subsequent analysis of the Asian currencies:

The IMF (1993a, p. 8) characterized the prelude to the 1992 crisis as a "convergence play" on European monetary union: "...there was the growing perception by international investors that the member countries of the EMS were on a continuous convergence path towards European Monetary Union (EMU), under which interest rate differentials in favor of the high-yielding ERM currencies would increasingly overestimate the actual risk of exchange rate depreciation." The amounts involved in such convergence play "could have been as high as \$300 billion" (IMF, 1993a, p. 10). However, the confluence of events led to a "one-way" bet that some of the high inflation countries (e.g. Italy, Portugal, Spain, UK) would have to realign their currencies. This caused substantial capital movements, including speculative bets and the unwinding of the "convergence play", that overwhelmed European central banks, causing the UK and Italy to pull out of the ERM.

In terms of speculator activities, it was widely reported that George Soros had a \$10 billion short position on the British Pound (often referred to as "Sterling" in the foreign exchange market), and made \$1 billion for his funds during the September devaluation of the British Pound.⁵ Figure 3 graphs the daily net asset values (NAVs) of the Quantum Fund in September 1992, along

with the British Pound/DM and Lira/DM exchange rates. It shows that Quantum's NAV increased dramatically during the month, when the Pound and Lire dropped out of the ERM. To be expected, other hedge funds were active during the ERM crisis. Fung and Hsieh (1999b) provided an estimate of just under \$2 billion of short sterling position from other "large" hedge funds. To put this position in perspective, note that the UK ran a current account deficit of \$5.4 billion and a financial account deficit of \$11.4 billion in the third quarter of 1992. UK official reserves averaged around \$40 billion in 1992. A \$11.7 billion Sterling position was larger than twice the UK current account deficit, equal to its financial account deficit, and exceeded 25% of its official reserves. That was a sizeable position in Sterling.

Even in the broader context of the entire ERM, a \$11.7 billion position was sizeable. The IMF (1993a) reported that, as of August 1992, the official reserves of the seven countries involved in the ERM crisis (France, Germany, Italy, Ireland, Portugal, Spain, Sweden, and the United Kingdom) were \$268 billion. At the end of September, the official reserves of the six countries defending their currencies fell by \$17.8 billion. However, the central banks had spent more than this amount in defending their currencies. The UK issued private debt of ECU 10 billion, and Sweden ECU 11 billion, to bolster their reserve positions. This provided another \$29.4 billion of intervention. In addition, the IMF (1993a) estimated that the German Bundesbank spent another DM 92 billion, or \$53.2 billion, to support the ERM currencies. Altogether, central bank interventions in the ERM amounted to roughly \$100 billion in September 1992. The hedge funds positions amounted to 4.3% of the official reserves of the ERM central banks and 11% of the amount they spent on intervention to support their currencies.

Based on these figures, it is reasonable to conclude that the estimated \$11.7 billion short Sterling position generated a "material impact" to the exchange rate and/or the external value of the British Pound. Furthermore, it could easily have "disrupted" the currency market when cast against the backdrop of \$300 billion of "convergence" bets that had to be unwound.

However, it must be noted that hedge fund activities never figured prominently during the buildup of the "convergence" bets. This is partly due to the fact that there were relatively fewer hedge funds that traded globally outside of traditional equity markets in the late 80s and early 90s. Indeed, to-date, hedge fund strategies are predominantly equity oriented with the US markets still ranking high on the list of preferred habitats. The more important reason was the limited supply of leverage from the banking community. During those days, extending credit lines to offshore entities on a non-recourse basis against collateral was not widely accepted by most banks. Foreign exchange trading was primarily an interbank activity. Whilst banks may act on behalf of corporate clients and traditional investment funds with well established credit worthiness, acting on behalf of highly leveraged speculative funds that are often incorporated in offshore centers was limited to perhaps a handful of funds only. Therefore, the speculative hedge funds may have "nudged" sterling over the ERM band, yet the unwinding of sizeable "carry" positions by proprietary trading books in commercial and investment banks must have pushed the higher yielding currencies a long way towards their respective ERM limits.

Before moving to the Asian Crisis of 1997, it is worth noting that hedge funds were noticeably absent from the financial news during the Mexican Peso devaluation of 1994. Figure 4 provides corroborating evidence. It graphs the daily NAV of Quantum and the Peso during December 1994. On December 22, the Peso suffered a 34.6% devaluation. Yet Quantum's NAV barely changed.

Next we contrast the events surrounding the ERM crisis to those fateful days leading to the demise of the Thai Baht in 1997. A similar characterization of the Asian Crisis in 1997 can be found in another IMF study by Eichengreen et al (1998, pp41):

"...The search for higher yield in an environment of strong regional growth, combined with the lure of the "carry trade" (see Box 2.9) led to the strong growth in bank lending flows, and a spectacular growth of Asian fixed income and foreign exchange markets during the 1990s...."

...As noted in Box 2.9, the carry trade took a number of forms, and gradually worked its way down the credit spectrum. These flows {foreign currency based funds, ibid} were invested in, first, sovereign credit, then the top-tier domestic commercial banks, followed by the lower-tier commercial banks and finance companies, gradually becoming more and more aggressive, moving into the corporate sector and then down the corporate credit spectrum....

....The behavior of domestic entities-both banks and corporates-also reflected a firm belief in the official stances on exchange rates. This is, of course, evident from the -by now- well publicized buildup of substantial unhedged lower-cost external foreign currency debt...

....Activities in local money markets-particularly in Indonesia and Thailand-is estimated to have reached a feverish pitch by mid-1996, with a commensurate deterioration in quality....

....By mid-1996 the international commercial and investment banks had built up substantial exposures in the region. Commercial and investment bank treasuries were long regional currencies from the carry trade, while their proprietary trading desks had substantial investments in, and their underwriting desks inventories of, Asia fixed-income instruments. The hedge funds played a very limited role in the fixed-income carry trade in the region over much of the period, focusing instead on more traditional long equity investments..."

While Eichengreen et al (1998) did not provide a direct estimate on the size of the "Asian carry trade", we can infer its magnitude from capital flows in Table 5. For the five affected Asian countries (Indonesia, South Korea, Malaysia, Philippines, Thailand), net private capital inflows jumped from an average of \$30.4 billion during 1990-1994 to \$62.9 billion in 1995 and \$72.9 billion in 1996. Probably most of the \$75 billion of unusual inflows in those two years were "carry trades".

Another eerie similarity is the lack of hedge fund involvement during the buildup of the very one-sided market in Europe during 1992 and in Asia

during 1995/6. In fact as noted in Eichengreen et al (1998, pp 44), the first episode of notable pressure on the Thai Baht stemmed largely from international commercial and investment banks unwinding their carry trades around July, 1996. It was not until the peak of the Thai Baht crisis in June of 1997 that Eichengreen et al (1998) reported significant hedge fund activities being observed by market participants. What this tells us is that speculative hedge funds did not participate during the buildup phase of the carry trade in Asia. Of the fateful \$26 billion forward position in short US\$/long Baht carried by the Thai central bank, market participants attributed \$7 billion to Global/Macro hedge funds absorbing the other side of the transaction. In the next section, we provide an alternative quantitative estimate of hedge fund exposures based on performance data around that period.

3. Monthly Analysis of Large Hedge Funds

Fung and Hsieh (1999b) identified 27 hedge funds and CTA funds with assets under management exceeding \$1 billion at the end of 1997, using the databases from Tass, Republic, Barron's listing of the MAR Hedge and CTA databases, and the internet information put out by Micropal and Nelson.⁶ These funds had combined assets of \$55.5 billion under management.⁷ Fung and Hsieh (1999b) used principal component decomposition to group these funds into four categories: Global/Macro funds (12), CTA funds (3), emerging market funds (1), and market neutral funds (11).

Table 1 provides the monthly returns of these funds in the second half of 1997. It shows that most Global/Macro hedge funds had sizable gains in July 1997, when the Thai Baht devalued 23%. Stanley Druckermuller, who headed the daily operations of the Quantum Fund, confirmed the existence of short positions in the Thai Baht and Malaysian Ringgit in a Wall Street Journal (September 5, 1997) interview. The position sizes were not disclosed. The financial press assumed that the short position was large. For the month of July, Quantum gained 11.4% while the Thai Baht fell 23%. Given Quantum's assets of \$5 billion in June 1997, a \$3 billion short position in the Thai

Baht would have been needed to generate an 11% return.

However, it would be naïve to think that a sizeable fund like Quantum had no other position in its portfolio. One needs to adjust for the effect of these other positions on performance in order to arrive at reasonable estimates of exposure. In particular, the US equity market had large gains during the second half of 1997, as shown in the table. It turned out that the monthly returns of large hedge funds were more correlated with the US equity market, as measured by the S&P 500 index, than with Asian currencies.

To demonstrate this point quantitatively, we ran regressions of the returns of the 27 funds against the rates of change of the Thai Baht and the S&P, jointly, for the last 6 months of 1997. The S&P was statistically significant and positive in 17 of the regressions, while the Thai Baht was statistically significant and negative (indicative of short positions) in only 4. Furthermore, in the 17 regressions where the S&P was significant, the average R^2 was 65%. This shows that the S&P was a stronger determinant of fund returns in the second half of 1997, much more so than the Thai Baht. The evidence from monthly returns of large hedge funds gave no indication of large short positions in the Thai Baht.

4. Daily and Weekly Analysis of 12 Large Hedge Funds

Hedge funds are known to be nimble and may change their positions frequently. Monthly returns, therefore, may not allow for accurate position estimates. Of the 27 large funds, we collected daily and weekly returns for 12 funds (10 Global/Macro funds and 2 CTA funds) from publicly available sources, such as the Financial Times, the International Herald Tribune, the Republic database, Bloomberg and Reuters. These high frequency returns provide many more observations to check our findings based on monthly returns. Take the case of Quantum. Figure 5 graphs Quantum's daily NAV from May 29 to Sep 30, 1997, along with the Thai Baht and the S&P 500 index. It shows that Quantum's performance was much more closely correlated with the S&P 500 index.⁸ This point is even more forcefully made in Figure 6, showing that

Quantum was long the US stock market throughout 1997. Once we accounted for Quantum's underlying exposure to the US stock market, roughly equal to 100% of its capital, the 8% rise in the S&P explained the lion's share of Quantum's 11.4% gain in July. A few words on the estimation procedure is in order.

The higher frequency returns allow us to estimate positions in a more precise manner using multivariate regression. The idea is similar to Sharpe (1992) and Brown, Goetzmann, and Park (1998). We began with a large number of assets markets in which Global/Macro funds and CTA funds trade: US stocks, European stocks, Japanese stocks, Asian stocks, US bonds, European bonds, Japanese bonds, three major currencies (British Pound, Deutsche Mark and Japanese Yen, all against the US Dollar), and four Asian currencies (Thai Baht, Malaysian Ringgit, Indonesian Rupiah, and Korean Won). Using a step-wise regression approach, we regressed the returns of each fund against these markets and sequentially omitted markets which did not have a statistically significant regression coefficient. In addition, we varied the sampling interval for these regressions, allowing for discrete position changes.

Using this procedure, we obtained position estimates for each fund over the second half of 1997. An example is in Table 2, which provides the estimated positions of the Quantum Fund. There were multiple exposures at any given time. For the purpose of our inquiry, we aggregated the positions in each of the Asian currencies across all funds. They are given in Figures 7 to 10.

In the Thai Baht (in Figure 7), we estimated that the 12 large hedge funds had a net short position just shy of \$5 billion at the end of June 1997. It dropped below \$3 billion on July 8, and was below \$2 billion by July 30. For the remainder of 1997, the group as a whole held both long and short positions in the Thai Baht several times, but never exceeding \$2 billion in either direction. The decline in the short position in July also indicated that the 12 hedge funds, as a whole, did not use positive feedback trading strategies. Our estimates indicated that hedge fund involvement during the July 1997 Thai Baht episode was smaller than the \$7 billion reported in

Eichengreen et al (1998).

5. Malaysia, Indonesia, Hong Kong, and Korea

The devaluation of the Thai Baht triggered a series of currency crises in the region. Once again, rumors of hedge fund activities figured prominently in the popular press. An excellent summary of the events can be found in Eichengreen et al (1998, pp. 49). The role of hedge funds in the Asian crisis is outlined in the following passage:

"....The hedge funds have been singled out as having played an important role in the onset of the Southeast Asian currency crises. It would appear, however, that they were only one among the groups of investors in the broader dynamic that unfolded and do not appear to have played a critical role-either as leaders or by cornering markets. While several hedge funds together took positions against the baht, the majority of these positions appear to have been taken when other major investor groups had already begun to get out of the speculative attack on the baht.

....The Thai baht is the only currency on which the hedge funds appear to have collectively taken a short position. The one other simultaneous buildup of hedge fund positions appears to have been on the Indonesian rupiah. These positions, were, however, taken after its initial depreciation and were long position, reflecting the view that the rupiah had overshot, and the expectation that it would appreciate...

....It appears that only a few of the hedge funds took modest positions for short periods, at different points in time, on the Malaysian ringgit..."

These findings are, of course, in direct contrast to news headlines, particularly in light of the sharp exchanges between George Soros and Prime Minister Mahathir of Malaysia. Here, we report our empirical estimates of hedge funds exposures to these currencies. Repeating the process we performed on the Thai Baht, first using monthly returns, then daily and weekly returns.

For each of the 27 large hedge funds, we regressed their monthly returns on the S&P and the Malaysian Ringgit during the second half of 1997. The S&P was statistically significant in 15 large hedge funds, while the Ringgit was significant and negative (indicative of short positions) in only 3 large hedge funds. There was one additional case where the Ringgit was significant and positive, indicating a long position. In the regressions with both the S&P and the Indonesian Rupiah, the results were 18 to 3, respectively. In the regressions with both the S&P and the Korean Won, the results were 18 to 0, and there were additional 3 cases when the funds were long the Korean Won. These results are in agreement with those of Brown, Goetzmann, and Park (1998), that there is no strong evidence that large hedge funds were heavily shorting Asian currencies in the second half of 1997.

Next we report the aggregate position estimates using weekly and daily data for 12 large hedge funds. In terms of the Malaysian Ringgit (in Figure 8), the 12 large funds had both long and short positions from July to December 1997. However, the position did not exceed \$2 billion in either direction. In terms of the Indonesian Rupiah (in Figure 9), they were on average long \$100 million. For the Korean Won (in Figure 10), there was one period in August 1997 when they were short \$3 billion Won. These positions are broadly in line with the qualitative results of Eichengreen et al (1998).

The analysis of Hong Kong required a different approach. The Hong Kong Monetary Authority was able to keep the Hong Kong Dollar pegged to the US Dollar. Therefore using movements of the Hong Kong Dollar to infer hedge fund positions did not provide useful insights. Another approach is called for. The following "telling" passage from Eichengreen et al (1998, p.51) provided important clues:

"... A popular account of the turmoil in Hong Kong SAR's financial markets was that a number of large investors, and in particular the macro hedge funds, took small positions against the Hong Kong dollar- 'attacking it a little'-but aware of the HKMA's commitment to the peg, predicted a sharp increase in interest rates, and took much larger short

positions in interest rate sensitive instruments, and in particular the equity market. However, there does not appear to be any evidence of a concerted strategy by any group of investors to simultaneously short the Hong Kong dollar and equity markets. While the sell-off in equity markets occurred in late October, a majority of the short positions on the equity market using futures index contracts would appear to have been taken much earlier—in July. These short positions appear to have been taken as a hedge against other long positions, as the market headed towards its all-time high in August. These short positions also appear to have been maintained—at roughly the same level—well after the sell-off in equity markets, with few if any holders of the short positions taking profits as markets fell, and the bulk of futures contracts expiring at end-October being rolled over into November. Neither was there any evidence of a concentration of positions. With regard to direct short sales of equity, during the period of turmoil, short-selling transactions contributed to less than 3 percent of total market turnover, suggesting little basis for believing that short-selling was an important contributor to the significant decline in the market. An important point with regard to the logic of a strategy of simultaneously short selling the currency and equity markets that should be noted is that a foreign investor shorting the equity market needs to put up local currency carry (that represents a long local currency position), which offsets any short foreign exchange position. This effectively lowers the returns and raises the risks from a two-pronged strategy in the event the attack on the currency does turn out to be successful."

This excellent summary provided anecdotal evidence to popular rumors of speculators shorting the Hong Kong stock market as an alternative to attacking the currency (*Euromoney*, September 15, 1997, p. 99). It also pointed to the multifaceted nature of speculative trading in modern capital markets and how easy it is to misinterpret events if one only considers a part of the total picture.

It is a challenge to estimate the Asian equity positions of large hedge funds, since the world stock markets were declining together for most of this period. Focusing on the specific events in question, we analyzed the largest decline in the Hong Kong market. During the period October 3 to October 28, the Hang Seng index dropped 40.1% from 15,128 to 9,060. However, in the position estimates from the daily and weekly data for 12 large hedge funds, we found only one fund with a short position in Asian stocks. It was short \$4.8 billion from October 1 to October 16, and then \$3.5 billion from October 17 to October 24. This particular hedge fund is known to take position in global equity markets on a "relative value" or "long/short" basis. For instance, during this same period, we found long exposures in other equity markets, such as the U.S., as well as short equity positions, such as Japan.

There is no evidence that the large hedge funds were pressuring the Hong Kong market as an isolated target for speculative attack. An alternative interpretation of the rumored activities of large hedge funds could be selective extractions from portfolio activities of these funds, used to aid the activities of other speculators. This incident raises another troublesome aspect of analyzing activities of hedge funds during these events. The central question is "At what point does hedging activities end and pure speculative attacks begin?" In the next section, we analyze the activities of hedge funds that specialize in emerging markets. Their activities, if taken out of context, can be construed as speculative attacks on Asian currencies.

6. Analysis of Emerging Market Specialty Funds

Another group of funds that we analyzed are those hedge funds that specialize in emerging markets, particular Asian emerging markets. These hedge funds are primarily engaged in long and short positions in Asian equities and bonds. While these funds are much smaller than the large hedge funds analyzed in the previous sections, their concentrated activities may result in position sizes that are comparable to the large hedge funds with more diversified activities.

For this purpose, we use two monthly return performance indices calculated by Hedge Fund Research (HFR) for hedge funds: hedge funds that invest in diversified emerging markets (called "diversified hedge funds" for short) and those that invest in Asian emerging markets (called "Asian hedge funds" for short). To contrast these funds' performance, we also included comparable US mutual funds, using two monthly return indices compiled by Lipper Inc: US mutual funds that invest in diversified emerging markets (called "diversified mutual funds" for short) and those than invest in Pacific excluding Japan (called "Pacific ex-Japan mutual funds" for short). The number of funds and their assets under management at the end of 1996 and 1997 are provided in Table 3.

Diversified Emerging Market Mutual Funds and Hedge Funds

Table 4 shows that both diversified (emerging market) mutual funds and hedge funds have strong correlation to the ING/Barings Emerging Market Index. During the second half of 1997, diversified mutual funds have a correlation of 0.97 with the US Dollar returns of the Barings Emerging Market Index, and the average beta is 1.02. Extending the sample further back in time leads to essentially the same conclusion. The evidence suggests that this group of mutual funds did not hedge against currency fluctuations. To corroborate this result, we found that diversified mutual funds had no correlation with any of the four Asian currencies: Thai Baht, Malaysian Ringgit, Indonesian Rupiah, and Korean Won, beyond the correlation with the ING/Barings Emerging Market Index.

Over the same period, diversified hedge funds have a correlation of 0.71 with the US Dollar returns of the ING/Barings Emerging Market Index, with an average beta of 0.42. The lower beta has several possible explanations.

(a) It can result from currency hedging. However, we found no correlation with the four Asian currencies beyond the correlation with the ING/Barings Index.

(b) It can result from country bets (or tilts) away from the Barings

Index. We found no obvious evidence of this also, as none of the Asian equity markets had any significant explanatory power beyond the Barings Index.

(c) It can result from investments in Asian bonds rather than Asian equities. This, however, is also not likely because we found no correlation with the J.P. Morgan Brady Bond Index or the J.P. Morgan Emerging Market Local Bond Index, beyond the correlation with the Barings Index.

(d) It can result from long/short positions in equity. There is no direct way to test this. In light of a less than fully developed "repo market" for equities, outright short positions in emerging market equities are often difficult to establish. Consequently, most specialist Asian hedge fund managers retain a long bias (a beta between 0 and 1) in the markets.

(e) It can result from market timing, that is, shifting between equities and cash.

In our view, long/short positions in (d) and market timing activities in (e) are the most likely explanations of the behavior of diversified hedge fund returns.

US-Based Asia Emerging Market Mutual Funds and Hedge Funds

Over the second half of 1997, Pacific ex-Japan mutual funds had a correlation of 0.98 with the US Dollar return of the Morgan Stanley Asia Pacific Ex-Japan Index, with an average beta of 1.08. This indicates that Asian mutual funds did not hedge currency fluctuations. To corroborate this result, we found that Asian market mutual funds had no correlation with any of the four Asian currencies: Thai Baht, Malaysian Ringgit, Indonesian Rupiah, and Korean Won, beyond the correlation with the Morgan Stanley Index.

Over the same period, Asian hedge funds had a correlation of 0.91 with the ING/Barings Asian Emerging Market Index, with an average beta of 0.35. There was no correlation with the four Asian currencies beyond the correlation

with the Barings Index. There was no obvious evidence of country bets or tilts. There was also no correlation with Brady bonds or with Asian local bonds. Thus, the low value of beta is consistent with long/short positions in Asian equities and market timing activities.

In conclusion, we found no collaborating evidence of Asian hedge funds and US-based mutual funds carrying significant short positions in Asian currencies. In addition, Post and Millar (1998) found no panic among US emerging market funds; in fact, they made positive net purchases in Asian equities. However, we have not been able to investigate rumors of significant capital withdrawals from the region's equity markets by European fund managers.

7. Market Disruption

In this section, we address the three mechanisms of market disruption in Eichengreen et al (1998).

Did hedge funds have a large position in Asian currencies? We estimated that the 12 large hedge funds had a \$5 billion short position on the Thai Baht in July 1997. For the four Asian currencies (Rupiah, Won, Ringgit, and Baht), the aggregate short positions of 12 large hedge funds never exceeded \$6 billion.

Relative to the assets under management in 12 large hedge funds, estimated to be \$30 billion in June 1997, these positions were certainly small. These funds were clearly not "betting the ranch" on Asian currencies.

These positions were also small relative to the size of official reserves. In the fall of 1997, Thailand certainly had sufficient foreign exchange reserves to neutralize a \$5 billion bet against the Baht. Thai official reserve had been consistently above \$36 billion from January 1996 through April 1997, then declined to \$32.3 billion in May 1997 and to \$31.4 billion in June 1997. For the five affected Asian countries (Indonesia, Korea, Malaysia, Philippines, and Thailand), official reserves were in excess of \$122 billion in June 1997.

However, there were substantial sales of Baht and other Asian currencies in the fall of 1997. The amounts appeared to be much larger than the short positions of large hedge funds. The sales of Asian currencies can be inferred from the net private capital flows of the five affected Asian countries. Table 5 shows a \$32.3 billion reduction of bank lending in 1997, an amount five times larger than the hedge fund short positions. This was offset by positive inflows in direct investments and portfolio investment, resulting in net capital outflows of \$11 billion. The capital outflows could have been even larger, because 'errors & omissions' jumped to an outflow of \$19.5 billion in 1997, \$10 billion higher than the previous two years.

The sales of Asian currencies can also be inferred from the reserve losses of the five affected Asian countries, reported in IMF (1998) to be \$36 billion in 1997. Actual intervention probably was much larger than this figure, since the loss of reserves did not reflect forward transactions of Asian central banks, as reported in Eichengreen et al (1998).

The evidence indicates that the \$6 billion short Asian currency position in large hedge funds coincided with a much larger capital outflow. While the hedge fund position could have been the last straw that broke the camel's back, the evidence shows that there were many "non-hedge fund straws" that preceded them.

Did hedge funds use positive feedback trading strategies in Asian currencies? Figure 11 provides the aggregate positions of the 12 large funds in all four Asian currencies. There is no evidence of positive feedback trading. Otherwise, we would have observed larger and larger short positions being put on as the Asian currencies continued their decline from July through December 1997.

8. Concluding Remarks

It is beyond doubt that excessive speculation, in the form of the Baht carry trade (made possible by an unsustainable fixed exchange rate regime) and the subsequent stampede to head for the exits, along with the forward

intervention of the Thai central bank that opened the door to short Baht positions by speculators, led to the Asian Currency Crisis of 1997. However, having examined the evidence, one comes away with the impression that no single group of speculators stood out as the culprit that brought about the crisis. Many players took active, but different, roles in this saga.

There is one more issue to address: Did hedge fund short positions herd other investor to flee the Asian carry trade?

To answer this question, it is important to remember the events that led up to the crisis. The Asian Currency Crisis of 1997 was much reminiscent of the ERM Crisis of 1992. Substantial amounts of "carry trades" were involved in the buildup of both crises. These carry trades allowed domestic corporations and banks to borrow in foreign currencies at lower interest rates. As long as the domestic currency did not depreciate, the foreign currency loans represented a cheap source of funding.

In the end, the carry trade was an unsustainable equilibrium. By fixing the exchange rate, the central bank was indirectly paying a risk premium to foreign investors to support domestic funding needs. However, when these foreign "lenders" are themselves highly leveraged institutions such as proprietary desks from investment banks (and occasionally leveraged domestic corporations) the resultant equilibrium, even while it lasted, was at best tenuous. This leveraged "carry trade" amounted to financing long-term foreign currency needs of the domestic economy from leveraged short-term speculators. The long-term merit and economic rationale of running what is essentially an asset/liability mismatched position is best deferred to another occasion. What is clear is that there will be periodic funding crisis whenever adverse fundamental economic factors emerge around rollover dates of these funds. Speculative foreign "lenders" can be myopic and, when they smell trouble, they will flee the local market. When this occurs, the existence of a "lender of last resort", irrespective of the economic motivation, should be considered as a solution not a problem.

In July 1997, for whatever reason, some foreign lenders decided to

unwind their carry trades in Thailand. They sold Baht/bought Dollars in the spot market, putting tremendous pressure on the Baht. The Thai central bank had two options. Either it could supply the Dollars in the spot market to facilitate the unwinding (thus draining its official reserves), or it could postpone this by arranging forward Dollar sales (thus conserving reserves) with commercial banks.

To understand the effects of the forward transactions, note that the commercial banks that did this transaction with the Thai central bank were buying Dollars/selling Baht forward. They would typically sell Dollars/buy Baht in the spot market, rolling the position until the forward contract expires. That would in fact supply the much needed Dollars to unwind the carry trades. Thus, the forward transactions of the Thai central bank was basically a short-term financing operation to borrow Dollars.

The commercial banks that engaged in the forward transaction with the Thai central bank now had two problems. One, they had to manage the currency risk of that position. Two, their long Dollar/short Baht forward trade has a negative carry, since they were long a lower yield currency and short a higher yield currency. It was, therefore, natural for these commercial banks to look for counterparties to absorb the offsetting transaction. Presumably, this was how large hedge funds came to accumulate a \$5 billion forward position against the Baht in a short period of time.

Clearly, the Thai central bank was betting that the pressure on the Baht in the spot market would subside. When that happens, it would be able to close out the forward transactions at a profit. Since the central bank was long Baht/short Dollar, it was long the "carry trade" and stood to benefit from the interest differential. By being on the other side of this trade, speculators (including some large hedge funds) had a negative carry position. They paid the interest differential, for the privilege to make a profit if a large devaluation took place. Given that the interest differential was small, this amounted to a low cost bet against the Thai Baht.

In the end, both sides were "speculating." The Thai central bank was

speculating that the foreign currency loans could be rolled over. The speculators were betting that it would not happen. The Thai central bank had been correct in the past, but it was wrong this time. This is the nature of selling catastrophe insurance policies. Often the insurer is "right" - the catastrophe does not happen and the insurer collects the premium. Periodically the catastrophe comes to pass and the insurer is faced with sizeable claims. The Thai central bank was writing insurance policies against a devaluation in the Baht. The catastrophe happened in July 1997.

Did hedge funds play a role in the crisis? Of course they did. Did hedge funds cause the crisis, by herding investors to flee the Asian carry trade? The answer had to be no. Hedge funds were only able to accumulate their forward positions because the central banks were engaging in forward interventions. That meant that hedge funds arrived after the start of the unwinding of the carry trade, not before. Thailand was funding long-term domestic investments with short-term foreign currency loans. It was unable to roll over these short term debts. This type of liquidity crisis happens to individuals, corporations, and entire countries. In fact, Long-Term Capital Management (LTCM) was also engaged in various forms of "carry trades", albeit in different markets. LTCM's troubles in October 1998 could also be characterized as a liquidity problem, when counterparties refused to "roll over" its carry positions. Just as the 1992 ERM Crisis replayed itself in a different form in 1997, history continued to repeat itself in 1998. The commonality appears to be highly leveraged carry trades that ultimately exceeded the market's capacity to absorb adverse economic events.

Our findings showed that hedge funds were not the main culprits in the 1997 Asian Crisis. Their speculative bets against the Asian currencies were small compared to the unwinding of leveraged carry trades by many market participants, including investment banks, commercial banks and corporations. If the strategy, not the trader, is the problem, then it is unclear whether new regulations on hedge funds are warranted or necessary. A comment on our methodology is in order here. Our estimates of hedge fund positions are based

on a limited number of observations, which is unsatisfactory from a statistical perspective. However it must be noted that if a limited number of observations during stressful market conditions cannot bias us into concluding very significant hedge fund involvements, it is unlikely that using a larger number of observations which ultimately must take us further away from the "fateful events" would lead us to conclude otherwise.

On the one hand, regulators already oversee the "main" supplier of leverage to hedge funds-- namely the banks. They can and have issued guidelines on conducting business with "Highly Leveraged Institutions"; see Bank for International Settlements (1999a, 1999b). On the other hand, it is far from clear how effective regulations can be enforced upon offshore hedge funds, and how onshore hedge funds can be singled out among leveraged traders. In addition, there is little empirical justification for doing so. What we can see is the need for collecting and disclosing aggregate market positions of large participants (banks and hedge funds alike) in potentially disruptive trades by an impartial regulating body. This would allow market participants to observe the large build up of positions on one side of the market. The possibility of a market disruption when everyone stampedes to the exits may deter speculators from adding more positions. That, to us, appears to be a useful initial step to the design of an early warning system.

Finally we believe that there are valuable insights to be gained by monitoring hedge fund trading strategies. Hedge funds are nimble and can jump on developing trends quickly. By following their footprints, regulators may get some early warnings about the next likely trouble spot in the world financial markets. For example, at the peak of the Asian markets rally in 1996, there were scattered reports on a variation of the Thai Baht carry trade being executed by hedge funds. Apparently, confidence in the "Asian Economic Miracle" was so rampant that out-of-the-money puts on the Baht were cheap, in the sense that speculators were able to secure these protective puts and still maintain a positive carry by being long the Baht. As pointed out in Fung, Hsieh, and Leitner (1993), the implied volatility of these protective puts is

indicative of the market's assessment of devaluation risk. Therefore, by observing these risk parameters, one can get a sense of the complacency of the market.⁹

However, we do not subscribe to the approach of extracting trading positions or exposures from hedge funds directly through regulations. We simply do not see the value in tracking dynamic trading positions. In addition, hedge funds are secretive organizations. More than likely they would disguise their positions to "outsiders," counterparties and regulators alike, by using a wide variety of instruments to achieve the same underlying bet. As we have argued here, it is the convergence of speculative bets (or strategies) that is the danger for markets. The instrument of choice to achieve the exposure is secondary. What we have developed is a methodology to estimate the "essence" of the "bet" by observing hedge fund returns. This approach is unobtrusive and does not involve complex disclosure issues. However, to achieve the desired result, a complementary monitoring effort must be put in place, involving commercial and investment banks. Regulators should obtain from the banking communities exposures to key risk factors in terms of gross positions unadjusted for the bank's own risk management aggregates. Risk factors can be defined at aggregated levels such as specific bond spreads, or option volatility of credit spreads. No counterparty information is necessary at this stage. It is only when "opinion" or "bets" among hedge funds coincide with exposures to the same risk factors among banks, then precautionary actions are called for. Therefore this process avoids difficult to obtain disclosures of potentially unuseable position information from hedge funds. At a sufficiently aggregated level, it is unnecessary to extract uncomfortable details of counterparty information from banks without affecting the objective of establishing an early warning system.

In conclusion, it is the monitoring of hedge fund strategies and not hedge funds per se that can yield helpful policy insights. They can provide a window for early detection of potentially dangerous risks being adopted by the "market" as a whole. Ironically, directly regulating hedge funds may have the

adverse effect of inviting them to disguise their activities, making early detection of "one way bets" even harder to achieve.

Footnotes:

1. For a description of hedge funds, see Fung and Hsieh (1999a), and Eichengreen et al (1998).
2. See Fung and Hsieh (1999b) for details.
3. Note, however, that hedge funds were conspicuously absent from the Mexican Peso Crisis of 1994.
4. See Fung, Hsieh and Leitner (1993) for an outline and empirical analysis of this "positive carry" strategy.
5. See *Forbes*, Nov. 9, 1992, p. 40-42.
6. Some managers operated multiple funds using identical strategies that had combined assets exceeding \$1 billion. In these cases, we aggregate the assets of all funds into the largest fund.
7. At the end of 1997, Tass had 875 hedge funds with assets of \$94 billion, and 299 CTA funds with assets of \$18 billion. Our sample of 27 large hedge funds and CTA funds controls 49.5% of the assets in this industry. This means that the rest of the funds are very small. Only the large funds have access to lines of credit to allow them to trade in the over-the-counter markets. The smaller funds would exert very little impact.
8. Regressing Quantum's daily return on the returns of the S&P and Thai Baht from July 2, 1997 (when the Baht first devalued 7%) to the end of July, we found that the S&P was highly significant but not the Baht. The same was true for the Ringgit, Rupiah, and Won.
9. There were rumors of a similar put in the Russian GKO just before the 1998 Russian default.

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Table 1
Returns of Large Hedge/CTA Funds: Jul-Dec 1997

	Jul	Aug	Sep	Oct	Nov	Dec
Market:						
THB	-23.0%	-7.3%	-6.2%	-13.0%	1.9%	-19.6%
MYR	-4.5%	-10.6%	-11.4%	-5.0%	-3.0%	-10.2%
IDR	-7.5%	-12.8%	-10.8%	-10.2%	-1.2%	-50.7%
KRW	-0.2%	-1.4%	-1.4%	-5.5%	-21.4%	-44.5%
S&P	8.0%	-5.6%	5.4%	-3.3%	4.6%	1.7%
IFC	1.6%	-10.8%	0.5%	-15.2%	-5.7%	0.4%
BARASI\$	-0.6%	-18.1%	-8.6%	-20.5%	-11.7%	-7.2%
BARTHAL	31.0%	-29.0%	13.5%	-22.6%	-14.7%	-10.2%
BARMALL	-4.9%	-19.8%	0.7%	-17.0%	-21.6%	18.4%
BARINDL	-2.8%	-32.7%	17.0%	-5.5%	-21.3%	-1.2%
BARKORL	-3.3%	-2.9%	-9.1%	-27.9%	-5.8%	4.9%
Global/Macro:						
1.	2.4%	-0.1%	1.7%	-0.3%	0.3%	1.7%
2.	11.4%	2.8%	9.4%	10.4%	5.1%	7.2%
3.	6.9%	0.1%	4.9%	0.8%	0.5%	1.5%
4.	10.1%	-1.9%	1.5%	3.8%	1.8%	5.9%
5.	6.5%	-2.0%	3.7%	-5.8%	-0.4%	n.a.
6.	11.4%	-7.4%	4.6%	-10.6%	2.5%	3.9%
7.	10.3%	-6.7%	2.0%	-11.8%	0.9%	-4.4%
8.	13.6%	-8.2%	-3.9%	-15.7%	5.1%	12.0%
9.	9.2%	-5.9%	0.4%	-15.1%	5.8%	7.4%
10.	7.3%	-3.4%	3.0%	-7.4%	4.2%	2.0%
11.	21.7%	12.1%	0.3%	1.5%	1.5%	10.5%
12.	9.6%	-0.8%	8.5%	-1.2%	1.2%	7.1%
CTA:						
1.	6.2%	-8.0%	5.0%	-2.3%	1.7%	4.8%
2.	6.8%	-10.2%	6.5%	-.6%	9.8%	1.5%
3.	15.8%	-3.7%	2.2%	2.0%	2.5%	2.9%
Emerging Market:						
1.	3.3%	-7.6%	3.3%	-13.6%	-2.3%	2.4%
Market Neutral:						
1.	1.5%	1.1%	1.3%	1.0%	1.2%	1.0%
2.	8.7%	-2.8%	1.8%	-1.0%	1.5%	7.5%
3.	0.5%	-0.1%	1.9%	1.1%	1.2%	0.0%
4.	-1.7%	2.8%	0.3%	-0.8%	-8.9%	-2.4%
5.	1.2%	0.9%	0.3%	0.3%	0.3%	-0.2%
6.	1.0%	0.7%	3.5%	0.3%	-0.8%	2.4%
7.	2.2%	-1.3%	4.1%	0.9%	2.3%	3.6%
8.	0.4%	4.1%	1.5%	0.7%	3.4%	1.4%
9.	2.8%	1.9%	na	na	na	na
10.	4.3%	2.4%	-0.8%	-3.2%	3.7%	2.4%
11.	16.5%	7.4%	15.6%	6.0%	1.3%	na

Table 2
Estimated Positions of the Quantum Fund

Begin Date	Currencies								
	BP	DM	JY	SF	THB	MYR	IDR	TWD	KRW
7/ 1/97		-80%	59%						
7/11/97				-66%	-4%	-10%			
7/18/97				-66%	-4%				
8/ 6/97									
9/23/97			-25%						
10/ 2/97									
11/ 7/97									
12/ 1/97									
12/ 3/97	-65%								
12/15/97	125%			-119%					

Begin Date	Bonds				Equity Indices			
	US2Y	Bund	JGB	Emg Mkt	S&P	Eur.	Japan	Asia
7/ 1/97					94%			
7/11/97					70%			
7/18/97					70%			
8/ 6/97					61%	54%	28%	
9/23/97					61%		28%	-102%
10/ 2/97	-286%		-122%		107%			
11/ 7/97		-189%		57%	70%			
12/ 1/97	-286%		-122%	20%	70%			
12/ 3/97				20%	70%			
12/15/97				20%	70%			

Begin Date	Commodity	
	Gold	Crude Oil
7/ 1/97		
7/11/97		
7/18/97		
8/ 6/97		19%
9/23/97		19%
10/ 2/97		
11/ 7/97		
12/ 1/97		
12/ 3/97		
12/15/97	-42%	

Table 3
Number and Assets of Specialty Funds

	1996		1997	
	#	AUM (\$b)	#	AUM (\$b)
HFRI Hedge Fund indices:				
Emerging Market	105	8.2	110	12.0
Emerging Market Asia	38	2.3	31	1.8
Lipper US Mutual Funds:				
Emerging Market	116	15.6	151	19.6
Pacific Ex Japan	76	9.8	82	4.3

Table 4
Return of Emerging Market Funds: Jul-Dec 1997

	Jul	Aug	Sep	Oct	Nov	Dec
Market:						
THB	-23.0%	-7.3%	-6.2%	-13.0%	1.9%	-19.6%
MYR	-4.5%	-10.6%	-11.4%	-5.0%	-3.0%	-10.2%
IDR	-7.5%	-12.8%	-10.8%	-10.2%	-1.2%	-50.7%
KRW	-0.2%	-1.4%	-1.4%	-5.5%	-21.4%	-44.5%
BARBEM	1.9%	-10.0%	0.2%	-17.1%	-2.2%	2.4%
BARASI	-0.6%	-18.1%	-8.6%	-20.5%	-11.7%	-7.2%
JPMBBRD	4.7%	-1.0%	3.3%	-10.6%	5.2%	3.2%
HFRI Hedge Fund Indices:						
Emg Mkt	4.6%	-2.1%	0.6%	-8.0%	-3.9%	1.3%
Asian	2.6%	-2.8%	-4.4%	-7.0%	-2.7%	-1.9%
US Mutual Funds						
Emg Mkt	2.9%	-11.0%	3.6%	-16.7%	-4.6%	0.9%
Pacific Ex Japan	2.3%	-15.3%	-1.3%	-25.2%	-3.5%	-2.6%

Table 5
 Net Capital Flows to Asian Emerging Markets
 (in \$ billions)

	1990	1991	1992	1993	1994	1995	1996	1997
Asia Emerging Markets:								
Net private capital inflows	19.1	35.8	21.7	57.6	66.2	95.8	110.4	13.9
Hedge Fund inflows**	na	na	na	na	0.5	1.8	-0.3	-0.5
US Mutual Fund inflows***	na	na	na	na	na	na	1.9	-3.7
Changes in Reserve Assets	47.4	45.9	6.9	43.0	78.3	47.7	61.4	10.7
Five affected countries*:								
Net private capital inflows	24.9	29.0	30.3	32.6	35.1	62.9	72.9	-11.0
Net for direct investment	6.2	7.2	8.6	8.6	7.4	9.5	12.0	9.6
Net portfolio investment	1.3	3.3	6.3	17.9	10.6	14.4	20.3	11.8
Other (Bank)	17.4	18.5	15.4	6.1	17.1	39.0	40.6	-32.3
Net external borrowing from official creditors	0.3	4.4	2.0	0.8	0.7	1.0	4.6	25.6
Errors & omissions	0.3	0.9	2.7	1.8	-4.7	-8.1	-8.5	-19.5

Source: IMF (1998), Hedge Fund Research, and Lipper Inc.

* Korea, Indonesia, Malaysia, Philippines, Thailand.

** Based on HFR's emerging market (Asia) hedge funds.

*** Based on Lipper's Pacific Ex Japan mutual funds.

Table 6
BIS Reporting Banks' Assets and Liabilities
(\$ billion)

	96-I	96-II	96-III	96-IV	97-I	97-II	97-III	97-IV	98-I	98-II
Indonesia:										
Asset	50.8	52.1	54.8	57.9	59.2	61.9	65.0	62.8	57.6	53.7
Liab	11.7	11.1	11.0	13.6	12.5	11.1	9.6	11.6	10.2	12.1
South Korea:										
Asset	91.2	98.5	101.8	109.1	112.9	118.0	115.7	103.9	87.3	83.0
Liab	29.4	31.1	28.4	29.1	32.6	35.7	34.3	41.3	45.9	43.9
Malaysia:										
Asset	19.1	23.6	26.2	25.9	31.0	32.9	33.0	29.1	26.2	24.6
Liab	15.1	17.5	17.0	17.5	18.4	17.1	13.8	13.1	14.3	15.2
Philippines:										
Asset	8.9	11.1	11.9	13.5	15.0	17.0	16.1	16.6	15.7	16.6
Liab	6.5	7.6	7.4	7.8	8.5	7.6	9.1	9.7	8.9	10.8
Thailand:										
Asset	94.5	98.0	98.9	99.3	98.3	99.5	87.8	79.7	70.8	65.0
Liab	11.7	12.0	9.0	9.0	10.0	8.7	8.7	9.8	10.9	12.3
Total:										
Asset	279.1	293.8	303.6	315.0	326.0	337.5	326.4	297.9	263.8	248.6
Liab	107.8	109.7	102.8	106.7	110.2	108.4	103.5	112.2	119.8	119.6

Source: BIS.

Figure 1: Dollars per Thai Baht: 1987-1997

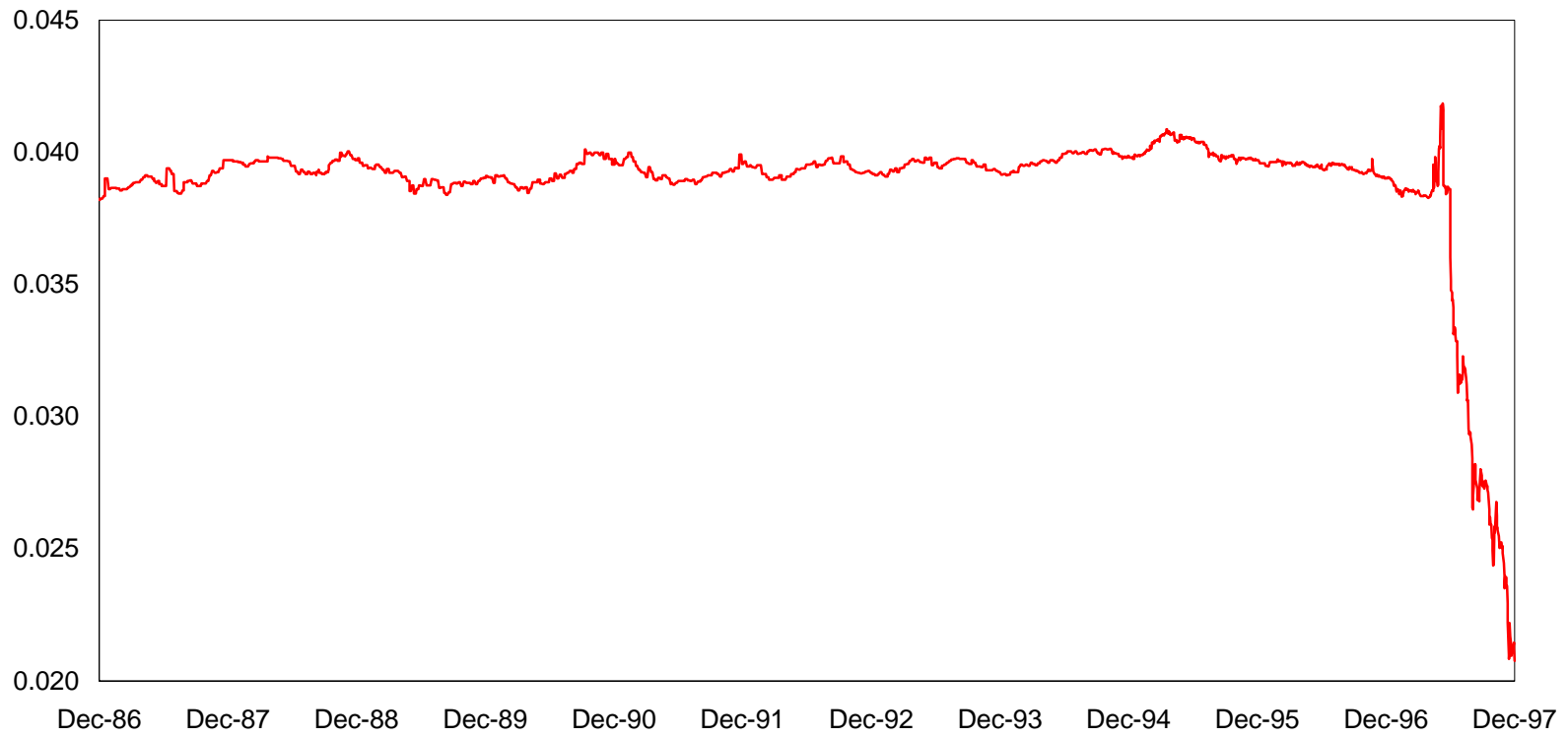


Figure 2: Asian Exchange Rates (Dec 31, 1996 = 100)

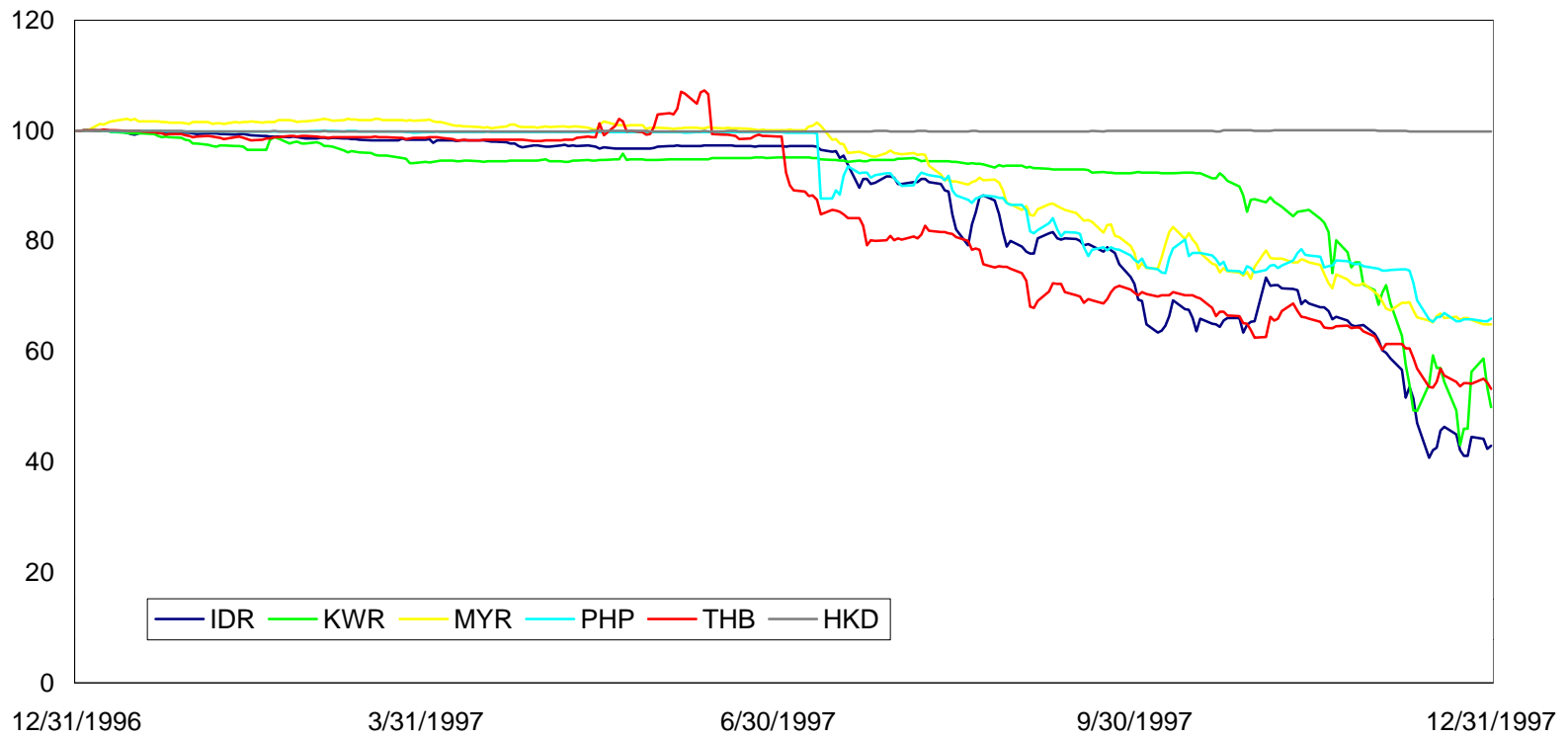


Figure 3: Quantum NAV Vs the Pound/DEM & the Lira/DEM (8/31/92 = 100)

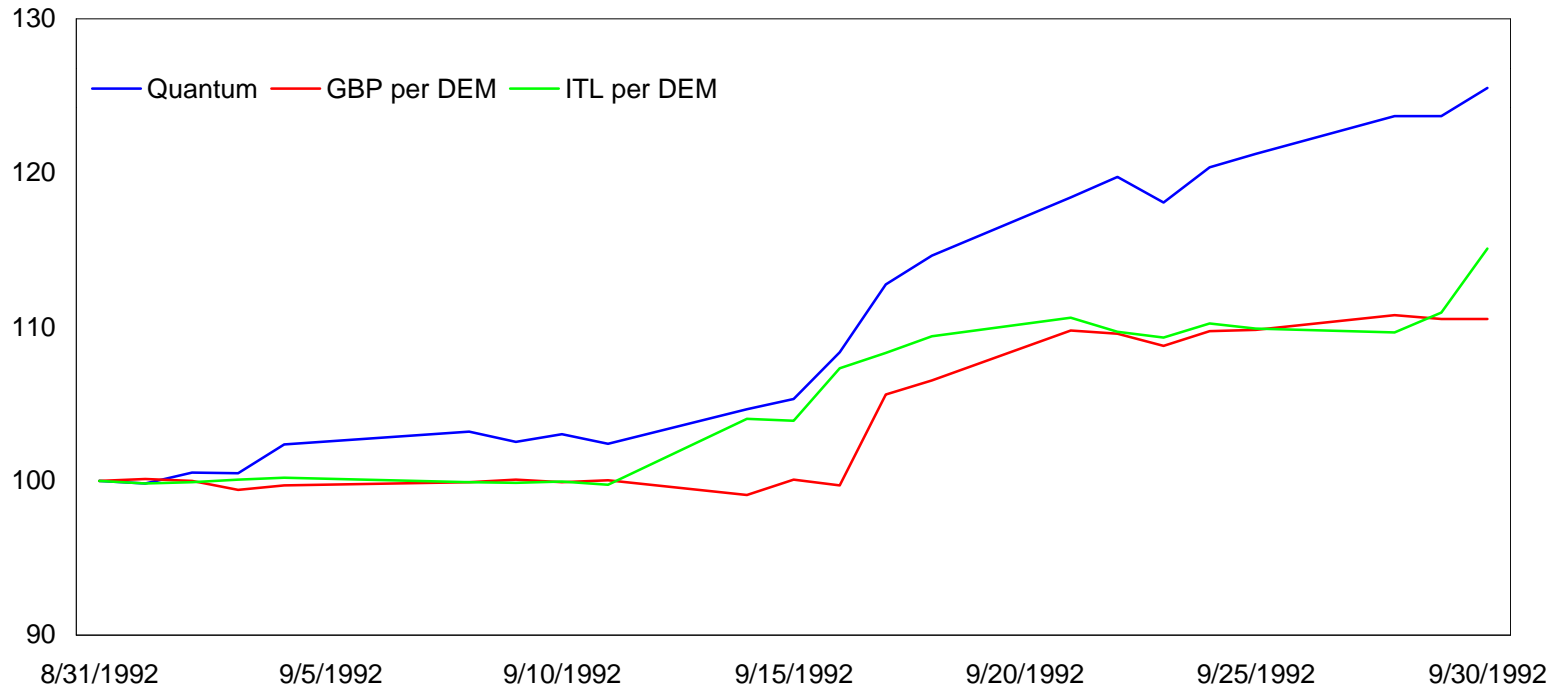


Figure 4: Quantum NAV and Mexican Peso (9/30/94 = 100)

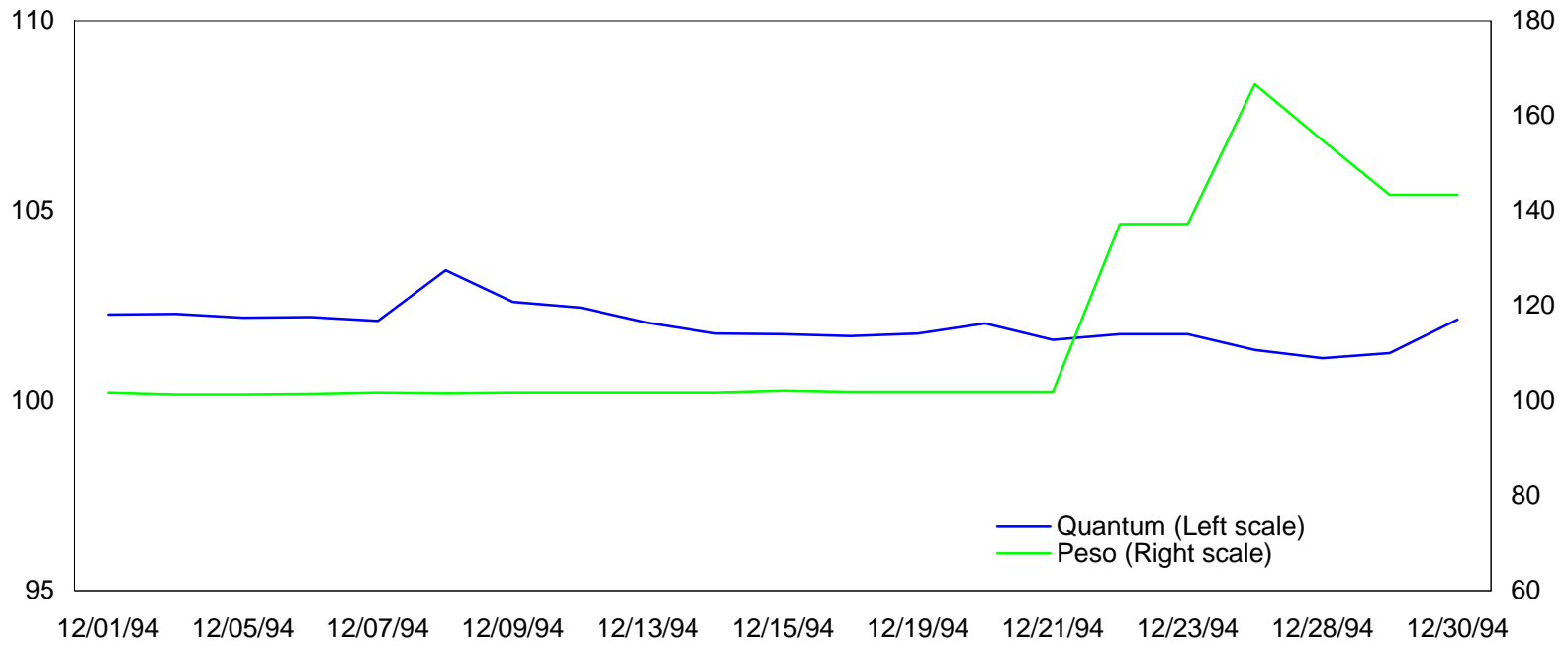


Figure 5: Quantum vs S&P & Thai Baht (97/5/30 = 100)

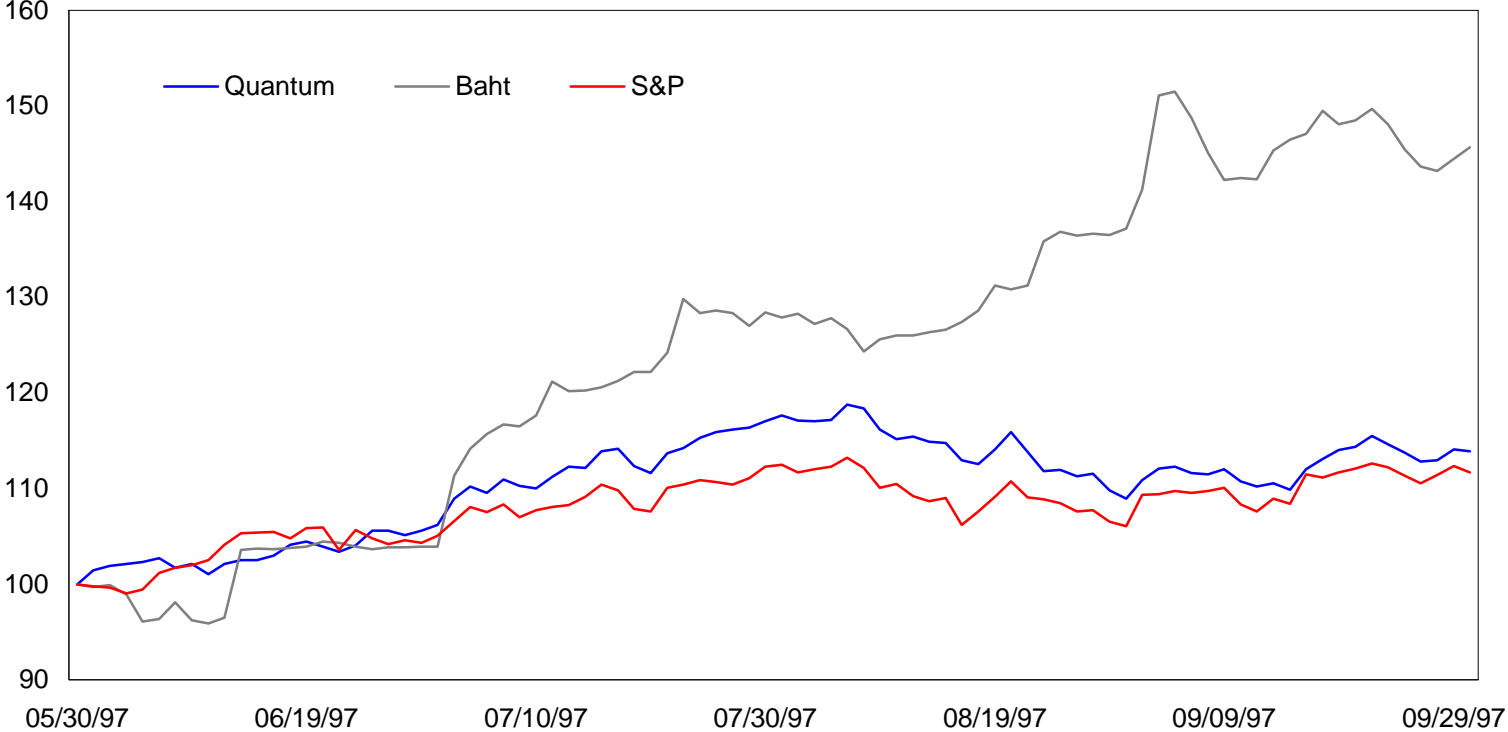


Figure 6: Quantum vs S&P (96/12/31 = 100)

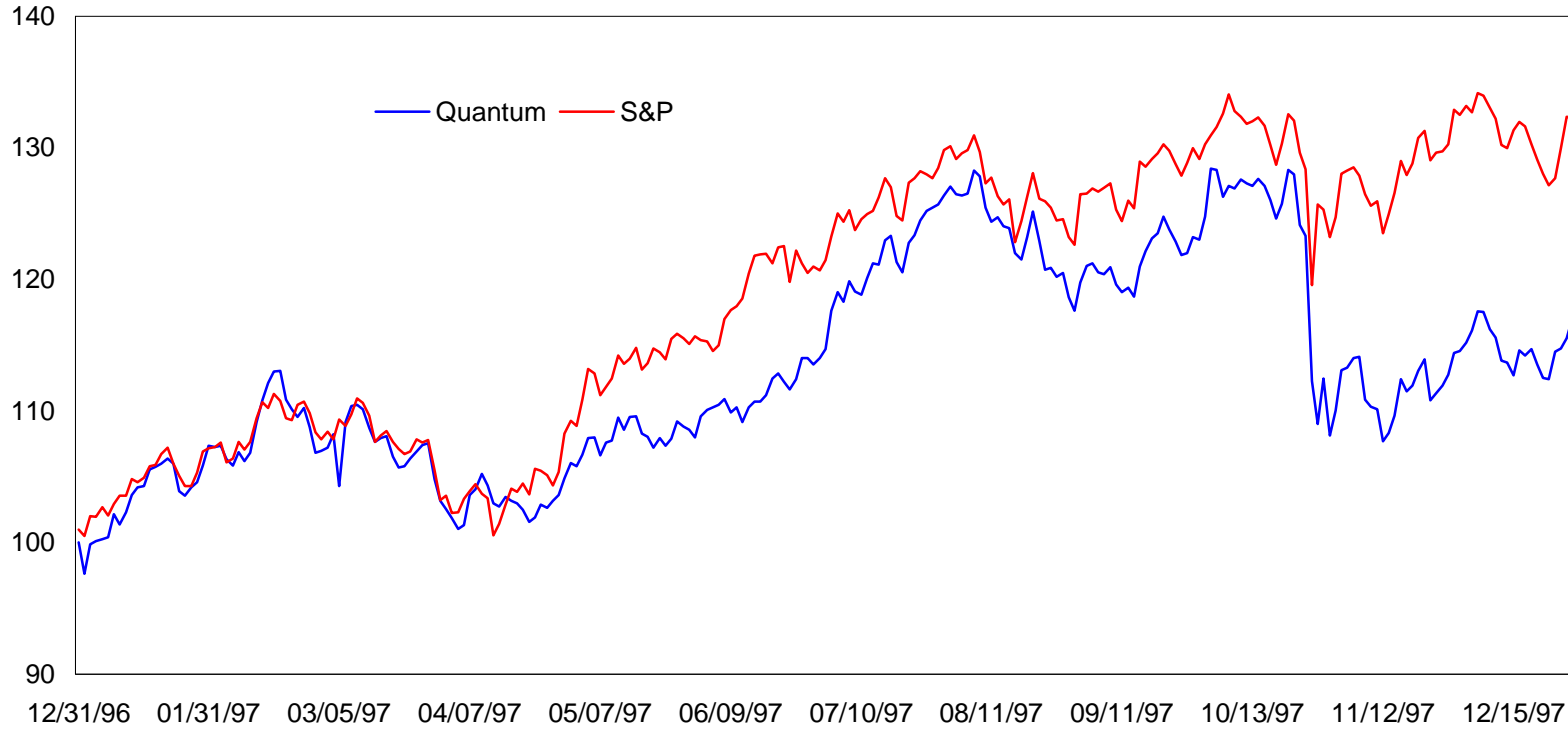


Figure 7: Thai Baht Positions of 12 Large Hedge Funds

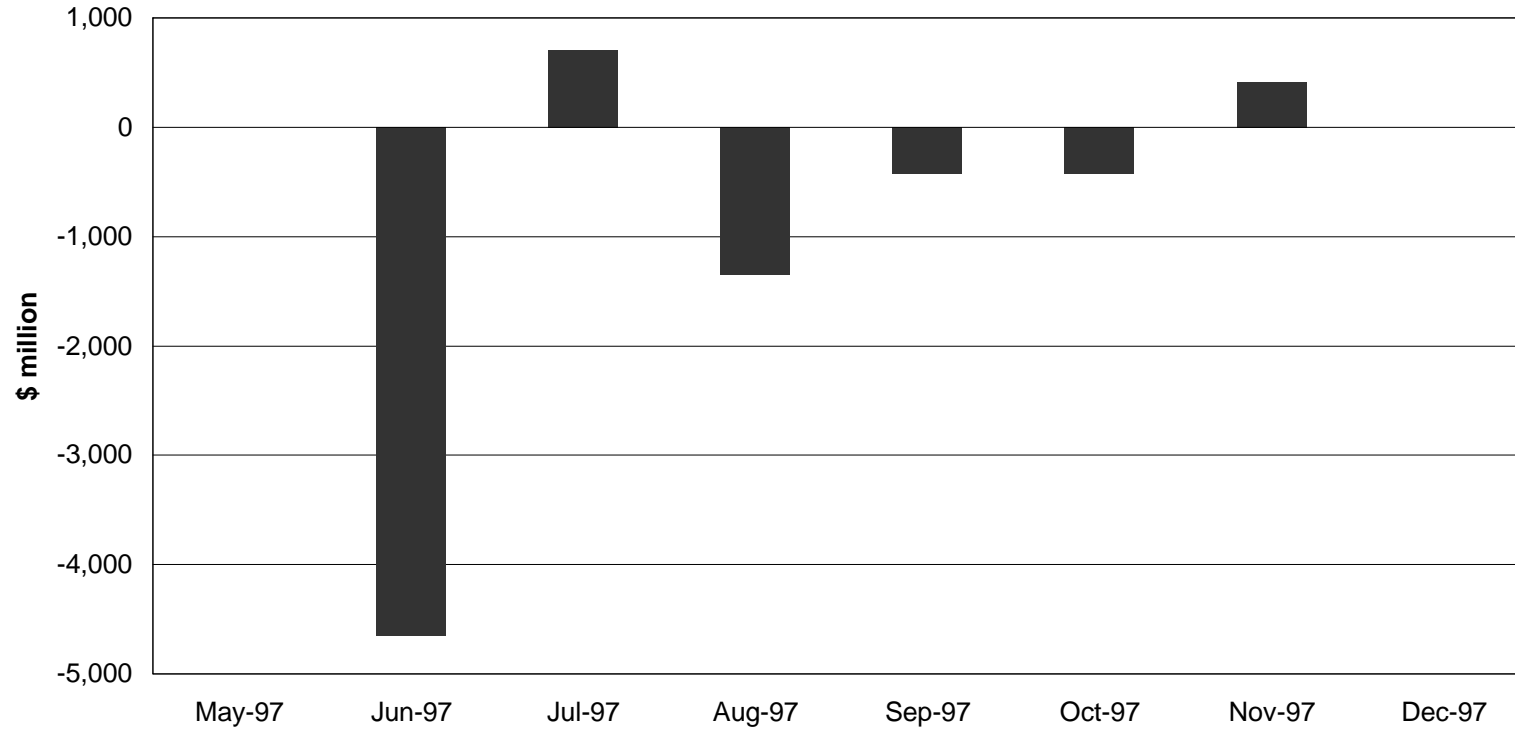


Figure 8: Malaysian Ringgit Positions of 12 Large Hedge Funds

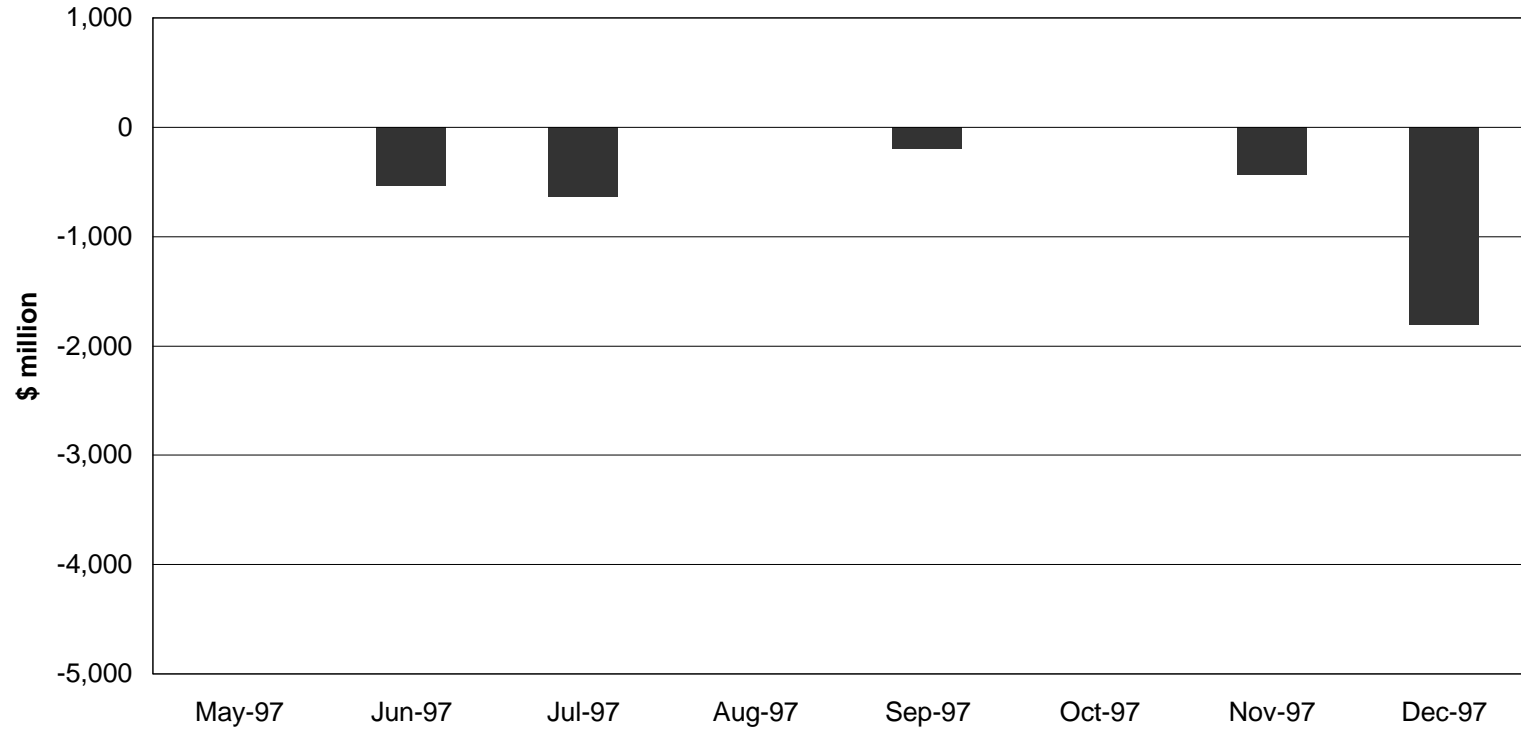


Figure 9: Indonesian Rupiah Positions of 12 Large Hedge Funds

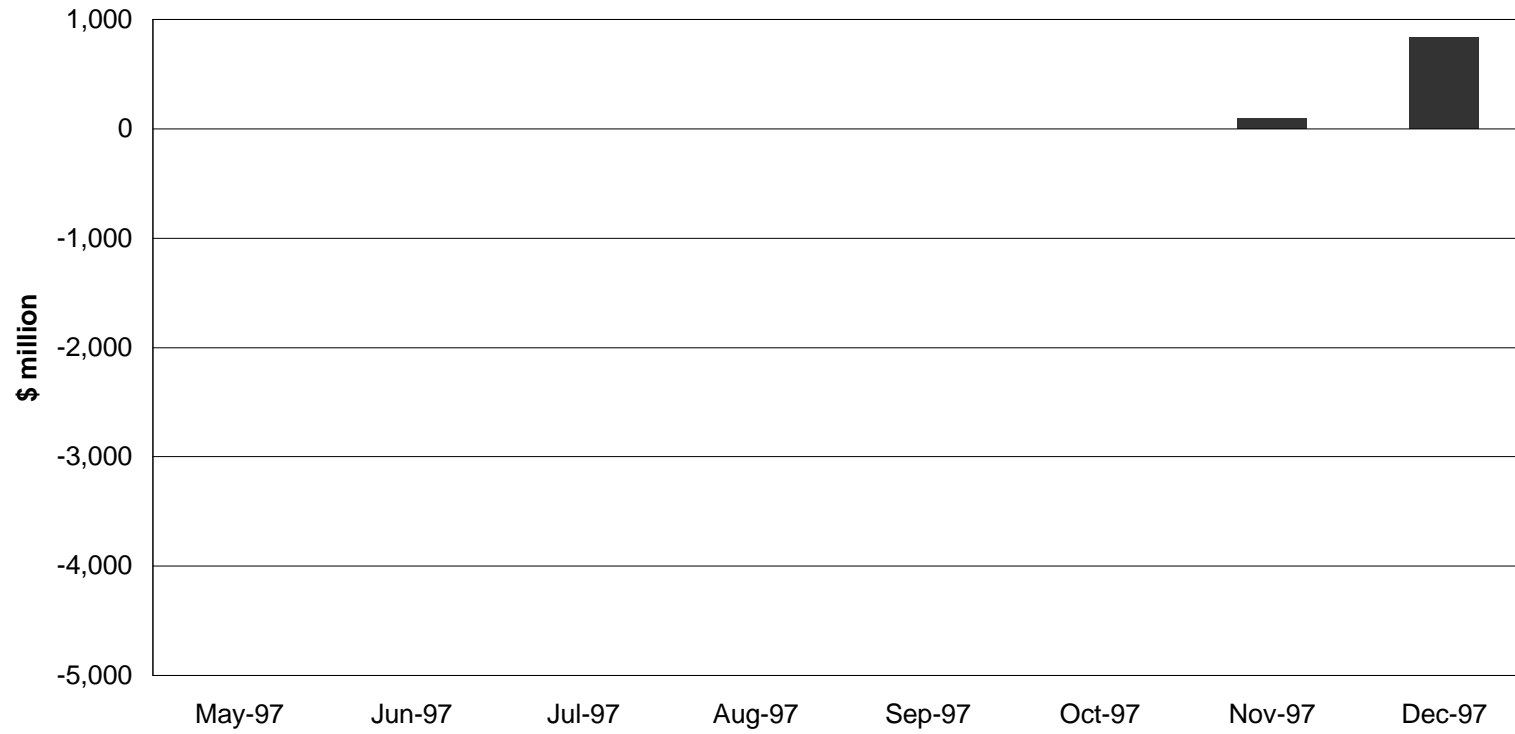


Figure 10: Korean Won Positions of 12 Large Hedge Funds

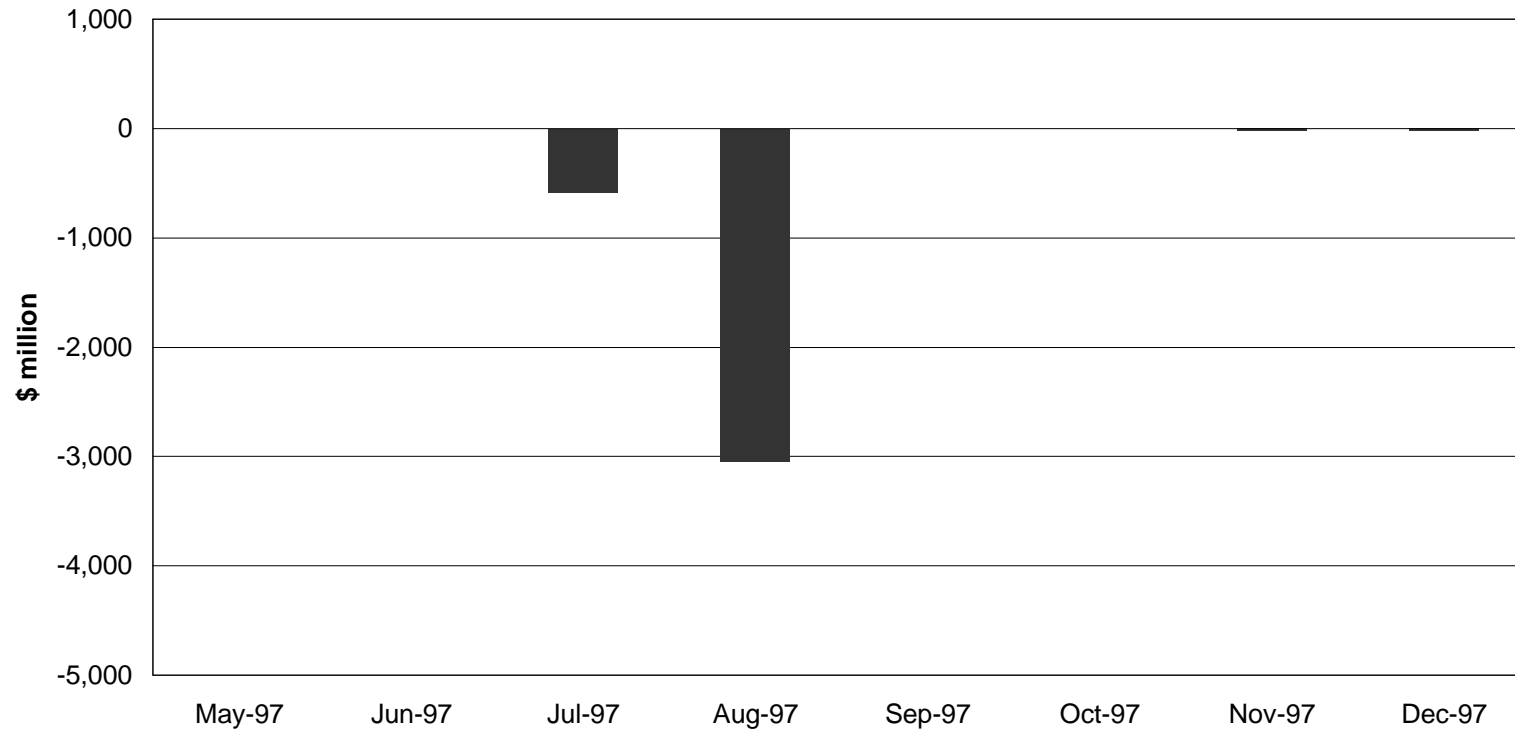


Figure 11: Asian Currency Positions of 12 Large Hedge Funds

