HEDGE FUNDS AND THE ASIAN CURRENCY CRISIS OF 1997

Stephen J. Brown
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ABSTRACT

We test the hypothesis that hedge funds were responsible for the crash in the Asian currencies in late 1997. To do so, we develop estimates of the changing positions of the largest ten currency funds in one currency, the Malaysian ringgit and to a basket of Asian currencies. Our methodology is adapted from the Sharpe's (1992) style analysis approach that decomposes fund returns. We find that the net long or short positions in the ringgit or its correlates did fluctuate dramatically over the last four years. However, these fluctuations were not associated with moves in the exchange rate. The estimated net positions of the major funds were not unusual during the crash period, nor were the profits of the funds during the crisis. In sum, we find no empirical evidence to support the hypothesis that George Soros, or any other hedge fund manager was responsible for the crisis.

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I. Introduction

Do the positions of global hedge funds affect fluctuations in exchange rates? More specifically, did George Soros and other large fund operators cause the Asian currency crisis of 1997? We address this question empirically by estimating the dollar exposure of the top ten global hedge funds to Asian currencies before and during the crisis. We test the hypothesis that the dramatic negative returns to these currencies versus the dollar were correlated to large positions, short or long, taken by the funds. The answer is "No."

We also examine several other questions of interest regarding the relation between global hedge funds and the currencies in which they speculate. We find that the positions of the largest funds are correlated. Over the period since 1993, we find periods in which total dollar-valued exposures to certain currencies by the major funds may have been on the order of hundreds of billions of dollars. Remarkably, currencies during these periods remained relatively stable. In sum, despite apparently correlated strategies that sometimes increase their combined positions to remarkable levels, global hedge funds did not "move" exchange rates. Identifying the drivers of exchange rate variation is potentially important information to global investors. If currencies can be "shocked" by sudden a buildup of positions by global currency fund operators, than risks are greater than time-series analysis of past data would suggest. In addition, our analysis sheds some light on the issue of whether the speculative activities of international currency traders should be regulated. While the issue of the Asian currency crisis of 1997 is of topical interest, there is a broader issue. Can speculators can move currency markets? This issue is central to market efficiency and investor confidence in the smooth and rational functioning of the exchange market. Part of the negative public perception of the role of hedge fund managers in Asia arises from the very limited

information available about what they actually do. They are unregulated investment entities, and much of perception of risk and uncertainty associated with their trading activities may arise from a simple lack of reliable information about their trading patterns. One possible conclusion from our research may be that the hedge fund industry would benefit from changes in regulation that would allow wide and public distribution of audited monthly or weekly returns.

The problem of estimating the exposure of managers to individual currencies is a difficult one. Unlike mutual funds, for example, hedge funds are not required to disclose their positions in specific securities. Not only are their positions secret, but they can change on a daily, or even an intra-day basis. Thus, quarterly information on, say, holdings of dollar/bhat exchange rate contracts by a particular manager at the end of the third quarter of 1997, would reveal little about the manager's exposure in the months before or after reporting. An alternative approach to estimating exposure to various currencies is to analyze the covariance of hedge fund returns with exchange rate changes. Sharpe (1992) develops a method for representing a mutual fund manager's "style" as a hypothetical portfolio of passively managed asset classes whose strictly nonnegative portfolio weights may change through time. The approach is useful for hedge fund managers because it relies upon the reported returns to infer exposures, rather than upon the unknown portfolio composition. We alter the Sharpe procedure to fit the particular problems of hedge fund returns. Not only do the managers take negative positions, but they change these positions frequently.

The paper is organized as follows. In the next section we describe our econometric methods. In section III we describe the data. In section IV we report the results of our tests. In section V we discuss the implications of our analysis for the potential influence that currency funds may have on

the global markets. Section V concludes.

II Methodology

II.1 Econometric Procedure

In the Sharpe (1992) style analysis, the return of any fund *I* at time *t* is represented as a linear combination of returns to passively managed asset classes, *k*:

$$R_{it} = \sum_{k=1}^{K} \beta_{kt} R_{kt} + e_{it}$$

$$1 = \sum_{k=1}^{K} \beta_{kt} \qquad (1)$$

$$0 < \beta_{kt} \quad \forall\ k$$

The β_{kt} coefficients cannot be estimated without additional information. In practice, these coefficients are estimated using at least *k* periods of data prior to and including *t* , assuming the coefficient is constant over this short interval.

The beauty of this approach is that the betas can be interpreted as positive portfolio weights on passive indices. Thus, Equation (1) may be estimated with a constant, and the constant can be interpreted as excess manager performance over investable indices. The coefficients also provide an estimate of the per-dollar exposure of the fund to a given asset class. The total dollar value exposure of the fund to asset class *k* at time *t* may be calculated as $E_{i,t,k} = \beta_{kt}$ * Net Asset $\text{Value}_{i,t}$. In our analysis, we are interested in accurately estimating $E_{i,t,k}$ for particular currencies. We relax the positivity constraint on the coefficients to reflect the fact that hedge funds take both positive and

negative positions in currencies and other asset classes. In addition, we relax the first constraint in Equation (1), because there is a tradeoff between the completeness of the specification of passive indices that "explain" manager performance, and the degrees of freedom in the estimation procedure. The more indices used as regressors, the more time-periods required to hold β_{kt} constant to estimate them, and the greater the standard error on our coefficient estimates. Thus, we simplify the Sharpe procedure to the estimation of:

$$R_{it} = \alpha_{kt} + \sum_{k=1}^{K} \beta_{kt} R_{kt} + e_{it} \qquad (2)$$

In fact, we set k as 1 to examine hypotheses about the Malaysian ringgit.

This paper is not the first to apply returns-based style analysis to hedge funds. Fung and Hsieh (1997) extend the Sharpe (1992) method to the analysis of hedge funds and commodity trading advisors [CTAs]. They find evidence that hedge funds and CTAs pursue highly dynamic strategies, which is to say that their implicit portfolio weights vary widely through time. Brown, Goetzmann and Ibbotson (1996) use a returns-based style analysis to separate the offshore hedge fund universe into a set of distinct "styles" characterized by co-movement. Both papers identify a distinctive "Global" style of manager. In the current paper, we focus in depth on this set of global macro managers and their relation to the 1997 Asian currency crisis.

II.2 Hypothesis Tests

The claims by the Malaysian Prime Minister Mohamad Mahathir in the financial press provide a clear hypothesis to test. The prime minister attributed the crash in the Malaysian Ringgit

to speculators in the currency markets -- hedge fund operators like George Soros, whom he termed "Highwaymen of the Global Economy."[1] While clearly the most outspoken of the critics of global hedge funds, Mohamad Mahathir was not alone in holding currency fund operators like George Soros responsible for recent crises. For example, Martin Peritz of *The New Republic* argues that Soros " . . . benefitted handsomely by whipping the currencies and markets of poorer countries, then returned to some of these countries to offer his philanthropy."[2] Considering the apparent common belief that hedge fund operators can "whip" currencies, translating such attitudes into a test that can be put to data is useful.

Under the presumption that currency market manipulation is undertaken for profit, we can test the hypothesis of currency manipulation by a given fund, or by a group of funds, by regressing the monthly percentage change in the exchange rate, R_{kt} , on the fund currency exposure $E_{t,k}$.

$$R_{kt} = \alpha + \gamma E_{kt} + e_t \qquad \textbf{(3)}$$

Note that this regression has a minor problem. $E_{t,k}$ must be estimated via the rolling regression described in equation (2) which induces an errors in variables problem for individual funds. This may be addressed by averaging across exposures so the errors in variable effects are mitigated somewhat[3]. In addition, with monthly data there are not enough degrees of freedom to estimate a

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[1] Mohamad Mahathir Mohamad, *Wall Street Journal*, September 23, 1997, "Highwaymen of the Global Eonomy,"

[2] Martin Peretz, "Capitalist tools; Jiang Zemin; George Soros; Cambridge Diarist" *The New Republic* November 24, 1997.

[3]While this mitigates the errors in variables problem, it does not eliminate it. The contemporaneous exchange rate R_{kt} is potentially correlated with errors in measurement of β_{kt},

monthly exposure to any given currency. Thus, in practice we are forced to substitute a trailing four-month average of the β_{kt} in our calculation of the exposure E_{ikt}. Nevertheless, if the currency market were being manipulated by hedge funds, we would expect a positive association between exposure and change in the currencies. Therefore we would expect to reject the hypothesis that γ in equation (3) is zero or negative.

III. Data

Hedge fund return data is difficult to obtain because, unlike mutual funds, hedge funds are not regulated by the SEC -- indeed most of the major funds operate offshore. As a result, they are prevented by the SEC from publically reporting their returns, since publication of performance records can be construed as solicitation of investors and thus would require the funds to conform to SEC regulations specified by the Investment Companies Act of 1940. We obtained monthly return information for major currency hedge funds over four years from Tass: an advisory service and data vendor.[4] We augmented this data with additional time series' maintained by Paradigm Asset Management. The funds were selected because either they identify themselves explicitly as global currency funds, or they are widely known in the industry as such. The funds are: Capital

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leading to an upward bias in the estimate of γ in Equation (3). In other words, the results are biased in favor of finding the positive association between exposure and changes in currencies we would expect if the market were manipulated by the hedge funds.

[4] More frequent data would improve the accuracy of the estimation of exposures and allow us to estimate simultaneous exposures to several currencies at once. A later section of the paper reports some results obtained from the use of weekly data on accounts from two major hedge fund operators who cannot be named. While informative, the results essentially confirm the results from monthly data. Given the lack of accurate disclosure requirements commensurate with mutual funds (i.e. daily pricing) more frequent data is not necessarily more accurate data.

International Emerging Markets Fund, Everest Capital International Limited, Hausmann Holdings NV, the Jaguar Fund, Orbis Global Equity Fund, Orbis Optimal Equity Fund, the Quantum Fund, The Quasar Fund, the Quota Fund and Swiss Bank Corporation Currency Portfolio Ltd. Together, they represent most of the top global hedge funds. Summary measures about the funds are reported in Table 1. The total capitalization estimated as of September 1997 is more than $29 billion. This number has grown only moderately since September 1994, despite strong performance by the managers. While $20 to $30 billion is a great deal of investment capital, it is small in comparison to the daily volume of foreign exchange, which is widely estimated to be in the Trillions of dollars. The capitalization does not represent an upper bound on the exposure a fund might take with respect to a given currency, however. Hedge funds typically lever their investments. The capitalization represented in Table 1 can be thought of as the size of the margin account used by managers to take positions in a range of different securities. While famous for currency speculation, the managers in Table 1 also take positions in the global debt and equity markets as well. The returns are expressed after fees. Since fees typically range from 15% to 20% of new profits, we can assume that the pre-fee returns were higher for months when the managers did well. This may affect inference, since we might underestimate the exposure of funds to currencies in these months.

IV. Results

IV.1 Did hedge funds cause the Malaysian ringgit crash?

Our test focuses upon the claim that hedge fund managers caused the Malaysian currency crisis. We estimate equation (2) for each of the hedge funds, using a four-month rolling window for the regression. Figure 1 shows the distribution of the monthly exposures averaged over all ten

funds. Since we are using a rolling estimation procedure, we do not expect each observation in the histogram to be independent. Even given the dependence across months, however, it is interesting that exposures vary widely both negatively and positively. The regression coefficients suggest that, in effect, there are times when the funds on average are levered eight times in their exposure to the ringgit. An important caveat in this interpretation is that, by using only the ringgit as an explanatory variable, we are assuming that the fund returns are solely explained by the ringgit. It is likely, however that the ringgit actually proxies for other Asian currencies in the regression. Thus, while the coefficients suggest that there were months when the funds were heavily betting for or against the ringgit, actually they may have been invested in another currency -- or even in another asset class that was simply correlated to the ringgit. Another note of caution is in order. Since the individual coefficients are produced by regressions having only four observations each, they are measured with error. For this reason we take the cross-sectional average of the ten coefficients. This will mitigate although not completely eliminate measurement error. Although the analysis suggests that the positions in the ringgit vary from bullish to bearish, the conclusion is based upon econometric analysis, not upon observation of investment positions.

Figure 2a through 2f shows how the estimated exposures vary through time and across funds, with one standard deviation confidence bands around the exposures. The confidence bands show how the reliability of the exposure estimates varies through time. Note, however that they are relatively tight at the end of the period, suggesting that we are confident of fund behavior during the critical late 1997 period. There are clearly a few periods for some funds when the hypothesis of net zero exposure can be strongly rejected. In spring, 1996, for example, Hausmann, Quantum, Quota and Jaguar had dramatic negative exposure to the ringgit, or something correlated to it.

Nevertheless, no corresponding shock to the currency can be found during this time. It is useful to note that some funds are correlated: this is not surprising, since three of them are operated by Soros. Sometimes the funds take opposite positions. In early 1995, for example, the Soros funds had negative exposure when the Orbis funds had positive exposure.

Figure 3 shows the total dollar-valued exposure of the ten funds along with an index of the value of the ringgit with respect to the dollar over the period. Notice that the aggregate exposure of the funds to the ringgit (or its correlates) varies considerably. In February 1996, for example, the trailing four-month exposure was a short position greater than $200 billion. Given this extreme position, it is perhaps extraordinary to note that the ringgit changed less than 1% with respect to the dollar over the four-month period ending in February 1996. The figure shows a large positive exposure to the ringgit ending in February 1997. Again, the net change of the ringgit was close to zero over the preceding four months. Now consider the crucial four month period of June through September of 1997. The ringgit dropped by 10% over this period. The net hedge fund exposure over this four-month interval was close to zero. Negative hedge fund exposures had reached a low of about $100 billion by the end of June. The hedge funds appeared to be unwinding their negative position in the ringgit or its correlates beginning in June. In fact, the figure suggests they were buying into the ringgit crash from June through August. An interpretation of this activity is that the hedge fund managers -- the speculators -- were supplying liquidity to a rapidly falling market. It is tempting to suggest that they cushioned the rapid fall of the ringgit, rather than hastened it. However, the entire trajectory suggests that the speculators could not affect the exchange rate either way, despite large positions both positive and negative.

Table 2 reports the result of the regression testing the manipulation hypothesis about whether

hedge fund managers caused the crash of the ringgit. Neither current nor last month's ringgit returns vs. The U.S. dollar are statistically explained by the estimated hedge fund manager positions. There is absolutely no evidence that the ringgit was affected by hedge fund managers.

One objection to the results of this analysis is that we have developed a weak test that failed to reject the manipulation hypothesis due to either its design or lack of data. Perhaps the true positions in the ringgit were much smaller, and were masked by the funds' other activities in other currencies during this period. This is a reasonable alternative explanation of the empirical results. Perhaps the ringgit (or its correlates) was simply not a major factor in the investment policy of the hedge funds. Another possibility is that currencies do respond to the hedge fund positions, but that this occurs only at short duration. For example, maybe a sudden short sale of one currency by a major fund can depress the exchange rate on that day -- or even over the interval of a week. Short term price pressure effects have been noted in even very liquid markets, such as the S&P 500 shares traded on the U.S. exchanges. Studies show that when the composition of the S&P 500 changes, and major index funds rebalance accordingly, the share prices are affected. Daily or weekly data on hedge funds might help us to identify this effect. On the other hand, if the effects are so small that they require higher frequency data to discern, then they are not the kind of critical market shocks that concern investors, speculators, hedgers and regulators over the long term.

Table 3 reports some evidence on the returns reported by the hedge fund managers over the crash period. The period June through October of 1997 was clearly a volatile period for the managers, and some made extraordinary profits -- and extraordinary losses. While the ringgit was only one of many currencies fluctuating in this period, we might expect that, if hedge funds were responsible for its drop, these funds would have profited by their actions. We do not have the

figures for the ringgit drop in October yet, but the trend of the other months suggests that the biggest drops were in August and September. Who made money then? Certainly not Soros, who appears to have roughly broken even over the crash period. In fact, in September, when Mahathir Mahamet wrote his famous editorial accusing Soros of being a highwayman, the Soros funds were mostly down by double digits!

VI.2 Did hedge funds cause the Asian currency crisis?

In the preceding section, we focused directly on the claims by the Malaysian prime minister that hedge funds drove down the price of the ringgit. The ringgit was only one of several Asian currencies to decline rapidly in late 1997. While we rejected this hypothesis for that single currency, perhaps hedge funds precipitated the slide of the entire set of currencies. To test this hypothesis, we use the same methodology as above. Instead of estimating exposure to the ringgit, however we develop a basket of Asian currencies, and estimate the sensitivities to this basket. The countries included in the basket are: Philippines, Taiwan, Thailand, Japan, Malaysia, Singapore, China and Indonesia. The basket is an equal-weighted index extending over the 1993-1997 period.

Table 4 shows the correlation of the currencies in the basket. China exchange rates may be disregarded, since they are not market rates. The others show interesting structure, and they are not highly correlated, despite the recent turmoil. Clearly Japan, Taiwan and Korea are related to each other and not related to the rest very strongly. Malaysia, Thailand and Indonesia are closely related, and Singapore seems to be related to all markets strongly. This pattern suggests a geographical structure to exchange rates. However, this a research issue in its own right.

Figure 4 shows the relationship between the total fund exposure to the Asian currency basket

and an index of basket returns through September 1997. As with the ringgit, there are periods when the hedge funds are bullish and periods when they are bearish. There is a dramatic positive spike in 1995.[5] As with the ringgit analysis, the drop in the currency basket value is not associated with any unusual exposure by the funds. If anything the net exposure was close to zero when the crisis occurred. In the year preceding the decline, the funds were net short the basket. This is also a period when the currencies declined about 5%. Is there any overall relationship between the positions and currency dynamics? While not reported in a table, the regression of contemporaneous and lagged basket returns yielded coefficients near zero.

VI.3 Weekly data

We were able to obtain weekly data on two accounts managed by well known global currency hedge fund managers over the past three years.[6] Under the assumption that these accounts are representative of activities by global hedge fund operators, they provide a fascinating glimpse into the cross-section of currency exposures. Using the same style analysis methods applied to monthly data, we have greater degrees of freedom to introduce more than one currency as an explanatory variable. In addition to an Asian currency basket, we measure the rolling three-month exposure to U.K., Germany, Japan and Mexico against the U.S. dollar. For both funds, the exposure to Asia is particularly strong and unlike the univariate regressions on monthly data, we can reject

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[5] This looks like a data error, but an inspection of the fund returns and the currency returns shows no evidence of an incorrect number.

[6] We thank Paradigm Asset Management for making this account data available. We are not able to disclose the identities of the managers.

the notion that this is caused by a correlated currency.

For both funds, the dynamics of the exposures is fascinating. They apparently are not following related strategies, but as we observed with the monthly data, the bets on Asia are occasionally quite strong - sometimes long, and sometimes short. As with the monthly data, however, it appears that the exposures in late 1997 were modest, and unrelated to the steep drop in the currency basket. Again, no evidence that these representative managers were culprits in the crash.

V. Conclusion

Our empirical analysis of the dynamics of hedge funds and Asian currencies suggest little evidence that hedge fund managers as a group caused the crash. In particular, it is difficult to believe that George Soros was responsible for a "bear raid" on the ringgit when the performance of three of his funds was less than stellar. If anything, it appears that the top ten hedge funds were buying into the ringgit as it fell in the late summer and early fall of 1997. Broadening our focus of an Asian currency basket, the story is essentially the same. There have been periods when hedge funds have huge positive and negative exposures to Asian currencies, but these bear no relation to current, past or future moves in exchange rates. Besides the immediate question of culpability for a major shock to the world's financial system, the issue of the relationship between hedge funds and the world's currencies is an interesting one. Hedge funds operate largely outside governmental regulations. They are only bound by the laws and rules governing the markets in which they operate, but there is no mechanism, other than suspending the convertibility of currency, to control individual positions. In a financial crisis, it is tempting to look for culprits among the most sophisticated of

market players, however our evidence suggests that even they bet wrong sometimes. One important issue is whether they regularly profit at the expense of small investors and governmental institutions. If so, then a cost-benefit analysis may be in order. Our study suggests that if anything, the global markets can "absorb" multibillion dollar positions put on by major currency funds without suffering ill effects. This is an encouraging result and provides the basis for an optimistic outlook on future development of sophisticated instruments and markets.

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Table 1: Currency Funds and Capitalization, 9/1993 through 9/1997

Company	Fund	9/93 Capital	9/94 Capital	9/95 Capital	9/96 Capital	9/97 Capital
Capital International	Emerging Markets Fund	$414,851,451	$889,557,779	$889,557,779	$1,281,490,551	$2,098,790,487
	Everest Capital Int'l Ltd	$77,475,986	$188,000,000	$188,000,000	$521,000,000	$1,030,000,000
	Haussman Holdings NV	NA	$2,100,000,000	$2,100,000,000	$2,471,369,347	$3,173,802,345
Tiger Management Corp.	Jaguar Fund NV	$3,207,000,000	$3,867,000,000	$3,867,000,000	$4,096,585,000	$7,109,416,846
Orbis Investment Mgmt Ltd	Orbis Global Equity Fund	$586,086,439	$616,622,417	$616,622,417	$826,700,000	$1,122,579,613
Orbis Investment Mgmt Ltd	Orbis Optimal Equity Fund	$626,514,397	$724,830,691	$724,830,691	$899,500,000	$1,039,465,999
Soros Fund Management	Quantum Emerging Growth	NA	$1,397,535,723	$1,397,535,723	$1,661,300,000	$2,026,600,000
Soros Fund Management	Quasar International Fund	NA	$3,803,764,764	$3,803,764,764	$4,528,400,000	$5,882,800,000
Soros Fund Management	Quota Fund NV	NA	$1,259,245,119	$1,259,245,119	$1,567,900,000	$1,544,200,000
Swiss Bank Corporation	Currency Portfolio Ltd	NA	$828,724,170	$828,724,170	$1,848,500,000	$2,379,200,000
	Total:	$4,911,928,273	$21,918,252,844	$15,675,280,664	$21,442,320,671	$29,467,860,414

Data source: TASS Advisory Service and Paradigm Asset Management. Capitalization as reported by the funds by month, or interpolated from quarterly data and returns.

Table 2: Exposure vs. Change in Ringgit Value

Regressions of percentage change in ringgit dollar exchange rate on the estimated dollar-valued net exposure of the top ten global hedge funds to the ringgit.

"Lagged" refers to a regression of last month's exchange rate return on this month's exposure. "Current" refers to a regression of the current month's exchange rate return on fund exposures.

	Lagged	Current
Constant	-0.351	-0.462
Std Err of Y Est	2.468	2.538
R Squared	0.005	0.002
No. of Observations	45.000	46.000
Degrees of Freedom	43.000	44.000
X Coefficient(s)	0.000	0.000
Std Err of Coef.	0.000	0.000
T-statistic	0.453	0.320

Table 3: Hedge Fund Returns Around Crash

After fee returns for hedge fund managers over the whole time period from 1993 to 1997 and over the crash period, June 1997 through October, 1997. The first column is the annualized geometric return from December, 1993. The second column is the average monthly return over that period. Columns 3 through 7 report the returns month-by-month for the funds.

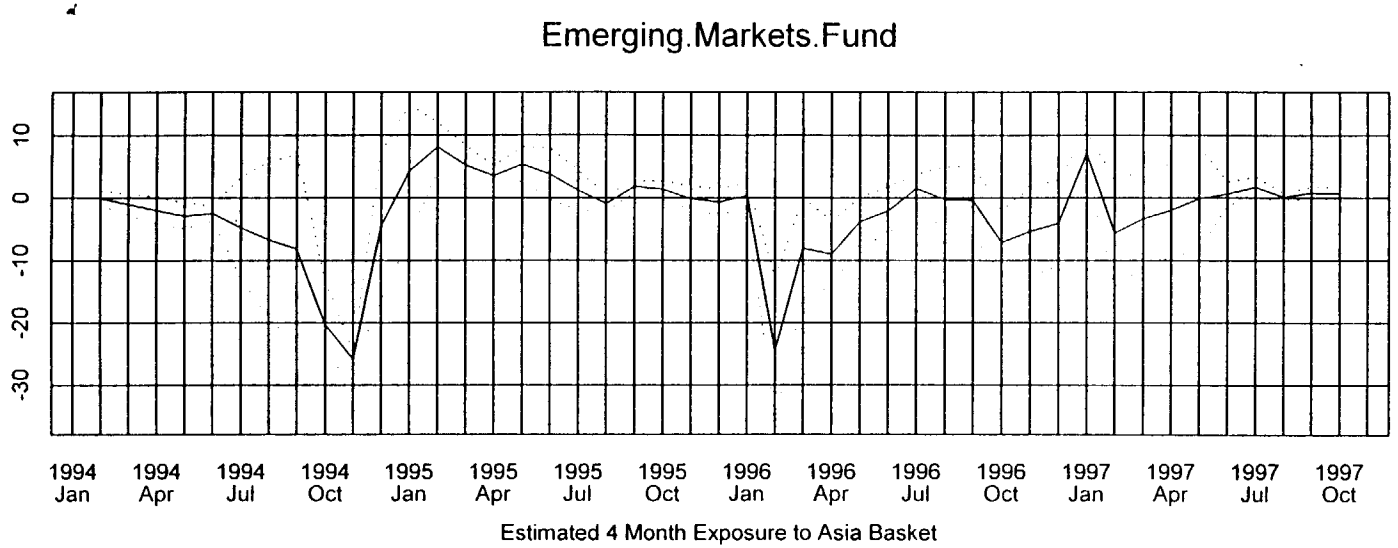
	Geometric Return 9/93 - 10/97	Monthly Arithmetic Return	June	July	August	September	October
Emerging Markets Fund	8.13%	0.87%	0.87%	1.59%	1.08%	1.88%	1.25%
Everest Capital Int'l Ltd	18.21%	1.59%	0.87%	0.87%	2.41%	-2.10%	3.82%
Haussman Holdings NV	12.54%	1.08%	2.41%	0.87%	0.87%	10.98%	5.85%
Jaguar Fund NV	22.42%	1.88%	-2.10%	10.98%	0.87%	0.87%	-4.29%
Orbis Global Equity Fund	13.72%	1.25%	3.82%	5.85%	-4.29%	0.87%	0.87%
Orbis Optimal Equity Fund	6.65%	0.58%	1.06%	-1.67%	2.81%	0.27%	0.87%
Quantum Emerging Growth	19.97%	1.91%	5.65%	10.29%	-6.72%	2.00%	-11.77%
Quasar International Fund	11.25%	1.20%	2.35%	9.17%	-5.88%	0.45%	-15.11%
Quota Fund NV	43.50%	4.18%	4.25%	13.62%	-8.17%	-3.86%	-15.74%
Swiss Bank Currency Portfolio	13.92%	1.25%	-2.52%	0.38%	4.11%	1.46%	0.72%
Ringgit/Dollar Return			-0.10%	-0.47%	-4.21%	-10.17%	NA

Table 4: Correlation of Currencies 1993 - 1997

	Philippines	Taiwan	Thailand	Japan	Malaysia	Singapore	China	Indonesia	Korea
Philippines	1.00	0.19	0.70	0.03	0.58	0.47	0.00	0.75	0.14
Taiwan	0.19	1.00	0.37	0.46	0.06	0.43	0.01	0.14	0.27
Thailand	0.70	0.37	1.00	0.28	0.45	0.63	-0.03	0.60	0.11
Japan	0.03	0.46	0.28	1.00	0.15	0.58	-0.13	0.08	0.53
Malaysia	0.58	0.06	0.45	0.15	1.00	0.59	0.13	0.84	0.24
Singapore	0.47	0.43	0.63	0.58	0.59	1.00	-0.07	0.56	0.57
China	0.00	0.01	-0.03	-0.13	0.13	-0.07	1.00	-0.02	-0.03
Indonesia	0.75	0.14	0.60	0.08	0.84	0.56	-0.02	1.00	0.20
Korea	0.14	0.27	0.11	0.53	0.24	0.57	-0.03	0.20	1.00

Source: Ibbotson Associates, Chicago.

Figure 1.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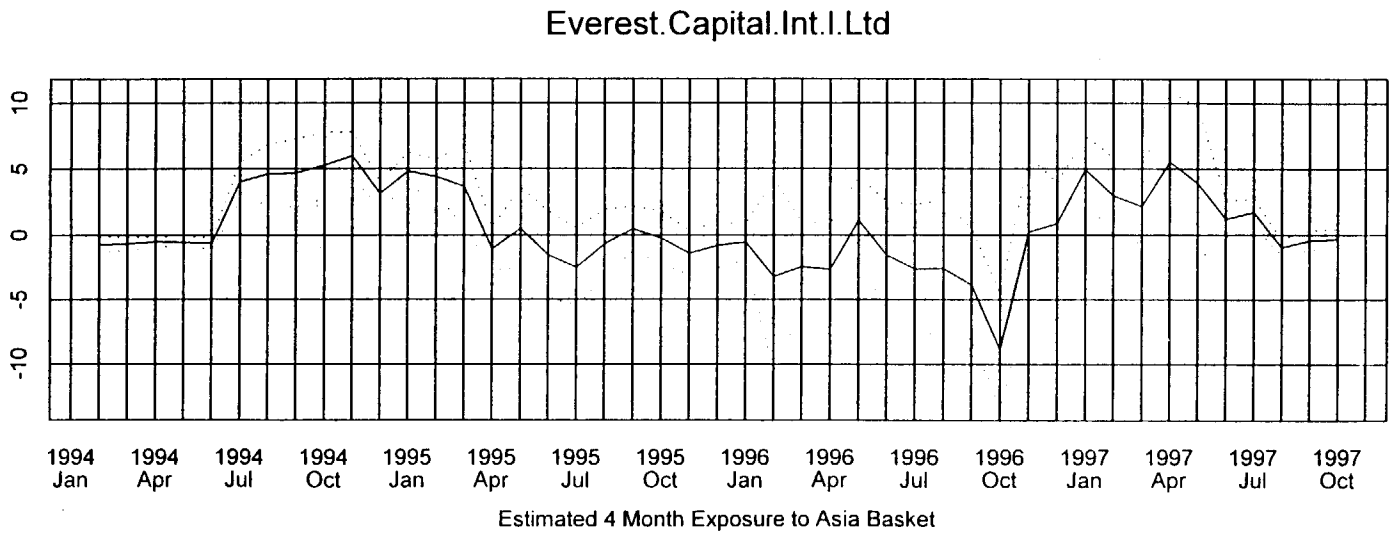
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Estimated 4 Month Exposure to Asia Basket

Figure 1a

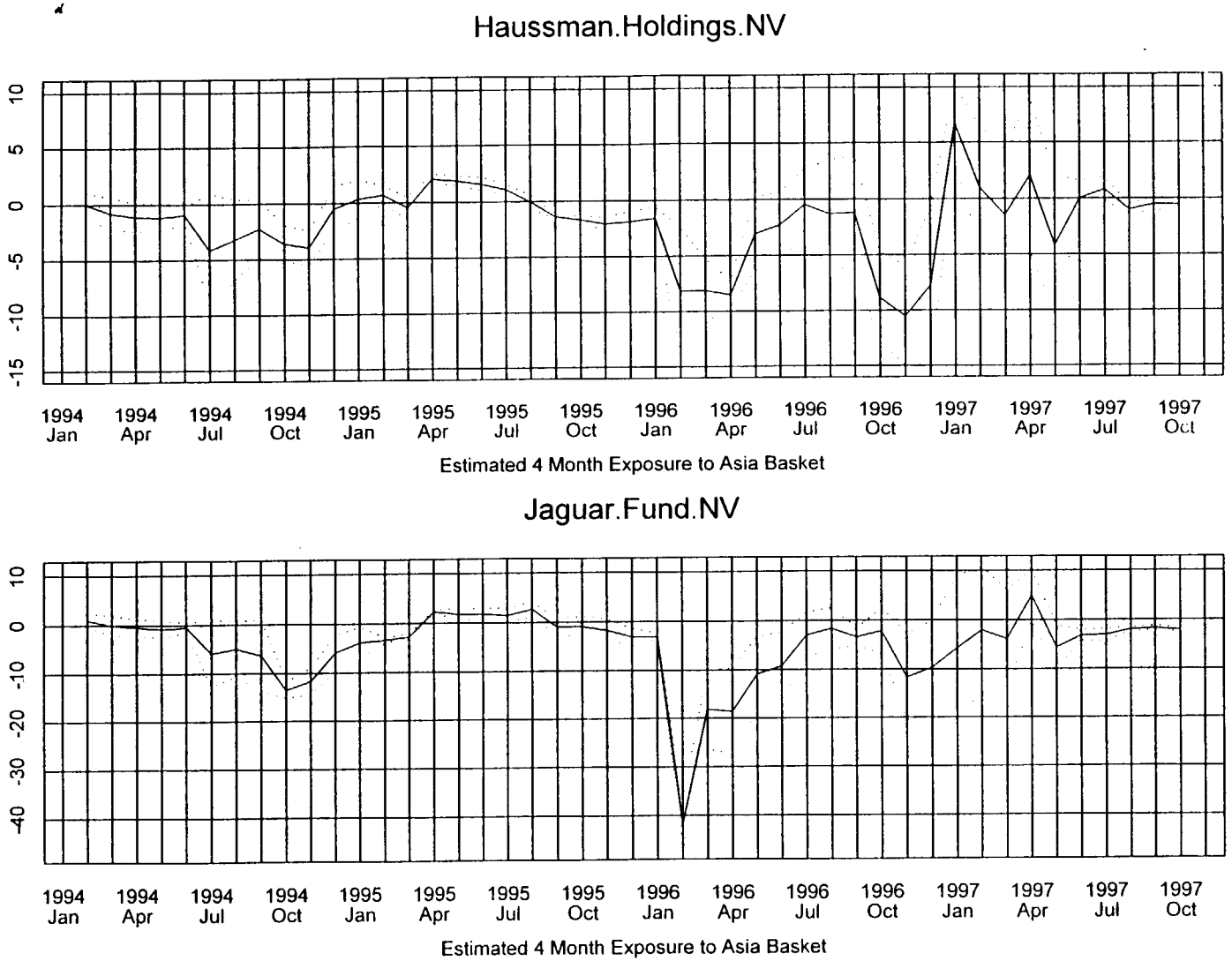

Haussman.Holdings.NV
10
5
0
-5
-10
-15
1994 Jan
1994 Apr
1994 Jul
1994 Oct
1995 Jan
1995 Apr
1995 Jul
1995 Oct
1996 Jan
1996 Apr
1996 Jul
1996 Oct
1997 Jan
1997 Apr
1997 Jul
1997 Oct
Estimated 4 Month Exposure to Asia Basket
Jaguar.Fund.NV
10
0
-10
-20
-30
-40
1994 Jan
1994 Apr
1994 Jul
1994 Oct
1995 Jan
1995 Apr
1995 Jul
1995 Oct
1996 Jan
1996 Apr
1996 Jul
1996 Oct
1997 Jan
1997 Apr
1997 Jul
1997 Oct
Estimated 4 Month Exposure to Asia Basket

Figure 2b

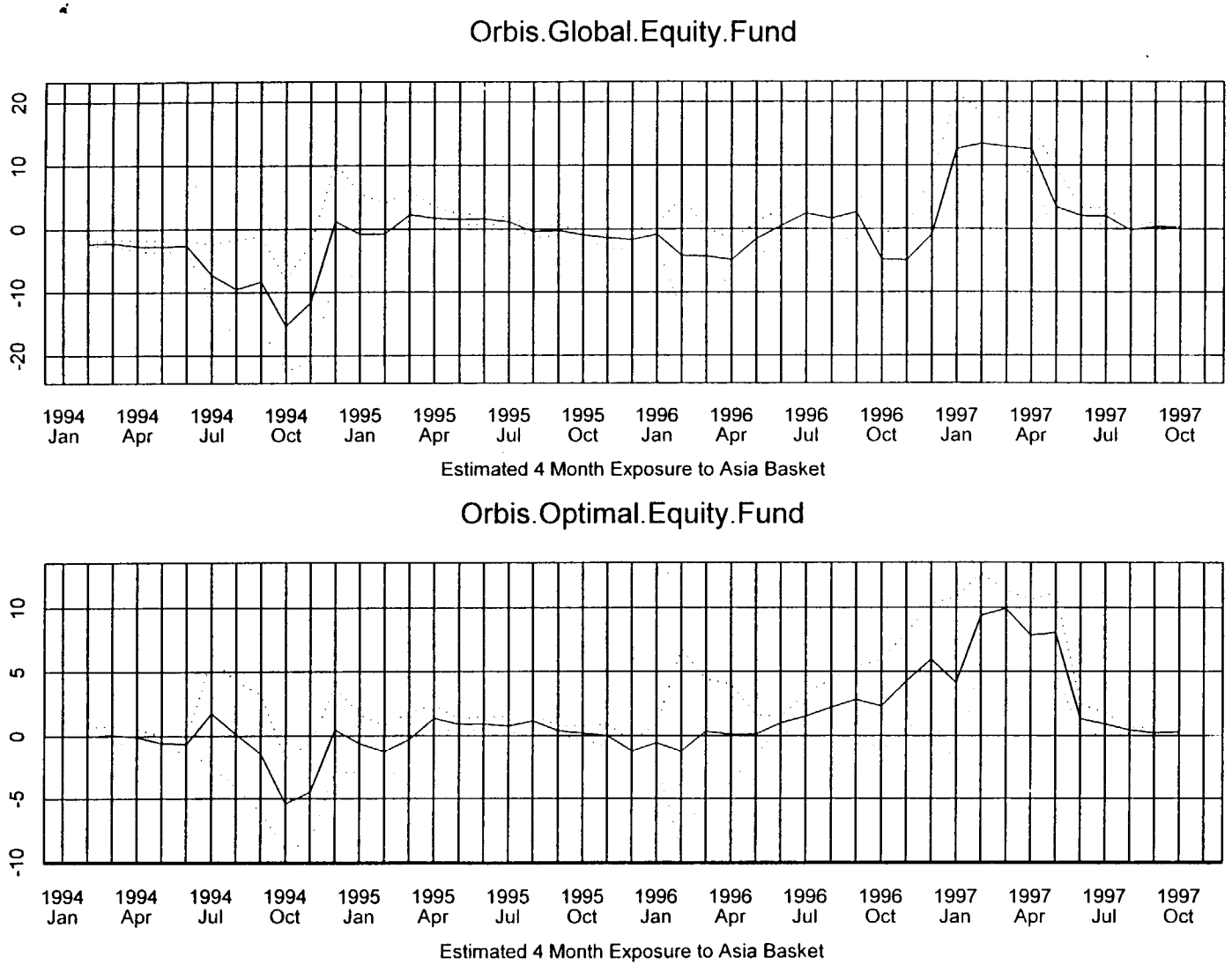

Orbis.Global.Equity.Fund
20
10
0
-10
-20
1994 Jan
1994 Apr
1994 Jul
1994 Oct
1995 Jan
1995 Apr
1995 Jul
1995 Oct
1996 Jan
1996 Apr
1996 Jul
1996 Oct
1997 Jan
1997 Apr
1997 Jul
1997 Oct
Estimated 4 Month Exposure to Asia Basket
Orbis.Optimal.Equity.Fund
10
5
0
-5
-10
1994 Jan
1994 Apr
1994 Jul
1994 Oct
1995 Jan
1995 Apr
1995 Jul
1995 Oct
1996 Jan
1996 Apr
1996 Jul
1996 Oct
1997 Jan
1997 Apr
1997 Jul
1997 Oct
Estimated 4 Month Exposure to Asia Basket

Figure 2c

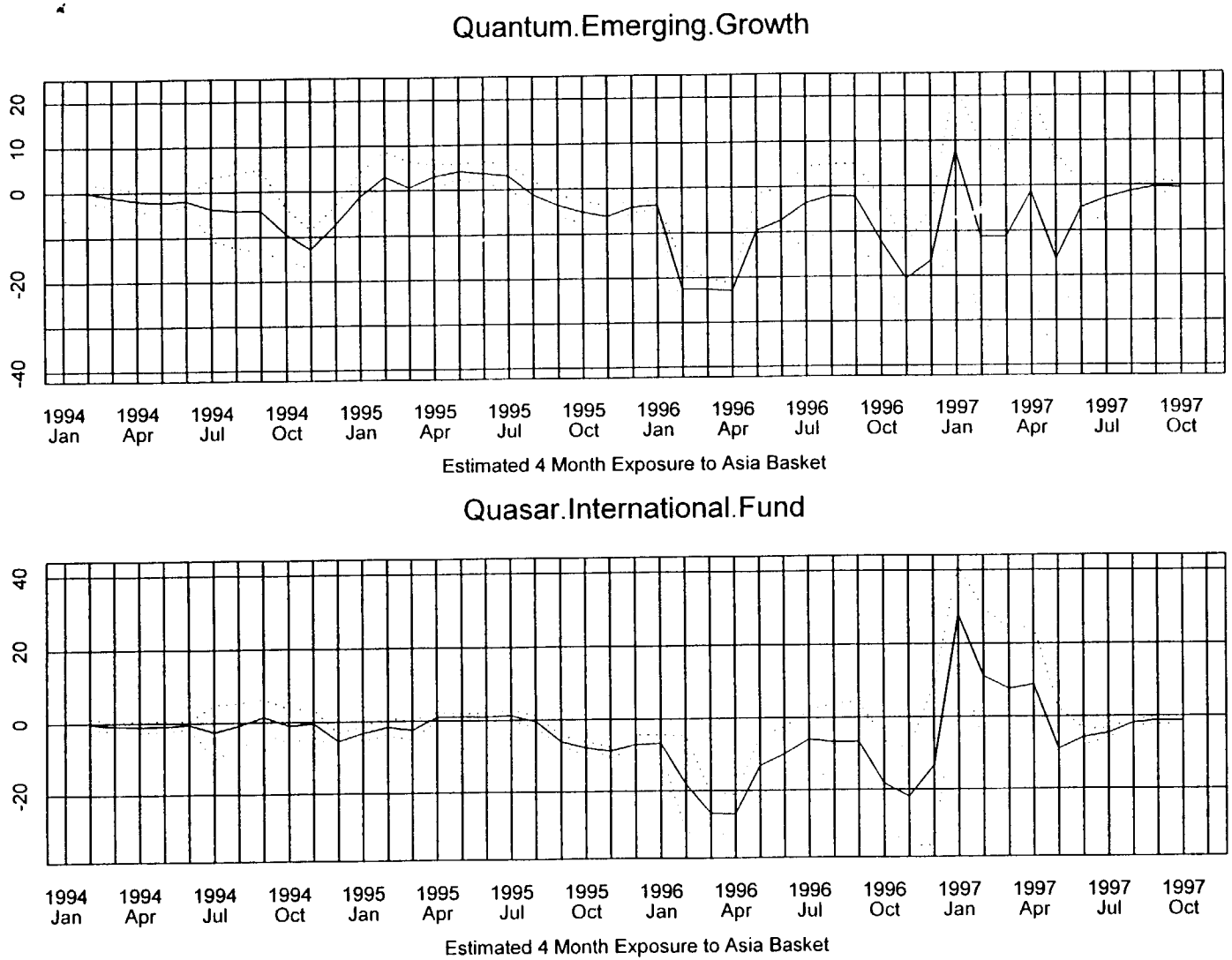

Quantum.Emerging.Growth
20
10
0
-20
-40
1994 Jan
1994 Apr
1994 Jul
1994 Oct
1995 Jan
1995 Apr
1995 Jul
1995 Oct
1996 Jan
1996 Apr
1996 Jul
1996 Oct
1997 Jan
1997 Apr
1997 Jul
1997 Oct
Estimated 4 Month Exposure to Asia Basket
Quasar.International.Fund
40
20
0
-20
1994 Jan
1994 Apr
1994 Jul
1994 Oct
1995 Jan
1995 Apr
1995 Jul
1995 Oct
1996 Jan
1996 Apr
1996 Jul
1996 Oct
1997 Jan
1997 Apr
1997 Jul
1997 Oct
Estimated 4 Month Exposure to Asia Basket

Figure 2d

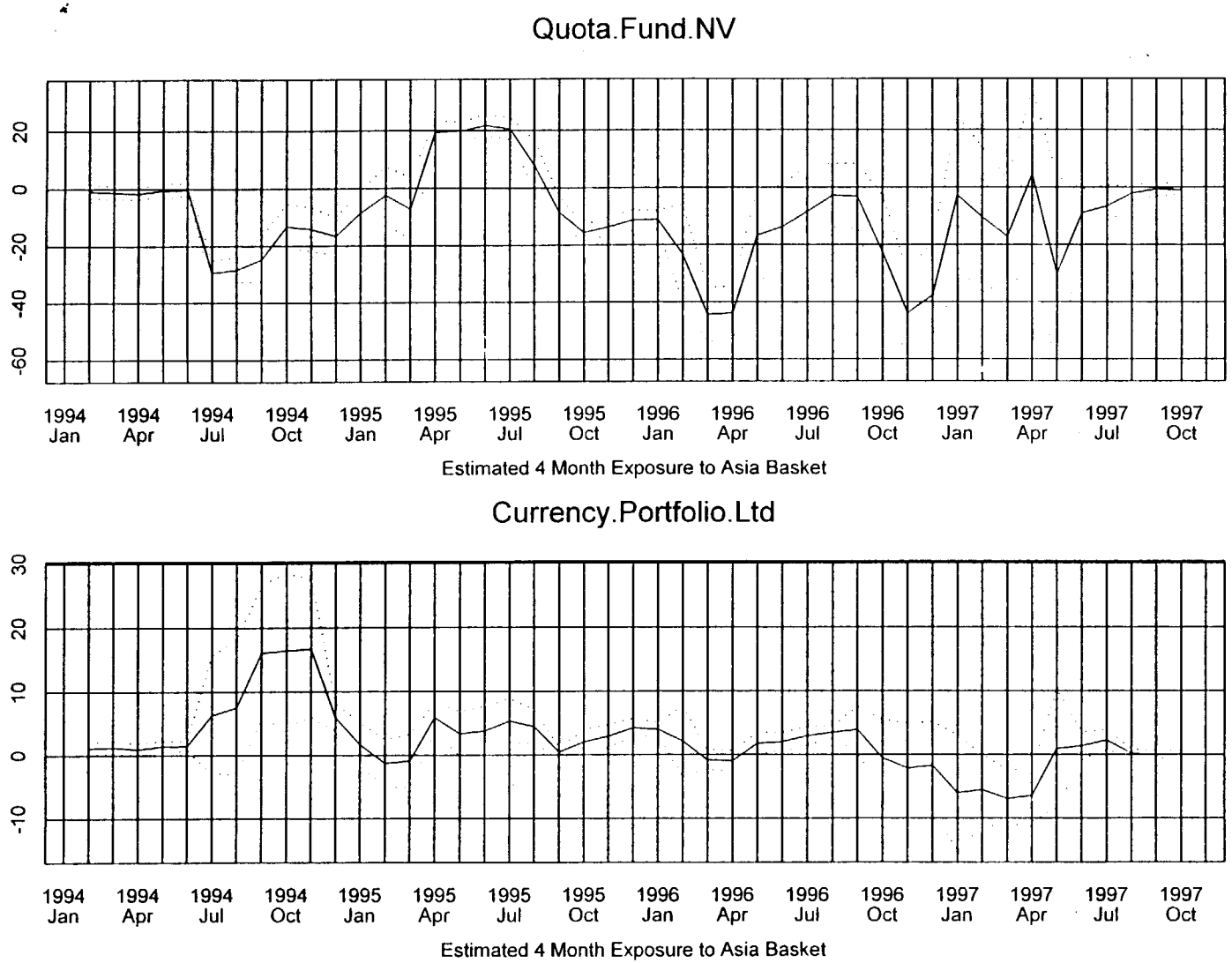

Quota.Fund.NV
20
0
-20
-40
-60
1994 Jan
1994 Apr
1994 Jul
1994 Oct
1995 Jan
1995 Apr
1995 Jul
1995 Oct
1996 Jan
1996 Apr
1996 Jul
1996 Oct
1997 Jan
1997 Apr
1997 Jul
1997 Oct
Estimated 4 Month Exposure to Asia Basket
Currency.Portfolio.Ltd
30
20
10
0
-10
1994 Jan
1994 Apr
1994 Jul
1994 Oct
1995 Jan
1995 Apr
1995 Jul
1995 Oct
1996 Jan
1996 Apr
1996 Jul
1996 Oct
1997 Jan
1997 Apr
1997 Jul
1997 Oct
Estimated 4 Month Exposure to Asia Basket

Figure 2f

Figure 3

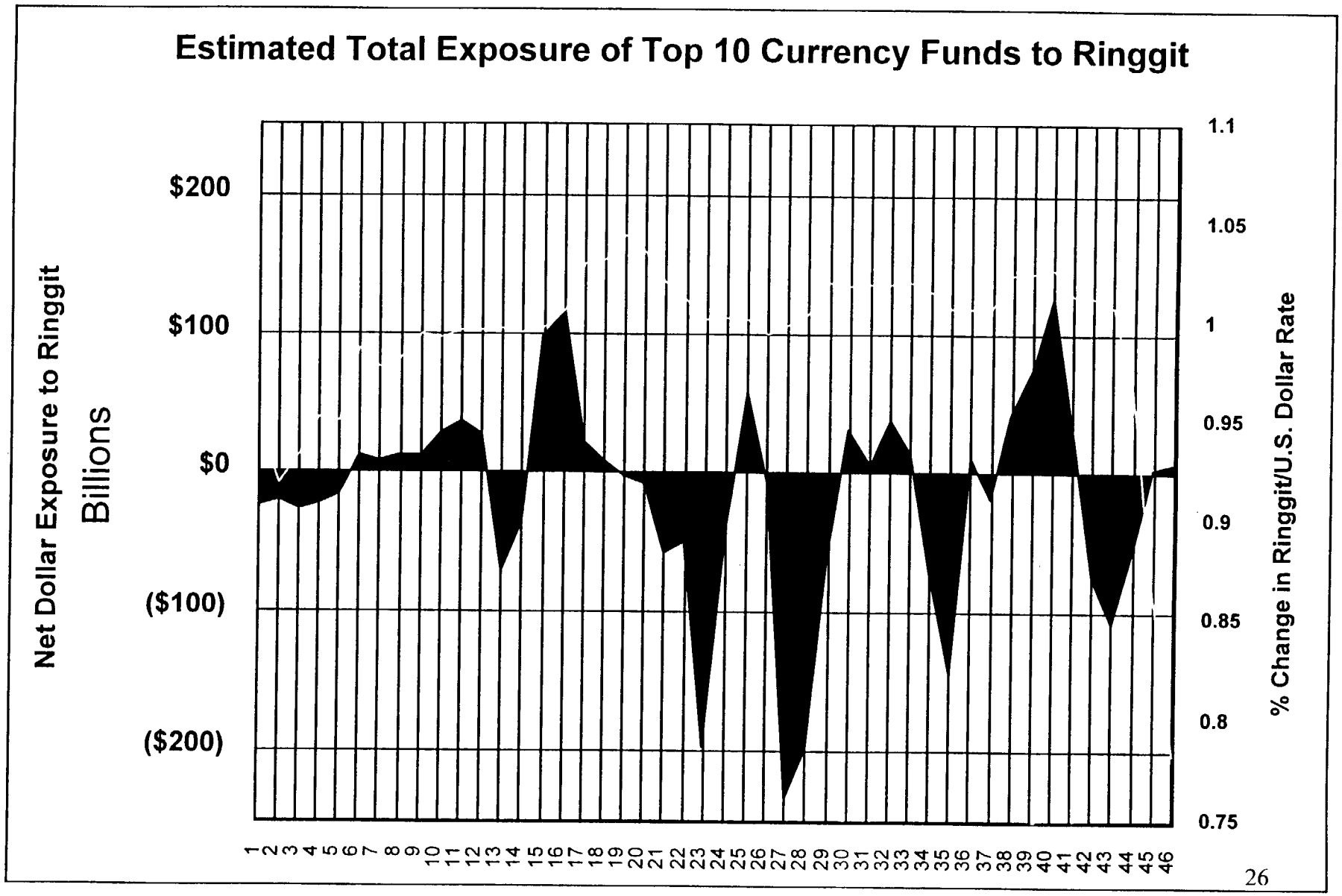
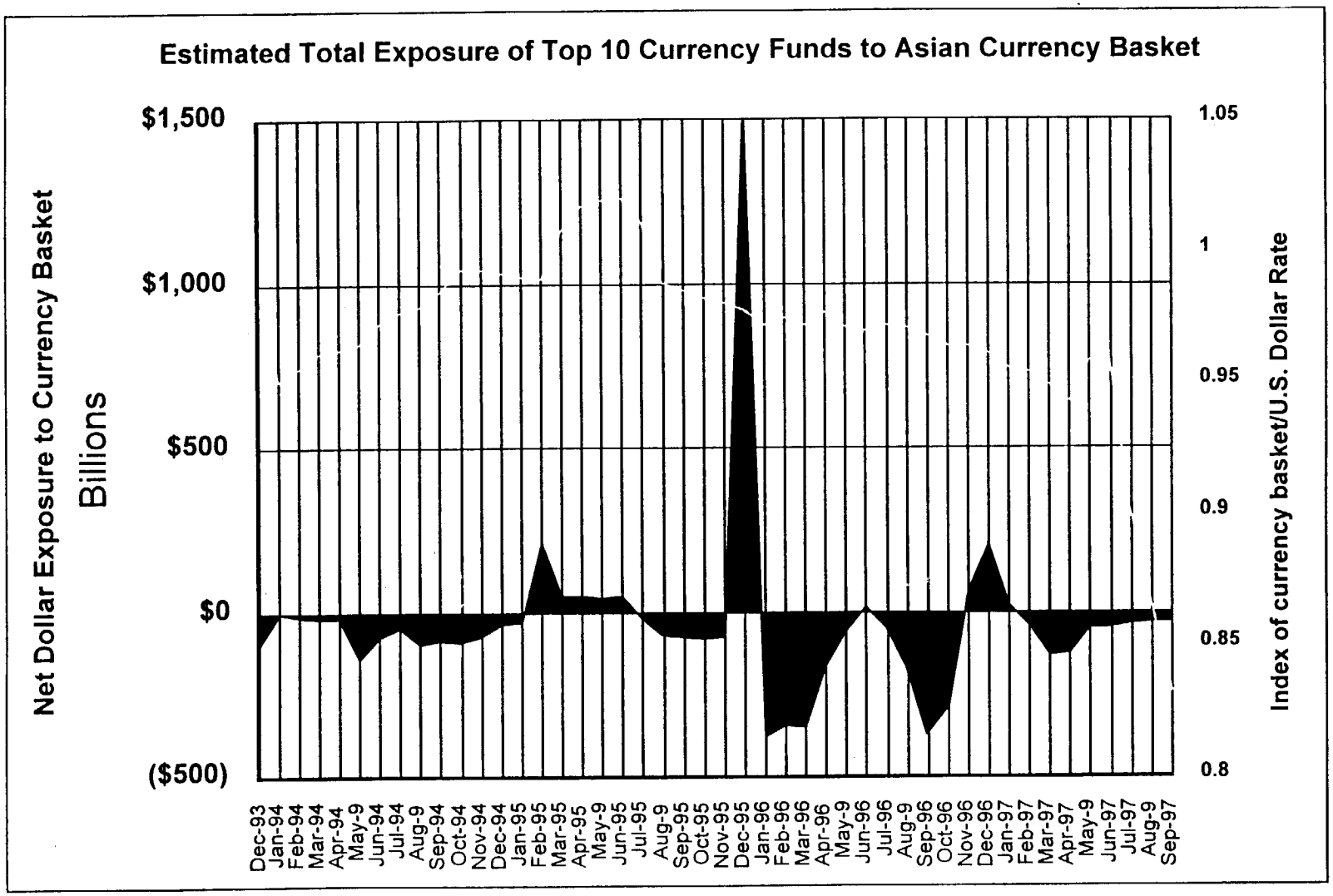
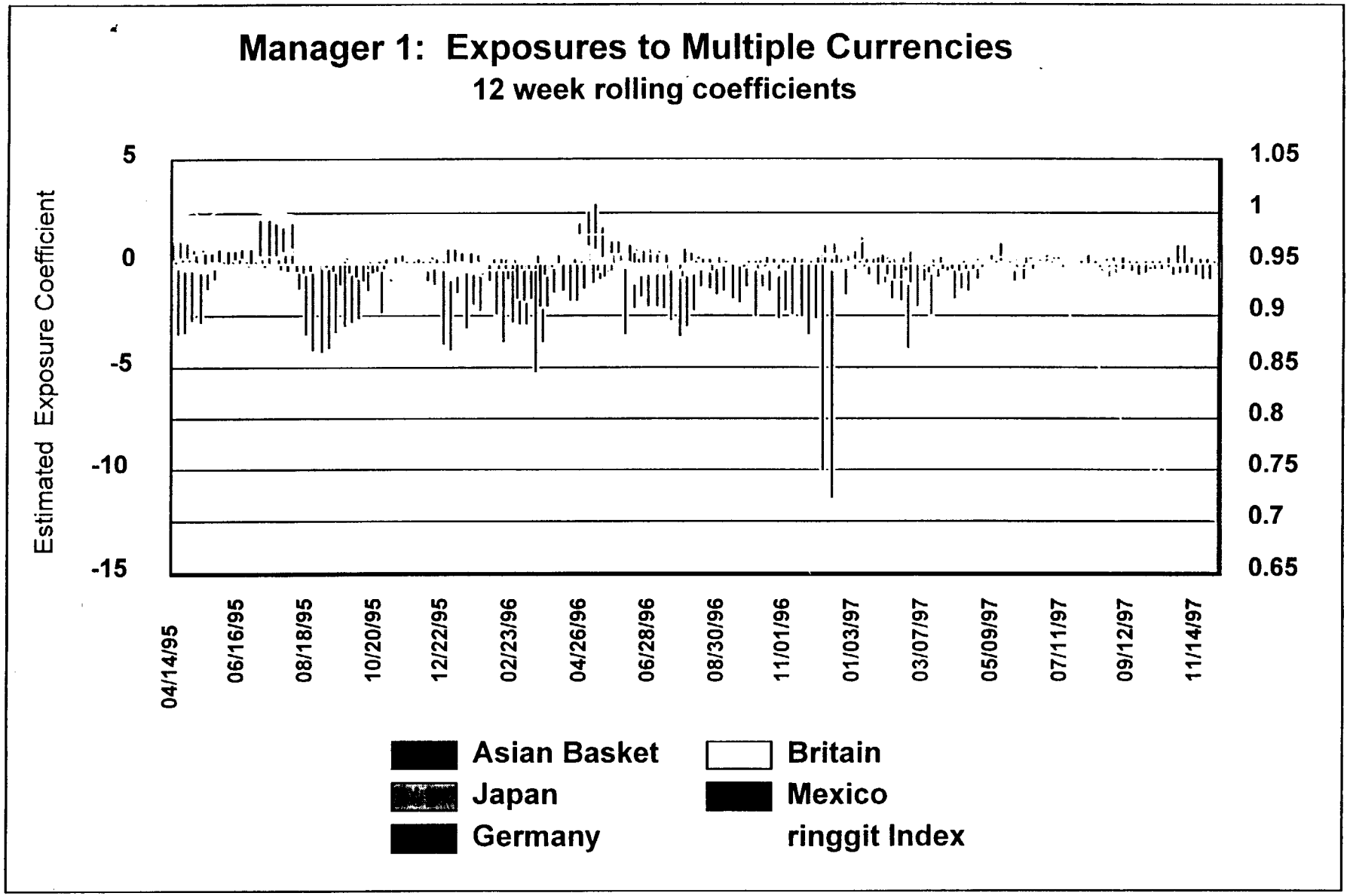
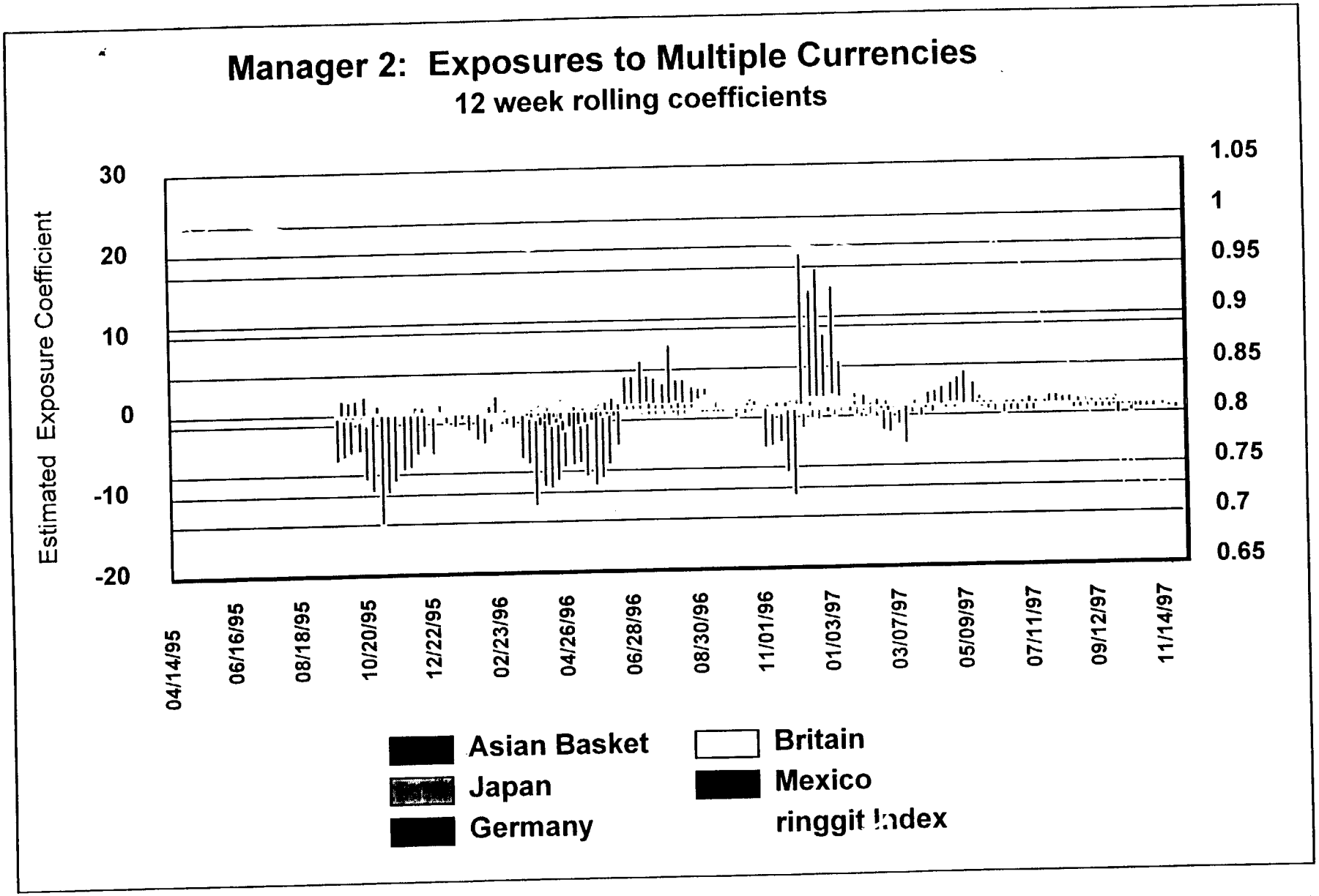

Estimated Total Exposure of Top 10 Currency Funds to Ringgit
Net Dollar Exposure to Ringgit
Billions
$200
$100
$0
($100)
($200)
1.1
1.05
1
0.95
0.9
0.85
0.8
0.75
% Change in Ringgit/U.S. Dollar Rate
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46

Figure 4.


Estimated Total Exposure of Top 10 Currency Funds to Asian Currency Basket
Net Dollar Exposure to Currency Basket
Billions
$1,500
$1,000
$500
$0
($500)
1.05
1
0.95
0.9
0.85
0.8
Index of currency basket/U.S. Dollar Rate
Dec-93
Jan-94
Feb-94
Mar-94
Apr-94
May-9
Jun-94
Jul-94
Aug-9
Sep-94
Oct-94
Nov-94
Dec-94
Jan-95
Feb-95
Mar-95
Apr-95
May-9
Jun-95
Jul-95
Aug-9
Sep-95
Oct-95
Nov-95
Dec-95
Jan-96
Feb-96
Mar-96
Apr-96
May-9
Jun-96
Jul-96
Aug-9
Sep-96
Oct-96
Nov-96
Dec-96
Jan-97
Feb-97
Mar-97
Apr-97
May-9
Jun-97
Jul-97
Aug-9
Sep-97


Manager 1: Exposures to Multiple Currencies
12 week rolling coefficients
Estimated Exposure Coefficient
5
0
-5
-10
-15
1.05
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
04/14/95
06/16/95
08/18/95
10/20/95
12/22/95
02/23/96
04/26/96
06/28/96
08/30/96
11/01/96
01/03/97
03/07/97
05/09/97
07/11/97
09/12/97
11/14/97
Asian Basket
Japan
Germany
Britain
Mexico
ringgit Index


Manager 2: Exposures to Multiple Currencies
12 week rolling coefficients
Estimated Exposure Coefficient
30
20
10
0
-10
-20
1.05
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
04/14/95
06/16/95
08/18/95
10/20/95
12/22/95
02/23/96
04/26/96
06/28/96
08/30/96
11/01/96
01/03/97
03/07/97
05/09/97
07/11/97
09/12/97
11/14/97
Asian Basket
Japan
Germany
Britain
Mexico
ringgit index