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The risk exposure of Hedge Funds operating in emerging financial markets.

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Introduction

Since 1990 hedge funds have taken a more and more prominent role on the financial markets. The increasing popularity resulted in an increase of the amount invested in hedge funds from approximately \$ 50 billion in 1990 to approximately \$ 1 trillion in 2004 (Malkiel and Saha 2004). Market makers even estimated that during 2004 more than half of the day to day trades were made by hedge funds (Malkiel and Saha 2004).

The American Heritage College dictionary defines "hedge" as a securities transaction that reduces risk on an existing investment position. It defines "fund" as an organization established to administer a sum of money. It defines "hedge fund," however, as an investment company that uses high-risk techniques, such as borrowing money and selling short, in an effort to make capital gains by searching for price discrepancies in financial markets. The latter definition reflects public perception thanks to a few high-profile failures such as the near-collapse of Long-Term Capital Management (LTCM). This failure started a wide notice of the risks hedge funds are able to take in order to get as large capital gains as possible. LTCM for example could lend an unlimited amount of money from its banks in order to take extraordinarily positions in international financial markets.

Current regulation is not able to prevent this high risk exposure which some hedge funds bear. One problem according to the control of hedge fund movements, by governments lays in the fact that the operational managers of hedge funds participate in the fund. Therefore an investment by a hedge fund can be seen as a private investment. Much of the regulation concerning public investments are not related to private hedge funds. For example, hedge funds are not required to comply with the regulatory controls as describes by the Investment Company Acts of 1933/1940. These controls limit fund leverage, short selling, holding shares of other investment companies and holding more than 10% of the shares of one company (Fung and Hsieh, 1999). However if regulation is made in a developed country there is always the possibility to go off-shore where financial regulation is limited.

The LTCM case shows how risky hedge funds can be when they are highly leveraged and take huge positions, especially when they operate in risky financial markets. This paper however focuses on the reverse effects of the risks taken by hedge funds on emerging financial markets. The central question therefore is:

Are hedge funds less exposed to risks when they speculate or operate on emerging financial markets?

Therefore the paper concentrates on these hedge funds, operating in emerging financial markets. These so called Macro/Global and emerging hedge funds, like for example some funds managed by George Soros, are usually large players on the international financial markets. They have a large range of possible investment strategies they can follow. They may for example rely on the carry trade strategy, which contents borrowing in low interest countries and invest this money in high interest countries. The interest rates in these emerging countries are normally higher than in developed countries. Other opportunistic strategies for example concerning exchange rate fluctuations are also employed by these hedge funds. These strategies Look for either overvalued or undervalued currencies. The idea is that long or short positions in under or overvalued currencies will generate gains.

There will be a closer look at the speculative incentives of hedge fund managers. The fact that managers of large macro funds are considered highly specialized in the analysis of macro economic variables in emerging markets, may for example stimulate a so called herding behavior by other investors. This notion can stimulate a manager in such a position to speculate. Also other sets of criteria which may induce managers of hedge funds to speculate will be described. In a case study of the role of hedge funds during the Asian crisis in 1998, signs of this incentive to speculate will be examined. If for example it can be shown that herding behavior affected the crisis negatively and hedge funds profited from this behavior, speculating is rewarded. This may encourage managers of hedge funds to abuse this power to create a conflict in relatively small illiquid financial markets.

The possibility of a high leverage for hedge funds, as stated earlier, can lead to a higher chance of speculation. When this happens in an emerging financial market, it can leave these markets vulnerable to disruption. When confidence erodes participants head for exit (Fung, Hsieh and Tsatsaronis, 2000). This can lead to a financial crisis in these markets especially if they are too small to set off occurring disruptions. The possibility of taking large concentrating positions and the possibility of rapid adjustments of these positions can have a substantial impact on market prices, especially at times when the liquidity in markets is thin (De Brouwer, 2001, p4). Therefore a closer look to find out how large the concentrated positions were during the Asian crisis is one of the purposes in the case study. The case study will introduce the first and second generation models concerning speculative attacks on fixed currencies. Out of these models a possible conclusion concerning the role of hedge funds in the Asian currency crisis will be given.

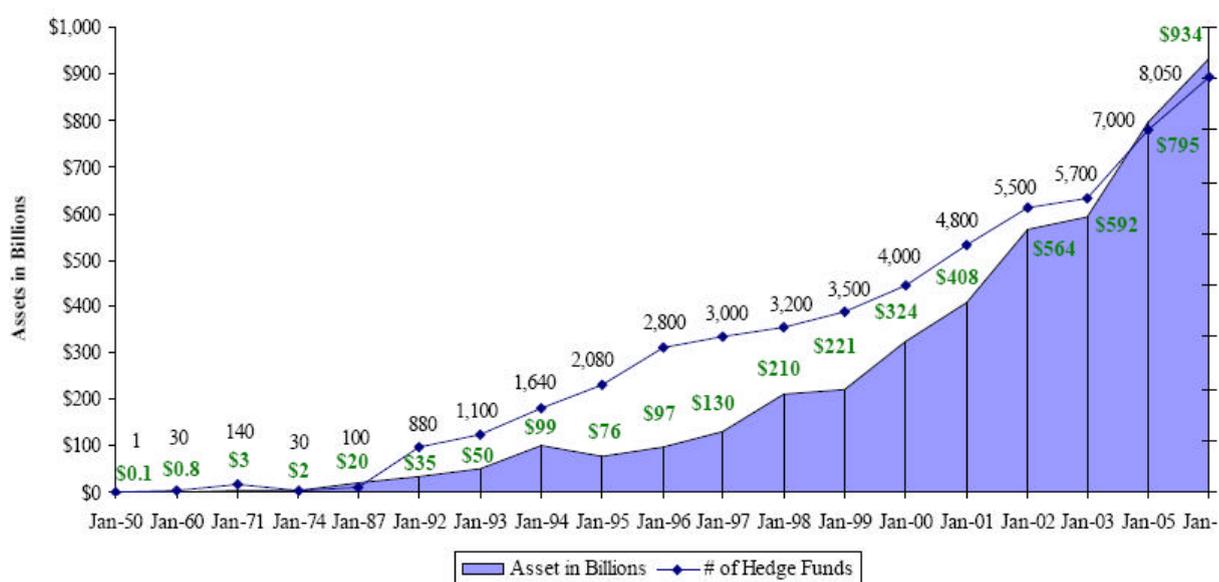
Although the theoretical issues stated above are of a great concern, they don't give prove that hedge funds bear less risks by speculating or operating on the financial markets in emerging countries than other investment vehicles. Therefore one must look at the returns of those hedge funds investing money in these emerging countries via regression analysis. The regression analysis will take place between the returns of these hedge funds and the MSCI world index. Of great concern are the Beta coefficients of the macro global hedge funds and the emerging market hedge funds. Using the Best Beta CAPM approach from dr. Zou, incorporated in the DAPM, the research will try to find out whether the changes in hedge fund returns are different in a so called upper market than in a lower market. Using the logic of the dichotomous ratio $Z = U/D$, the differences between the outcomes in the upper market and the lower market will be analyzed.

The paper will start with a fully description about hedge funds, the legal environment and the problem off the relative freedom concerning hedge funds compared to publicly traded funds. Herein a theoretical approach concerning the managers incentives towards speculating will be given. Thereafter a theoretical explanation and the possible role of hedge funds during the Asian crisis will be presented in a case study. In this part the role of Global/Macro funds is highlighted both positively as well as negatively. Especially the possibility of speculative behavior and the herding behavior are standing central in this part. Then the research concerning the returns of hedge funds operating in emerging markets will be done. This all in order to try to give an answer to the question whether hedge funds are less exposed to risks when they speculate or operate in emerging financial markets.

1 .Hedge funds: regulation and strategies

Hedge funds have grown explosively during the last decades in both the number of funds and the assets under management. The total value of assets under management of hedge funds of over \$ 800 billion in 2005 is a large amount from an absolute point of view. Figure one shows the development of the absolute value of hedge fund assets and the number of hedge funds.

Figure 1: Hedge Fund Assets vs. Number of Hedge Funds, January 2005



Source: E. L. Hennessee, C. J. Gradante, 'hedge fund Industry Growth', January 2005, Hennessee Group LLC

However, when you compare this to the total market capitalization, this amount is virtually negligible (Bakker and Ho, 2004, p58). The total market capitalization is the sum of equity, bonds and total assets at the 1000 largest banks. This was estimated at about \$126 trillion in 2003 (Bakker and Ho, 2004, p58). This means that the total amount of assets under management of hedge funds is less than one percent of the total market capitalization.

It is often perceived that the assets under management of individual hedge funds amounts to many billions of dollars. This is however only true for about three percent of the hedge funds. More than two third of the hedge funds have less than \$100 million under management (Bakker and Ho, 2004).

As stated in the introduction it is very hard to give a precise definition of hedge funds. Therefore a better understanding of hedge funds will be given through two

descriptions in order to discuss the role hedge funds play in emerging markets. The first one will be in terms of their trading strategy in the several financial markets and the second one will be in terms of their regulatory environment. The second term will show that hedge funds are relatively less restricted than publicly traded funds according to U.S. legislation. Although this undermines the controlling possibilities by the government, this problem has not been fully solved. Several exclusions by laws concerning the publication of results, also limits the possibilities of scientific research. Before taking a better look at the regulatory environment, hedge funds first will be described looking at the strategy they follow. Hedge fund can be classified along several dimensions, such as investment style, asset class and geographical focus, leverage and management incentive structures. After these descriptions of hedge funds, a closer look will be taken at the behavior incentives of hedge fund managers. These can have a speculative character considering their legislative habitat and the fact that they can have large trading values.

1.1 Hedge fund strategies

The classic definition of hedge funds is a privately organized, pooled investment vehicle, investing primarily in publicly traded securities and derivatives. Combinations of short and long positions reduce exposures to general movements in the markets, while the focus is on profiting from security selection. This definition of hedge funds does not cover all the different trading strategies applied by hedge funds these days. Hedge fund strategies are usually very different from the strategies followed by traditional investment funds like for example mutual funds or pension funds. Hedge funds generally aim at high absolute returns, where the more traditional investment funds aim at relative returns. Hedge fund strategies need not to be more risky than those of the traditional investment funds. As a matter of fact they can be very subtle.

The basic principle of hedge fund strategies is that the returns of financial assets consist of several different risk premiums. If one of these component risk premiums has a high return to risk premium, a hedge fund can choose to take up only this component and hedge out the others. The way in which a hedge fund does this can be very different. The next paragraph will reveal that hedge funds are largely unregulated and for example are able to have a high leverage. Due to the fact that hedge funds are largely unregulated and are allowed to have a high leverage, they can gear up for those component risk premiums and make the often small risk premiums economically significant. In principle every hedge fund follows its own proprietary strategy (Goris, 2004). Hedge fund strategies are often subdivided in three categories, namely relative value, event driven and market directional strategies.

Relative value strategies

These strategies often use arbitrage, based on inefficiencies in financial markets or price discrepancies between two financial assets. These strategies are largely independent of movements in these markets. Pure arbitrage can be seen as a set of risk-free transactions on which a market participant can lock 'in a profit by simultaneously entering two or more markets' (Hull 2000, p14). The strategy is said to be market neutral and their market risk is to be said zero. Hedge funds are however, according to many literatures not acting like arbitrageurs but more as speculators. They speculate that an asset is over or under valued and therefore selling or buying this asset must not be seen as risk-free. These Relative value strategies work best in decreasing markets, where panic exists and inefficiencies arise on which hedge funds can anticipate. There are different kinds of Relative value strategies.

- | *Convertible arbitrage*: Funds that buy undervalued convertible securities, while selling the underlying equity and thereby hedging (some of) the intrinsic risk to avoid market risk (Brooks and Kat, 2002, p3)
- | *Fixed income arbitrage*: Funds that exploit pricing anomalies in the global market for interest rate securities and their derivatives (Brooks and Kat, 2002, p3). This is one of the hedge fund groups that can be active on emerging markets. According to strategies concerning interest rates, a strategy of so called carry trade can be followed. This strategy contains borrowing in low interest rate countries and investing this money in high interest rate countries. The interest rates in emerging countries can be seen as high, considering the fact that emerging markets are riskier to invest in than developed countries.
- | *Equity market neutral*: Funds that are simultaneously long and short matched equity positions, i.e. portfolios are designed to have zero market risk. Leverage is often applied to enhance returns. The difference to a normal investment fund is that the latter is often not allowed to go short above a perceived percentage of the fund. So when the managers' judgement about an asset is negative, a hedge fund manager can go heavily short and buy back later on a lower level, while a manager of a normal investment fund can only go short on a limited base. Though the judgement of the asset can be the same, the hedge fund manager can make a "higher" return.

Event driven strategies

- | These strategies do not aim at arbitrage, but more at specific events. These strategies have a higher market risk than the relative value strategies.
- | *Merger/acquisition arbitrage*: Funds that trade the securities of company involved in a merger or acquisition (de Jong, 2004, p10). Typically these funds buy the stock of the company being acquired and shorting the stocks of the company acquiring.
- | *Distressed securities*: Funds that trade the securities of companies which are in great financial distress. In this case hedge funds speculate that the distress will pass and the share price will recover.

Market directional

These strategies are the most risky and the most common among hedge funds strategies. A large part of the returns of these strategies depend on the direction of the stock and bond markets. These strategies concentrate on economic change and sometimes make extensive use of leverage and derivatives. Most media attention goes out to this kind of funds. As will be seen in the next paragraph regulation concerning these funds, especially macro funds, is hard because they are mostly situated off shore from a U.S. point of view.

- | *Macro*: Funds that aim at economic variables like interest and currencies. They try to discover trends in these variables and try to anticipate at these trends. In order to be successful they need to take a closer look at macro economic changes, financial market changes as well as the policy process of a country. Further it is necessary to follow the impact of international movements for the economy of a specific country. It is not surprisingly that these are the funds mostly operating on emerging markets. Therefore most of the attention in this paper will go to macro global funds. Especially when it is taking into account that these funds are the most leveraged hedge funds and as stated before mostly are situated off shore. How leverage can induce speculation will be explained in the last paragraph of this chapter. Another characteristic of these funds is that they have a tendency to take large positions and that they are able to change these positions rapidly. This and the fact that these funds can take short positions may have effect on emerging markets, as will be seen in chapter two the role of hedge funds during the Asian crisis.

- | *Emerging market:* As the name reflects, these hedge funds operate on emerging markets. Although their strategies are quite similar to the macro global funds, little is known about possible large positions and leverage. Therefore they can be seen as smaller than the macro global hedge funds. The emerging hedge funds are subject to this research.
- | *Long/short strategy:* Just like the equity market neutral strategy (discussed above), this strategy takes long and short positions at the same time, though in this case there need not to be a balance between those positions. Short sellers depend on a decrease of the stock markets, for example. They sell certain assets which they have borrowed, with the purpose of buying them back at the moment they have to give back the borrowed assets at hopefully a lower price level. Long strategies, buying an asset, will be obtained if the market is expected to rise. The returns, when following these strategies, are very dependent on the developments on the different stock markets and bond markets (van Jong, 2004, p11)

Fund of hedge funds

It is not necessary for an individual investor to invest in individual hedge funds directly; they can also invest in a so-called fund of hedge funds. A fund of hedge funds consists of hedge funds with different strategies. These kind of funds make it possible for individual investors to access hedge funds which would otherwise be inaccessible. Research found that the correlation between the different hedge fund strategies is less than 1. To be more specific one research estimated a correlation between the different hedge funds strategies of 0.13 (Brealy and Kaplanis, 2001). If an investor adds different kind of hedge funds to his portfolio, the risk of the overall portfolio can decrease. This makes fund of hedge funds a good alternative for individual funds.

A rough estimate states that about 51 % of the hedge fund market consists of market directional strategies, 28 % event driven strategies and about 21 % relative value strategies (de Jong 2004, p11). As a sub group long/short strategy has the largest market percentage (30 %). A decade before, almost all of the hedge fund market consisted of market directional funds (87 %) (de Jong, 2004, p11). One could conclude that the strategies of hedge funds became less risky in time, as more market neutral strategies were followed.

1.2 Regulatory environment

Having seen what kind of strategies a hedge fund roughly follows, an explanation about why hedge funds are considered unregulated private partnerships must be given. In some respect, hedge funds do have less regulatory controls than the more traditional investment funds. It must be clear that this paragraph is written from an U.S. point of view. This because most literature uses the U.S. legislation concerning hedge funds. Other developed countries have a quite similar legislation concerning the protection of small investors. At least the problems they face concerning the control of private investment instruments are the same. It may seem that hedge funds are free in their investing behavior. They must however do comply with restrictions concerning all investment instruments. The different aspects of the regulatory environment of hedge funds will be described in this paragraph.

Hedge funds are not required to comply with the regulatory controls as describes by the Securities Act (1933). This Act requires investment vehicles which issue securities to register and to make extensive disclosure through their prospectuses (Brouwer, 2001, p 13). The same Act exempts however those entities which make a private security placement. A hedge fund falls under this description and therefore it is exempted. Because hedge funds are no public investment vehicle the same act has also two other effects on hedge funds. First off all it restricts marketing and advertising of hedge funds. They are not allowed to advertise to the general public. Word of mouth advertising and inclusion in databases are the most important options left to obtain funds. Second it restricts investing in hedge funds to a select group of the rich. The logic behind this is that these very rich are capable of analyzing the risk they bear if they participate in a hedge fund. Which investment vehicles will fall under this description is stated in the Rule 506 Regulation D of the securities. This rule states that hedge funds can only accept investments from investors that have a good understanding of the financial markets and are willing to invest more than \$5 million. In addition they can accept investments from institutions that have at least \$25 million of capital to invest (Gould J.B., Goldstein D.A. and D. Peterman, 2005).

The legislation concerning the type of investors and the amount of these investors per hedge fund is loosening. Before 1996, hedge funds had to limit the number of investors to 99 in order to be excluded from regulations concerning advertising and solicitation of investors. This ceiling has been raised to 500 (Fung and Hsieh, 1999). In addition to this, recent rules by the SEC have further broadened the abilities of hedge funds to attract both individual and institutional investors. Also European governments have recently released new laws that provide hedge funds with more opportunities for

marketing activities. Generally speaking, European law concerning hedge funds do not differ much from US laws.

The previous description of participants in hedge funds also makes sure hedge funds are excluded from the Investment Company Act (1940). This Act requires an independent board of directors for investment companies in order to exercise control over investment strategies and operations (Brouwer,2001, p 14). Again this is an Act to protect investors from exploitation. As long as the investors in hedge funds are high worth individuals, the rationale tells us that this Act can be avoided by hedge funds. This act and the Investment Company Acts of 1933 limit also fund leverage, short selling, holding shares of other investment companies and holding more than 10% of the shares of one company (Fung and Hsieh, 1999). Hedge funds are also excluded from these acts and therefore unlimited borrowing is possible. The next paragraph will describe what kind of incentives a hedge fund manager may have concerning unlimited leverage and short selling, being excluded from these acts.

The fact that managers of a hedge fund participate in their own strategy excludes them from two other Acts. The first is the exclusion from the Securities Exchange Act (1934). This Act controls the behavior of dealers and brokers who have to keep detailed information about their financial dealings and customer transactions (Brouwer,2001, p 14). The second exclusion is from The Investment Advisers Act (1940). This act regulates the performance based fees for investment advisors. Hedge fund managers can receive certain types of performance-based fees that are prohibited to mutual funds and other investment vehicles. Mutual fund performance-based fee have to comply the "fulcrum" rule. This means that gains and losses must have a symmetric effect: the same amount of over- and under-performance relative to a benchmark must result in the same amount of positive and negative incentive fees for a mutual fund manager. Hedge fund managers are not subject to the "fulcrum" rule, or any rules other than what the private investors would stipulate. Typically, hedge fund managers mostly receive asymmetric fees in that they receive positive incentive fees for gains but are not required to rebate fees to investors for losses (Fung and Hsieh, 1999, p.6). This type of fees may induce speculation and risk taking by hedge fund managers in order to make the largest gains possible as will be seen in the next paragraph.

Having explained the exemptions hedge funds are subject to it must be noted that all funds operating in the U.S. are subject to requirements relating to the general oversight of financial market integrity by U.S government bodies (Brouwer,2001, p 14). Depending of the strategy a hedge fund follows many will fall under the Commodity Exchange Act (1974). This act requires funds to be registered and to provide information about risks, historical performance, fees, business background and conflicts of interest to

the Commodity Futures Trading Commission (CFTC) (Brouwer,2001, p 14). To be subject to this Act a hedge fund must either be a commodity pool operator or be a large trader in exchange futures markets. If this is the case, the CFTC requires a monthly report to the investors and an annually report to the CFTC. They also require daily reporting of large positions. Off course one can state the same for hedge funds operating wherever in the world. However one might doubt that regulations in emerging countries are the same as the regulations in developed countries. The extent to which regulation with respect to hedge funds is possible, is limited because of the possibility for hedge funds to move to off shore location. A known location for these kind of investment vehicles for example are the Cayman Islands. Additional regulation usually drives hedge funds offshore where they are out of reach.

Although hedge funds are not strictly regulated concerning borrowing, they are in a sense regulated by the banks that give them credits. The general perception is that banks themselves are regulated and will not give credits to a fund that cannot prove to have adequate capital or provide an adequate margin. Especially small hedge funds require collateral if they want to borrow money. It appears however that often the large hedge funds do not need a convincing collateral for the loans. From a government's point of view there are initiatives to regulate hedge funds more severely:

"The Bush Administration today will take a major step in its effort to increase oversight of hedge funds when the Treasury Department proposes new anti-money-laundering rules requiring the private investment pools to disclose their identities to its financial intelligence unit...The funds, primarily used by wealthy and institutional investors, have thus far escaped the welter of federal rules that cover most of the financial-services industry. Under the new proposal, even many funds that are based offshore will have to register with the Treasury Department's Financial Crimes Enforcement Network if they have investments of more than \$1 million and have U.S. clients or are organized or sponsored by someone in the U.S." (Dow Jones Business News, 2002.)

1.3 Hedge funds and their incentive to speculate

Hedge funds are accused of speculative behavior during the Asian crisis. Before turning to this point in the next chapter, it first must be explained how theoretically hedge funds behave considering their particularly special place in the financial world. The previous paragraph described to which laws and acts of the U.S legislation concerning investment entities hedge funds are excluded from. Many of these exclusions are also embedded in the legislation of other developed countries. If a hedge fund, however wants to avoid the strictness of the "western" legislation, they always can go off shore to manage their

investments. As stated it is known that some managers of hedge funds are operating from the Cayman Islands. Therefore it is very hard to control the activities of hedge funds. Lets however presume that hedge funds are limited in their investment strategies according to U.S. law. What kind of incentive behavior will they have in their strategies concerning the exemptions they have?

Although investment vehicles are limited in their amount of liabilities by law in the U.S., hedge funds can have as high a leverage as their partners accept. Off course there is an obligation of the lenders like banks to control the funds they have being their counterparts. One might think that banks and institutional investors that provide funds to hedge funds do not allow the amount of leverage to be too high. It could be however that the performance of hedge funds are valued wrongly because they have no obligation to publish their previous and current performances. The borrowing of money to acquire assets is called on-balance leverage. Although not limited it seems that hedge funds have no tremendous high leverage as one might think. A study of Van Hedge Funds Advisors (TASS, Van Hedge Fund Advisors, 2002) shows that 27% of the hedge funds claim not to use any leverage, 45 % claim to use a leverage of 1:2 or less and 28% of the hedge funds say that they use a leverage of more then 1:2. Judging from this study, the argument that hedge fund are highly leveraged is overstated. There are however exemptions like the case for the LTCM. LTCM leveraged it's holdings up to several billions of dollars. Apparently, banks where willing to lend funds to LTCM up to a debt-equity rate of up to 55:1 (Jorion 2000). This case shows that high on-balance leverage ratio's can occur, especially when a fund is in trouble. A high on balance leverage induces managers to take risks through speculation.

Another form of leverage which may enlarge the risk of investment funds is the economic leverage. This leverage occurs through off balance transactions like the repurchase of agreements, derivative contracts and the taking of short positions (Brouwer de, 2001, p10). When for example a short strategy is followed, an asset is borrowed and then sold to a third party. The asset therefore does not occur on the balance sheet. When however the asset rises in value, losses can occur. This happens when the repurchase costs in order to give the borrowed asset back to the lender are more than the incomes that came in when the asset was sold in the past. The same holds for the derivative contracts. If a future or forward contract has been made and in the future the price of the underlying asset has been dropped, losses are made. This is a loss for hedge funds because their aim is to get the highest absolute return as possible.

As seen in the previous paragraph, hedge funds have no limits in taking short positions by U.S. legislation. Therefore there is no control on the positions of hedge funds. Theoretically they can take as many short positions as possible, raising the risks

through off balance leverage. Again co-investors of a hedge funds probably has to agree with the strategy a manager wants to follow. There is however no evidence that this really happens. The case for derivative contracts is different. As seen the CFTC requires a monthly report to the investors and an annually report to the CFTC. One might however doubt whether annual reporting is sufficient enough to control the contracting on the futures exchange markets. Although economic leverage can increase depth and liquidity to financial markets, it also can increase the vulnerability of financial market due to sharp price movements when positions shift. This especially may occur when financial markets are small and not fully mature. At the same time it can make positions vulnerable to changes in the credit intermediation process (Counterparty Risk Management policy group, 2000).

In the previous paragraph the particular way of receiving fee by a hedge fund manager came along. Being excluded from the “fulcrum” rule they are able to receive asymmetric fees without rebating fees in times of losses. They are in fact excluded from every rule reflecting performance based fees other than what the private investors would bear (Fung and Hsieh, 1999, p.6). This could induce speculation and risk taking by hedge fund managers. In the case of hedge funds, many managers are accompanied by high water

mark provisions which condition the payment of the incentive upon exceeding the maximum achieved share value (Goetzmann & Ingersoll Jr & Ross, 1998). This means that hedge fund managers receive a proportion of the returns excess of the previous set water mark of the portfolio. This percentage of the returns usually range between 15% and 25% of annual new profits (Goetzmann & Ingersoll Jr & Ross, 1998). This is normally combined with a 1% or 2% of the portfolio assets as a fixed fee (Goetzmann & Ingersoll Jr & Ross, 1998). Before however receiving a bonus above the water mark, the manager has to make up for losses in the past. With incentive based contracts for fees like these the aim is to induce managers to get the highest absolute returns as possible. This however enlarges the risks that managers are willing to speculate in order to obtain these high returns.

In a situation where the expected returns are laying above the previous set water mark, more returns mean more income for the manager as they will receive a high percentage of the excess return. Knowing to be on the positive side will urge the managers to aim even higher. In a situation where the expected returns are beneath the previous set water mark, the risk a manager wants to take might be even higher. Receiving a fixed fee anyway and knowing that losses has to be made up first before receiving the high incentive fees will drive a manager in this situation to take more risk. There is also the change of capital outflow from the investors of the hedge funds if losses

occur. Again a manager will try to reverse an expected downfall in returns. Research shows that high water mark incentives are more used in “speculative” assets like hedge funds where volatility may be high due to the previous reasons in order to get the highest possible returns (Goetzmann & Ingersoll Jr & Ross, 1998).

Having seen what the incentives of hedge fund managers might be, considering the legislative exemptions they have, it is also important to take into account the impact of hedge funds’ influence on other investors who can copy the actions a hedge fund manager takes. This behavior by other investors is called herding. Investors are portrayed as herds when they charge into risky ventures without adequate information and appreciation of the risk reward trade-offs. They also flee to safer havens at the first sign of trouble (Bikhchandani & Sharma, 2001). When this behavior by other investors is taken into account by a fund manager, he may have market power through influencing financial markets toward the direction he wants it to go in order to gain money. This situation may even occur when the fundamentals are not supporting the direction a financial market is going to. This situation mostly occurs in small or medium sized financial markets where information concerning these markets is difficult to obtain. In this manner the emerging financial markets fulfill this description.

There is some rationality behind the theory of herding from an investors point of view. The first fact is that investors may have an intrinsic preference for conformity(Bikhchandani & Sharma, 2001). The more investors invest in a similar asset the more profitable this asset will be. The second fact is that the compensation scheme and terms of employment may be such that imitation is rewarded (Bikhchandani & Sharma, 2001). The results of an investor will mostly be compared with the results of other investors in order to be rewarded. The focus here however will be on information asymmetry and how this affects herding behavior. The notion here will be that some investors might have special knowledge or at least are considered to have special information. If this is the case, a strategic investments will be followed by others. To be situated in such a special position it must be important that the investor or the investment is large enough. Small investors will not be followed. Large in this matter can be in the form of size, reputation for the quality of information and the ability to “signal” the portfolio positions to the rest of the market (Corsetti & Pesenti & Roubini, 2001).

Not all hedge fund managers are in this situation but the large macro hedge funds are widely regarded as having the best analysis and understanding of the region’s economy fundamentals and of the regional financial markets. This, with in particular an unrivalled understanding of the changing pattern of liquidity in for example the Asian financial markets, could have them making use of herding behavior during the Asian financial crisis as will be outlined the next chapter(Brouwer de, 2001, p 7). It must be

noted that the possible effects will be larger in small financial markets. Their influence therefore could be significant in the emerging markets in Asia before and during its crisis. In the case of a small or medium financial market it can exacerbates volatility, destabilize markets and increase the fragility of the financial system in a country in order to gain positive returns(Bikhchandani & Sharma, 2001).

The previous situations and reasons state that managers of hedge funds have the incentive to take some risks in speculating on the financial markets. This on its own is not a bad thing. Hedge funds can bring sources of liquidity and innovation on the financial markets. This might improve efficiency on the financial markets. Sometimes they can also bring stability in financial markets due to speculation. If the prices are high they can create a situation of excess supply, earlier than others they can be willing to sell their assets. If prices are low hedge funds can provide an excess demand so prices will go up. In these cases stability will be maintained in a financial market. Through speculation the funds are willing to take risks others don't want to bear. This enables households and firms to shift financial risks (Brouwer de, 2001, p. 1).

They also provide a situation where diversification is possible due to investing in hedge funds, the so called funds of hedge funds. Table 2 shows a correlation matrix of stocks bonds and hedge funds.

Table 1: Hedge funds, stocks and bonds correlation (1994-2004)

	Hedge funds	Stocks	Bonds
Hedge funds	1	0,48	-0,12
Stocks	0,48	1	0,20
Bonds	-0,12	0,20	1
Sources: CSFB/Tremont (www.hedgeindex.com), S&P index 500 and Lehman Brothers Bond			

This table clearly shows that hedge fund in a diversified portfolio reduces the portfolio risk due to a correlation coefficient less than 1. This is in line with the research by Amin and Kat (2002) who shows that parts of an portfolio invested in hedge funds can reduce the overall standard deviation through diversification. An other research found out that the correlation between hedge funds is estimated at 0.13 (Brealy and Kaplanis, 2001). An extended research towards the risk exposure of hedge funds operating in emerging markets will follow in chapter four.

This chapter explained the background of hedge funds, both legal as from a strategic point of view. A further explanation towards their possible leader position in information and strategy, from which it can be derived that hedge funds have the incentive to speculate on the financial markets was given. This however reflects not the incentive for every hedge fund manager. The size of the funds and the reputation of the manager are important to have some market power. The next chapter will take a closer look at speculative attacks on currencies and the possible exploitations of the leadership by hedge funds in other financial markets in Asia. This will be presented as a case study. An answer will be given whether hedge funds operating in emerging markets, especially on the Asian financial markets, had any influence through speculation on these markets. If there is any evidence that large players like hedge funds were active and speculative on these currency and financial markets in order to gain large positive returns, this may support the notion that these hedge funds are less riskier in their speculations. The descriptive character of the next chapter however does not fully explain the risk exposure of these hedge funds. This will be explained in chapter four.

2.Hedge Funds and the Asian crisis: A case study

This chapter researches theoretically the possible influence of hedge funds on the Asian financial crisis. Some believe that hedge funds were the trigger to start this crisis. The former prime minister of Malaysia claims that the crash in the Malaysian Ringgit was caused by speculators in the currency markets. He specifically aimed at the hedge fund operators like George Soros whom he termed “ Highwayman of the global economy”.¹ Others however claim that no influence was induced by hedge funds to let the economies in east Asia collapse. An IMF study in 1998 argued that hedge funds are essentially a benign force in financial markets, and that it is misguided to blame them for the Asian financial crisis (Eichengreen & Mathieson, 1998).

To get a better understanding of this matter, it first is important to explain what theoretically happened during the Asian crises conform the literature. Thereafter this chapter will highlight the role of hedge funds in different countries and different financial markets in Asia during the Asian crisis. In this part the theoretical model of speculative currency attacks will be introduced in order to shed some light over the possible speculative role of large macro hedge funds. This all to find out whether theoretically this incentive had influence on the risk exposure of hedge funds operating in emerging markets at that time. An analysis of the risk exposure will follow in chapter four.

2.1.The Asian crisis

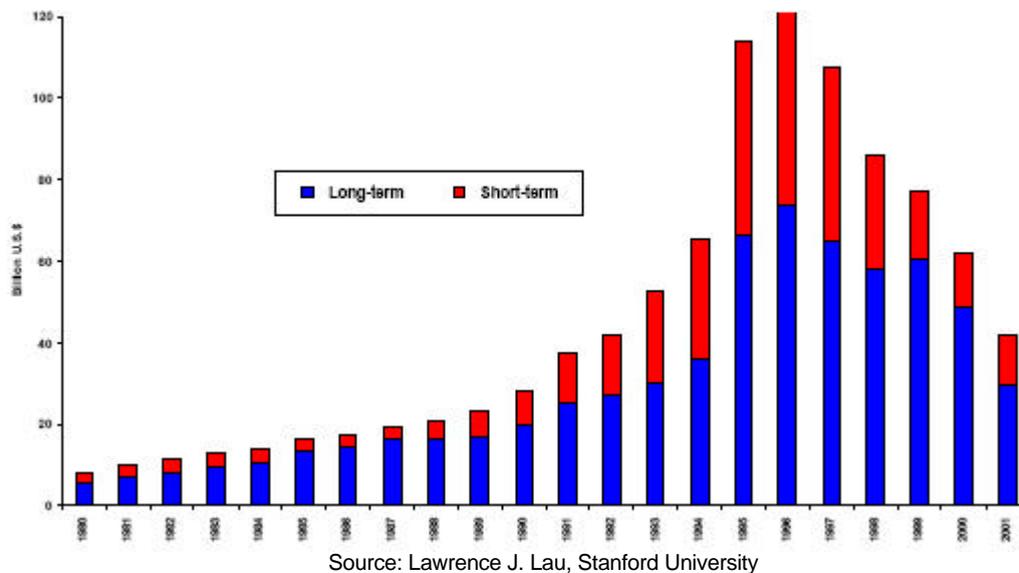
Many economists and other important economic institutions like the IMF didn't suspect something like the Asian crisis could happen. For years or even decades the countries in the south east of Asia flourished in prosperity. Many of these countries had impressive performances in growth with a relatively low inflation. This compared with, so it seemed, macro-economic stability, strong fiscal positions, high saving rates and thriving export sectors, made the predicted chance of a financial crisis very low (Aghenfli, 1999). It happened however differently due to many reasons which became clear afterwards.

Because of the previous success, authorities in Asia were not focussing on possible problems they were facing until it was too late. There was a great capital inflow in Asia due to foreign investments in the Asian financial markets. Beside this type of capital inflow at that time, domestic demand for foreign money, from Asia's point of view was

¹ Mohamad Mahathir Mohamad, *Wall Street Journal*, September 23, 1997, “Highwaymen of the Global Economy,”

very high because of the economic expansions in these countries. The foreign interest was relatively low and therefore many foreign funds were available. Mostly however these debts were short term borrowings which left the countries vulnerable for external shocks (Aghenfli, 1999). Figure 2 shows how these external debts in the case for Thailand grew further in the mid 90's. This figure is quite representative for other Asian countries.

Figure 2: Stock of external debt: Thailand. (Annually Data 1990-2001)



Central banks and commercial banks borrowed these foreign short term debts, lending the money to domestic corporations. Normally this would not have been a problem if these foreign funds were allocated efficiently. In Asia however this was not the case due to “crony capitalism” and inefficiencies in the allocation of these funds. Both resulted in a lower rate of return on the domestic savings (Halwood, C.P. & MacDonald, R. 2000, p304). This phenomenon could occur because of weak financial sectors and the lack of transparency. The misallocation of financial resources and the over-borrowing of foreign short term debts increased the vulnerability of the Asian economies (Saxena & Wong, 2002).

This situation on its own however would not have caused a financial crisis. A second important matter is the fact that many Asian currencies were pegged to the U.S. dollar. This gave Asian borrowers a false sense of security to take mostly dollar dominated debts (Aghenfli, 1999). The fact that these currencies were pegged had also other consequences. Asian countries had to manage their currency supplies through active monetary policies. The ideology behind a fixed currency is that inflation is controlled and

therefore situations like hyperinflation and currency deterioration normally are avoided. This however is only possible if one is sure of the fact that a devaluation won't occur.

There are two ways of controlling the exchange rate. The first, when money demand decreases, is through the issuance of government bonds. The effect will be that interest rates will rise and therefore an effect is also visible in the economy as a whole. For example the demand for domestic loans will decrease which also has influence on the domestic investments. Lowering the domestic investments will lower the demand for domestic goods. The negative effect will therefore be seen on the local stock markets which will decrease. This is a very simplistic example and many side effects are left aside.

A second way to deal with a lowering money demand is through the purchase of the local currency with the foreign reserves a country has. As long as there are sufficient foreign reserves, the effect on the economy will be minimized. A monetary policy change is first of all necessary when there is a change in the relative global value of the currency the domestic currency is pegged against, in the case of Asian countries the dollar. Another case would be when there is a change in the domestic current account. The current account reflects the difference between export and import. If the current account runs into a deficit, i.e. import is larger than the export, a reflection in the exchange rate will occur. As table 2 shows this was already the case in some countries in the east of Asia prior to the Asian crisis itself.

Table 2: Current account in a selection of Asian developing countries. (US\$b)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	For the period 1987-1996 (cumulative)
East Asia											
Indonesia	-1.4	-1.1	-3.0	-4.3	-2.8	-2.1	-2.8	-7.0	-8.0	-4.8	-37.3
Malaysia	1.9	0.3	-0.9	-4.2	-2.2	-3.0	-4.5	-7.4	-5.1	-4.9	-29.9
Korea	14.5	5.4	-1.7	-8.3	-3.9	1.0	-3.9	-8.3	-23.1	-13.8	-42.0
Philippines	-1.3	-2.5	-2.7	-1.1	-1.0	-3.0	-3.0	-3.3	-3.9	-4.1	-25.8
Thailand	-1.7	-2.5	-7.3	-7.6	-6.3	-6.4	-8.1	-13.6	-14.7	-5.3	-73.3

Source: Economist Intelligence Unit and Datastream/ICV

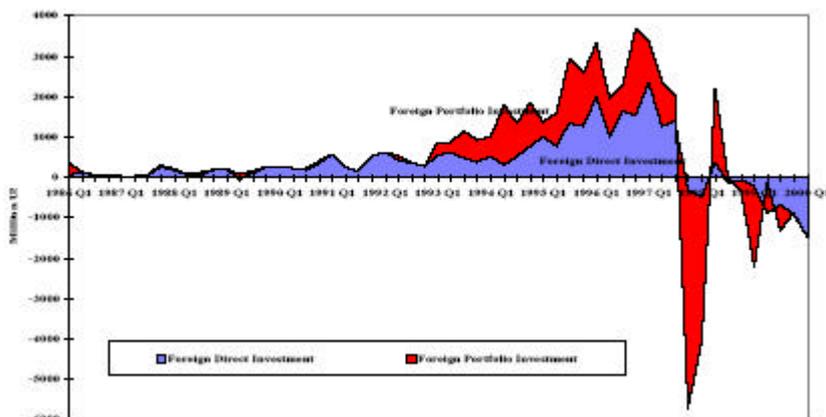
If the current account runs into a deficit, the demand for the domestic currency will fall and with a policy where the exchange has to remain constant, an intervention by the government must occur. We have seen that this can be done by either buying the domestic currency with foreign reserves or through issuing government bonds.

Of course the current account and the exchange rate are woven together. Many of the currencies in Asia were pegged to the dollar like the currencies of Thailand, Malaysia and the Philippines. When in 1996 the dollar appreciated against the Yen by 35%, this had influence on the current accounts of these Asian countries with a peg against the dollar (Feldstein, 1998). For their export sectors this meant that their products became relatively more expensive than the same products from Japan, considering Japan as a major trade partner in the region (Feldstein, 1998). Concurrence increased and during 1997 this possible caused a decrease of the exports in these countries. A current account deficit meant more pressure on the fixed exchange rates in Asia. Meanwhile imports from Japan became relatively cheaper, and therefore from the import side this also resulted in a widening gap in the current accounts. Other possible reasons for the increasing concurrence on the international market where the devaluation of the China's yuan in 1994 and the loss of some export markets for Asia, after the establishment of the North American Free Trade Agreement in January 1994 (Aghenfli, 1999).

These underlying problems are according to many theorists the cause of the first happening in the Asian crisis, the deterioration of the Thai current account. Pressure on the Thai Bath became real and as stated earlier a tightening monetary policy had to be followed in order to let the Thai Bath pegged to the U.S. dollar. However much of the foreign reserves were also used to pay out to foreign lenders in the form of short term interests and the payback of foreign loans. This resulted in an shortage of foreign reserves which came into notice when Thailand asked for a monetary support by the I.M.F.. This resulted in a sudden flight of foreign capital out of the Thai financial markets. Meanwhile the fixed exchange rate came under attack and so a devaluation of the Thai Bath was unavoidable.

This collapse of the current account and the following devaluation of the Thai Bath created a so called domino effect. Several other countries in Asia experienced a similar situation in capital flight and a devaluation of their currencies. The capital in and outflow at that time can best be seen in figure 3 where this is shown for the case of Indonesia.

Figure 3: Foreign investment Indonesia. Blue scale foreign direct investment. Red sale foreign portfolio investment. (Quarterly Data 1986- 2001)



Source: Lawrence J. Lau, Stanford University .

It must be noted that the dramatic fall of both direct and portfolio foreign investment was the largest in Indonesia. Other countries which experienced large losses due to the Asian currency crisis were Malaysia, Hong Kong, South Korea and even strong economies like Australia and New Zealand. As an effect, interest rates rose in these countries to protect their currencies as much as possible. The side effect was a downward trend of the stock exchange markets in these countries. In history the Asian currency crisis became real. Some situations in different Asian financial markets and the role hedge funds may have played will be explained further in the next paragraph. So far this was in short the theoretical explanation of the beginning of the Asian crisis.

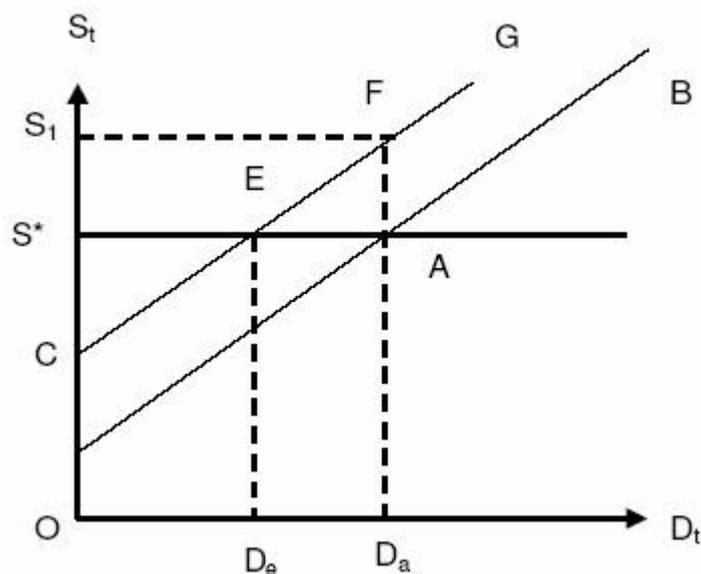
2.2 The role of hedge funds during the Asian currency crisis.

The devaluation of the Asian currencies were the beginning of the Asian currency crisis. The change from a fixed exchange rate to a sudden devaluation is called a speculative attack. To maintain a fixed exchange rate we saw that a monetary policy is necessary. This mostly is done through the selling of foreign reserves against the local currency if the demand for these local currency is low. A lower demand for the local currency occurs when the current account runs into a deficit and as we saw in table 2 this was the case for most of the Asian countries in the years prior to the collapse of the currencies. A change of the foreign reserves however does not mean a collapse of the domestic currency. For an investor in pegged currencies, the currency board must fall in time in order to gain profits on the purchased foreign reserves i.e. the bought foreign reserves at time $t=t$ must be relatively more worth at time $t= t+1$, otherwise no future profits can be earned. This however is not an every day situation. Therefore trading in pegged

currencies is highly speculative. Before turning to the possibilities that hedge funds influenced the devaluation and therefore the Asian crisis, the model of a speculative attack first will be explained.

The models of a speculative currency attack can be divided in first and second generation models. The first generation models, developed by Krugman (1979), Flood and Garber (1984) and Blanco and Garber (1986), state that if the growth of the rate of domestic credit expansion is faster than the growth of the demand of domestic money, the foreign exchange reserves will deteriorate. At some point in time this ultimately will destroy a currency peg (Halwood & MacDonald, 2000, p305)². In their models they state that beside the fixed exchange rate there is a so called shadow exchange rate. This is the rate used by agents to determine whether a currency is overvalued or not. At some point the shadow exchange rate intersect with the fixed exchange rate. If this is the case, agents will buy the foreign reserves with the domestic currency, leading the exchange rate to devalue. In figure 4 this is the line B.

Figure 4: The speculative currency attack model



Source: Ordean Olson and Matthew He

D_t represents the rate of domestic credit.

S_t represents the exchange rate.

² For a full mathematical explanation of the speculative attack models see: Hallwood, C.P. & MacDonald, R. (2000): "Currency crisis and speculative attacks", International money and finance, third edition, Blackwell Publishers, Oxford, 2000

Consider the domestic nominal money supply with all variables in natural logs.

$$M_t = \theta D_t + (1-\theta)R_t \quad 0 < \theta < 1$$

With: D_t the rate of domestic credit

R_t the domestic currency value of the foreign exchange reserves

θ the initial share of domestic credit in the money supply

Every lowering demand of the domestic currency must be compensated with an increase of the initial share of the domestic credit in order to let the exchange rate fixed i.e. money demand must equal money supply. If the domestic money supply stock is held to be constant, this has an effect on the foreign reserves of the country. At some point $D = D_a$, the shadow exchange rate depreciates relative to the pegged rate, provoking a speculative attack. This reduces the demand for domestic money immediately, empties the foreign exchange reserves and reduces the money stock (Halwood & MacDonald, 2000, p307). This model suggests a full insight in the domestic situation of its fundamentals and hence an attack will only occur when $D = D_a$. It is Logic that if $D < D_a$ speculators would suffer a capital loss on the purchased foreign reserves and therefore no attack will occur. The first generation models state that the amount of foreign reserves is finite and therefore it is impossible for governments to maintain a fixed exchange rate. Krugman (1979) argued that the attack occurs when the central bank's foreign reserves reach a minimum level. If this is the case, no speculators and hence hedge funds will have influence on the moment a devaluation of a fixed currency sets in.

The first generation models state that only inconsistent policies prior to the speculative attack can run the economy into a crisis. The second generation speculative attack models however state that even with consistent policies, the speculative attack can be forced. The model, developed by Flood and Marion (1997) introduces a second shadow exchange rate which lies left of the former shadow exchange rate, line G in figure 4. When the domestic credit is at point D_e , a situation of multiple equilibria occurs either on the intersection with line B or on the intersection with line G. If agents believe that there is no possibility of an attack the equilibrium will stay on the line B. However, if speculators believe that a speculative attack will be forced by the market, the equilibrium shifts to point E on line G. No speculator will want to hold the domestic currency and this will push the currency off the fixed rate (Halwood & MacDonald, 2000, p311). This situation is possible if the market is dominated by large players who have single-handed the power to move the market. This can have been the case for hedge funds in the currency markets in Asia during the Asian currency crisis.

A second generation speculative currency attack can occur under certain conditions. As stated, only large players who dominate relative small markets can inflict such an attack. To see whether this was the case for the Asian markets is quite difficult. Knowing however that the currency markets were relative small it can be assumed that some large traders like hedge funds were able to control these markets in a certain direction. Some proofs of this can be found looking closer to the individual financial markets. Some evidence of a double play, being active on more than one market in order to gain profits through the change of economic fundamentals is present. The main situations during the Asian crisis will be explained below. One might however doubt if the situations are representative for hedge funds operating on these emerging markets as a group. It does however give some insight in the notion that speculation can be less riskier than economically can be explained.

First of all it is important to find out if large players had large positions in the Asian financial markets. If this were the case, these large players i.e. hedge funds could disrupt the relative small markets. The FSF Working Group on HLI's (2000) state that Highly leveraged Institutions and in particular global macro hedge funds were the key players on the Asian financial markets during the mid 90's. Position size however varied by market and regional economy. The report shows that in the mid 1998, half of the net open interest in the Hang Seng Futures index was held by four funds among which three were identified as global macro hedge funds. These data can be seen as the only hard data on hedge funds positions available. Large positions held by hedge funds are however said to be existed in other markets in Asia as well during that time.

So inflicting the price dynamics by large hedge funds would have been possible either through the encouraging of other players to establish a similar position or through taking a contrary position and stand aside from the market altogether (Brouwer, 2001, pp 50). In both cases this would adversely affect liquidity in the markets and therefore price movements become more disorderly and exaggerated (Brouwer, 2001, pp 50). As stated in paragraph 1.3, hedge funds and especially the large ones, are able to use their knowledge and market power to inflict a herding situation in markets. One must however bear in mind that such an action might also restore imbalances on financial markets and so speculation on its own should not be treated as bad per se.

There is a strong empirical link that the effects on market prices is greater the bigger the position (Karpoff 1987: Stickel and Verrechia 1993). So if speculators take large short positions on a currency which is pegged, one might doubt whether this is done conform economic reasoning. A pegged currency will be adjusted if changes of the economy and hence a change of the demand of the currency occur. Normally no profits will be gained by shortening such a pegged currency if the currency board does not

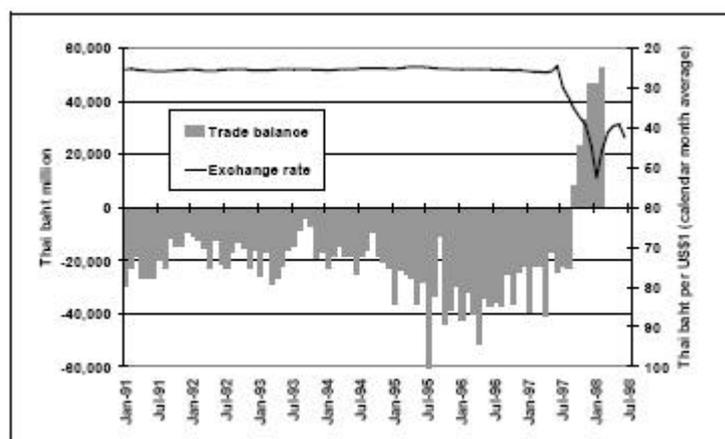
collapse. Therefore such an investment would not appear by hedge funds because of their philosophy to gain the highest absolute returns as possible. If therefore large positions on currencies are taken by hedge funds and the foreign reserves are not yet dried out, the reasoning behind the second generation speculative attacks might be true. If this is the case, a currency devaluation has been inflicted without the malfunctioning of the monetary policies by governments. Paragraph 2.1 rejects this notion where it states that the misallocation of foreign funds and cronyism was present in the Asian countries before and during the crisis. A hard conclusion therefore cannot be drawn.

The case for Thailand

In paragraph 2.1 an explanation is given about how the Asian crisis started in Thailand. The situation in Thailand could have been perfectly conform the first generation models of speculative attacks with large currency account deficits and a foreign reserve drying out. This also is the conclusion of the research by Eichengreen, et al. (1998) which estimated that hedge funds directly had about US\$7 billion of the Bank of Thailand's US\$ 28 billion forward book. If this was the case, hedge funds had positions of nearly a quarter of the nations total forward book and therefore a conclusion can be made that the market power was not sufficient enough to inflict a fall of the currency board. Key domestic and international participants in the foreign exchange market at that time however estimated a hedge funds aggregate short positioning of US\$10-15 billion, quite larger than the former research suggested (Brouwer, 2001, pp 57). With nearly a third of Thailand's foreign book in the hands of hedge funds, this changes the view of market power by hedge funds during that time. Still this cannot be seen as hard evidence concerning the speculative role of hedge funds in the devaluation of the Thai Baht. Figure 5 shows the devaluation of the Thai Baht from a pegged situation in July of 1997. This figure also shows the balance of trade deficits during and before the devaluation of the Thai Baht.

Figure 5: The effect of the devaluation on the visible trade balance of Thailand. (Quarterly Data January 1991- July 1998)

Source: Bank of Thailand and Datastream/ICV

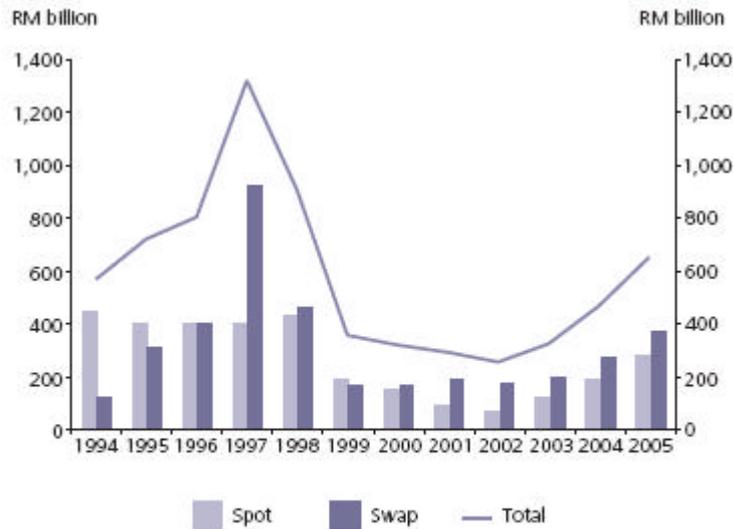


The case for Malaysia

As mentioned in paragraph 2.1 the devaluation of the Thai Baht started the fall of other currencies in the region. This devaluation on its own however is not enough to have effects on other economies. In the case of Malaysia for example the devaluation created a situation where its exports came under pressure, being highly competitive with Thailand exports which became relatively less expensive. At the same time, a known conflict between the Prime Minister and the Minister of Finance concerning the economic problems did not support the international perspective of the Malaysian economy. These situations on its own can be the answers for the devaluation of the Malaysian Ringgit.

There are however also indications that hedge funds played a role in the devaluation of the Malaysian Ringgit. Some argue, like the Prime Minister, that hedge funds played a so called double play on the financial markets of Malaysia. This strategy could have been profitable by establishing short positions in the Ringgit and then selling a large amount of assets on the stock markets in order to affect the currency rate (Brouwer, 2001, pp 106). In this case the currency must have been devaluating in order to make such a strategy profitable. Taking short positions on the Malaysian Ringgit was really speculative unless the participants had a great deal of market power through large positioning and inside knowledge. There is some evidence that previously to the devaluation of the Malaysian Ringgit the establishment of short positions increased. A common way to establish short positions on a currency for example is to sell in the spot market and borrow funds in the swap market to settle the spot sale (Brouwer, 2001, pp 104). Figure 6 shows that the trading in the swap market was the highest in 1997.

Figure 6: Volume of the Inter bank transactions in the Kuala Lumpur foreign exchange Market.



Note: Data from 2002 onwards is based on the new Ringgit Operations Monitoring System (ROMS), whereas observations for previous years are based on transactions of the eight Authorised Dealers.

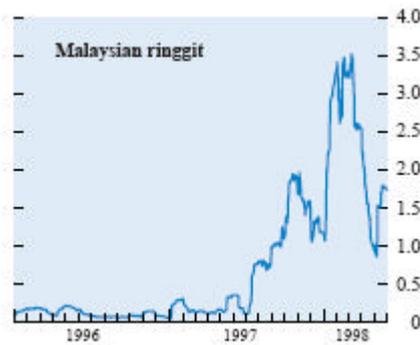
Source: <http://www.bnm.gov.my/files/publication/ar/en/2005/cp09.pdf>

Figure 7a: Exchange rate volatility of the Malaysian Ringgit in percent in a 200-day rolling window using daily bid spot prices. (Daily Data, January 1, 1996 – May 29, 1998).

Figure 7b: Bid-Ask spread Malaysian Ringgit over mid point spot rate in percentage.

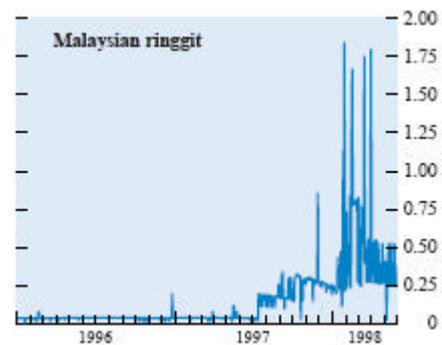
(Daily

Data January 1, 1996 – May 29, 1998)



7a

Source: Reuters



7b

Source: Reuters

A closer look at the data in 1997 of the swap and spot transactions for the Malaysian Ringgit reveals that the increase in transactions started in May 1997 and was very high until the end of 1997 with a peak in August that year (Brouwer, 2001, pp 103). This is conform figure 7b where the high Big-Ask Spread of the Malaysian Ringgit reveals a high activity on the currency markets of Malaysia. The participants, establishing short positions, bet on the idea that the Malaysian currency would depreciate more than it already did in the beginning of 1997. Figure 7a shows that the speculators who took the short positions made a lot of money because the Malaysian Ringgit depreciated with a peak of 3.5 percentage point per day at the end of 1997. These figures however only show the high activity on the currency markets during that time, with short positions being established.

This on its own does not reveal a double play by hedge funds. At that time a correlation play by market participants became a popular strategy. This strategy contains buying and selling assets based on the correlation of its prices. In the case of Malaysia this phenomenon occurred somewhere around July 1997. Where previously the correlation between a depreciation of the Malaysian Ringgit and the Malaysian stock exchange fluctuated around zero, it became significant negative around that period (Brouwer, 2001, pp 107). This opened the way for a successful double play for market participants with large short positions on the Malaysian Ringgit and large positions on the Malaysian stock exchange. A sale in the stock market would have an impact on the depreciating value of the Ringgit. At the same time the value of the Malaysian stock exchange would also descent. Figure 8 shows the drop in the Malaysian stock exchange in the end of 1997. From the peak in 1997 to the lower bound in 1998 the Malaysian stock prices fell 80 percent (Brouwer, 2001, pp 106). As seen in figure 7b the Ringgit dropped in value at the same time which confirms the negative correlation between the depreciation rate of the Ringgit and the Malaysian stock exchange.

Figure 8: Real estate and stock prices in Malaysia indices. March 1993 = 100



Sources: International Finance Corporation; and Jones Lang Wootton.

This drop in the stock exchange would also have been profitable for market participants holding short positions in the stock exchange. Although this theory is not supported by hard data the signs in the different financial markets indicate that this double play was present at that time. As only the large players were really able to fully exploit this situation this especially suspects hedge funds operating in emerging markets, being the largest players in that area at that time.

A second suspicion of a double play in Malaysia occurred on the Malaysian Ringgit market and the Indonesian Rupiah market. During the crisis both currencies became positively correlated especially during the first few months of 1998 (Brouwer, 2001, pp 107). This suggests that a depreciation of one currency would have inflicted a depreciation of the other currency. Positive returns could have been made by first establish short positions on the Malaysian Ringgit, which signs were there at that time, and then aggressively selling the Indonesian Rupiah. In this case, with a positive correlation, the short positions of the Ringgit became highly profitable if the cross-price effect is large enough and the buy order to close out the short position does not push up the price of the currency too much (Brouwer, 2001, pp 107). These kinds of double plays are however very risky, with correlation's far from perfect and therefore difficult to predict.

The case for Hong Kong

As mentioned for the case of Malaysia the results are highly speculative and are not based on hard data. This however is not the case for Hong Kong where, as stated earlier, hard data confirms that large hedge funds held nearly half of the net open interest in the Hang Seng Futures index. This implies a similar kind of double play on the Hong Kong Dollar market and the Hang Seng stock exchange. These positions were mostly established during the five months prior to August 1998 where a peak of 150935 contracts at a value of \$US 7 billion was reached (Brouwer, 2001, pp 78). At the same time a large amount of put options on Hong Kong equities were bought, establishing short positions on the Hang Seng stock exchange.

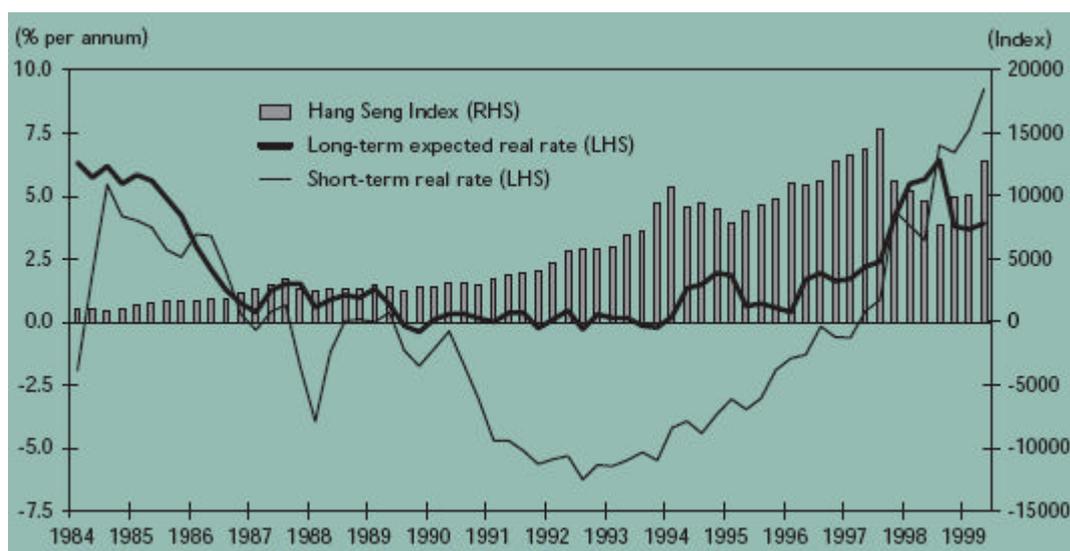
During 1997 there were three periods of speculative pressure in Hong Kong namely in January, June and September. Especially the selling pressure of the HK Dollar in September became profitable for the investors who had established large short positions in both in the currency as in the stock exchange markets in Hong Kong. Although there is no hard proof of illegal trading during September 1997 there are some activities which occurred at the same time, leading to a fall of the HK dollar and the Hang

Seng stock exchange. First of all there was an increase in rumors that the Hang Seng would drop in value. Although such rumors cannot be seen as reasons for price changes it must not be denied as having at least some influence on the price dynamics. Second of all there are reports of spoofing on the electronic trading system indicating that the HK Dollar pegged situation was left behind and replaced by a floating or devaluating policy (Brouwer, 2001, pp 84). Third of all there was an increase in trading on markets which are more vulnerable to price movements (Brouwer, 2001, pp 84).

These activities had effects on the financial markets in Hong Kong. Due to the selling activities of the Hong Kong dollar the interest rate had to rise in order to let the Hong Kong dollar value fixed to the US dollar. At a certain point however these increases in the interest rate lead to a depreciation of the forward rate of the Hong Kong dollar which on its own increased the volatility of the price dynamics on the Hong Kong financial markets. The situation on the currency market made a devaluation of the Hong Kong dollar unavoidable and so the previous established short positions towards the Hong Kong dollar became profitable.

The increased interest rate had also an impact on the Hang Seng stock exchange. Although a negative effect of an interest increase on the returns of equity markets is logical, the effect on the Hang Seng stock exchange can be seen as exceptional. Research found out that over the period 1990-2000 this correlation coefficient was -0.07 . However if the correlation coefficient is measured during the period 1997-1998 the results are quite different with an estimation of -0.48 (Brouwer, 2001, pp 87). This made short positions on the Hang Seng stock exchange during that period much more profitable than they otherwise should have been. Figure 9 shows this situation of the downfall of the Hang Seng stock exchange in 1997 and 1998 combined with increasing interest rates.

Figure 9: Real interest rates vs. The Hang Seng stock exchange index



Source: www.info.gov.hk/hkma/eng/public/qb9908/fa01.pdf

The notion that a double play on the financial markets of Hong Kong happened is supported by the FSF working group on HLI1 (2000). This research reports that some large HLI's i.e. hedge funds, had large short positions in the currency market and the equity market of Hong Kong. The Security and Futures Commission (SFC) of Hong Kong who had its own research refutes this notion by arguing that "there was no basis for the allegation of intermediaries, local or international, manipulating the market through the futures market and that of correlation between currency speculators and futures market participants" (HKSARG, 1998, p 78). Although there is some hard evidence of large short positions by hedge funds on the financial markets of Hong Kong, this does not mean they disrupted market dynamics in order to gain profits. It can however be seen as "soft" evidence that a strategy like a double play existed during 1997 and 1998 without drawing real conclusions.

This chapter first described how the Asian crisis evolved in time with an explanation of the happenings that occurred in chronological order. The chapter then continued with a deeper insight in speculative attacks on currencies with first and second generation models. The first generation models let wrong policies by governments be the reason that a pegged situation of a currency is not able to sustain. The second generation models state that also speculators on currency markets can inflict a devaluation of a currency. A closer look at the Asian financial markets during the Asian crisis indicates that this indeed could have been the case for some currencies. It even gave some possible evidence where hedge funds could have been able to get lots of profits by following a strategy of a double play. Hard evidence however is not possible to

generate whereas in that case managers of hedge funds must reveal their strategies at that time. Even if hedge funds inflicted the Asian crisis it can be stated that the fundamentals of some countries were quite wrong due to miss management by governments concerning their economic situation. As stated in paragraph 2.1 many of the foreign funds were misallocated and subject to cronyism. Therefore to find out whether speculations by hedge funds are less riskier than theoretical financial models predict, a closer look at the returns of hedge funds, operating in emerging markets is necessary. This shall be done in chapter four after the derivation of the Dichotomous Asset Pricing Model out of the most used financial models is explained in chapter three.

3.The Dichotomous Asset Pricing Model

The previous chapter described the Asian crisis case where hedge funds were accused of speculating on the various Asian financial markets. Although signs are available to support this notion this does not mean they really played an illegal game during that period. Therefore it hardly gives an answer to the central question of this thesis. Even if some hedge funds were able to force some markets towards a certain direction this does not mean a conclusion can be drawn towards hedge funds as a group. It however supports the theoretical idea that hedge fund managers are willing to take risks through the speculation on different financial markets, as described in chapter one. This speculating behavior however is not bad per se as chapter one sets out. It also cannot be said that this speculative behavior is cost-less, as one might think reading many articles in newspapers where hedge funds from time to time are accused of speculating on and the disturbing of financial markets. A clear view on this is impossible to get because managers of hedge funds will never reveal the strategy they follow.

Some have researched the returns of hedge funds against a known benchmark. Fung & Hsieh (2000) support the research by Eichengreen & Mathieson (1998) that no evidence can be shown against the disrupting behavior on financial markets by hedge funds. In their cross-sectional analysis they even found that one of the largest hedge funds at that time, the Quantum fund, was more correlated against the S&P 500 than against the Thai Baht during the Asian crisis. As mentioned, this is conform the Eichengreen & Mathieson (1998) conclusion in their empirical research towards hedge funds during the Asian crisis. Brown, S. J. & Goetzmann, W, N & Park, J, M (1998) also conclude, using a Sharpe (1992) style analysis, that no empirical evidence can be found towards the suspicion that hedge funds, especially the large ones, were responsible for Asian crisis. These results are however against the notion of the report made by the FSF Working group on HLI's (2000) which states that by virtue of their large concentrated positions and highly aggressive trading tactics, hedge funds do have the potential to materially destabilize financial markets which are vulnerable. Many of their findings are described in the case study of the role of hedge funds during the Asian crisis, the previous chapter. Other criticism has been given by the Reserve bank of Australia (1999) which mentions the lack of objectivity of the researches done by J. & Goetzmann, W, N & Park, J, M (1998). It argues that a basket of Asian currencies had to be used as benchmark instead of only the Malaysian Ringgit. It also doubt the credibility of the outcomes, where only monthly data is used for a short period in time. Also the data collection is not sufficient because hedge funds are not obliged to report their outcomes.

The paper will deal with this problem and other limitations of this research in the next chapter.

The research that will be done uses the Dichotomous Asset Pricing Model developed by Liang Zou. This is an extension on the Sharp Lintner's Capital Asset Pricing Model (1992) and it is proved to increase the pricing accuracy by 20 to 30 percent using a so called Best Beta CAPM instead of the normal Beta CAPM (Zou, 2006). The model further makes a distinction between upper market returns and lower market losses and states that if $\beta_+ = \beta_-$ they both must be the same as the Best Beta CAPM (Zou, 2005). A full explanation and possible outcomes concerning hedge funds and the risk they bear will be given in paragraph 3.1. This paragraph will start with the theoretical build up and back ground concerning the DAPM. In a row the Mean-Variance efficient model (Markowitz), the CAPM (Sharp, Lintner, Mendel), the BCAPM (Zou) and the DAPM (Zou) will be explained. Thereafter the way to evaluate the performance of hedge funds operating in emerging markets using both the DAPM and a so called Z-ratio will be explained. This all in order to research the variables of hedge funds operating in emerging markets the next chapter.

3.1 Deriving the Dichotomous Asset Pricing Model

Modern finance methodologies can be used to value a wide variety of assets, investment decision making and the evaluation of past performances of the investment strategies. These theories have three central assumptions namely: markets are highly efficient, investors exploit potential arbitrage opportunities and investors are rational (Dimson & Mussavian, 1999). Two variables are essential in order to analyze any possible investment namely expected utility, which can be seen as the expected return and the risk of receiving this expected return. Under the previous set assumptions Markowitz (1952) stated that a set of portfolios can be identified which provides the highest possible return for a given level of risk. If this is done for every possible level of risk, a line can be drawn between all these maximizing portfolios. This line is called the efficient frontier and every investment laying on this frontier can be seen as mean-variance efficient. The variables used in this model are the Expected return and the standard deviation where:

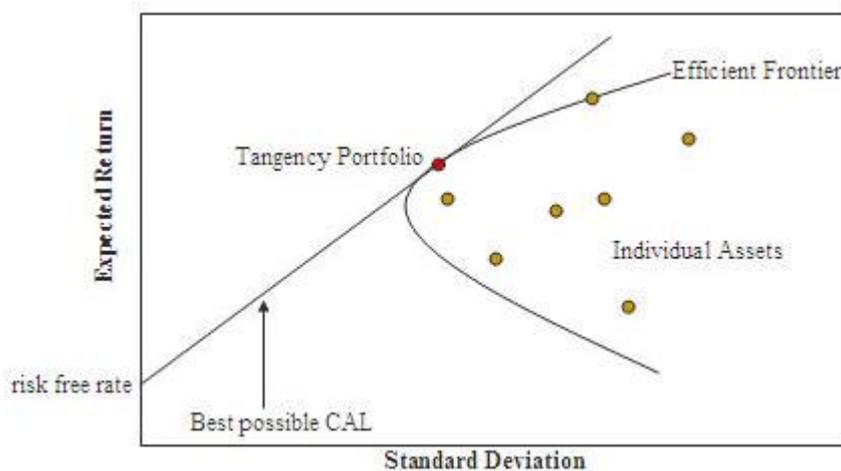
$$E(r_p) = \sum w_i E(r_i)$$
$$s^2 = \sum w_i w_j \text{Cov}(r_i, r_j)$$

In this model the case that diversifying the portfolio will reduce the overall portfolio risk is denoted with the covariance between all possible assets in the risk measure. If for

example several securities or portfolios had the same highest future return then the investor would be indifferent between any of these, or any combination of these securities or portfolios. There is however the existence of uncertainty and therefore diversification is a common and reasonable investment practice (Markowitz, 1991). Highly diversified portfolios will have no or minimum embedded unique risk, however there will always be the risk of an overall change in the economy. This is referred as the so called market risk. In order to identify the possible expected return of a predetermined portfolio, an investor will set out a probability distribution between all possible outcomes.

Because none sure future probability distribution exist this can be derived out of the past performances of the set portfolio against a stable benchmark. This benchmark in the literature is named the optimal market portfolio and includes all traded assets. None such a portfolio exists and therefore different models try to proxy this optimal market portfolio. Markowitz for example argues that this market portfolio must lie on the efficient frontier. A line called the Capital Allocation Line will show graphically the expected return of this market portfolio. This will be derived when a straight line is drawn between the risk free interest rate and the one possible tangency point on the efficient frontier. This line showing the market or tangency portfolio, is also called the capital market line.

Figure 10: The capital allocation line and the efficient frontier.



Source: http://en.wikipedia.org/wiki/Capital_asset_pricing_model

However to structure a clear efficient frontier requires a large amount of estimates of return and risk characteristics, impossible to carry out considering the unlimited universe of securities and other investment potentials (Dimson & Mussavian 1999).

Sharpe (1964) was the first to come up with a solution for this problem, stating that stocks are likely to co-move with the market. His model assumes that security returns are linearly related to fluctuations in a market wide index, with a known degree of sensitivity.

He further states that additionally, security-specific returns are generated with a known pre determined mean and variance (Dimson & Mussavian 1999). Along with the contribution of Lintner (1965) and Mossin (1966) this resulted in the Capital Asset Pricing Model (CAPM). As mentioned all assets are lying on a linear line which is called the Security Market Line (SML). This line can be derived setting the expected return against a risk measure called Beta. The assumption is that all possible investments have a unique beta which can be derived from the equation:

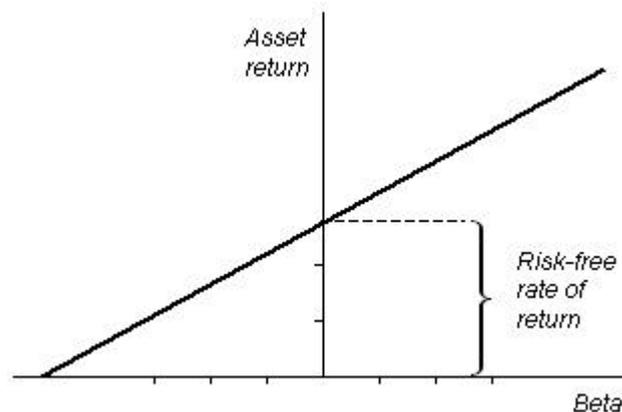
$$E(r_i) - r_f = \beta_i[E(r_m) - r_f] \quad ? \quad E(r_i) = r_f + \beta_i[E(r_m) - r_f]$$

Where:

$$\beta_i = \text{Cov}(r_i, r_m) / s^2_m$$

In this case the risk premium on individual assets will be proportional to the risk premium on the market portfolio. Figure 11 shows this Security Market Line where the intersection with the y-axis being equal to the risk free interest rate.

Figure 11: The Security Market Line



Source: http://en.wikipedia.org/wiki/Capital_asset_pricing_model#Assumptions_of_CAPM

Note that if beta equals one this must be the beta of the market portfolio:

$$\text{Cov}(r_m, r_m) / \text{Var}(r_m) = 1$$

The model implies that when a security lies above the SML the security is relatively under priced considering its risk and expected return. Due to the market efficiency hypothesis, one of the central assumptions mentions earlier, this soon will be noted by investors active on the financial market. Demand will increase because all investors try to invest in this so called arbitrage opportunity the second made assumption. As a reaction the price

of the individual asset will rise until no arbitrage opportunity is available. Now the relative price of this investment increases against all possible investments with the same beta. As a result the expected returns in the form of expected future dividends will drop and hence the relative expected return will decrease until all arbitrage is leveled out. Notice that the expected payoffs will remain the same. This no arbitrage point will lie on the SML. The same principle holds for an asset lying under the SML where no investors will buy the asset and therefore a fall in the asset price must occur in order to raise demand for this asset. Again an investor will pay relative less for the expected returns of future dividends and hence the expected return will rise.

The CAPM computations are more easily done using only three parameters per security. Due to a regression analysis the mean return and beta can be derived. However determining the market return, still will be a problem. If all investors are single period mean variance optimizers then the market portfolio will be mean variance efficient as Markowitz states. This implies a beta pricing relation between all assets and the Markowitz market portfolio (Campbell, 2000). As seen no such portfolio exist and hence only a proxy of the market portfolio can be used. The same principle holds for the use of the risk free interest rate because no truly riskless one-period real asset in the economy exists (Campbell, 2000). So in principle using a regression analysis, beta can only be estimated with error (Dimson & Mussavian, 1999).

Although the CAPM is easy to use for valuing assets, investment decision and performance evaluation, one can state that there is a lack of accuracy in the pricing of assets or the prediction of expected returns. During the last decades, several deviations from the CAPM were discovered and therefore extensions on the CAPM model have been made. One of the elements which, after research, could not be explained by the CAPM was the size effect. This size effect state that small stocks have higher average excess return than can be explained according to the CAPM (Banz, 1981). This phenomenon resulted in a steeper SML for small stocks compared with the CAPM's SML. Other effects which are discovered are the value effect by Fama and French (1992) and the momentum effect by Jegadeesh and Titian (1993). Beside these discovered "anomalies" concerning the CAPM, extensions to the CAPM are made like the Intertemporal CAPM by Merton (1993). In short this model assumes that the time flows continuously which makes the model more realistic and tractable than the discrete time model (Dimson & Mussavian, 1999).

Due to the potential errors in the CAPM, Zou (2006) developed another variation of the CAPM called the Best-Beta CAPM (BCAPM). This BCAPM can be derived by incorporating a target variable into the investors preferences (Zou, 2006). Empirical evidence show that this model typically improves the pricing accuracy of the CAPM by

20% to 30% on an annual basis (Zou, 2006). Although both models predict a linear relation between assets' risk premiums and betas, they differ in their assumptions about investor preferences. The CAPM derives its beta results using the Mean Variance framework, which states that all investors have the same perception of risk, measured by the variance of portfolio returns and that investors only differ in their degrees of risk aversion. The BCAPM however assumes that each investor perceives risk as the second moment of portfolio returns around a personal target return. Therefore investors may differ in both their perception of risk as well in their degrees of risk aversion (Zou, 2006). The model implies that all investors with homogeneous beliefs will choose the same optimal risky portfolio although they might have different targets as well as degrees of risk aversion. The beta measure for expected asset returns with this equilibrium condition therefore will be³:

$$\beta_b = E(X_m, X) / E(X^2_m)$$

with:

$$E(X_m, X) = \text{Cov}(X_m, X) + E(X)E(X_m)$$

$$E(X^2_m) = \text{Var}(X_m) + [E(X_m)]^2$$

Both equations state that the Best beta is not only influenced by the Variance as well as the Covariance as the CAPM implies, but also by the expected excess returns. Interesting in this model is to find out to which degree the BCAPM outperforms the CAPM. The model therefore introduces an eta-ratio.

$$\beta_b = \eta^2 \beta_i + (1 - \eta^2) \beta_{iMV} \quad \text{with } \beta_{iMV} \text{ is the CAPM beta}$$

$$\eta^2 = [E(X_m)]^2 / E(X^2_m)$$

This equation implies that the BCAPM outperforms the CAPM unless both models are perfectly correct. This notion is important because when the portfolio m is interpreted as the mean variance market portfolio then the best beta is equal to the mean variance beta.

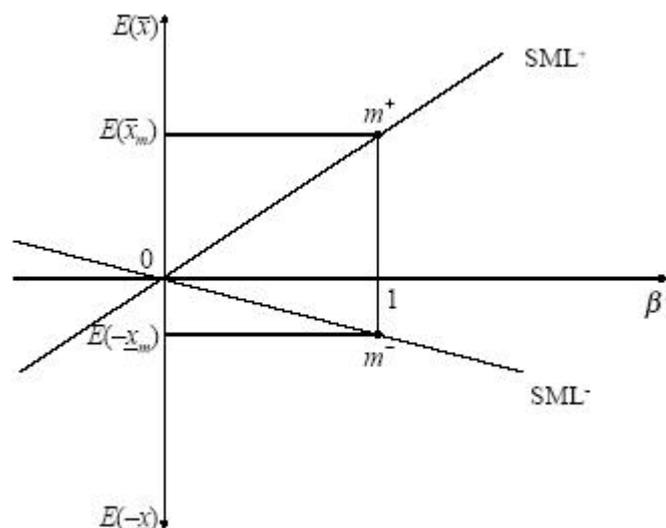
The best beta approach is important for the Dichotomous Asset Pricing Model developed by Zou (2005), which will be used in the research concerning the evaluation of the performance of hedge funds, operating in emerging markets. As the models described above the DAPM can be used for asset valuation, investment decision and performance evaluation. Being an extension of the CAPM it also uses the same underlying assumptions and principles mentioned before. The model however makes a

³ A full derivation of the best-beta CAPM including theorems can be found in: Zou, L. (2006): "The best-beta CAPM", Applied financial economic letters 2006, vol. 2, p 131-137.

distinction between a so called upper market and a so called lower market. So instead of a best beta or a mean variance beta there will be an upper beta and a lower beta in the DAPM. The simplicity of the CAPM

however remains and therefore the DAPM is highly useful to, in this case, measure the performance of a group of hedge funds ex-ante. Out of this distinction follows logically that an upper SML and a lower SML exist as figure 12 shows.

Figure 12: The DAPM with an upper SML and a lower SML



Source: Zou, L. (2005) Dichotomous Asset Pricing Model

As can be seen a prediction of two security market lines is made by the DAPM. M in the figure can be seen as any benchmark portfolio that is both mean-variance efficient as well as gain-loss efficient⁴. The upper market function and its upper market expected gains X_{i+} can be derived from ($= r_i - r_0$ if $r_m > r_0$ and $= 0$ otherwise). The lower market function and its lower market expected losses X_{i-} can be derived from ($= r_0 - r_i$ if $r_m = r_0$ and $= 0$ otherwise). Out of these assumptions the following equations in relation to the benchmark portfolio m can be made:

$$E(X_{i+}) = \beta_{i+} E(X_{m+}), \quad \beta_{i+} = E(X_{m+}, X_{i+}) / E(X_{m+}^2)$$

$$E(X_{i-}) = \beta_{i-} E(X_{m-}), \quad \beta_{i-} = E(X_{m-}, X_{i-}) / E(X_{m-}^2)$$

⁴ Prove of this statement can be found in: Zou, L. (2005): "Dichotomous Asset Pricing Model", Annals of economics and finance, vol.6, p 185-207.

In this sentence the expected upper-market gains and the lower market losses on every asset are proportional to the benchmark portfolio's expected gains and losses (Zou, 2005). Therefore the DAPM holds if:

$$\beta_{i+} = \beta_{i-} = \beta_{ib}, \quad \beta_{ib} = E(X_{m-}, X_{i-}) / E(X^2_{m-})$$

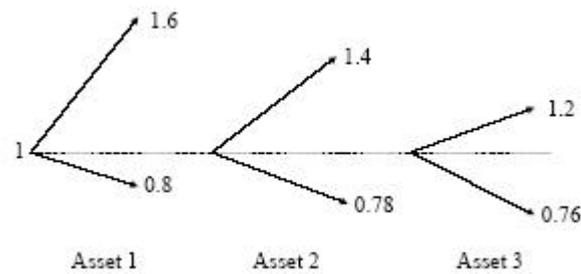
If the DAPM holds exactly then the asset's best-beta is equal to the mean-variance beta of the CAPM. As seen the reverse is not necessarily true as the best-beta predicts significant better than the CAPM beta.

The research will evaluate the performance of hedge funds operating in emerging markets against a proxy of the market portfolio, using the DAPM. This will result in an upper and lower market beta for these particularly hedge funds. The evaluation however is not finished after this regression analysis. In order to come to a possible conclusion, these results will be evaluated with a so called Z-ratio. This Z-ratio is developed by Zou (2000) and is capable of ranking investment strategies with any return distributions. The Z-ratio stays consistent with the principles of no-arbitrage and first order stochastic dominance. It also states that if there exists an inherently efficient benchmark portfolio within any given set of feasible strategies, then the risk premium on any of these strategies must satisfy a simple relationship with the benchmark risk premium (Zou, 2000).

The ratio, which can be seen as a dichotomous view of investment uncertainty, makes a common judgement of how the investment reward and risk should be defined. These are called the inherent reward and inherent risk for any possible investment strategy within the paradigm. The ratio can therefore be defined as $Z=U/D$ where U is the inherent reward and D is the inherent risk of the investment strategy⁵. The ratio states that although the variance risk measure of two possible strategies can be the same, the possibility that one strategy at all times can be preferred over the other can exist. Expected rewards in this case are left outside the example. Table 5 and figure 13 shows how this is possible:

⁵ The theoretical foundation can be found in: Zou, L. (2000): "Inherent reward and risk (part 1): Towards a universal paradigm for investment analysis", www.Tinbergen.nl/discussionpapers/00050.pdf

Figure 13: Assets with different downside risks and upside potentials



Source: Zou, L. (2000): "Inherent reward and risk (part 1): Towards a universal paradigm for investment analysis"

Table 5: The ranking of different measures (increasing inherent risk)

	Upside Profit ($p=0.5$)	Downside Loss ($1-p=0.5$)	σ	P	D
Asset 1	60%	-20%	0.40	0.15	0.10
Asset 2	40%	-22%	0.31	0.14	0.11
Asset 3	20%	-24%	0.22	0.11	0.12

Source: Zou, L. (2000): "Inherent reward and risk (part 1): Towards a universal paradigm for investment analysis"

According to figure 13 and the table 5 an investor would prefer asset 3 being the least risky investment over asset 2 over asset 1 being the most risky investment using the variance as a risk measure approach to value the possible investment. Using however the Dichotomous risk measure approach the preference would be asset 1 over asset 2 over asset 3 which in this sentence is more logic.

This inherent dominance measure Z can easily be used to evaluate the performance of investment strategies and hence the performance of the hedge funds operating in emerging markets. If they really outperformed the benchmark portfolio, a proxy of the inherent efficient market portfolio, then their Z -ratio must be higher than the Z -ratio of the benchmark. Incorporating the DAPM into this ratio, the upper market beta can be seen as the Z -ratio for this upper market situation. At the same time the lower market beta can be seen as the Z -ratio for this lower market situation. Using the same benchmark portfolio, a proxy of the inherent efficient market portfolio, in both situations,

one might conclude that if the lower market beta is less than the upper market beta, then the hedge funds operating in emerging markets did outperform the inherent efficient market portfolio. Of course the same holds if the lower market beta is larger than the upper market beta, hence the inherent efficient market portfolio outperformed the hedge funds. In the research no conclusion can be drawn if both beta's are equal to each other. The results will follow in chapter four.

4.Hedge fund performance and risk

The previous chapters described first a case study concerning the behavior of hedge funds during the Asian crisis and a build up towards the DAPM. This model will be used to find out whether hedge funds operating in emerging markets performed better than would be expected using financial performance models. Chapter three also states that some research concerning hedge funds has been done. It is already mentioned that Fung & Hsieh (2000) support the research by Eichengreen & Mathieson (1998) that no evidence can be shown against the disrupting behavior on financial markets by hedge funds. These findings however are not reached using the DAPM mainly because this model was not known at that time. The researches are also simply using the Asian crisis as a time range. One might doubt whether this is sufficient to get an overall conclusion which can be used at all times.

Another difference lies in the deviation of hedge funds by strategy type. This will be done by using the ex post returns of hedge funds with the highest possibility of operating on emerging financial markets, namely Macro Global Hedge Funds and Emerging Market Hedge Funds. Previous research has either used the returns of hedge funds as a group or the returns of some large macro hedge funds. The data used in this research comes from the data bases build up by the Credit Suisse/Tremont Hedge Fund Index. As mentioned there are limitations on the use of these data. This and other limitations will be described in paragraph 4.2. after the setting of the research in 4.1. The last paragraph will show the results and conclusions from the outcomes.

4.1 The risk profile of hedge funds operating in emerging markets: The DAPM

Although a beta analysis for hedge funds is not new, the use of the DAPM to derive these beta's has never been done. These previous researches show that hedge funds have a low beta with little predictability. Fung, Hsieh & Tsatsaronis (2000) for example estimated a global macro hedge fund beta over a period between 1990-1998 of 0.282. The explanatory variable, the adjusted R-square was very low being 0.051. They used the returns of the

S&P 500 as a benchmark. This is also stated by Liang (1998) who concludes that the low beta values for hedge fund groups indicate that hedge funds have low systematic risk. Fung and Hsieh (1997) already noted that one possible conclusion could be that hedge funds rather follow a dynamic strategy than a buy and hold strategy.

As mentioned in chapter three, this research will use the DAPM in order to find out whether hedge funds operating in emerging markets bear less risk than they are

supposed to considering their risk profile. As seen it can be stated that hedge funds have the incentive to speculate due to their legal operating environment, their high amount of capital and their perceived unique information out of which hedge fund managers derive their strategy. One might think, especially after analyzing the case study of the role of hedge funds during the Asian crisis, that the performance of these hedge funds are superior against a respectable benchmark. If this is the case one might conclude that the speculating behavior is profitable and hence this could indulge hedge funds to be even more speculative. Governments in this case are to be exhorted to create tighter legislation for hedge fund managers in order to create a more transparent situation on financial markets. This however can only be derived if this legislation is to be interpreted on a global scale, which nowadays is politically hard to achieve. The political status quo may remain although an action to change legislation globally is desirable.

Another result of the research could be that the results of this group of hedge funds are conform their risk profile. If this is the case, speculation in this matter does not generate superior returns and hence they do not violate the efficient market hypothesis one of the core statements of finance models. Although they do not generate superior returns, this outcome does not reject the possible incentive to speculate by this group of hedge funds. It only states that they cannot speculate with less risk in losing money. As stated before, speculating is not bad per se and therefore ruling out speculation might worsen a downward trend in financial markets. A situation where the performance of this group of hedge funds were worse than the chosen benchmark might also appear. However ex-ante this is very doubtful.

The DAPM divides the benchmark twofold, namely a situation where the benchmark portfolio goes up and a situation where the benchmark portfolio goes down. The research therefore will have two regression analysis using the following equations.

$$E(X_{i+}) = \beta_{i+} E(X_{m+}), \quad \beta_{i+} = E(X_{m+}, X_{i+}) / E(X^2_{m+}) \quad (1)$$

$$E(X_{i-}) = \beta_{i-} E(X_{m-}), \quad \beta_{i-} = E(X_{m-}, X_{i-}) / E(X^2_{m-}) \quad (2)$$

Because the research will be done ex-post, returns are known and therefore the embedded expectation of the model can be left outside the analysis. Being a regression analysis the two equations that are going to be derived can be rewritten as:

$$(X_{i+}) = a_i + \beta_{i+} (X_{m+}) + e_i, \quad \beta_{i+} = (X_{m+}, X_{i+}) / (X^2_{m+}) \quad (3)$$

$$(X_{i-}) = a_i + \beta_{i-} (X_{m-}) + e_i, \quad \beta_{i-} = (X_{m-}, X_{i-}) / (X^2_{m-}) \quad (4)$$

The CAPM and hence the DAPM uses in the ideal situation the efficient market portfolio as the independent variable. This portfolio however cannot be derived and therefore this analysis will use the historical monthly returns of the MSCI world index as a proxy of this efficient market portfolio. The use of the S&P 500 in this case is not logical because this is a local U.S. market, where the hedge funds in this research are operating internationally. This is not new where many of the CAPM empirical international researches use this benchmark as a proxy of the global efficient market portfolio. Shanken (1987) and Kandel and Stambaugh (1987) state that although this market is not the true efficient market portfolio it must be highly correlated with the true efficient market portfolio (Dimson & Mussavian, 1999).

The depended variable in the regression analysis will be the historical monthly returns of the global macro hedge funds and the emerging market hedge funds, build up by the Credit Suisse/Tremont Hedge Fund Index. The logic behind the use of this data is that, as stated in chapter one, these are the hedge funds most likely to be operative on the emerging financial markets. The Credit Suisse/Tremont Hedge Fund Index makes this distinguish between the different types of strategy of hedge funds and their historical performances. Although other data bases are available, the Credit Suisse/Tremont Hedge Fund Index is the solely data base where the fund indices are asset weighted indices. This means that winners increase and losers decrease their relative weight in the index. Other data bases uses equally weighted indices and hence winners will have relative less influence on the indices where losers have relative more influence on the indices. The indices that will be used are also known for its quality and transparency. The risk free interest rate r_0 will be represented by the 3 month T-Bill rates of the United States of America. Although this rate changed historically this rate is a good proxy for a risk free interest rate.

Equation 1 is the so called upper market function and its upper market expected gains X_{i+} can be derived from ($= r_i - r_0$ if $r_m > r_0$ and $= 0$ otherwise). Equation 2 shows the so called lower market function and its lower market expected losses X_{i-} can be derived from ($= r_0 - r_i$ if $r_m = r_0$ and $= 0$ otherwise). This deviation is very interesting because it sets out the risk profile of the depended variable in both a upward market as a downward market. According to the CAPM there should be no difference between these two situations. As seen the DAPM also states that:

$$\beta_{i+} = \beta_{i-} = \beta_{ib}, \quad \beta_{ib} = E(X_m, X_i) / E(X^2_m)$$

If this is shown by the empirical results, then no conclusion towards the central question from this point of view can be drawn. If however $\beta_{i+} > \beta_{i-}$ than a different situation

concerning the past results of hedge funds occurs. Using the logic of the Z-ratio, presented in the last chapter, the hedge funds as a group gained more in an upward market than they lost in a downward market. Therefore the conclusion will be that hedge funds operating in emerging markets are less riskier in speculating on these markets than the financial models would have predicted.

The time range over which the research will be taken is twofold. First off all a closer look will be taken between January 1994 and May 2006. This is the largest possible range for this research because earlier data of the Credit Suisse/Tremont Hedge Fund Index is not available. The second range will be between January 1996 and December 1999. Within this range the Asian crisis did happen. Having treated the Asian crisis as a case study, it is interesting to see whether the beta's differ in this period. One limitation however is that there will be less points in time to evaluate, divided into two markets and hence this probably will have effects on the significance. Other limitations will be treated in the next paragraph.

4.2 Limitations of the research

Hedge funds have no formal obligation to disclose their results. This and the fact that the industry still is in a growing stadium gives little and not a straightforward insight in the performance characteristics of hedge funds. This creates a form of self selection bias because under performers do not wish to make some of their performance known or because funds that are performing well have less incentives to give results to vendors. Having this said it is true that some funds release voluntarily performance and other administrative information. This gives another problem of self-selection bias because hedge funds are not allowed to advertise publicly to raise funds. So hedge funds may be reluctant to give away their performance data at all (Ter Horst, Verbeek 2004).

A second problem concerning the data is that there is a lot of attrition in the industry. The attrition rate over the period 1987-1996 was about 14% per year (Brown, Goetzmann and Ibbotson 1999). This raises the problem of survival bias. With the lack of the performance of disappeared funds in the past, this may lead to an overestimation of the true results. While most studies attempt to eliminate survivorship bias by taking fund returns into account until the moment of disappearance, the look-ahead bias mostly is overlooked. This bias arises because the employed methodology implicitly or explicitly conditions upon survival over a number consecutive periods (Baquero, Ter Horst, Verbeek 2002). The results of these periods are under the influence of the survival of the fund.

Using however the database of the Credit Suisse/Tremont Hedge Fund Index still is a good proxy of the results of these kinds of hedge funds. They collected the available data ex-post and therefore they are quite reliable. This doesn't however rule out the biases described above and prudence has been ordered in drawing a conclusion. Especially considering the fact that monthly instead of more accurate weekly or daily data will be used in the research.

Another problem lies in the fact that monthly data of the MSCI world index will be used. Although this index is a good proxy of the efficient market portfolio this does not mean that the DAPM as an extension to the CAPM is correct, one of the critiques by Roll (1977). Again the monthly data is less accurate than weekly or daily data. The same can be said about the use of the three months T-Bill rates as the risk free interest rate. Although this rate can be seen as highly riskless this does not mean it is the true risk free interest rate.

Another limitation has a more statistical background. Brooks and Kat(2002) found out that hedge fund returns are far from normally distributed. First of all they saw that the long/short funds and the tactical-treading funds combined a relatively high mean and a low standard deviation compared to stocks and bonds. These strategies however are left outside this research but nevertheless this might also be the case for hedge funds operating in the emerging markets. Because of these outcomes the Sharpe Ratio's of hedge funds were higher than those of bonds or equity. This would be an indication of market inefficiency looking at the first and second statistic moments. The results show also quite a difference in the third and fourth moments, the skewness and kurtosis. Most hedge funds had relatively low skewness and a high kurtosis. This means that because of the low skewness there is a negative distribution of a hedge fund. Combined with a large kurtosis this means that the chance of large negative returns are more likely than it would be the case under a normal distribution.

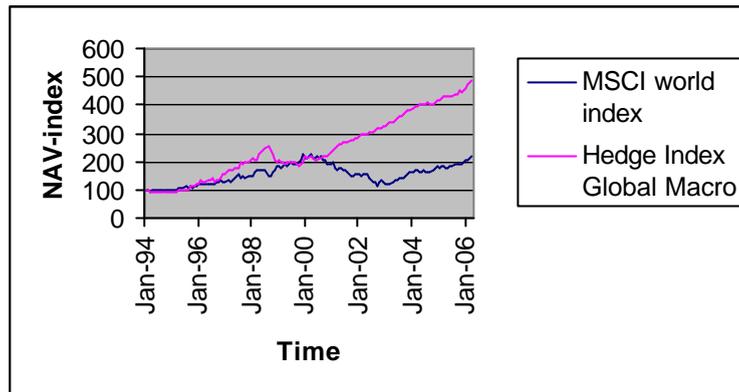
Another inconsistency with efficient markets is the observed positive auto correlation. This will systematically lead to estimates of the standard deviation to be biased downwards. A second problem with auto correlation in the returns of hedge funds is that it also may lead one to miss estimate the true correlation's, which also has effect on the portfolios standard deviation. One explanation lies in the difficulty to obtain up-to-date valuations of the positions in illiquid and complex over the counter securities of the hedge fund manager. Although these statistical problems are worth mentioning they are left outside in this research.

4.3 The evaluation of the outcomes

The research has taken a closer look at the historical outcomes of the macro global hedge funds and the emerging market hedge funds, presented in the data base of the Credit Suisse/Tremont Hedge Fund Index. Therefore the results concerning these two types of hedge funds will be treated separately. The results reflect two time ranges, from January 1994 to May 2006 and from January 1996 to December 1999. Differences between the upper beta and lower beta, if existed, will be analyzed following the logic of the Z-ratio.

After seeing the possible influence of macro global hedge funds in the case study of the Asian crisis, these funds will be analyzed first. Although this influence came from some large macro global funds, this does not mean that all funds with such a strategy are able to operate in such a specific situation. The purpose of this research however is to analyze the different types of strategy concerning the emerging markets instead of analyzing individual funds. Appendix A shows the outcomes for the global macro funds within the time range of January 94 until March of 2006 for the upper market situation, the lower market situation and the non divided market. Both beta's are low, which is conform previous researches. The upper beta in this research however has a negative outcome of -0.07 whereas the lower beta has a positive outcome of 0.148 . This is contrary to the expectations of the research. Where it was presumed that during times of an ascending world market index the Beta should have been positive and during a descending world market index the beta should have been less positive or even negative. If this were the case the outcome, using the logic of the Z-ratio, the hedge funds would have had a better performance in both an upper market situation as well in a lower market situation. The alpha's of the upper market and lower market situations tell another story. Being 0.016 for the upper market this means gaining profits when the market goes up. The lower market alpha is -0.005 and because of the negativity of the outcome this means that gains are made in a descending market. As figure 14 shows the beta outcome is inconsistent with the net asset value indices, where over time the value of the global market funds rose more than the MSCI world index setting January 1994 at 100.

Figure 14: Net asset value index for the MSCI world index and the global macro hedge index



A possible explanation is the randomness of the outcomes. In both situations the explanatory power of the outcomes, in the form of the R-square, is very low. The more this variable reaches toward one the more the outcomes can be explained by the regression analysis. In our case the outcomes are respectively 0.002 for the upper market situation and 0.024 for the lower market situation. This randomness is also shown in the scatter plot for the non divided market situation in appendix A. The same can be seen in figure 15a and 15b which show graphically the randomness between the outcomes of the MSCI world index and the global macro upper market and lower market outcomes.

Figure 15a: Returns of the upper MSCI world index and the corresponding global macro returns.

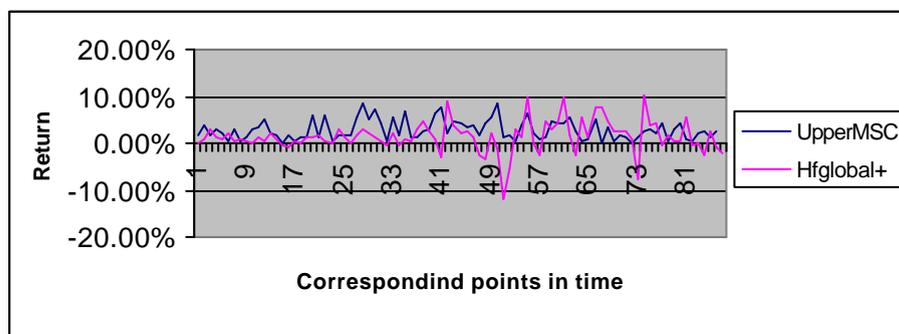
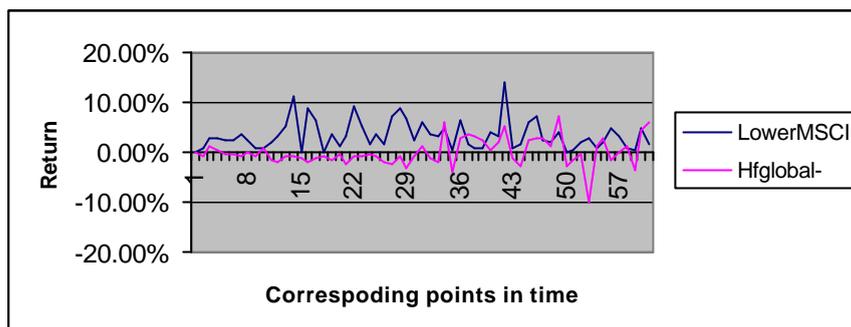


Figure 15b: Returns of the lower MSCI world index and the corresponding global macro returns.



Surprisingly in the outcomes is that the predictability, using the non dichotomous beta is low but a fraction higher being 0.032 than for both the upper and the lower beta. This goes against the prediction of the DAPM, that this model is significantly more accurate than the CAPM. The randomness however again has a great influence on the research and hence the three cases are not significant at all as can be seen in appendix A. Therefore no conclusion towards these two models can be drawn with these outcomes. It also must be noted that the beta outcomes cannot be treated as best beta outcomes where the DAPM states that if $\beta_{i+} = \beta_{i-}$ then $= \beta_{ib}$ which is not the case in this research. Computing the B-Beta results in a negative outcome of -0.04 which is slightly different than the MV-Beta being -0.09.

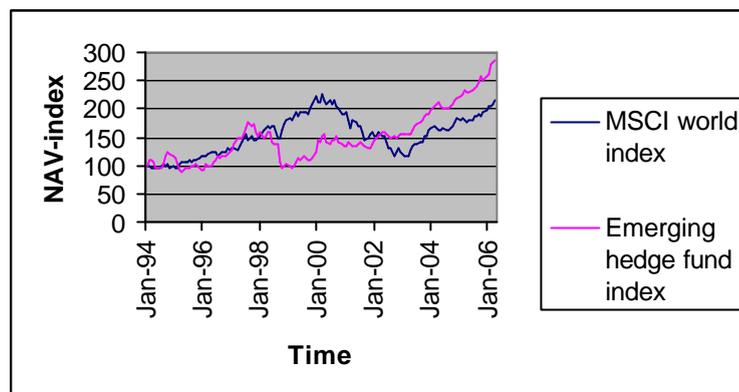
Having analyzed the outcomes over the largest possible time range it is interesting to see if there are any differences taking the range between January 1996 and December 1999. Within this time range the Asian crisis happened and as seen in the case study this should have been a profitable time for global macro hedge funds if they had any influence on the emerging financial markets. Although the case study reveals some evidence, these are not empirical. The upper beta of -0.250 in appendix B with a R-square of 0.013 reveals losses for the global macro hedge fund group during this time when the MSCI world index went up. This short term beta is even less than the long term upper beta described before. This suggest that they lost more during this short period. The lower beta of 0.425 during this time is quite larger than the long term lower beta. This suggest more losses during this time than the long term average predicts. Both are revealed in figures 14, 15a and 15b. The difference between the upper and lower alpha, 0.028 and 0.002, remains as was the case for the longer range of time. The higher R-square of 0.276 even gives a slight significance of the outcomes. However one must noted that the number of outcomes is low being 15. The relevance of the R-square in this

matter must be treated with caution. Also the outcomes for the non dichotomous beta within this time range, which is 0.004 with a R-square of 0.098, is not significant.

The second group of hedge funds that has been analyzed are the emerging hedge funds. As the name already predicts these hedge funds strictly operate on the emerging financial markets. The results of the analyzes are not the same as for the global macro funds. As appendix C shows the upper beta is 0.421 with a R-square of 0.044. The scatter plot clearly shows the randomness of the outcomes. The lower beta of 0.860 however has a higher predictability rate of 0.316. The chance therefore of losing money when the market goes down is higher than for the other predictions. The upper alpha for this group of funds is higher than the alpha of the lower market being 0.008 against a negative alpha of -.012. The non dichotomous beta of 0.624 has a R-square of 0.279. Clearly the predictability of the emerging hedge funds is greater than the predictability of the global macro funds. The R-squares of the emerging funds however cannot be seen as really significant despite the higher values. Following the logic of the Z-ratio the opposite for emerging funds, as was for the global macro funds, is true. Without really significance the lower beta is greater than the upper beta meaning losing more money if the market goes down than gaining money if the market goes up. As with the outcomes of the NAV index for global macro hedge funds this does not make sense. This is due to the relatively randomness of the outcomes. Figure 16 shows the NAV index for both the MSCI world index and the emerging hedge fund index. It clearly shows that from January 1994 until May 2006 emerging hedge funds performed better than the MSCI world index.

The case for the Asian crisis reveals a different kind of situation for emerging funds. The upper beta of 0.675 and an R-square of 0.093 reveals the same story as the previous outcomes, however the lower beta is different. With an unusually high lower beta of 1.595 and a R-square of 0.686 this outcome is more significant than any other outcomes this research. Clearly these funds lost a large amount of money during the Asian crisis when the MSCI world index went down. This is the first and only indication this research that the Asian crisis and the corresponding MSCI world index had some influence on the returns of hedge funds. One might however doubt whether the outcome has any predictive value because of the number of return outcomes during that time of 15.

Figure 16: Net asset value index for the MSCI world index and the emerging market hedge fund index.



The non dichotomous beta during the Asian crisis was 0.993 with a R-square of 0.417. The scatter plot reveals some linearity. The B-Beta for emerging market hedge funds is -0.11 whereas the MV-Beta is -0.15 . Overall it can be said that these emerging market hedge funds at least were less randomized than the global macro hedge funds during the Asian crisis.

Despite dividing the market into an upper and a lower market, which according to the DAPM should have made the results more accurate, the outcomes are as random as previous research found out. Although this must not be seen as a surprise, a better explanatory variable for both the upper and lower beta against the non dichotomous beta was predicted. The results therefore can be treated as a conformation rather than a renewing of the return characteristics of hedge funds. Without actually having an inside into the strategies followed by hedge funds operating on emerging financial markets it can be said that these funds act randomly compared to strategies followed by other investment funds like mutual funds. Liang (1998) for example state that hedge funds can use more flexible investment strategies and that hedge fund managers have a different incentive scheme. This notion is supported by the outcomes of chapter one. He also states that hedge fund managers detect differences in markets faster than the market itself. This is also one of the outcomes in this research putting together the different aspects of hedge funds into one overview. This notion can be a possible explanation of the randomness in the outcomes in this research. Being lather in their notion of differences in financial markets it is well possible that at some points the hedge funds trends goes against the trend of the benchmark index, especially where the markets are not as transparent as the western financial markets are. The figures 14 15 and 16 may confirm these trends although without any empirical background. At least further research

has to be done concerning the hedge fund groups in order to create a better understanding of these investment vehicles.

5. Conclusion

This research of hedge funds operating on the emerging financial markets tried to shed some light on both the incentive as well as the risk characteristics of these hedge funds. It began with a description of hedge funds from a strategic point of view and a legal environment point of view in chapter one. This was followed by an analysis of the incentives of hedge fund managers setting out the operational environment of hedge funds. In this section it became clear that theoretically hedge fund managers are willing to take risks through speculation.

This incentive thereafter has been analyzed in a case study of the role of hedge funds during the Asian crisis in chapter two. This chapter first sets out how the literature explains the existence of the Asian crisis. This to create a better understanding of the possible speculations by hedge funds during that time. It became clear that there are two camps in this dilemma. One group states that hedge funds deliberately inflicted a crisis in order to make lots of profits. They state that there are some evidence that large positions were taken by some global macro funds with a possibility of a double play, leading the mid-side financial Asian markets towards a pre setup direction. The second stage models of speculating attacks confirms that the fall of fixed currencies by speculators might appear without a miss management by local government in holding their fixed currency. Although short positions has been taken towards for example the Thai Baht, prior to the collapse of the Thai Bath, this hardly is sufficient to blame hedge funds for letting the Thai Baht devaluate. This notion is supported by the existence of miss allocation of foreign capital and cronyism by the Thai government prior to the devaluation of the Thai Baht. The second group argues exactly this towards the Asian crisis. They also mention that there is no empirical evidence that hedge funds had superior returns during this time. The statements of both sides are also be treated towards other Asian countries that were involved in the Asian crisis.

The empirical research of hedge funds, especially the hedge funds operating in emerging markets, has been done to figure out whether the speculating behavior is less riskier than financial models would have predicted. Deriving from the main common models comes the special extension of the DAPM. This model divides the market into an upper and a lower market. Within this bipartition an upper and a lower beta has been calculated via regression analysis. According to the expectations the beta outcomes were low. This implies that hedge funds have a low risk scheme compared to the used benchmark, the MSCI world index. These outcomes however are not very trust worthy with explanatory R-squares less than 10 percent. This low value can be explained looking at the scatter plots of the different analysis. It makes however clear that the performance

of hedge funds operating in emerging markets are random compared to the benchmark. This randomness cannot be explained by the common financial model, neither by the DAPM. One possible explanation might be that managers of these funds react faster at fundamental differences. If this is the case, the managers speculative incentives then make sure they are willing to react first at differences. This possible explanation however can not be evaluated without the exact understanding of the followed strategy by the hedge fund managers. The speculating incentive is also not supported by the low values of the beta outcomes. Speculating would increase risk and hence a high beta should then have been the outcome. Again the randomness can give some explanation to this notion.

In order to get a better understanding of hedge funds they should reveal more about their performances. This transparency will only occur when legislation changes, not only in the developed world but also in the emerging countries. This is important in order to push back the possibilities of going off shore. Such a political process is very slow and one might doubt whether changes concerning this problem actually occur. In the mean time different methods are to be used in order to increase the transparency of hedge funds to get a better understanding of this kind of investment vehicle.

References

- Ackermann, C. & McEnally, R. & Ravenscraft, D. (1998). "The performance of hedge Funds: risk, return and incentives".
- Agarwal, V. & Naik, N.Y. (1999). "Multi-period performance persistence analysis of hedge funds". Amin, G. S. & Kat, H.M. (2002). "Who should buy hedge funds? The effects of including hedge funds in portfolios of stocks and bonds".
- Aghevli, B.B. (1999): " *The Asian crisis: Causes and remedies*"; Finance and development, June 1999, pp. 28-31
- Amin, G & Kat, H. M. (2002): " *Stocks, bonds and hedge funds: Not a free lunch*", ISMA discussion papers in finance 2002-11, version 29 April 2002
- Bakker A. and V. Ho (2004). "Is meer intensief toezicht op hedge funds nodig?", *fiducie* 13(2), p.58-61. Baquero, G & Horst ter, J & Verbeek, M (2002). "Survival, look-ahead bias and the Persistence in hedge fund performance". www.erim.eur.nl
- Banz, R.W. (1981): " *The relation between return and market value of common stocks*", *Journal of financial economics* vol. 9, p 3-18
- Baquero, G & Horst ter, J & Verbeek, M (2002): " *Survival, look-ahead bias and the persistence in hedge fund performance*", www.erim.eur.nl
- Bikhchandani, S & Sharma, S. (2001). "Herd behaviour in financial markets". *IMF Staff Papers*", Vol 47, No 3 pp 279-310
- Brealy, R.A. and E. Kaplanis (2001). "Changes in the Factor Exposures of Hedge Funds". Working Paper London Business School.
- British Bankers Association (2003/2004) Credit Derivatives Report 2003/2004 Executive summary.
- Brooks, C. & Kat, H.M. (2002). "The statistical properties of hedge fund index returns and their implications for investors". *The journal of alternative investments*, vol. 5, p. 26-44.
- Brown, S. J. & Goetzmann, W. N. & Ibbotson R. G. (1997). "Offshore hedge funds: survival and performance 1989-1995", *Journal of Business*, 72,. 91-117.
- Brown, S. J. & Goetzmann, W, N & Park, J, M (1998): " *Hedge funds and the Asian crisis of 1997*". viking.som.yale.edu/will/research.term/crisis.pdf
- Campbell, J.Y. (2000): " *Asset pricing at the millenium*"; *The journal of finance*, vol. LV, No 4, August 2000, pp 1515-1567

- Corsetti, G & Pesenti, P & Roubini N, (2001): "*The role of large players in currency crisis*"; NBER Working Paper No. W8303 May 2001
- Counter risk management policy group (2000): "*Sound practices for hedge fund managers*", New York, February
- CSFB/TREMONT. www.hedgeindex.com
- Dimson, E. & Mussavian, M. (1999): "*Three centuries of asset pricing*". Journal of Banking & Finance 23, 1999, p 1745-1769
- Dow Jones Business News (2002): "Treasury Department Proposes Increased Hedge Fund Scrutiny." September 18.
- Eichengreen, B & Mathieson, (1999): "*Hedge funds: what do we really know?*" international monetary fund september 1999
- Eichengreen, B & Mathieson, D (1998): "*Hedge funds and financial market dynamics*". Washington D.C.: International Monetary Fund, 1998
- Eichengreen, B & Park, B. (2001): "*Hedge fund leverage before and after the crisis*". Journal of Economic Integration, 2002
- Feldstein, M. (1998): "*Refocussing the IMF*". www.foreignaffairs.org?feature.html
- Fung, W. & Hsieh (1999). "A primer on hedge funds". *Journal of empirical finance.*, vol. 6, no. 3 (September), p. 309-331.
- Fung, W. & Hsieh (1997). "Empirical characteristics of dynamic trading strategies: the case of hedge funds". *The review of financial studies*, vol. 10. No. 2. p.275-302.
- Fung, W & Hsieh, D,A & Tsatsarionis (2000): "*Do hedge funds disrupt emerging markets*". Brookings-Wharton Papers on Financial Services, 2000
- Fung, W & Hsieh, D,A (2000): "*Measuring the market impact on hedge funds.*" Journal of emperical finance 7, 2000, pp1-36
- Gimbel, T. & Gupta, F. & Pines, D. (2002). "Entry and exit: the lifecycle of a hedge fund". Washington University in St. Louis.
- Goetzmann, W. N. & Ingersoll Jr, J. & Ross, S.A. (1998): "*High water marks*", NBER Working paper No. 6413
- [Gould J.B.](#), [Goldstein](#) D.A. and D. Peterman (2005). "Hedge fund and private equity fund use of related performance – so that's the difference!", March 7, hedgeco.net.

- Hallwood, C.P. & MacDonald, R. (2000): " *Currency crisis and speculative attacks*", International money and finance, third edition, Blackwell Publishers, Oxford, 2000
- Hennessee E.L. and C.J. Gradante, "hedge fund Industry Growth", January 2005, Hennessee Group LLC.
- Hong Kong Special Administrative Region Government (HKSARG) (1998): " *Report on financial market review*", Financial services bureau, April.
- Horst ter, J. & Verbeek, M (2004). "Fund liquidation, self selection and look- head bias in the hedge fund industry". Erasmus University Rotterdam.
- Hull, J. C. (2000). "Options, Futures and other Derivatives", Upper Saddle River, N.J.: Prentice Hall International, 4th edition.
- Jong, R. de (2004). "Hedge funds onder de loep genomen; zijn hedge funds echt de heilige graal van beleggers?" *Fiducie* 13(2), 9-13.
- Jorion, P. (2000). "Risk management lessons from Long-Term Capital Management", *European Financial Management*, Vol. 6. No. 3. 2000. 2777-300.
- Karpoff, J. (1987): " *The relation between price changes and trading volume: a survey*", Journal of financial and quantitative analysis, 22 p 109-126.
- Liang, B. (1998): " *On the performance of hedge funds*", <http://www.edge-fund.com/Lian98.pdf>
- Malkiel, B. G. & Saha, A. (2004). "Hedge funds: risk and return". Princeton's centre of economic policy research.
- Markowitz, H.M. (1991): " *Foundation of portfolio theory*". Journal of finance, volume 46, issue 2 (June, 1991), p 469-477.
- Olson, O. & He, M. : " *A model of balance of payment crisis: the strong currency as a determinant of exchange rate disequilibria*", <http://www.econ.cam.ac.uk/cjeconf/delegates/olson.pdf>
- Reserve bank of Australia (1999): " *The impact of hedge funds on financial markets.*", Paper submitted to the House of Representatives Standing Committee on Economics, Finance and Public Administration's Inquiry into the International Financial Markets. Effects on Government Policy, June 1999
- Saxena, S. C. & Wong, K. (2002): " *Economic growth, over investment and financial Crisis*". <http://faculty.washington.edu/karyiu/papers/invest-crisis.pdf>, july 10, 2002

- Shirreff D. (2000). "Lessons From the Collapse of Hedge Fund, Long-Term Capital Management", Financial Risk Institute (IFCI).
- Stickel, S.E. & Verrecchia, R.E. (1993): "Evidence that volume sustains price changes", Wharton school working paper.
- TASS, Van Hedge Fund Advisors. www.vanhedge.com
- Warde I. (1998). "LTCM, a hedge fund above suspicion". *Le Monde Diplomatique*, English edition November.
- White, W, R (2000): "What have we learned from recent financial crisis and policy responses?". BIS working papers, No. 84, January 2000
- Zou, L. (2000): "Inherent reward and risk (part 1): Towards a universal paradigm for investment analysis", www.Tinbergen.nl/discussionpapers/00050.pdf
- Zou, L. (2005): "Dichotomous Asset Pricing Model", *Annals of economics and finance*, vol.6, p 185-207.
- Zou, L. (2006): "The best-beta CAPM", *Applied financial economic letters* 2006, vol. 2, p 131-137.

Appendix A

Upper market MSCI world index vs Global macro hedge funds

Descriptive Statistics

	Mean	Std. Deviation	
Hfglobal+	.01393157006	.033356291652	{
232		960	(
UpperMSCI	.02845877029	.020922535856	{
358		608	(

Correlations

		Hfglobal+	UpperMSCI
Pearson Correlation	Hfglobal+	1.000	-.044
	UpperMSCI	-.044	1.000
Sig. (1-tailed)	Hfglobal+	.	.344
	UpperMSCI	.344	.
N	Hfglobal+	86	86
	UpperMSCI	86	86

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	UpperMSCI(a)	.	Enter

a All requested variables entered.

b Dependent Variable: Hfglobal+

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.044(a)	.002	-.010	.033521865584161

a Predictors: (Constant), UpperMSCI

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.000	1	.000	.162	.688(a)
	Residual	.094	84	.001		
	Total	.095	85			

a Predictors: (Constant), UpperMSCI

b Dependent Variable: Hfglobal+

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.	Correlations		
		B	Std. Error				Zero-order	Partial	Part
1	Alpha	.016	.006		2.600	.011			
	UpperMS CI Beta	.070	.174	-.044	-.403	.688	-.044	-.044	-.044

a. Dependent Variable: Hfglobal+

Lower market MSCI world index vs Global macro hedge funds

Descriptive Statistics

	Mean	Std. Deviation	N
LowerMSCI	.034318	.0288804	60
Hfglobal-	.000116	.0279027	60

Correlations

		LowerMSCI	Hfglobal-
Pearson Correlation	LowerMSCI	1.000	.154
	Hfglobal-	.154	1.000
Sig. (1-tailed)	LowerMSCI	.	.121
	Hfglobal-	.121	.
N	LowerMSCI	60	60
	Hfglobal-	60	60

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.154(a)	.024	.007	.028782667323006

a Predictors: (Constant), LowerMSCI

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.001	1	.001	1.401	.241(a)
	Residual	.048	58	.001		
	Total	.049	59			

a Predictors: (Constant) LowerMSCI

b Dependent Variable: Hfglobal-

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.	Correlations		
		B	Std. Error				Zero-order	Partial	Part
1	Alpha	-.005	.006		-.889	.000			
	Lower MSCI Beta	.148	.125	.154	1.184	.241	.154	.154	.154

a Dependent Variable: Hfglobal-

Non dichotomized MSCI world index vs Global macro hedge funds

Descriptive Statistics

	Mean	Std. Deviation	N
Hfglobal	.011363	.0319609	146
MSCI	.005864	.0394481	146

Correlations

		Hfglobal	MSCI
Pearson Correlation	Hfglobal	1.000	.198
	MSCI	.198	1.000
Sig. (1-tailed)	Hfglobal	.	.008
	MSCI	.008	.
N	Hfglobal	146	146
	MSCI	146	146

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.198(a)	.039	.032	.0314384

a Predictors: (Constant), MSCI

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.006	1	.006	5.860	.017(a)
	Residual	.142	144	.001		
	Total	.148	145			

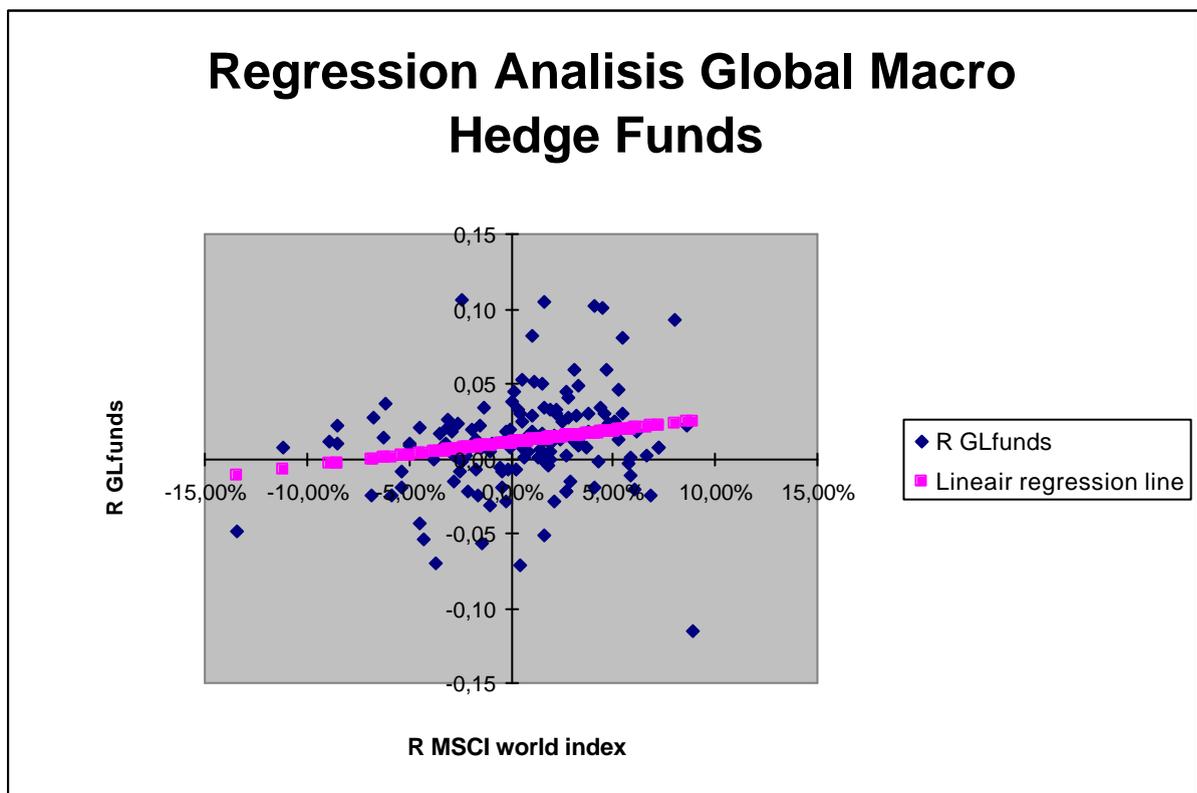
a Predictors: (Constant), MSCI

b Dependent Variable: Hfglobal

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.	Correlations		
		B	Std. Error	Correlation			Zero-order	Partial	Part
1	Alpha	.010	.003		3.962	.000			
	MSCI-Beta	.160	.066	.198	2.421	.017	.198	.198	.198

a. Dependent Variable: Hfglobal



Appendix B

Upper MSCI world index AC jan96-dec99 for Global macro Hedge funds

Descriptive Statistics

	Mean	Std. Deviation	N
HFGlobUpAC	.020182	.0494723	33
UpperMSCIAC	.030203	.0222037	33

Correlations

		HFGlobUpAC	UpperMSCIAC
Pearson Correlation	HFGlobUpAC	1.000	-.112
	UpperMSCIAC	-.112	1.000
Sig. (1-tailed)	HFGlobUpAC	.	.267
	UpperMSCIAC	.267	.
N	HFGlobUpAC	33	33
	UpperMSCIAC	33	33

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.112(a)	.013	-.019	.0499472

a Predictors: (Constant), UpperMSCIAC

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.001	1	.001	.394	.535(a)
	Residual	.077	31	.002		
	Total	.078	32			

a Predictors: (Constant), UpperMSCIAC

b Dependent Variable: HFGlobUpAC

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.	Correlations		
		B	Std. Error	correlation			Zero-order	Partial	Part
1	Alpha	.028	.015		1.870	.071			
	Upper MSCI AC Beta	-.250	.398	-.112	-.628	.535	-.112	-.112	-.112

a. Dependent Variable: HFGlobUpAC

Upper MSCI world index AC jan96-dec99 for Global macro Hedge funds

Descriptive Statistics

	Mean	Std. Deviation	N
HFGlobLoAC	.016261	.0289896	15
LowerMSCIAC	.032671	.0358583	15

Correlations

		HFGlobLoAC	LowerMSCIAC
Pearson Correlation	HFGlobLoAC	1.000	.525
	LowerMSCIAC	.525	1.000
Sig. (1-tailed)	HFGlobLoAC	.	.022
	LowerMSCIAC	.022	.
N	HFGlobLoAC	15	15
	LowerMSCIAC	15	15

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.525(a)	.276	.220	.0255990

a. Predictors: (Constant), LowerMSCIAC

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.003	1	.003	4.954	.044(a)
	Residual	.009	13	.001		
	Total	.012	14			

a Predictors: (Constant), LowerMSCIAC

b Dependent Variable: HFGlobLoAC

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.	Correlations		
		B	Std. Error	correlation			Zero-order	Partial	Part
1	Alpha	.002	.009		.263	.797			
	Lower MSCIAC Beta	.425	.191	.525	2.226	.044	.525	.525	.525

a Dependent Variable: HFGlobLoAC

Non dichotomized MSCI world index AC jan96-dec99 for Global macro Hedge funds

Descriptive Statistics

	Mean	Std. Deviation	N
HFGlobAC	.012877	.0470899	48
MSCIAC	1.463843%	3.9807715%	48

Correlations

		HFGlobAC	MSCIAC
Pearson Correlation	HFGlobAC	1.000	.312
	MSCIAC	.312	1.000
Sig. (1-tailed)	HFGlobAC	.	.015
	MSCIAC	.015	.
N	HFGlobAC	48	48
	MSCIAC	48	48

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.312(a)	.098	.078	.0452172

a Predictors: (Constant), MSCIA C

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.010	1	.010	4.974	.031(a)
	Residual	.094	46	.002		
	Total	.104	47			

a Predictors: (Constant), MSCIA C

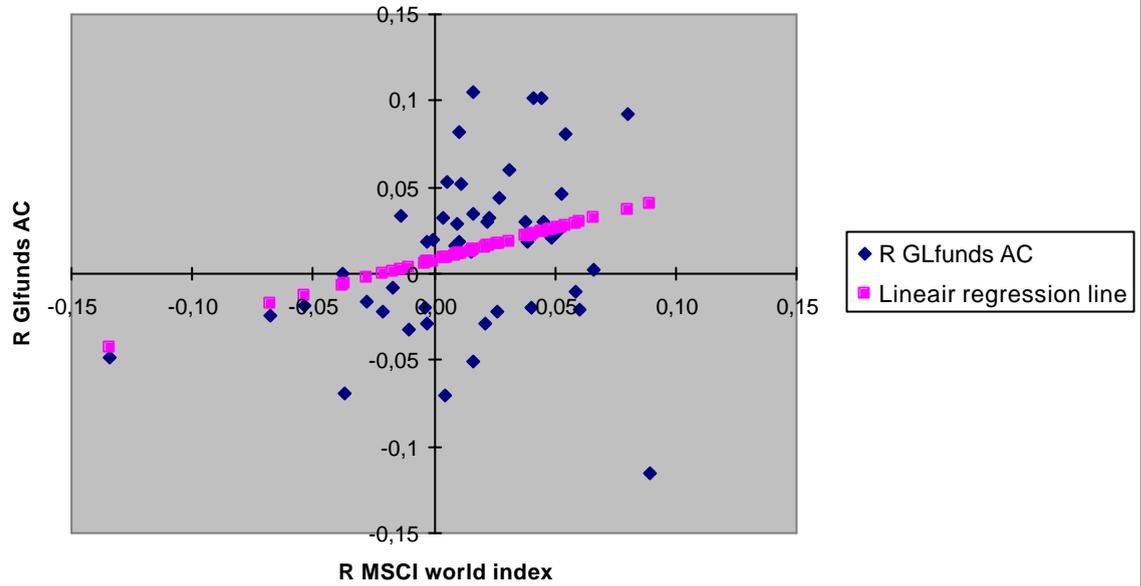
b Dependent Variable: HFGlobAC

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.	Correlations		
		B	Std. Error	Correlation			Zero-order	Partial	Part
1	Alpha	.007	.007		1.073	.289			
	MSCIA C Beta	.004	.002	.312	2.230	.031	.312	.312	.312

a Dependent Variable: HFGlobAC

Regression Analysis Global Macro Hedge Funds AC



Appendix C

Upper MSCI world index vs Emerging market hedge funds

Descriptive Statistics

	Mean	Std. Deviation	N
HFEmup	.019928	.0422169	86
UpperMSCI	.028459	.0209225	86

Correlations

		HFEmup	UpperMSCI
Pearson Correlation	HFEmup	1.000	.209
	UpperMSCI	.209	1.000
Sig. (1-tailed)	HFEmup	.	.027
	UpperMSCI	.027	.
N	HFEmup	86	86
	UpperMSCI	86	86

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.209(a)	.044	.032	.0415334

a Predictors: (Constant), UpperMSCI

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.007	1	.007	3.821	.054(a)
	Residual	.145	84	.002		
	Total	.151	85			

a Predictors: (Constant), UpperMSCI

b Dependent Variable: HFEmup

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.	Correlations		
		B	Std. Error	correlation			Zero-order	Partial	Part
1	Alpha	.008	.008		1.047	.298			
	UpperMSCI Beta	.421	.215	.209	1.955	.054	.209	.209	.209

a Dependent Variable: HFEmup

Lower MSCI world index vs Emerging market hedge funds

Descriptive Statistics

	Mean	Std. Deviation	N
HFEmlo	.017812	.0441387	60
LowerMSCI	.034318	.0288804	60

Correlations

		HFEmlo	LowerMSCI
Pearson Correlation	HFEmlo	1.000	.562
	LowerMSCI	.562	1.000
Sig. (1-tailed)	HFEmlo	.	.000
	LowerMSCI	.000	.
N	HFEmlo	60	60
	LowerMSCI	60	60

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.562(a)	.316	.305	.0368081

a Predictors: (Constant), LowerMSCI

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.036	1	.036	26.841	.000(a)
	Residual	.079	58	.001		
	Total	.115	59			

a Predictors: (Constant), LowerMSCI

b Dependent Variable: HFEml0

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.	Correlations		
		B	Std. Error	correlation			Zero-order	Partial	Part
1	Alpha	-.001	.007		-1.576	.120			
	LowerMSCI Beta	.0166		.562	5.181	.000	.562	.562	.562

a Dependent Variable: HFEml0

Non dichotomized MSCI world index vs Emerging market hedge funds

Descriptive Statistics

	Mean	Std. Deviation	N
HFEmerging	.007622	.0466020	146
MSCI	.005864	.0394481	146

Correlations

		HFEmerging	MSCI
Pearson Correlation	HFEmerging	1.000	.528
	MSCI	.528	1.000
Sig. (1-tailed)	HFEmerging	.	.000
	MSCI	.000	.
N	HFEmerging	146	146
	MSCI	146	146

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.528(a)	.279	.274	.0397153

a Predictors: (Constant), MSCI

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.088	1	.088	55.646	.000(a)
	Residual	.227	144	.002		
	Total	.315	145			

a Predictors: (Constant), MSCI

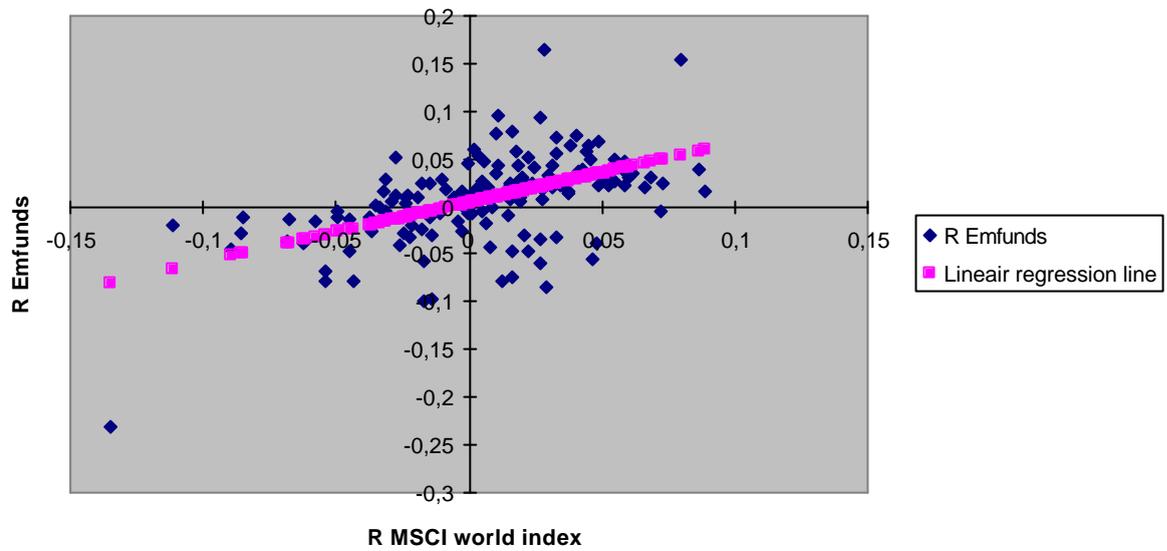
b Dependent Variable: HFEmerging

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.	Correlations		
		B	Std. Error	Correlation			Zero-order	Partial	Part
1	Alpha	.004	.003		1.193	.235			
	MSCI Beta	.624	.084	.528	7.460	.000	.528	.528	.528

a Dependent Variable: HFEmerging

Regression Analysis Emerging Market Hedge Funds



Appendix D

Upper MSCI world index AC jan96-dec99 vs Emerging market hedge funds

Descriptive Statistics

	Mean	Std. Deviation	N
HFEmerUpAC	.0224	.0493627	32
UpperMSCIAC	.0307	.0223272	32

Correlations

		HFEmerUpAC	UpperMSCIAC
Pearson Correlation	HFEmerUpAC	1.000	.305
	UpperMSCIAC	.305	1.000
Sig. (1-tailed)	HFEmerUpAC	.	.045
	UpperMSCIAC	.045	.
N	HFEmerUpAC	32	32
	UpperMSCIAC	32	32

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.305(a)	.093	.063	.0477830

a Predictors: (Constant), UpperMSCIAC

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.007	1	.007	3.084	.089(a)
	Residual	.068	30	.002		
	Total	.076	31			

a Predictors: (Constant), UpperMSCIAC

b Dependent Variable: HFEmerUpAC

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.	Correlations		
		B	Std. Error				Zero-order	Partial	Part
1	Alpha	.002	.015		.116	.909			
	UpperMS CIAC Beta	.675	.384	.305	1.756	.089	.305	.305	.305

a Dependent Variable: HFEmerUpAC

Lower MSCI world index AC jan96-dec99 vs Emerging market hedge funds

Descriptive Statistics

	Mean	Std. Deviation	N
HFEmerLoAC	.030981	.0690566	15
LowerMSCIAC	.032671	.0358583	15

Correlations

		HFEmerLoAC	LowerMSCIAC
Pearson Correlation	HFEmerLoAC	1.000	.828
	LowerMSCIAC	.828	1.000
Sig. (1-tailed)	HFEmerLoAC	.	.000
	LowerMSCIAC	.000	.
N	HFEmerLoAC	15	15
	LowerMSCIAC	15	15

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.828(a)	.686	.661	.0401783

a Predictors: (Constant), LowerMSCIAC

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.046	1	.046	28.358	.000(a)
	Residual	.021	13	.002		
	Total	.067	14			

a Predictors: (Constant), LowerMSCIAC

b Dependent Variable: HFEmerLoAC

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.	Correlations		
		B	Std. Error	correlation			Zero-order	Partial	Part
1	Alpha	-.021	.014		-1.481	.162			
	LowerMSCIAC Beta	1.595	.299	.828	5.325	.000	.828	.828	.828

a Dependent Variable: HFEmerLoAC

Non dichotomized MSCI world index AC jan96-dec99 vs Emerging market hedge funds

Descriptive Statistics

	Mean	Std. Deviation	N
HFEmerAC	.010915	.0612669	48
MSCIAC	.014638	.0398077	48

Correlations

		HFEme rAC	MSCI AC
Pearson Correlation	HFEmeAC	1.000	.645
	MSCIAC	.645	1.000
Sig. (1- tailed)	HFEmeAC	.	.000
	MSCIAC	.000	.
N	HFEmeAC	48	48
	MSCIAC	48	48

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.645(a)	.417	.404	.0472999

a Predictors: (Constant), MSCIAC

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.074	1	.074	32.855	.000(a)
	Residual	.103	46	.002		
	Total	.176	47			

a Predictors: (Constant), MSCIAC

b Dependent Variable: HFEmeAC

Coefficients(a)

Model		Unstandardized Coefficients		Standard Coefficient correlation	t- value	Sig.	Correlations		
		B	Std. Error				Zero- order	Parti- al	Part
1	Alpha	-.004	.007		-.498	.621			
	MS CIA C Beta	.993	.173	.645	5.732	.000	.645	.645	.645

a Dependent Variable: HFEmeAC

Regression Analysis Emerging Market Hedge Funds AC

