THE BUSINESS SCHOOL
FOR FINANCIAL MARKETS

The University of Reading

Is There an Optimal Mix Between Alpha and Beta Benefits in Hedge Fund Returns?

An Empirical Study on Asian Hedge Funds
Employing a Long/Short Equity Strategy

Diana Calin

Dissertation Submitted in Partial Fulfilment of the MSc Requirements
Supervisor: Dr. Jacques Pezier

MSc ISIB 2005/6
ICMA Centre, University of Reading

ICMA Centre • The University of Reading
Whiteknights • PO Box 242 • Reading RG6 6BA • UK
Tel: +44 (0)1183 788239 • Fax: +44 (0)1189 314741
Web: www.icmacentre.rdg.ac.uk
Director: Professor John Board, Chair in Finance
The ICMA Centre is supported by the International Capital Market Association

Abstract

The popularity of hedge funds has known its ups and downs. While hedge funds' supporters attribute their remarkable returns mainly to manager's skill (alpha), their critics argue that those are explained by increased volatility of such funds compared to traditional funds (beta) and mention some considerable failures. Most of the debate is due to the lack of proper understanding of these funds. Research has tried to shed light on these matters, by attempting to quantify the risk-adjusted performance of hedge funds and compare it to traditional funds' performance.

The difficulty arose upon discovering that hedge fund returns are non-linear and uncorrelated with the main asset classes. Thus, traditional measures like Sharpe's ratio, Jensen's alpha, Traynor's ratio, based on normality assumption, proved to be inadequate, as they overestimate the alpha of a hedge fund. It then became clear that hedge funds, as alternative investment vehicles, needed an alternative performance measure that would specifically capture the non-linearities induced by the dynamic strategies and by the asymmetrical structure of fees. Finding that measure has been the objective of subsequent research.

The present paper is an empirical study on the Asian hedge funds that employ a Long/Short Equity Strategy. In an attempt to evaluate their performance, the asset based style factor method was applied. Special features of Asian markets, such as illiquidity, had to be accounted for in this study. Also, in order to capture non-linearities in returns, I have included option payoffs in the regressions. Hedge funds' returns are used to create two indices, one asset-weighted, and the second one volatility-weighted. By means of a stepwise regression process, the alpha estimate found for the two indices differs considerably, although it is significant in both cases. The conclusion is that the results are not robust to the weighting method, nor to the regression type. Although it is clear that hedge funds investing in Asia do offer excess return, its magnitude is not known. This excess return could be a result of market inefficiencies rather than manager skill.

Acknowledgements: I would like to thank my supervisor, Professor Jacques Pezier, for his continuous support and useful comments throughout the making of this paper. Anthony White, PhD student at ICMA, also proved to be invaluable. Special consideration goes to Eurekahedge, one of the world's largest independent hedge fund research companies, for providing the data, without which this project would have lacked the empirical part. Of course, the paper is not flawless, but all such blunders pertain to the author.

I INTRODUCTION

To some extent, one can assert that there are certain similarities between hedge funds and derivatives. Derivative products have been introduced in response to investors' increasingly sophisticated needs. Hedge funds emerged as an alternative to traditional active funds that were charging high fees for beating a benchmark rather than offering positive returns. Thus, hedge funds seek a decrease in volatility while offering positive returns irrespective of market behaviour. Both derivatives and hedge funds deal with misconceptions, in the sense that in times of market crises they hold the blame for much of the instability. They are deemed as riskier than their much simpler counterparts (the underlying in the case of derivatives and the traditional investment funds in the case of hedge funds) and past examples seem to suggest they shouldn't be invested in.

However, some argue that it is the poor understanding of their complexity that led to past spectacular falls. It wasn't because of the bad nature of derivatives that Barings fell, but because of the lack of proper understanding of their use. Similarly, Long Term Capital Management (LTCM) did not collapse because it was a hedge fund, but because of the underestimation of liquidity risk and the high leverage of the position taken. Derivatives too are leveraged instruments and what every investor needs to bear in mind is that if they promise better payoffs than the underlying, they can also trigger bigger losses.

On the other hand, when referring to hedge funds, it is superficial to explain their underperformance with inadequate comprehension of their complexity. The question is whether hedge funds indeed deliver what they promise: positive excess returns. An answer to this question, as well as a better understanding of hedge funds' payoffs, is sought nowadays by the investment community and therefore much of the research is focussed in this direction.

Similarly, the present paper takes up the challenge of explaining the **optimal mix between alpha and beta benefits in hedge funds.** More specifically, a certain level of return is composed of alpha benefits and beta benefits. If alpha represents the hedge fund manager's performance (skill), beta is the sensitivity of the hedge fund with respect to market risk, and therefore it is a measure of risk. The optimal mix is, therefore, reached via maximisation of alpha while minimising beta. However, identifying the best alpha and beta estimates can prove to be quite cumbersome in practice. First of all, one needs to properly identify the risks. A superficial review of risks, an omission of some, an underestimation of their impact on the hedge fund can lead to a small estimate of beta and a bigger than the real value estimate alpha. As much as such a result would satisfy the researcher, it is incorrect, and thus, the scope of research is not met.

The present paper does not attempt to propose a new model to explain the performance of hedge funds, as that would be deemed overambitious. Previous research has already designed models for hedge funds' returns, tailored to their characteristics. However, the bulk of the research has targeted US hedge funds, due to their overwhelming number. European hedge funds have also been subjected to research. Nevertheless, little has been said about Asian hedge funds. This is mainly due to the fact that hedge funds in Asia gained momentum only recently.

In this regard, Asian markets provide a new avenue of research. They offer a testing ground against which the performance of existing models and methodologies can be assessed. To this end, one might apply exactly the same model previously used on other markets, which would facilitate comparison. However, this may not always be possible due to scarcity of data. Fewer indices are available for Asia/Pacific and the ones that exist do not have a long enough history. Furthermore, specific characteristics of the data need to be accounted for when applying a particular model. To exemplify, one of the main differences between Asian and US markets is the degree of liquidity, which is highly relevant for hedge funds and their returns. All these departures from the original model are fully justified throughout this study. Its findings are compared with those of previous research.

To present all concepts and results in an orderly fashion, I have decided to structure the rest of the paper as follows. Before addressing other issues, **a closer look at hedge funds** and their characteristics is needed. This will be pursued in Section II. It will facilitate the justification of parts of the methodology used without having to interrupt the flow of ideas for mere terms explanations. Section III reviews the pertinent **literature** on the topic. This is followed by a description of the **Models and Methodology** used in Section IV. **The Data** is the major input in this empirical research and therefore, a comprehensive description will be provided in Section V. The **Empirical Results** are reported in Section VI**.** Section VII concludes the study and discusses some scope for further research.

II A CLOSER LOOK AT HEDGE FUNDS

II.1 What is a hedge fund?

Before addressing the issue of alpha and beta, one must understand what a hedge fund is. There is a certain degree of ambiguity related to the definition, mainly due to the name, that is misleading. Although the first hedge fund, established by in 1949 Albert Jones in US deserves this name, as Jones combined short selling and leverage to devise a **hedged portfolio** that would perform well indifferent of the direction the market would move in, nowadays, hedge funds are rarely **hedged.**

There is no legal definition of hedge funds and therefore no unique definition of such funds. Most of the times, they are defined by means of comparison against mutual funds (traditional type of investments). They do, however, posses characteristics that distinguish them from other investment vehicles. Therefore, rather than deciding on an arbitrary definition, enumerating such features is preferred:

- Hedge funds are large investment pools, much like mutual funds;
- They are unregistered, unlike mutual funds;
- Unlike traditional funds, restricted to long only strategies, hedge funds can employ strategies like short selling, the use of derivatives and leverage, which translate into a low correlation of hedge funds with traditional asset classes. This makes them natural candidates for diversification;
- They are unregulated. This has many implications. Because they are not required to report their returns, they are also not allowed to advertise publicly. Therefore, data about hedge funds is rather scarce. Moreover, rather as a means of advertising, hedge funds only report results when their performance is positive, but stop reporting when performance is negative. This induces certain biases in the data on hedge funds' returns;
- Hedge funds concentrate on absolute performance rather than relative performance. Therefore they do not try to beat a falling index, but to consistently offer positive returns;
- Remuneration of managers creates an important difference between traditional funds and hedge funds. If the manager of a traditional fund is remunerated proportionally to assets under management, the hedge fund manager's remuneration is performance related, usually a 2% basic fee, accompanied by a 20% performance fee. Moreover, hedge funds have hurdle rate and high watermark provisions. The hurdle rate is the minimum rate promised by the hedge fund. The manager will receive an incentive fee only if the return exceeds the hurdle rate and that will be calculated only on the excess amount. The high watermark provision states that the return needs to exceed a certain threshold and that the profits made on a given year will first cover the losses incurred in the previous year before incentive fees are calculated. This asymmetrical treatment of upsides and downsides by performance fees introduces non-linearities in returns;
- Hedge funds require large initial investments compared to traditional funds, which makes high net worth individuals regular candidates as hedge funds' investors;
- Hedge funds may employ various strategies, while keeping the same characteristics as described above. However, they differ greatly in terms of the risk-return relationship or other characteristics. Hedge funds' strategies can be divided into directional and non-directional (or market neutral) strategies. The difference between the two is that the directional strategies attempt to predict the direction of market movements, while the non-

directional ones pursue a low correlation with the market. Consequently, the latter will have a lower volatility.

There is no unique taxonomy of hedge funds that is unanimously agreed upon. The purpose of this paper is not to decide on one such classification, but to present the characteristics of the Long/Short Equity Strategy, which is the focus of the present study. Brief notes on other strategies are provided in the Appendix.

The Long/Short Equity strategy involves going long on some stocks while going short on others. This is in effect a bet on the relative value between stocks. Managers of hedge funds employing a long/short equity strategy reject the veracity of the Efficient Market Hypothesis and believe to be excellent stock pickers. There are fewer restrictions imposed to the manager in terms of what stocks he should select, but the strategy is considered to be riskier. Depending on the proportion invested in the shorted stocks compared to that allocated to long positions, the strategy can be classified as long-biased, short-biased, or an Equity Hedge strategy. The latter's name is a reference to the fact that by going short, the hedge fund manager hedges the long position, the outcome being a portfolio uncorrelated with the market. In either one of the first cases, long-biased or short-biased, the returns of the hedge fund will be correlated to some extent to the market, which makes this strategy a directional one.

Another aspect of the strategy is based on the difference between the long only funds and hedge funds employing a long-short strategy. The reason why the manager chooses to go short is because he is unwilling to accept the entire beta in his portfolio. He wants to reduce the sensitivity of his portfolio with respect to market risk. If the manager is correct in his assumptions, meaning that the stock he went long on appreciated and the one he went short on depreciated, then he will obtain a double alpha on his portfolio (one from the stock he sold and another one from the stock he bought). Moreover, even if the manager is not entirely correct in his assumptions, he will still make alpha as long as the appreciation on his long stock is higher than the depreciation on his shorted stock. This makes this strategy appealing. However, one must bear in mind that there is also the possibility of the manager being entirely wrong in his bet, meaning that his portfolio will return a negative double alpha. This suggests that the manager's skill as a stock picker is essential.

The Long/Short Equity is the oldest strategy, because Alfred Jones' fund, the first believed to be a hedge fund, was a function of both long and short positions on stocks. This explains perhaps why hedge funds employing this strategy display the largest number of funds and assets under management.

As has been mentioned before, because the resulting strategy can be long-biased or short-biased, the market exposure can be regarded as a parameter that the manager can subjectively adjust in accordance to his perception of a good portfolio. Market exposure can vary from 0 to 100%. According to Greenwich Van[1], the Long/Short Equity Strategy has the following variants[2]:

Aggressive Growth: It involves investing in companies with a strong growth in earnings per share. Such companies may be identified either on the basis of fundamental analysis or simply technical factors, such as stock price momentum. Although short selling is used, the funds employing this strategy are generally long biased.

Opportunistic: The manager of the fund employing such a strategy is more likely to take advantage of market opportunities and employ a blend of investment approaches, rather than being constrained by only one such approach.

Short Selling: The strategy will be short-biased. The manager will, therefore, need to be an excellent stock-picker of overvalued shares.

Value: Fundamental analysis is a pre-requisite for this strategy. Should stocks be identified as being undervalued (when the market price is compared against the fundamental value of the share), the manager takes a long position in them. The opposite happens for stocks believed to be overpriced. If the manager is correct in his assumptions, then the market price will eventually be corrected and the hedge fund will benefit form the positions taken. Typically, there isn't a high degree of leverage associated with this strategy.

To complicate matters further, hedge funds, due to their rather esoteric nature, are reluctant most of the times to disclose their strategy. One cannot be sure therefore that the reported strategy is the true one. This is why research has devoted some attention to this matter and Fung and Hsieh (1997) argued that a good way to find out whether a fund indeed follows the self-proclaimed strategy is to look at autocorrelation of returns of funds. The ones following the same strategy should have higher correlation.

Another common issue related to hedge funds is represented by **data biases**, which constitutes the focus of Section V.

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[1] Greenwich Van is composed of two companies that provide hedge fund advisory services.
[2] http://www.vanhedge.com/pdf/press/vanindex0705.pdf

II.2 Why Asian hedge funds?

According to a report[3] released by Financial Insights[4] in 2005, which states that "With the region no longer viewed as peripheral to the global community, we envision the Asian hedge fund market catapulting almost 40% to US$90 billion in 2005.", Asian markets experience a great boost. The reason for the rising interest of hedge funds in the Asia/Pacific region resides not only in the growing market, but also in the inefficiencies present in it. Asian markets are not as efficient as their US or European counterparties, particularly because until recently they have not been of interest for fundamental analysts. According to the Grossman and Stiglitz (1980) paradox, markets are not efficient as theory might suggest, but they are so competitive that they approximate a theoretically efficient market. The paradox states that although in efficient markets fundamental analysis is useless, it is the analysts that keep the markets efficient[5].

Asian markets are also less liquid than US or European markets. Although this materialises into extra return for hedge fund managers investing in illiquid assets, as they demand a liquidity premium, can also trigger considerable losses. In this regard, the case of Long Term Capital Management (LTCM) provides the lesson that illiquidity and leverage result in a disastrous combination. One should also bear in mind that Asian markets do not benefit from the presence of a regulatory entity such as the Federal Reserve which can intervene in order to restore market equilibrium.

Another dissimilarity between US or European markets and the Asian ones consists in the degree of regulation[6]. Although hedge funds are known to be exempt from any disclosure requirements, the same is not true for Asian hedge funds. Under regulatory supervision, hedge funds provide more confidence for investors. This is highly needed, especially for a region that not as long ago as 1997 suffered from a severe financial crisis.

Certainly, the late start of hedge funds in Asia means that they have not been subjected to researchers' scrutiny as the US and European markets have. As the literature review will illustrate, although there was a keen interest in finding a performance model for hedge funds, empirical analysis was performed mostly on other markets and, to this point, little is known about the performance of Asian hedge funds.

All these constitute the underlying motivation of this study.

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[3] "Hedge funds in A/P: Squarely on Radar" available at http://www.financial-insights.com/FI /getdoc.jsp?containerId=prSG00184405.

[4] An independent advisory and research company.

[5] Without such studies, one would not know what the true price of a share is, so market prices would probably deviate from true prices. Analysts spot such mispricings and trade accordingly, until the difference between the market price and the true price disappears, which, in turn, makes markets efficient.

[6] According to the same cited report "Hedge funds in A/P: Squarely on Radar"

III LITERATURE REVIEW

The idea of asset based style analysis goes back to 1992, when Sharpe (1992) devised a model to analyse the performance of mutual fund managers. Performance was thus defined as a combination of managers' style and skill.

Given the constraints imposed to mutual fund managers with respect to the type of assets they can hold in their portfolios, the use of leverage and short selling, it was concluded that only the asset mix in the mutual fund's portfolio defines the style of the manager. By grouping highly correlated assets into asset classes, Sharpe's model also achieves dimension reduction, as only a small number of asset classes, rather than a large number of assets, are used as factors in explaining mutual funds' returns. In this context, skill, the measure of performance adjacent to style, describes the stock picking ability of the manager.

While Sharpe's model works well for mutual funds, which in essence use a buy and hold strategy, it is no longer viable when applied to alternative investments, which use dynamic strategies. This is due to additional dimensions of hedge funds' managers' style, such as the investment strategy and the amount of leverage. Fung and Hsieh (1997) were the first to extend Sharpe's model to hedge funds and CTAs, by adding new factors to the model. It no longer suffices to specify the Location factors (the assets invested in), but also the Trading factors (pertaining to the strategy) and the Quantity factor (leverage).

While Fung and Hsieh (op.cit.) have laid the foundation in this area, further research was needed on identifying such factors. As different strategies are exposed to different risks, their returns are also explained by various asset factors. For instance, Fung and Hsieh (2001) show that lookback options' payoffs are highly correlated with the returns of trend following funds. Mitchell and Pulvino (2001) devised a model for the Merger Arbitrage style of hedge funds, while Henriksson and Merton (1981), as well as Carhart (1997) constructed a Momentum factor, to account for the market timing abilities of hedge fund managers. Agarwal et al. (2004) focused on the convertible arbitrage strategy, while Fung and Hsieh (2003) and Agarwal and Naik (2003) devised Equity Asset Based Factors. At present, research concentrates largely on funds of hedge funds, such as Fung and Hsieh (2005).

In addressing the non-linearity issue, various methods have been employed. Lhabitant (2001) advocated the use of hedge fund indices as factors, since they are inherently non-linear. Fung and Hsieh (2001) and Agarwal and Naik (2000) were among the first to explain non-linearities in hedge fund returns with option payoffs. Without properly accounting for the particularities of hedge funds, traditional performance measures confer hedge fund managers the status of

superior performers. Nowadays, the inclusion of non-linear factors in the performance evaluation model of hedge funds is a sine qua non condition. Zairi and Sideri (2004) demonstrate the superiority of adding options' returns to the macro-factor model over the simple version of the model.

The bulk of the literature in the field seems to be an intensive study of the US hedge funds. Nevertheless, an increasing number of papers chose Europe as the focus of their research. For instance, Seeholzer (2003) applies the methodology proposed by Agarwal and Naik (2003) to European hedge funds employing a Long/Short Equity strategy and finds similar results.

On the other hand, Asian hedge funds have only recently been subjected to analysis by researchers and investors. To my knowledge, there is only one study focused on Asian markets, undertaken by Koh, Koh and Teo (2003). However, they conduct their research in a return-based factor framework which makes use of Principal Component Analysis. Their study also incorporates a small section dedicated to the asset-based factor model, in order to test the persistence in hedge fund returns as a result of persistence in risk taking. The pitfall of this study is that the authors give no indication on how they built their factors and so no definitive conclusions can be drawn on their results. In addition to this, their analysis is performed against all hedge funds in their data sample, indifferent of the strategy they employ. Their results will serve though as a benchmark for comparison for the present study.

While there are other methods that attempt to capture the risk exposure of hedge funds, they all deal with several limitations. The peer-group style factors are nothing more than indices comprising of hedge funds following a particular strategy. However, in an unregulated market, the uncertainties related to the veracity of the self-proclaimed strategy add to the data limitations that hedge funds deal with.

In an attempt to overcome this drawback, Fung and Hsieh (1997) make use of Principal Component Analysis in order to divide hedge funds into strategies based on the high correlation between their returns. This was the origin of return-based style factors.

According to Alexander and Dimitriu (2005), there is no "perfect" model for the identification of the true alpha and beta. Therefore, there will always be a model risk. The same applies to the Asset-Based Style Factor approach, which attempts to provide the link between conventional and alternative asset classes. This translates into a number of advantages, like dimension reduction, the use of observable market prices rather than historical ones. It also avoids using hedge funds' prices in constructing the factors and links hedge funds' risks to the risks of conventional asset

classes, thus allowing one to properly evaluate the beta. There are also limitations: it requires extensive study on identifying the specific factors pertaining to a strategy and it cannot model all or very specific strategies.

The present paper takes the challenge to touch on a subject that remains still largely unexplored. While looking at the less observed Asian markets, it focuses on a particular strategy, Long/Short Equity, and attempts to discover the asset-based style factors. In other words, after properly assessing beta, the remainder is labelled as alpha, the manager's skill.

IV AN ALTERNATIVE PERFORMANCE MODEL: THE ASSET BASED STYLE MODEL

The model used in the empirical part of the present study is in effect a simple linear factor model, along the lines of that devised by Sharpe (1992), which in this case relates hedge fund returns to the values of several factors:

$$R_t = \alpha + \sum_{k=1}^{K} \beta_k F_{k,t} + \varepsilon_t \,, \tag{1}$$

where

R_t = the net-of-fees return in excess of the risk free rate[7] at month t;

α = the excess return, representing manager's skill;

β_k = the sensitivity of the hedge fund return to the return on factor k;

$F_{k,t}$ =the return in excess of the risk free rate of factor k at month t;

ε_t = the error term of the regression.

In the following, the study will draw on the work of Agarwal and Naik (2003). What distinguishes the present approach from theirs is that they estimate equation (1) for each individual fund, while the dataset under investigation in the present study consists of 95 funds, which would make calculations too time consuming. Consequently, two indices which include the returns of all found funds have been constructed. Details on the construction of the indices will be given in the data description section.

The model in itself reminds one of the famous APT. Its power resides in its simplicity. The pitfall it shares with APT, however, is that it gives no indication about the factors to be used.

[7] The risk free rate is represented by the 1 month US T-bill rate, obtained from Datastream

The seminal work of Fung and Hsieh (1997) provided the advent for further research on identifying the factors specific to each strategy followed by hedge funds. Firstly, they noticed that since different strategies are exposed to different risks, the choice of asset-based style factors to explain these exposures will differ for every strategy. For this reason, the present paper focuses on Asian hedge funds employing a Long/Short Equity strategy only.

Secondly, they divided the factors in three types: Location Factors, which are specific to the asset classes in which the hedge fund manager invests in, Trading Factors, which account for the strategy, and the Quantity Factor, which accounts for the use of leverage.

In what the Location Factors are concerned, Fung and Hsieh (2003a) as well as Agarwal and Naik (2003) researched closely the Asset Based Style model when applied to the Equity Hedge strategy. However, any attempts to find Fung and Hsieh (2003a) proved futile. The factors identified in Fung and Hsieh (2003a) were obtained from Fung and Hsieh (2003b), which is a synopsis of the developments in the Asset Based Style methodology up to 2003. However, there is no indication of the detailed methodology used nor of the results. The factors they find relevant in these cases are: the Capitalization Spread, which is nothing more than the famous Fama and French's Size Factor, the Value/Growth Spread and VIX, the Volatility Implied Index. The present paper follows largely the methodology described in Agarwal and Naik (2003), while using that study for comparison purposes.

Since the area of focus for this research paper is Asia/Pacific, one needs to deal with additional data limitations. If the US markets benefit from a wide variety of choice in terms of indices, this is not the case for Asia/Pacific. For example, as Location Factors, while the Value/ Growth Spread can be split into two: the **Value Factor**, represented by the MSCI AC Asia Pacific Value, and the **Growth Factor**, represented by MSCI AC Asia Pacific Growth, Fama and French's Size Factor was not readily available. Since it represents the difference between Small Cap and Large Cap, and only the indices MSCI AC Asia Pacific and MSCI Pacific Small Cap were available, the Large Cap version was constructed using the formula:

$$Lar.geCapFactor = MSCIACAsiaPacific - MSCIPacificSmallCap \quad (2)$$

Thus, the Fama and French' **Size factor** was computed as:

$$SizeFactor = MSCIPacificSmallCap - (MSCIACAsiaPacific - MSCIPacificSmallCap) \quad (3)$$

The reasoning behind this computation is that MSCI AC Asia Pacific [8] is composed of over 500 companies, Large Caps, as well as Small Caps.

The **Equity Index Factor** will be represented by the MSCI AC Asia Pacific. Given that the majority of funds employ a Long Biased Strategy, it is expected a priori a positive exposure to the market index.

The Volatility Index is, again, unavailable. A **Volatility Factor**, an estimate of market volatility using the MSCI AC Asia Pacific index was constructed using the GARCH model. The advantages of GARCH model over Moving Average Models like EWMA (Exponentially Weighted Moving Average) are overwhelming. The essential one is that EWMA assumes constant volatility, while it is a known fact that volatility varies through time. EWMA also requires a subjective choice of its parameter, on which the volatility estimate will dependent. Although more complicated models for volatility could be chosen, the present study does not focus on volatility estimation, therefore GARCH suffices. In calculating GARCH volatility, daily data for the market index was needed in order to obtain meaningful values[9]. Monthly variance was calculated using the formula:

$$V_t(r_{t,20}) = \sum_{i=1}^{20} V_t(r_{t+i}) + \sum_i \sum_j \mathrm{cov}_t(r_{t+i}, r_{i+j})\ ^{10}, \qquad (4)$$

where the double sum is usually insignificant compared to the first sum and therefore ignored. Volatility is then calculated as:

$$Vol_t = \sqrt{250/20 * V_t(r_{t,20})} \qquad (5)$$

For the **Trading Factors**, option payoffs were used. Although the prospect of replicating the dynamic character of hedge fund strategies using simple option payoffs written on standard asset classes seems inconceivable, Agarwal and Naik (2003) found that these capture most of such non-linearities.

Since data on options written on Asian equity was not available, series of calls and puts using the Black Scholes formula were constructed. Market prices of at the money options are very close to the theoretical ones, so it makes no difference which prices one uses. Out of the money, as well as in the money options though, have higher market prices than predicted by the Black Scholes

[8] The Indices were obtained from http://www.msci.com/equity/index2.html
[9] Daily data for the MSCI AC Asia Pacific was obtained from Datastream.
[10] Alexander, C. (2001) *Market Models: A guide to financial data analysis*, John Wiley and Sons, Chichester, England, p 100.

formula. According to Mitschell and Pulvino (2000) however, by using real option prices as opposed to theoretical prices, the performance of funds decreases by 4 basis points, which does not have a great impact on results. European options with 1 month to maturity are written on the market index, following the strategy[11] described by Agarwal and Naik (2003): if the option expires in the money, the return of the payoff given the original cost of the option is calculated. Otherwise, a -100% return is assigned that month. Thus, two series of ATM puts and calls are obtained. In accordance with Agarwal and Naik (2003), series of out of the money and deep out of the money options (both for puts and calls) were also constructed, where the strike price is half a standard deviation, and a standard deviation away from the at the money strike price respectively.

The Quantity Factor (leverage) was not used per se in the regressions performed by Agarwal and Naik (2003). Provided with information on which hedge funds used leverage and which ones did not, the researchers tested the performance of such hedge funds against each other. Since Eurekahedge, the data provider for this research project, gives no indication as to which funds use leverage and which do not, the present study follows Alexander and Dimitriu (2005) who use squared market returns (as suggested by Treynor and Mazuy (1966)) to account for the use of leverage, as well as market timing abilities. This will be denoted as the **Leverage Factor.**

When conducting research on a new market, it is worthwhile, for comparison purposes, to employ the same model that has been previously used on other markets. However, special characteristics of the data need to be considered. As it has already been explained, one of the particularities of Asian markets is a higher level of illiquidity. Thus, the inclusion of a Liquidity factor is mandatory. The effect of illiquidity, or stale prices, as well as smoothed[12] returns, is identified by Getmansky, Lo and Makarov (2004) to cause autocorrelation in hedge fund returns. Autocorrelation implies a certain degree of predictability, as for a level of return on a given month, it can be deducted to a certain extent what the return in the following month will be. When investing in illiquid assets, should anything go wrong one month, the position will be harder to liquidate and will affect in the same way the return in the following month. In order to account for serial correlation, I follow Dimson (1979), Asness, Krail and Liew (2001), as well as Alexander and Dimitriu (2005), and include the lagged return of the MSCI AC Asia Pacific index as the Liquidity Factor.

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[11] In all papers using option payoffs, different strategies are constructed. Seeholzer's (2003) strategy consists of buying an option at the beginning of each month, while Zairi and Sideri (2004) use straddles. This shows that the choice of strategy is not relevant. The objective is to introduce the non-linear payoff specific to options in the model. Some researchers look at the characteristics of the hedge funds under investigation and specify option strategies that are expected to best fit the data particularities.

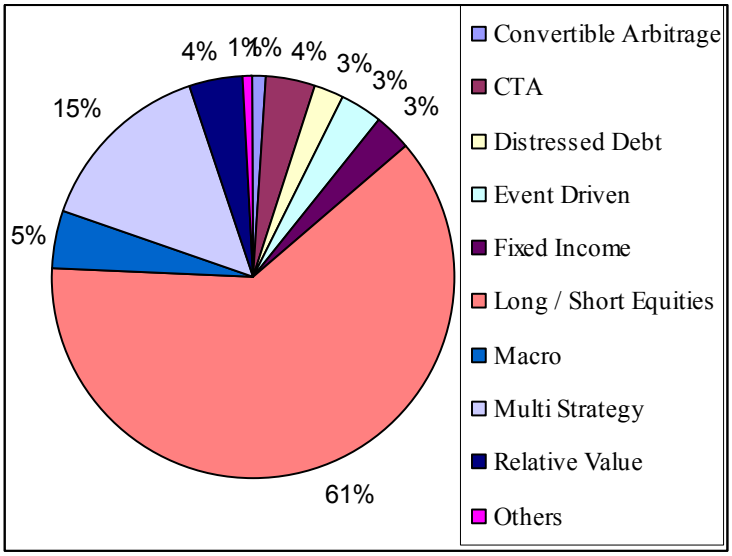
[12] Hedge funds are known to be less volatile than standard asset classes and to have a low correlation with them. When a fund is deemed too volatile, its manager may smooth the returns, that is, adjust them in order to display lower volatility and correlation.

V DATA DESCRIPTION AND BIASES

The data are provided by Eurekahedge, one of the major hedge fund data providers. All hedge funds following a Long/Short Equity strategy investing in Asia and/or Japan and reporting their returns in US dollars are selected, these representing more than half of the hedge funds investing in Asia (see Figure 1). Although Asia and Japan have been viewed as distinct markets, in recent years they have converged towards a more homogenous performance. Therefore, the choice of markets makes economic sense. Opting only for the funds that report in US dollars finds its reasoning in the choice of the risk – free rate of interest, which is the 1 month US T-bill.

Figure 1. Asian Hedge Funds by Strategy

The graph[13] shows that while being the oldest strategy employed, Equity Long/Short hasn't been outmoded. With over a half of all hedge funds investing in Asia employing this strategy, it is deemed representative and appears to be the obvious choice for a research project on Asian hedge funds.



When utilizing hedge fund data for analysis purposes, one must be aware of the inherent data biases. These can seriously distort the results and can determine the researcher to draw the wrong conclusions. Because they are so important and they can have such grave implications on the results, they should be dealt with before proceeding with the analysis.

The **Survivorship Bias** results from the funds with poor track records being dissolved and thus excluded from the database, while the performing ones still remain. Another reason is that different databases incorporate different funds, without necessarily overlapping, so the choice of database again affects one's results. It is also a fact that data vendors started collecting data in hedge funds rather late. Indices are calculated in different manners. This bias can distort the

[13] I have constructed a pie chart using the information provided by Eurekahedge.

research results upwards or downwards. Fung and Hsieh (2000) estimated a monthly value for the survivorship bias of 0.30%.

The main cause for the **Selection Bias** is that hedge fund managers are not constrained to report their results. Funds with an unsatisfactory performance will stop reporting, and this will induce an upward bias in results. However, funds with a good performance that have reached their size limit will also stop reporting as they do not need to attract further investors, which will induce a downward bias. Nevertheless, this is not a reason for concern, as Fung and Hsieh (2000) estimate that the presence of the two biases results in a negligible effect.

Since result reporting is merely a marketing tool for hedge funds, when they do report, their performance history is updated, resulting in an upward bias called **Instant History Bias.** Various researchers proposed methods that would remove the instant history bias. Fung and Hsieh (2000) estimated the bias by comparing the average return of all the hedge funds in the database against the average return of these funds once the first month of reported return has been ignored.

The **Multi-Period sampling bias** is induced by hedge funds that have a short history, and can be mitigated by analysing only the funds with a history longer than 24 (Ackermann et al. (1999)) or even 36 (Fung & Hsieh (2000)) monthly observations.

In accordance with these findings, funds with a history of minimum 24 months have been selected for the purpose of this study. From 346 hedge funds employing a Long/Short Equity strategy, a pool of 95 hedge funds resulted after all data manipulations. The time span is January 1997 to October 2005. Given that there are 8 years of monthly data subjected to analysis, the results can be compared against those of Agarwal and Naik (2003), which use eight years of data as well.

In order to reduce the number of regressions performed, two indices have been constructed from the available data, rather than working with individual funds. The first index calculates average monthly returns, using the assets under management as a weighting factor (known as Raum from now on). This is believed to be superior to the equally weighted returns of Schneeweis and Spurgin (1999), as it takes into account the investing power of a given hedge fund.

However, when mixing all hedge funds and calculating one average return on a given month of all hedge funds that report in that particular month, one ignores their volatility. Therefore an

index that accounts for each funds volatility and thus augments the returns on a given month for funds that display lower volatility (Rvol) has been constructed. The formulae used in constructing the above mentioned indices are as follows:

$$Raum_t = \frac{\sum_{i=1}^{n} R_{it} * AUM_{it}}{\sum_{i=1}^{n} AUM_{it}} \quad (6)$$

where,

$Raum_t$ is the return of the calculated index in month t;

R_{it} is the return of fund i reported in month t;

AUM_{it} is the reported figure for assets under management of fund i in month t.

n is the number of funds that report returns in month t.

In calculating the Rvol index, the reasoning behind it is the following: hedge funds are defined as investment vehicles that offer high returns with lower volatility. When comparing the performance of two hedge funds, one looks at the level of returns. However, one is also interested in volatility. The more volatile a fund is, the riskier it is. Thus, by looking at two hedge funds that obtain the same return on a given month, but one of them has a record of higher volatility than the other, then the same return actually means a poorer performance. Therefore, in order to be directly comparable, the returns should be rescaled to account for volatility. Thus, the fund with a higher volatility will have its return decreasing, which will show it as a worse performer when compared against the other fund. The formula used is the following:

$$Rvol_t = \frac{\sum_{i=1}^{n} R_{ti} * \frac{\sigma_0}{\sigma_i}}{n}, \quad (7)$$

where,

$Rvol_t$ is the value of the volatility weighted index at time t;

R_{it} is, again, the return of fund i reported in month t;

σ_0 is the overall volatility of the portfolio of selected hedge funds;

σ_i is the volatility of fund i in the period under investigation;

n is the number of funds reporting returns in month t.

The summary statistics for the two indices are provided in Table 1. Both Raum and Rvol reject Jarque-Bera's null hypothesis of normality, which is to be expected for hedge funds. Figure 2 shows that, although the two series are rather similar, Rvol displays higher volatility. To be noted

that the market index displays negative skewness (valid for equity markets), while the hedge fund indices display positive skewness and positive excess kurtosis. This implies that although hedge fund returns are generally higher than those of the market, the tails of the distribution are heavier, and so the probability associated with extreme values bigger. This means hedge funds are also riskier than the market index.

Table 1. Summary statistics

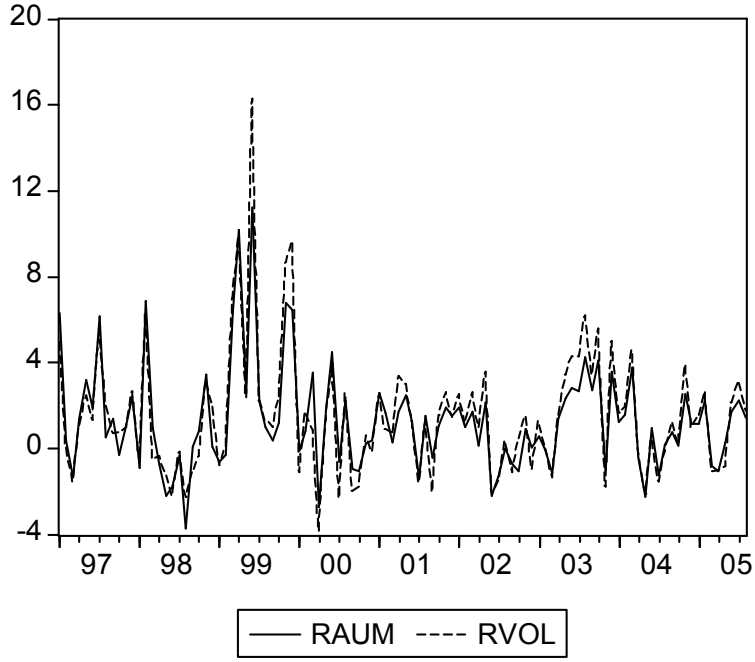
The table below shows the summary statistics for the constructed hedge fund indices, Raum and Rvol, the MSCI AC Asia Pacific (MKINDEX), the Size, Value and Growth Factors, the Volatility Factor (VOL), the Momentum Factor (MOMENTUM) factors and the 1 month US T-bill, which serves as the risk-free rate of interest (RFR).

In addition, the Jarque-Bera statistic and the associated p-values are given. Jarque-Bera is a test for normality, where the null hypothesis states that the series is normally distributed. To be noted that both series reject the normality assumption.

Factor	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
RAUM	1.3025	1.0136	11.2280	-3.7545	2.4521	1.3710	6.1369	75.2187 (0.0000)
RVOL	1.5200	1.2574	16.2735	-3.8298	2.9614	1.7088	8.3910	176.5529 (0.0000)
MKINDEX	-0.0576	0.0350	15.5900	-13.7100	5.5019	-0.1117	2.8738	0.2852 (0.8671)
SIZE	0.0153	0.1900	14.5700	-15.7300	6.6570	-0.0744	2.6183	0.7273 (0.6951)
VALUE	0.0640	-0.0550	18.5600	-13.2400	5.4436	0.1732	3.5052	1.6259 (0.4435)
GROWTH	-0.1981	0.7250	12.7100	-16.2400	5.9712	-0.3725	2.5971	3.1091 (0.2113)
VOL	5.6500	5.3500	11.6100	3.7600	1.3791	1.4798	5.8934	74.2325 (0.0000)
LEVERAGE	5.4867	4.2500	18.8100	0.0200	4.4489	0.9823	3.3449	17.2421 (0.0002)
RFR	3.4953	4.0750	6.3700	0.8600	1.8382	-0.1420	1.4170	11.2079 (0.0037)

Figure 2. Linear plot of Raum and Rvol

The figure shows that, although there is not much difference between the two series, Rvol displays higher volatility.



Before the actual implementation of the regression, it is imperative to test the data for stationarity, in order to avoid the spurious regression[14] identified by Yule (1926). Performing the Augmented Dickey Fuller test, the null hypothesis of a unit root is rejected for all factors. Therefore, it is concluded that all series are stationary.

Both Raum and Rvol display serial correlation, as by performing the Ljiung –Box test and computing the Q statistic, the null hypothesis of no autocorrelation is rejected at different lags. This indicates, according to Getmansky et al (2004), smoothed returns and illiquidity. However, it is not a great deal of concern, as for every regression, Newey-West Standard Errors are calculated. These errors are corrected for autocorrelation and heteroskedasticity, which means that the t-ratios, as well as the corresponding p values will be modified, while it has no impact on the adjusted R-squared of the regression, nor on the Durbin Watson d statistic.

Figure 3 is a scatter plot of Raum against the market index. One notices a change in slope: for negative market returns, the relationship between Raum and the market index displays a certain beta, but as the returns of the market index move towards positive, the slope becomes steeper.

[14] A regression in which, although the R-squared shows that the explanatory variable captures well the variation in the dependent variable, there is no economic relationship between them. It is also called a nonsense regression.

This implies that in market downturns, hedge funds tend not to be as correlated to the market as they are in market upturns. The same observation is made evident in Figure 4 for Rvol.

Figure 3. Scatter plots of Raum against the market index MSCI AC Asia Pacific

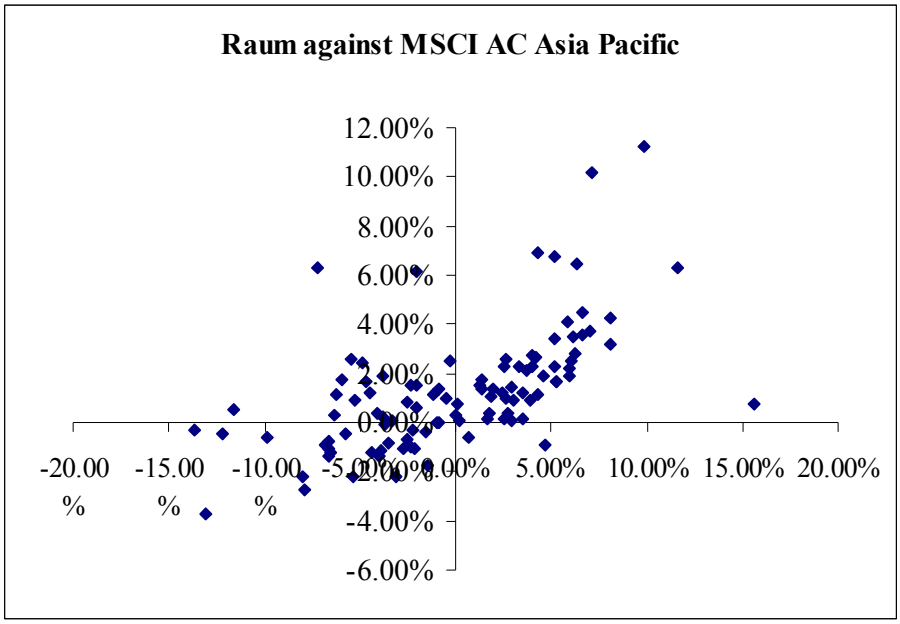


Figure 4. Scatter plots of Rvol against the market index MSCI AC Asia Pacific

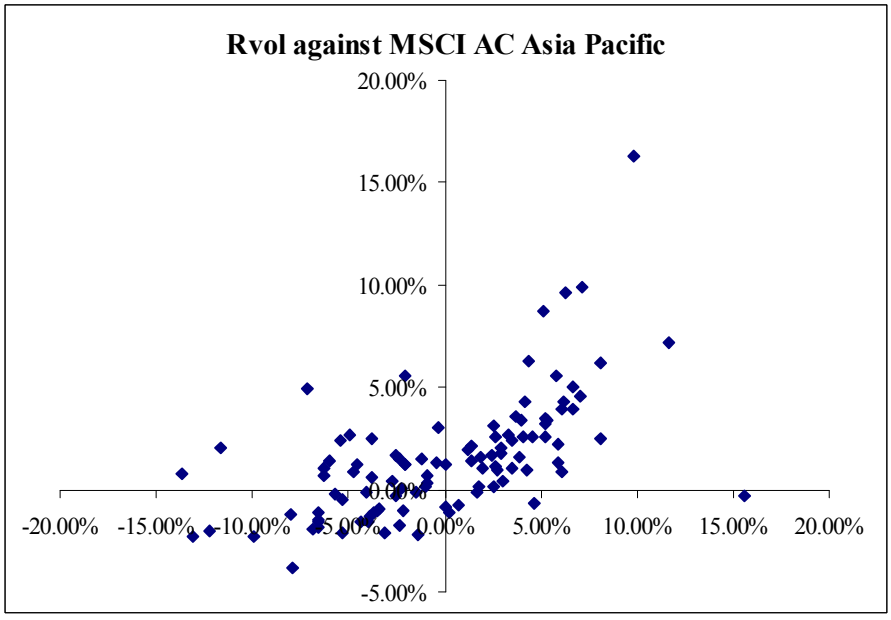


Figure 5 plots the average return of Raum and of the market index in negative, as well as positive, performing months of the latter. It is again evident a change in the correlation of hedge funds and the market index depending on the market's performance. In negative performing months of

the market, Asian hedge funds provide a positive return, however small. In positive performing months of the market, hedge funds become more correlated with the market in order to take advantage of favourable market conditions. The same relationship is displayed in Figure 6 between Rvol and the market index. This is consistent with one's expectations of hedge funds, which promise to offer a positive return irrespective of market conditions.

Figure 5. Correlation between Raum and MSCI AC Asia Pacific

The figure plots the average returns of the constructed hedge fund index Raum and of the market index in negative, as well as positive performing months of the latter. It is evident that in market downturns, hedge funds manage to be uncorrelated with the market, and offer a positive return, however small. However, in market upturns, hedge funds manage to take advantage of the favourable market conditions. The graph suggests that the relationship between hedge funds and the market resembles buying a call option on the market index.

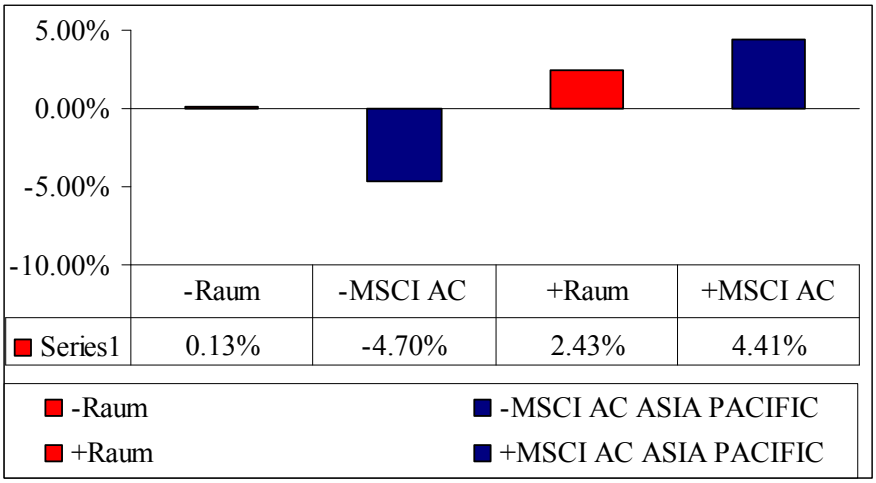
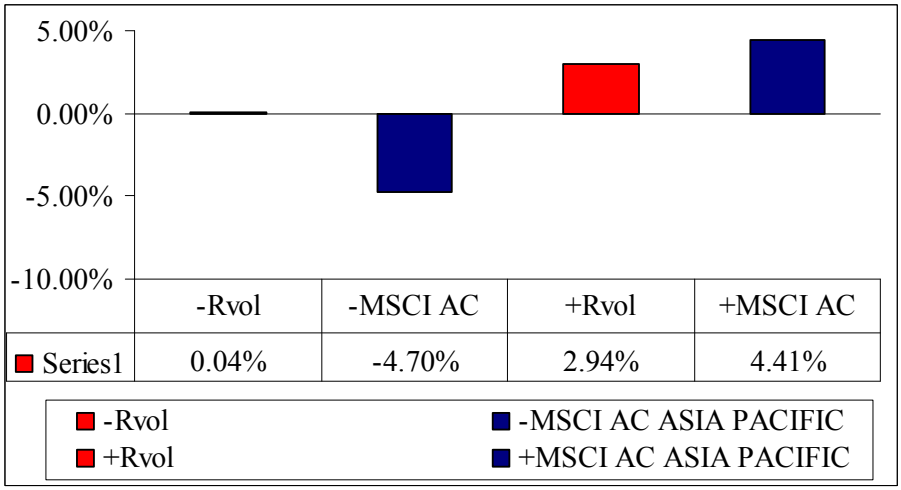


Figure 6. Correlation between Rvol and MSCI AC Asia Pacific

The Figure displays the same relationship between Rvol and the market index as Raum and the market index.



Analysing all figures from 3 to 6, one can observe the striking resemblance with the payoff of a long position in a call on the market index. It is therefore expected a priori to find a positive and significant relationship between at least one of the call strategies and Raum. The same is expected in the case of Rvol. Since there is a plethora of factors, out of which only some are relevant, a forward stepwise regression is implemented, in accordance with previous research papers. Thus, regressions are conducted on each of the factors individually, and the most important factor, the one that gives the highest adjusted R-squared[15], is selected. New regressions are ran, by pairing the most significant factor with each of the remaining factors and the best pair is kept. This continues until all significant factors are identified.

VI EMPIRICAL RESULTS

Table 2 presents the results of the stepwise regression for Raum. The Market Index is the first most significant factor, with an adjusted R-squared of 0.50. The Illiquidity Factor is the second most significant factor (the inclusion of the second factor boosts the adjusted R-squared to 0.58), followed by Leverage (adjusted R-squared becomes 0.62), Value (0.62) and Growth (0.63). The last significant factor is the deep out of the money call option, which increases the adjusted R-squared to 0.65, a quite satisfactory figure. The F-statistic shows that the regression is significant. All the coefficients in the regression, except for Value and Growth factors, are positive, suggesting that Asian hedge funds are long biased, given the significant positive exposure to the market, take illiquid positions and use leverage. Thus, the a priori expectations were upheld by these findings.

They seem to go short on both Growth and Value companies, a result inconsistent with previous empirical findings. The fact that one of the option strategies defined is included among the significant factors supports the theory that hedge funds have non-linear exposures and that simple calls and puts manage to capture such non-linearities. That this strategy is in fact a call strategy on the market index is in accordance with a priori expectations. All factors are significant at a 10% confidence level. The constant term, alpha, is found to be 0.4192%, or 0.11% after accounting for the survivorship bias estimated by Fung and Hsieh (2000). This seems to suggest that managers of hedge funds investing in Asia/Pacific possess the skill to generate extra return, as it fails to be explained entirely by the risk factors.

[15] Throughout the present paper, only the adjusted R-squared is used, as by adjusting for the degrees of freedom, allows comparisons between regressions.

Table 2. Forward stepwise regression of Raum

The letter "e" put in front of each factor signifies that all explanatory variables are in excess of the risk free rate. The Dcall factor is the deep out of the money call strategy constructed. The rest of the factors' names are eloquent.

Dependent Variable: **ERAUM**

Method: Least Squares

Sample(adjusted): 1997:02 2005:08

Included observations: 103 after adjusting endpoints

Newey-West HAC Standard Errors & Covariance (lag truncation=4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	**0.419238**	0.229665	1.825428	**0.0710**
EMKINDEX	**6.611981**	2.376386	2.782368	**0.0065**
EILLIQUIDITY	**0.058804**	0.031660	1.857388	**0.0663**
EMOMENTUM	**0.496498**	0.097767	5.078363	**0.0000**
EVALUE	**-3.322074**	1.222263	-2.717969	**0.0078**
EGROWTH	**-3.100960**	1.167854	-2.655263	**0.0093**
EDCALL	**0.007343**	0.003411	2.152946	**0.0338**

R-squared	0.671534	Mean dependent var	-2.225064
Adjusted R-squared	**0.651005**	S.D. dependent var	2.923320
S.E. of regression	1.726974	Akaike info criterion	3.996160
Sum squared resid	286.3141	Schwarz criterion	4.175219
Log likelihood	-198.8022	**F-statistic**	**32.71135**
Durbin-Watson stat	1.837570	**Prob(F-statistic)**	**0.000000**

The stepwise regression for Rvol is shown in Table 3. The first most significant factor is the Growth factor (adjusted R-squared is 0.50), followed by the Leverage factor (increasing the adjusted R-squared to 0.56), the deep out of the money call strategy (adjusted R-squared becomes 0.59), Illiquidity (0.61), Volatility factor (0.62), Value factor (0.63) and the Market Index (0.65). The null hypothesis that the Illiquidity factor is insignificant cannot be rejected, and thus the factor is removed from the regression. Adjusted R-squared drops to 0.64 and the F-statistic indicates that the regression is meaningful. The choice of the Volatility factor (which was not significant in the regression of Raum) as a significant factor comes as no surprise: by accounting for the volatility of hedge funds, it appears that their returns are negatively related to market volatility. This factor substitutes the Illiquidity factor found significant in the previous regression. The rest of the factors are identical with the ones found in the previous regression, and they display the same sign and approximately the same factor loadings. All variables are significant at a 10% confidence level. However, although the excess return attributable to manager's skill is highly significant (with p value is 0.18%), its value seems questionable. The value of 2.81%, from which the 0.30% survivorship bias estimated by Fung and Hsieh (2000) will be subtracted, is

indeed rather large when compared against the 0.4192% found in the case of Raum. Of course, such a value could also be explained by the inefficiencies present in the Asian markets, but one should be cautious on interpreting this result. The puzzle is that the two indices are rather similar, yet they considerably disagree on the value of alpha, although they find it significant.

Table 3. Forward stepwise regression of Rvol

Dependent Variable: **ERVOL**

Method: Least Squares

Sample: 1997:01 2005:08

Included observations: 104

Newey-West HAC Standard Errors & Covariance (lag truncation=4)

Variable	**Coefficient**	Std. Error	t-Statistic	**Prob.**
C	**2.818264**	0.876055	3.216993	**0.0018**
EGROWTH	**-4.158732**	1.11253	-3.738084	**0.0003**
ELEVERAGE	**0.986547**	0.172852	5.707455	**0**
EDCALL	**0.013122**	0.004576	2.867262	**0.0051**
EVOL	**-0.321298**	0.18376	-1.748469	**0.0835**
EVALUE	**-4.60405**	1.133966	-4.060128	**0.0001**
EMKINDEX	**8.92123**	2.234054	3.993292	**0.0001**
R-squared	0.661547	Mean dependent var		-1.975294
Adjusted R-squared	**0.640611**	S.D. dependent var		3.485217
S.E. of regression	2.089354	Akaike info criterion		4.376522
Sum squared resid	423.4437	Schwarz criterion		4.55451
Log likelihood	-220.5791	**F-statistic**		**31.59964**
Durbin-Watson stat	1.877093	**Prob(F-statistic)**		**0**

Table 4 examines a regression of Raum on the exact same factors found to explain Rvol. The sign and approximately the magnitude of the factors' coefficients remain unchanged. All factors are statistically significant at a 10% confidence level, and the adjusted R-squared decreases slightly to 0.62. The regression is still significant (as measured by the F-statistic) and alpha is measured as 1.81%. This is a major increase in the estimate of alpha, while all factors remain significant, and it shows how sensitive is the stepwise regression to small changes in the series.

Table 4. Regression of Raum on the same factors found to explain Rvol in the stepwise regression

By regressing Raum on the factors found to be significant for Rvol in the stepwise regression, one notices that the alpha estimate increases, while the factors are still significant at a 10% confidence level.

Dependent Variable: **ERAUM**

Method: Least Squares

Sample: 1997:01 2005:08

Included observations: 104

Newey-West HAC Standard Errors & Covariance (lag truncation=4)

Variable	**Coefficient**	Std. Error	t-Statistic	**Prob.**
C	**1.816102**	0.664434	2.733305	**0.0075**
EGROWTH	**-3.090081**	1.286987	-2.401019	**0.0183**
EMOMENTUM	**0.806972**	0.131274	6.147248	**0.0000**
EAGDCALL	**0.008701**	0.004259	2.042922	**0.0438**
EVOL	**-0.266953**	0.144600	-1.846146	**0.0679**
EVALUE	**-3.283319**	1.318055	-2.491034	**0.0144**
EMKINDEX	**6.547294**	2.592951	2.525036	**0.0132**
R-squared	0.642373	Mean dependent var		-2.192748
Adjusted R-squared	**0.620252**	S.D. dependent var		2.927703
S.E. of regression	1.804159	Akaike info criterion		4.083002
Sum squared resid	315.7341	Schwarz criterion		4.260990
Log likelihood	-205.3161	**F-statistic**		**29.03871**
Durbin-Watson stat	1.832755	**Prob(F-statistic)**		**0.000000**

Yet again, by performing a backward stepwise regression, the significant factors chosen for each index differ altogether, and so do the alpha estimates. For Raum, the factors Growth and Value are no longer found to be significant, and the alpha estimate, although has a similar magnitude with the one found in the forward stepwise regression (0.31%), is no longer significant. In the case of Rvol, the Value and the Market Index factors are no longer chosen as explanatory variables in the regression, and the sign of the Volatility factor is changed. The alpha estimate of 2.97% is significant and indeed comparable in size with the one obtained from the forward stepwise regression.

The results of the present paper can be compared against the ones obtained by Koh, Koh and Teo (2003), which investigate hedge funds investing in Asia/Pacific, too. The authors construct equally weighted portfolios of funds and regress their returns against the Asia ex Japan Stocks

Index[16], the Japan Stock index, a proxy for the Asian bond index, the US market factor, the Fama and French factors for Size and Book to Market and the Momentum Factor. The alpha of the spread between the highest and the lowest decile is calculated as 2.65% per month and is statistically significant. Although the present study contrasts Koh's (et. al.) in various aspects (in terms of how the hedge funds were weighted in the portfolio, and also because their study is based on a 3-year times span), the results obtained are comparable. However, their average adjusted R-squared is about 0.45, compared to the average R-squared of 0.62 obtained in the present study, which implies that this paper manages to better capture the risk factors of hedge funds. Their study also finds a positive exposure to the Asian equity market, which was identified in this study as well.

The study of Agarwal and Naik (2003) is based on US hedge funds. However, the methodology applied here follows closely the one presented in the above cited study, which will, for that reason, constitute grounds for comparison. The alpha estimate of 2.81% obtained in the case of Rvol is strikingly similar to the 2.80% obtained by Agarwal and Naik (2003). Their value represents the mean of positive alphas significantly different from the 0.30% monthly survivorship bias estimated by Fung and Hsieh (2000b). This was the case for 67 out of 155 hedge funds following the Hedge (Long Biased) strategy under investigation, which represents 43% of all cases.

Seeholzer (2004) performs his analysis in accordance with Agarwal and Naik (2003), while applying it to European hedge funds. He finds a significant alpha of 0.03%. Barclays Capital Equity Guilt Study[17] investigates the Long/Short Equity hedge funds in US and finds that only two factors, the Market Index and the Size factor, explain most of the variation in hedge fund returns (they find an adjusted R-squared of 0.77). Their annual alpha estimate is equal to 8.3%, which corresponds to a monthly estimate of about 0.69%, considerably smaller than the estimate obtained in this study for Rvol. All these studies, although focused on different markets, find on average that the alpha provided by hedge funds is positive and statistically significant.

VII CONCLUSIONS

The quest for the optimal mix between alpha and beta benefits in hedge fund returns translates into an issue of performance evaluation. Beta represents exposure to risk factors and consequently, is a measure of risk, while alpha is the excess return attributable to manager's skill. It is therefore clear that, from an investor's perspective, the optimal mix can be attained by the

[16] The authors state that their factors are approximated with indices obtained from Datastream. However, they give no indication as to which indices they select, or to how they proxy the Asian Bond Index.
[17] http://www.hedgeweek.com/SourceDocuments/Reports/4A5A5554-0F28-4D58-A87E-03450E683887.pdf

maximisation of alpha and the minimisation of beta. However, it is finding the best estimates[18] of alpha and beta that proves cumbersome. Various models attempt to find such estimates.

The model used in this project is the Asset Based Style Factor model, in light of its straightforward implementation. It also allows one to properly account for hedge funds' data characteristics, such as non-linearities. Thus, the identification of the risk factors for the Asian hedge funds employing a Long/Short Equity strategy became the raison d'etre of the present study. Two portfolios, or indices of hedge funds, were constructed by assigning different weights to the components of the same pool of hedge funds. A stepwise regression was performed for both indices in order to discover the corresponding risk factors, and the remainder is denoted as alpha. Although all calculations were performed in an identical manner, a slight discrepancy in the volatility of the two indices triggers the estimation of different alphas. In the case of Raum, the monthly alpha estimate was found to be 0.41%, while in the case of Rvol, almost seven times as much (2.81%). Even though the second estimate appeared implausible, it was found to be more in the line of the results obtained by another study on Asian markets.

Nevertheless, both alpha estimates were found to be positive and significant, in excess of the 0.30% monthly survivorship bias estimated by Fung and Hsieh (1997). The adjusted R-squared obtained in both cases is higher than the values obtained in other studies that serve as a ground for comparison. This shows that the model and the factors identified in the present study manage to adequately capture the risk exposure of hedge funds investing in Asia/Pacific. However, the model does not appear to be robust to the choice of calculation method for the hedge fund index. Perhaps one should not rely on indices, but use individual hedge funds. The caveats of stepwise regression should also be considered, as the results seem to be affected by the type of stepwise regression used, whether forward or backward.

In conclusion, the present study finds that excess return is indeed offered by hedge funds investing in Asia/Pacific, but that its exact magnitude is subject to debate. In addition, the source of alpha is again uncertain: whether it is due to manager skill indeed, or market inefficiencies. Further research can be employed in order to find better methods of assessing the beta estimate. In other words, an alternative to the method of stepwise regression might offer an avenue of research that can lead to more robust results.

[18] By best estimate it is meant the closest to the real value.

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APPENDIX: HEDGE FUND STRATEGIES

The **Equity Market Neutral** strategy uses long and short positions, just like the Long/Short equity strategy, but the idea is to keep market exposure to 0. This is achieved by matching the sensitivities of the stocks the manager went long on with the sensitivity of the stocks that the manager has shorted. In other words, the betas will be equal, and thus the overall portfolio will be beta neutral with respect to the market. The profits arise by going long the strong companies that seem to be undervalued and shorting the weak companies, that look overvalued, in other words, it is a strategy based on identifying market mispricings. This strategy, although seems rather similar to the long/short equity strategy is fundamentally different as it is non-directional.

Event driven hedge funds employ a non-directional strategy as they are indifferent to the general direction of the market. They are only *driven* by corporate specific *events* such as mergers and acquisitions, hostile takeovers, share buybacks, leveraged buyouts, reorganisations or even significant transaction events. The manager of this type of fund will not only short or long equities, but also include derivatives in his portfolio in order to hedge against interest rate or market risk (for example, the manager could write a put option on an index, which is in effect a form of insurance against market risk).

There are various forms of strategies that employ arbitrage as main tool: Convertible Arbitrage, Fixed Income Arbitrage, Risk Arbitrage and Statistical Arbitrage:

Convertible Arbitrage involves buying convertible securities and short selling the underlying common stock, thus achieving a hedge. This strategy is based on the idea that the convertible is mispriced relative to the stock. However, the great popularity of this strategy led to narrowing of such arbitrage opportunities.

Fixed Income Arbitrage relies upon pricing inefficiencies between fixed income instruments. The scope of the strategy is to achieve low or even zero exposure to interest rate risk

Risk Arbitrage or **Merger Arbitrage** can be considered an arbitrage strategy, but it may just as well be considered an event driven strategy. It is an event driven strategy as the investment decision is triggered by events such as mergers, leveraged buyouts and hostile takeovers. Usually, prior to a merger, the shares of the targeted company appreciate, while the shares of the acquirer depreciate. Thus, an *arbitrage* opportunity arises by buying the shares of the targeted company and shorting the shares of the targeted company. Upon completion of the merger, the shares of the targeted company will be converted into shares of the acquirer, after which the arbitrageur delivers the converted stock into the short position to complete the arbitrage. However, the

position is also risky, and hence the name of Risk Arbitrage**.** Risks involve the deal being delayed or not being completed at all.

Statistical Arbitrage makes reference to a statistical metric, which is the expected value of assets. If the price of the asset differs from its expected value, then the asset is considered to be mispriced and consequently triggers arbitrage opportunities.

Emerging Markets hedge funds are primarily long investments in emerging markets. They are long as, most of the times, short selling is not allowed in these countries. The risk of the strategy is rather high, as emerging countries are characterized by high inflation and volatility.

Macro strategy is a directional one, as it is a function of macroeconomic changes. It entails making bets on changes in interest rates, as well as in stocks, bonds and commodities prices. It is not restricted to any markets and the use of leverage and derivatives is meant to enhance profits. Among all these, there are also funds of hedge funds that seek further diversification.